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Dear TestAS candidate,

You have decided to study in Germany. You are considering which path of study would be the right one for you and how you can make the best of your academic training by studying at a German university.

This process involves important decisions about your future: which subject would you like to study and which university should you choose?

With our brochure, we would like to provide you with advice to help you optimise this process.TestAS can help you and the German universities to make the right choice.

Aptitude tests like the Test for Academic Studies - TestAS - in combination with the marks attained in your university entrance examination allow a particularly precise prediction about your chances of success as a student. This is the reason why many German universities are already implementing TestAS as an objective, reliable and standardised aptitude test in their selection and admission of foreign students.

In those countries where Academic Evaluation Centres (APS) have already been installed - such as in The People's Republic of China or in Vietnam - TestAS is part of the APS procedure. Specially gifted students having a good command of German who can apply for the PASCH programme in many countries via the German Academic Exchange Service (DAAD), also take TestAS.

In this brochure you will find sample questions from the so-called Core Test, which every applicant has to complete, and further tasks from all Subject-Specific Modules of which one module has to be selected according to your chosen field of study.

You will find a lot of helpful tips on how to proceed when solving the tasks. With good results you will increase your chances of getting an attractive ofer from a university that suits your personal goals and interests.

The DAAD has consigned the ITB Consulting GmbH in Bonn with the development of TestAS and the Society for Academic Study Preparation and Test Development (Gesellschaft für Akademische Studienvorbereitung und Testentwicklung e. V., g.a.s.t.), the TestDaF-Institut, with the worldwide organisation of the test.

Many of you will already be familiar with g.a.s.t. from the Test of German as a Foreign Language (TestDaF) and the TestDaF-Institut. Among others, the portfolio of ITB comprises the Test for Medical Studies (TMS), the TM WISO and the Self-Application Test of the German National Academic Foundation. You may be assured that TestAS will determine your aptitude and competence in an objective, reliable and fair manner.

We do ask you to take the preparation for the test very seriously in order to give yourself the optimum chance of proving your real capabilities. On behalf of the TestAS team we hope you will obtain the university place you are aiming for and furthermore, we wish you success in your studies and hope you will be able to enjoy and profit greatly from studying in Germany.

We wish you great success!

Prof. Dr. Günter Trost
ITB Consulting GmbH

Dr. Hans-Joachim Althaus
g.a.s.t. / TestDaF-Institut

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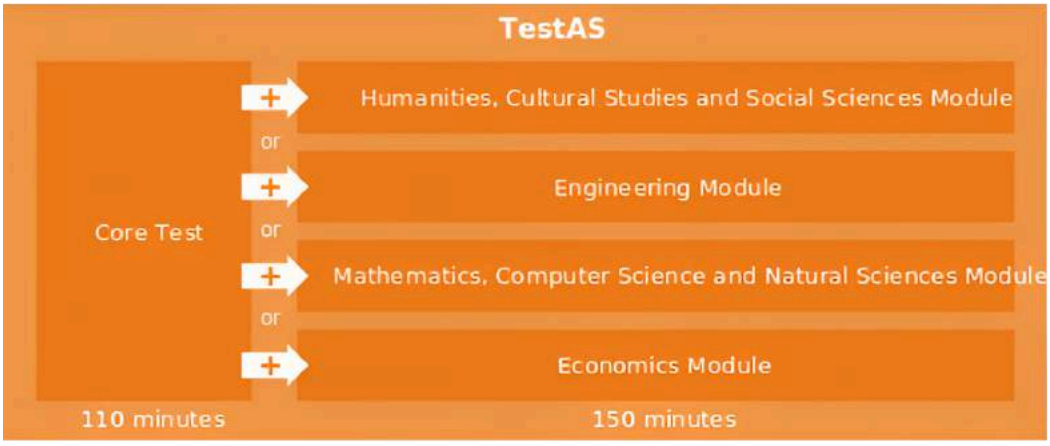
Why should I take TestAS?

TestAS is the most important aptitude test for foreign applicants wishing to study in Germany. TestAS analyses skills necessary for successful studies, e.g. logical thought processes, recognising structures or solving problems. German universities use the TestAS certificate in order to select and admit suitable students for their courses. TestAS increases your chances of obtaining a university place in Germany.

How is TestAS structured?

TestAS is offered both in English and German. When registering you select either the language you are better at or the one the university requires.



The Core Test assesses skills necessary for successful studies in all subjects.

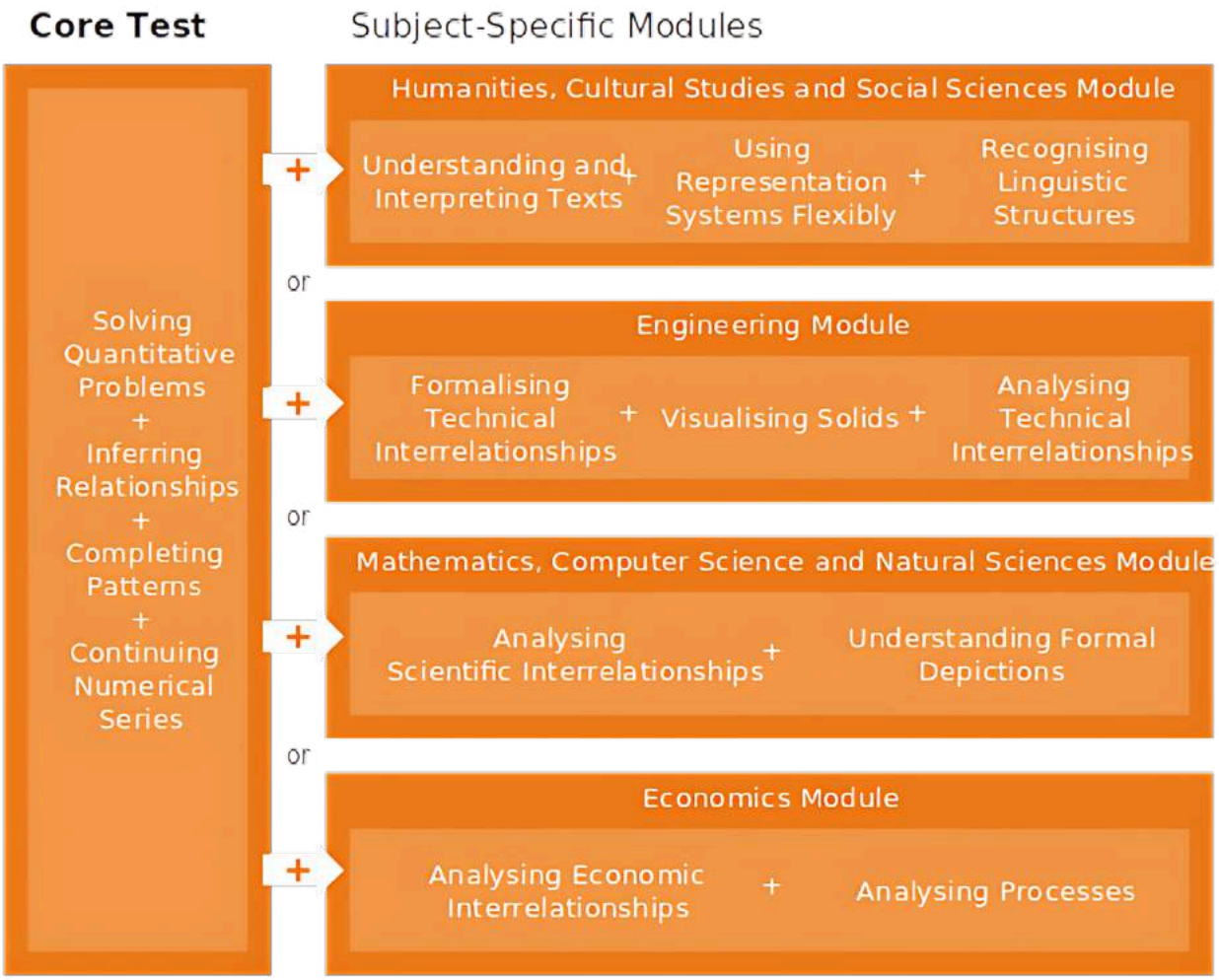
Subsequently you work through the Subject-Specific Module which analyses skills you will need in typical situations in your particular field of study.

The university you have decided to study at will determine which Subject-Specific Module you will be required to take according to your chosen course of studies.
Below you will find some examples of which courses may well suit which Subject-Specific Module.

Humanities, Cultural Studies and Social Sciences	**Engineering**	Mathematics, **Computer Science** and Natural Sciences	**Economics**
German language and literature	Mechanical Engineering	Mathematics	Business Economics
Linguistics	Electrical Engineering	Chemistry	Political Economics
Sociology	Mechatronics	Physics	Management
Politics	Civil Engineering	Computer Science	Business Management
Philosophy	Automotive Engineering	Psychology	Education Management
Historical Science	Environmental Engineering	Pharmacology	Energy and Water Management
Law	Chemical Engineering	Medicine	

Which tasks will I have to solve?

In the Core Test, as well as in the Subject-Specific Module, you will be required to solve two to four different subtests. You will find these subtests in the table below. You will find more detailed information for each subtest (What is it about? How many tasks are there?)at the beginning of each subtest in this brochure.



In both the Core Test and the Subject-Specific Module you will be answering multiple-choice questions only.

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Tips on how to proceed

Organise your working time well:

- **Work quickly but take care.**
  It is very important to read the tasks through carefully. If you read too quickly and hence not thoroughly enough, then you will miss important information.

- **Work through the questions in the given order.**
  The first tasks in any group tend to be easier than later ones. That is why we would suggest that you work through the booklet in the given order. But:

- **If a particular question is too difficult for you, then come back to it later.**
  It is better to use your time on tasks you find easier. On average, test takers solve about half of the tasks.

- **If you are solving mathematical problems, try to find your own solution first.**
  Then check if your answer is among those in the multiple-choice. If you look at the choices first, it may lead to confusion. If you are not able to find a solution, then try to exclude the answers which are most likely going to be false.

- **If you have very little time left...**
  You do not get minus points if the answer is wrong. Enter all solutions onto your answer sheet.

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Sample questions
Core Test

Everyone has to do the Core Test and it has to be completed first.

The Core Test is divided in four different subtests. You have a total of 110 minutes to solve the tasks. In the table below you can see how many tasks there are in each subtest and how much time is allowed.

To prepare for this, there are six tasks to solve for each subtest on the following pages. The tasks at the beginning are easier than those at the end. At the beginning of each subtest there is a short explanation about the type of the tasks, together with instructions on how to solve the tasks.

You can find the solutions starting at page 53.

Subtest	**Amount of tasks**	Time allowed
Solving Quantitative Problems	22	45 minutes
Inferring Relationships	22	10 minutes
Completing Patterns	22	20 minutes + 5 minutes to read instructions
Continuing Numerical Series	22	25 minutes + 5 minutes to read instructions
Total working time		**110 minutes**

Sample questions

Economics Module

The Economics Module is divided in two different subtests. You have a total of 150 minutes to solve the tasks. In the table below you can see how many tasks there are in each subtest and how much time is allowed.

To prepare for this, there are six tasks to solve for each subtest on the following pages. The tasks at the beginning are easier than those at the end. At the beginning of each subtest there is a short explanation about the type of the tasks, together with instructions on how to solve the tasks.

You can find the solutions starting at page 53.

Subtest	Amount of tasks	Time allowed
Analysing Economic Interrelationships	22	65 minutes
Analysing Processes	22	85 minutes
Total working time		**150 minutes**

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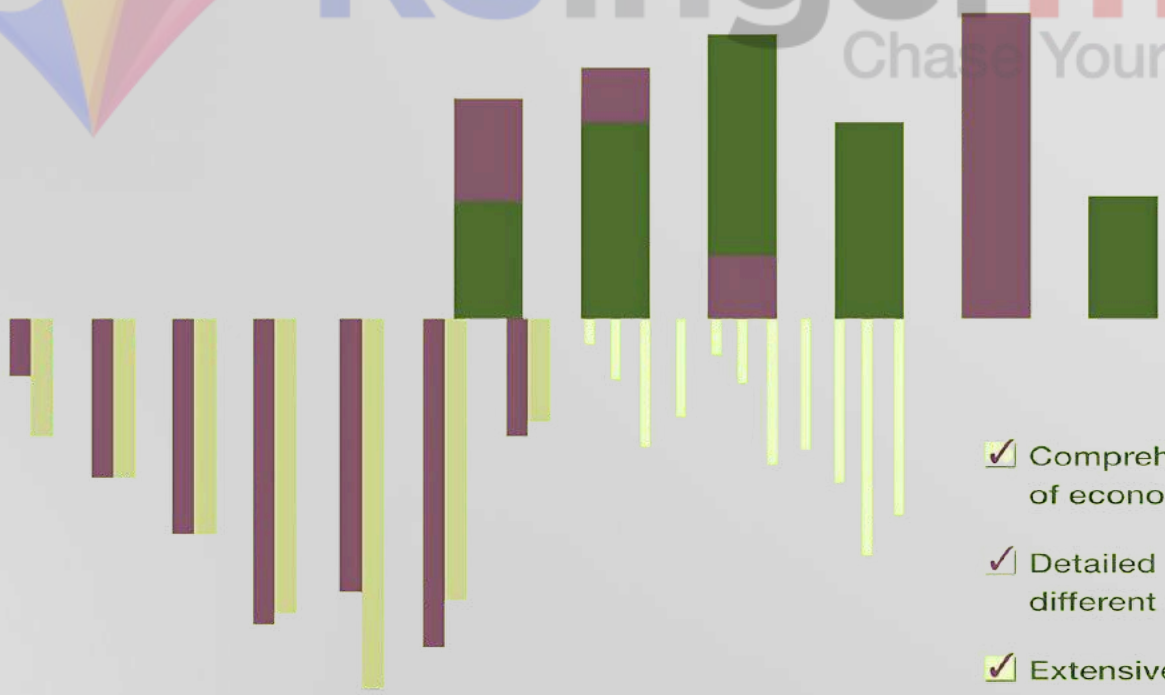
1. Preparation Book for the

TestAS

Economics

Analyzing Economic Interrelationships

2022



- ✓ Comprehensive explanation of economic diagrams
- ✓ Detailed descriptions of the different types of graphics
- ✓ Extensive collection of questions with easy to understand solutions

1. Preparation Book for the TestAS Economics: Analyzing Economic Interrelationships

PREFACE

Attending university in Germany is an appealing option for many students from outside of the European Union. Germany has countless universities, many of which are recognized on an international level for their excellence. According to the “Times World University Ranking”, 31 of the world’s 300 best universities are inGermany. As such, a Bachelor’s or Master’s degree from Germany can open the door to a variety of exciting career opportunities, both within Germany and worldwide. The multitude of programs offered in English, as well as the numerous funding options for international students, make studying in Germany feasible for students from abroad. What’s more, studying in Germany is also quite affordable: Most universities don’t have tuition fees for non-EU citizens. Therefore, it is no surprise that an ever-rising number of non-EU applicants seek admission to German universities. As a result, the application pool is more competitive than ever, and German universities have raised the difficulty of their admissions criteria for non-EU applicants.

Many foreign applicants find it difficult to be accepted at a German university. In most cases, the main problem is not a poor performance of the applicant, but rather the complicated application process itself. In Germany, there is a decentralized application system for most programs. This means that each university has its own application process and thus places different requirements on the applicants.

The TestAS is a standardized exam for high-school graduates from countries outside of the European Union who hope to study at a German university. The test is offered by the Society for Academic Study Preparation and Test Development and is optional to applicants. The TestAS aims to measure cognitive and intellectual capabilities and has been used since 2007 as an aid for the application process to German universities. The test may be taken in German, English, and, in some cases, Arabic.

Competitive scores on the TestAS put applicants at an advantage when applying to many universities. Participating universities use TestAS scores to evaluate the academic aptitude of potential students. As such, a favorable test score can greatly increase an applicant's chances of being admitted to their desired university and course of study. Good scores are also indicative that a student is likely to succeed in their studies.

The TestAS consists of two sections: the Core Test and a subject module. We offer three preparation books for the Core Test and two for the subject module Economics, each of which explains how to complete the different subtests. The third book for the subject module is a test simulation with which you can practice the exam in one go.

In this book, the subtest “Analysing Economic Interrelationships” from the Economics module is explained. You will find detailed explanations as well as further tips on preparing for your exam. There are two complete practice exams and detailed solutions to each question.

All preparation books are available in German and English on Amazon as a printed book or Kindle eBook. On our homepage www.testasprep.com you will find a lot of useful information about the exam. Furthermore, on www.edulink.thinkific.com we offer video courses that can be used in addition to the books.

We wish you success during your preparations and on the exam!

Best regards,
Your rsingermany Team

1. ABOUT THE ECONOMICS MODULE

INTRODUCTION

The TestAS exam consists of two parts:

- Core test (110 minutes) to assess the skills necessary for a successful study in all university subjects, and
- a subject specific module (145-150 minutes), which depends on the field of study you have chosen

The “Economics“ module is relevant for students who want to study an economic or social science subject in the future. The university where you apply decides which subject module you need for your application. In the case of the following subjects, the “Economics” module is typically required:

- Business (German: Betriebswirtschaftslehre)
- Economics (German: Volkswirtschaftslehre)
- Management

If you are unsure which subject specific module is suitable for you, we advise contacting the university of which you wish to apply to. For example, the industrial engineering curriculum consists partly of business and economics, but many universities require the TestAS results for the “Engineering” module when applying for industrial engineering program.

The subject module “Economics“ consists of two subtests:

- Analysing Economic Interrelationships (22 questions; 65 minutes)
- Analysing Processes (22 questions; 65 minutes)

We will cover the second part in a separate book. This part is mainly about being able to evaluate different diagrams. According to the manufactures of the TestAS, in depth knowledge of the subject area is not necessary.

General Tips:

1. Familiarize yourself with the different types of questions and answers several weeks before the test day.

- The subtests "Analysing Scientific Interrelationships " and "Understanding Formal Depictions " take some getting used to. In addition, the answer sheet and correction format on the answer sheet is different from common multiple choice exams.

2. Solve all questions in this book without a calculator or dictionary.

- As you will not have access to aids during the exam, it is best to prepare for the exam with the same conditions as the day you will take the exam.

3. Answer our practice questions under real test conditions (without distractions) and pay attention to the time constraints.

- The test is long and many students report difficulty concentrating towards the end. In order to build your stamina and train your concentration skills, you should practice by repeatedly simulating the conditions of the exam. We strongly recommend you practice with a timer; during this period, remove any distractions while solving our practice questions. These tips should help you identfy common careless mistakes and limit them on test day.

4. You should begin preparing for the exam several weeks in advance.

- You will be able to successfully monitor your own progress and readiness if you complete the exercises conscientiously and without outside or inadmissible help.

HOW TO GUESS?

Answer all questions – if you get stuck on one, guess after eliminating the obviously wrong answer choices. There is no penalty for incorrect answers.

We recommend the following approach to increase your likelihood of answering all questions and guessing effectively.

STEP 1: Answer the questions that you are familiar with first.

On the first pass, focus on those questions and skip questions that seem to require more thinking or that you need to read two or three times before you understand.

Circle questions that you skip so that you may easily identify them later on.

STEP 2: Use the process of elimination wherever possible.

Once you have gone through all the questions, go back to the ones that you skipped earlier. This two-round strategy might boost your self-confidence as you will see that – despite the skipped questions– you can still solve many questions correctly.

Use the process of elimination to rule out answer options that you know or believe are wrong. Mark these ruled-out answers clearly on the question sheet by crossing them out.

STEP 3: Determine which letter you picked the least so far and use that one as your “letter-of-the-day”.

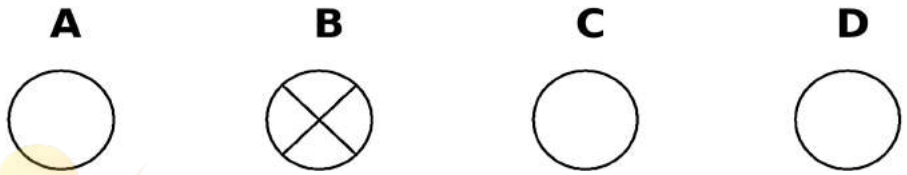
Determine which of the letters (A to D) you have selected the least on your answer sheet so far in that section. This will then be your “letter-of-the-day” (in past years, each of the four answer letters were, more or less, equally correct on the exam). Use that letter each time you guess (unless you have already eliminated this option). This will increase the likelihood of answering more questions correctly.

Skip step 2 if you are running out of time so that you have at least one answer marked for every question on the answer sheet.

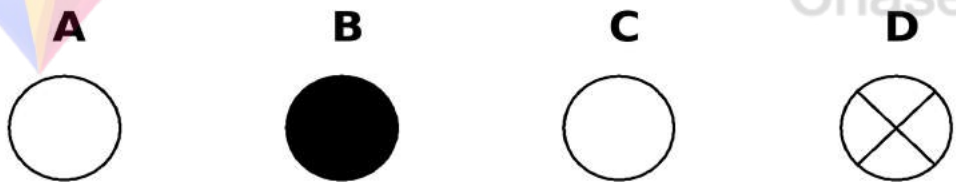
HOW DO I ENTER MY ANSWERS ON THE ANSWER SHEET?

The questions of the core test and the subject-specific test modules are presented in a small exercise book. There is a separate answer sheet on which the answers must be marked with a ballpoint pen. Answers marked within the exercise book are not checked.

You must use a ballpoint pen with blue or black ink to select the answers. Do not use pencil. The selected answer must be markedwith an X. In the example below, answer choice B has been selected.



In case you need to change an answer that you already marked, fill in the entire wrong circle and put an X in your new answer choice. In the example below, D is marked.



In the unlikely event that you would like to change your answer again, fill in the wrong circles and cross the correct answer. In the example below, C is marked.

If you change your mind again and you would like to re-enter an answer which you have already crossed out, you need to fill in the

wrong circles and manually write the correct letter (A, B, C, D) at the end of the answer row. In the example below, B is marked.

Take note that the answer sheets are evaluated by a computer, not a human, once the exam is finished. Because of this, we recommend that you try to avoid making multiple changes to your answer sheet.

Make sure that you have entered all answers in the answer sheet before the time runs out. After the end of the subtest, you will begin working on the next section and cannot return to the previous section. Remember that only the markings on the answer sheet, not the exercise book, will be counted in your exam score.

If you have difficulty with a specific question, do not spend too much time dwelling on it. Instead, use the process of elimination and try to guess. You are not penalized for wrong answers, so it is better to guess than to leave a question blank.

USEFUL TIPS FOR THE EXAM DAY

The test will take more than five hours. Make sure to bring adequate food and drinks to have enough energy for the duration of the test.

It is very important to get sufficient sleep the night before the exam. This may sound obvious, but it is certainly necessary as you will have to remain focused for several hours.

2. ANALYZING ECONOMIC INTERRELATIONSHIPS

WHAT ARE THEY TESTING IN THIS SECTION?

In the Economics module, the exam section “Analysing Economic Interrelationships” tests your ability to:

- analyse various quantitative tables, graphics and diagrams,
- check information and processes for correctness,
- distinguish between relevant and unimportant information,
- perform simple arithmetic calculations without a calculator,
- draw conclusions based on the information provided.

You do not need to know any specific economic terms or have extensive knowledge in the field of economics. Please keep in mind that the test institute is aware that most participants are high school students. Therefore, most tasks only require that you have basic secondary school mathematical knowledge, good language skills, and the ability to interpret facts.

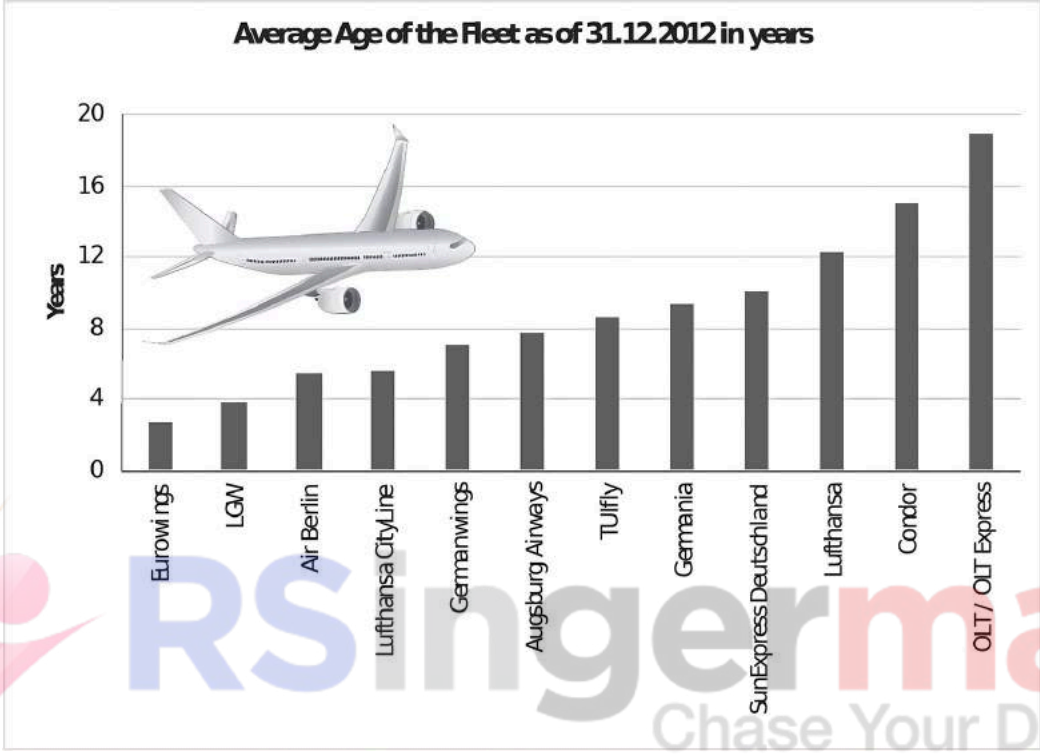
In this preparation book you will also find a summary of the most important terms and topics of this section. If test questions require prior knowledge, which is rarely the case, these questions will be explained in detail and the necessary information will be provided. Solving the exercises in this book will prepare you well for this part of the exam.

Each question contains a graphic or table and two statements that refer to the illustration.

Now, let’s look at what a task in the “Analysing Economic Interrelationships” section might look like.

EXAMPLE

This bar chart shows the average age of airplanes from select German airlines in the year 2012.



Source: Deutsches Zentrum für Luft- und Raumfahrt e.V., Durchschnittsalter der Flugzeugflotten ausgewählter deutscher Luftverkehrsunternehmen zum 31.12.2012, http://www.dlr.de/fw/Portaldata/42/Resources/dokumente/pdf/LVB2012.pdf, Accessed 25.01.2019

Which of the following statements is or are correct?

I. Based on the chart, the following sequence is in decreasing order for the average age of airplane fleets: Condor, Lufthansa, SunExpress Deutschland, Germania, Augsburg Airways, TUIfly and Germanwings.

II. Eurowings has the newest and Condor has the second oldest airplane fleet (= all the airplanes owned by an airline) from the airlines presented.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: TUIfly needs to come before Augsburg Airways in the list.
Statement I is not correct

Statement II: The average age of the airplanes from Eurowings is the lowest with its 2.7 years. The airplanes from Condor are, on average, 15 years old, which makes them the second oldest fleet. Thus, statement II is correct.

It is important that you evaluate both statements separately from each another. After you have made your decision as to whether statement I and II are true or false, simply select the corresponding possible answer (A, B, C or D).

TIPS FOR SUCCESS

There are several tips which you should take into consideration when preparing for the test day.

1.

- **Read the corresponding statements carefully before you start to analyse the illustration in detail.** Many diagrams are complex, but the question may be referring to just one part of the diagram. Take the time to read the statements carefully before analyzing the illustration.

2.

- **Become well familiarized with important terminology and concepts (e.g. quarterly invoices).** Within this guide, you will find complex terms and topics with which students typically struggle.

3.

- **Trust the numbers and not the visual illustration.** Always take a close look at the values found within the illustration. Some illustrations are intentionally confusing. A bar chart can optically communicate that a number is doubled, whereas in reality the increase is minor. Only by reading the values closely can we see how drastic the change really is.

4.

- **Become familiar with various types of diagrams, tables and graphs.** Once you know how to read various graphs, you can confidently focus on the calculations found in the exam.

5.

- **"Don't know" means "statement incorrect".** In some questions you will not have enough data to determine whether a statement is correct or not. In such cases, the statement is considered wrong.

6.

- **Always check which units you are dealing with and pay attention to the correct unit when answering!** For example: cm, m, cent and percent.

7.

- **Think about whether you have to calculate a real difference or a percentage difference.** Many students mistake what the diagram is displaying (e.g. percentages) for what is being asked (e.g. the real difference between numbers).

8.

- **If you do not make any headway with a question, eliminate those answers which are obviously incorrect, guess, and move on to the next question.** You have 24 questions and 40 minutes time, i.e. less than 2 minutes per question. This might sound like a lot. However, many questions are calculation-intensive, so 2 minutes can go by fast. If you do not make any headway with a question within one minute 's time, then make an educated guess and move on to the next question.

9.

- **Use your common sense to determine whether or not an answer makes any sense.** If a diagram looks like the price for bananas has doubled in three years' time, then take a closer look at the axis values. It could be that the diagram shows only the price increase as a percentage.

Last but not least, we would like to give you two pieces of advice:

- Solve our questions without a calculator so you can learn how to calculate quickly and error-free, as you will be required to on the test day.

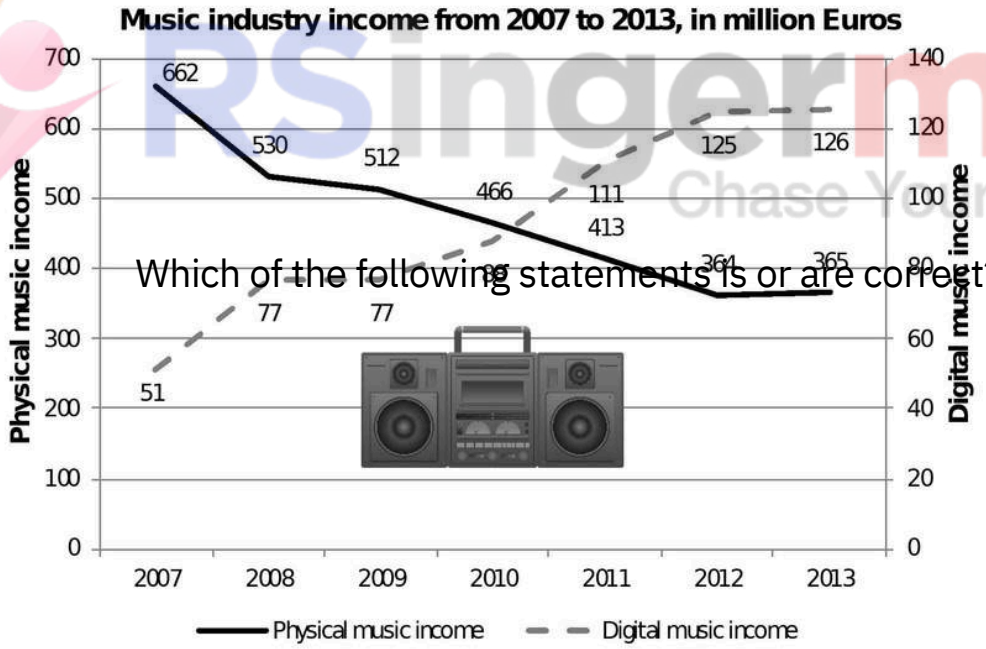
- Especially if the test language is not your first language, read as much as possible in the test language. It does not matter if you are reading non-fiction, newspapers or school books. Your language skills and your vocabulary will greatly influence your test result. On this test in particular, there are many lengthy questions. It is important to be able to quickly read through these questions and identify the important parts.

WHAT MAKES UP A DIAGRAM?

Using the following example, we will show you how a diagram is structured and what components make up the illustration as a whole. At first glance, the diagram below might seem confusing as it has many different lines and numbers. But, within this chapter, we will explain how to quickly recognize and decode the components of each diagram. Once you get the hang of reading such diagrams, you will have more confidence to answer the corresponding questions in the exam.

EXAMPLE

The line chart shows the income of the music industry within the country of XYZ over the last seven years. The income display is in millions of Euros.



Source: The Statistics Portal

Which of the following statements is or are correct?

Which of the following statements is or are correct?

I. The percentage change of the physical music income was larger in 2008 and smaller in 2013 (both in comparison to the previous years).

II. The physical music income change was purely negative from 2007 to 2013.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: In 2008, the physical music industry shows the largest reduction in income, with a reduction of almost 20% when compared to 2007. The income change in 2013 was the smallest. Thus, statement I is correct.

Statement II: In all of the years from 2007 to 2012, the income for physical music decreased; from 2012 to 2013, it increased slightly. Thus, statement II is not correct.

THE HEADER

The header briefly explains the content of the diagram. It helps the reader determine the topic of the diagram and the information that it is presenting. It can be creative or simple. It should clearly explain what the diagram is about. The header of this diagram identifies the content as the income of the music industry between the years of 2007 and 2013.

THE LEGEND

The legend explains what the entries within the diagram mean. It does not matter if they are lines, numbers or shaded areas. Just like the legend of a map, a legend helps readers understand what the individual pieces of information mean.

The legend here says that the solid line expresses the income of the physical music industry (audio media, CDs, etc.) and the dotted line is the income of the digital music industry.

THE DATA

The most important part of the diagram is, of course, the information or data which it contains. Within this example, two sets of data are presented, namely the physical and the digital music income. Thanks to the data labels, we can read the different values.

THE GRIDLINES

If we do not have any data labels or a data table within the diagram, we can use the gridlines to precisely or roughly determine the height of the columns or the length of the bars. The gridlines within this example show a spacing of 100 units, or 100 million Euros.

THE Y-AXIS

Within a line chart, the y-axis runs vertically (from top to bottom). Typically, you will find numbers or entries pertaining to facts which are measured. The y-axis normally begins with 0 and can be divided into any number of sections.

Within this example, the left y-axis expresses the physical music income (in million €).

THE X-AXIS

Within a line chart, the x-axis runs horizontally (from left to right). Typically, you will find quantity entries, for example: various time entries, year numbers, or facts which can be compared to one another.

In this example diagram, the x-axis expresses the years from 2007 to 2013.

THE SECOND Y-AXIS

Some diagrams do not just have the standard left y-axis, but also a second y-axis which you will always find on the right-hand side, if one exists. In the music income example shown above, this is the case. The second y-axis is used when, for example, two situations which have different values are to be compared with one another. Within the example, these are the physical and digital music incomes. Since the digital income is much lower than the physical income, the values for the digital income are marked on a second y- axis. This provides for a more even scaling and the ability to observe the relationship between both lines, one for each type of income, despite the large difference in their overall magnitudes.

THE SOURCE

The source explains where the information within the diagram comes from. Indicating the source is important for copyright reasons and is done out of respect for the person who collected the data.

In this example, the source informs us that the information originates from the “The Statistics Portal”.

TYPES OF VISUALS IN THE EXAM

Our ability to notice patterns from visual information is a powerful tool for understanding and interpreting data. By depicting information graphically, using tables and diagrams, it is often much easier to observe trends and make comparisons between data that might otherwise be difficult to understand through the use of words or numbers alone.

The following display formats are commonly found in the examination. Unless otherwise indicated, all charts are represented on a linear scale.

TABLE

A table is a summarized overview of various data. The table consists of a horizontal “row” and a vertical “column”. The boxes in which data are found, as seen in the following example, are called “cells”. Data in a table almost always have a relationship to one another and are displayed in this form for a clear overview and comparison purposes.

EXAMPLE

This table shows the top 5 countries with the highest expenses for healthcare and the corresponding life expectancy of the population.

Country	Country’s expenses for healthcare per person (€)	Healthcare expenses in % of the gross domestic product per person	Life expectancy (years)
USA	8,000€	17%	78
Norway	5,500€	10%	81

Country	Country's expenses for healthcare per person (€)	Healthcare expenses in % of the gross domestic product per person	Life expectancy (years)
Switzerland	5,500€	12%	82
Netherlands	5,000€	12%	81
Luxembourg	5,000€	8%	81

Which of the following statements is or are correct?

I. Norway and Luxemburg have the highest gross domestic product per person.

II. The US has the highest healthcare expenses on a per capita basis and as a percentage of the gross domestic product per person.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: C

Statement I:

USA: 8,000 ÷ 17 × 100 ≈ 47,059

Norway: 5,500 ÷ 10 × 100 = 55,000

Switzerland: 5,500 ÷ 12 × 100 = 45,833

Netherlands: 5,000 ÷ 12 × 100 = 41,667

Luxemburg: 5,000 ÷ 8 × 100 = 62,500.

Statement I is correct.

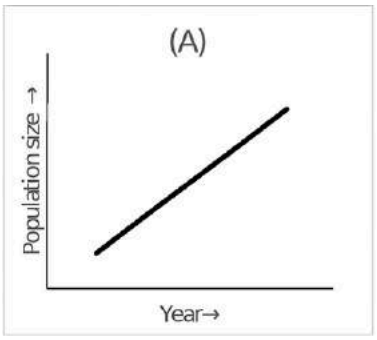
Statement II: The US indeed has the highest healthcare expenditure per person, both in absolute terms and as a percentage of the GDP per capita. Statement II is correct as well.

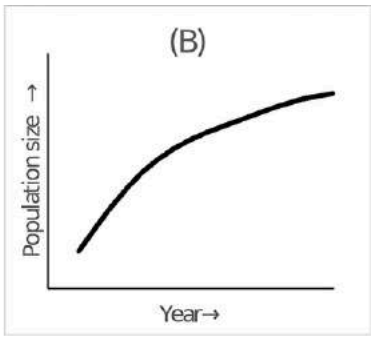
EXAMPLE

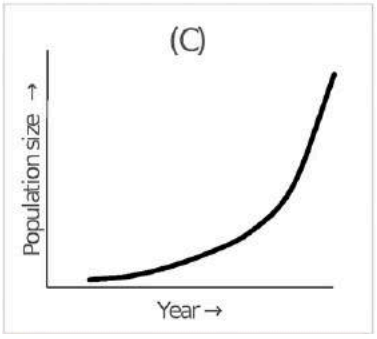
Below you will see a data table for a rabbit population, collected over a time period of several years.

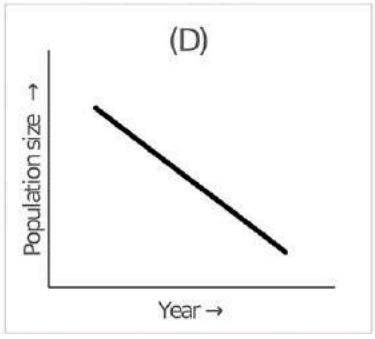
Year	Number of Rabbits
1	4
2	17
3	62
4	245

Which of the following graphs best describes the rabbit population data?









Answer: C

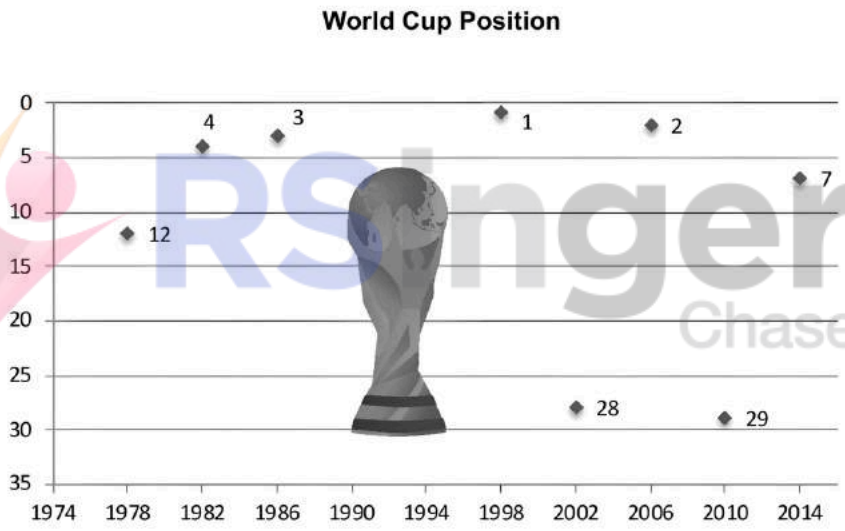
The rabbit population increases every year by a larger number (e.g., year 1 to 2 = 13, year 2 to 3 = 45), which is best expressed by C.When looking at the table, you can see that there is exponential growth (this means an uneven and growing increase), as opposed to a linear (this means an increase in constant magnitude) as in answerchoice A, or a flattening growth as in answer choice B.

SCATTER CHART

A scatter chart, also called scatter plot or scatter graph, presents specific results or features for two independent situations. This way, the development of a specific aspect can be displayed graphically and values can be compared. Another type of a scatter chart is the bubble chart. We will take a closer look at this type later.

EXAMPLE

The following chart shows France's positions in the last ten FIFA Football World Cup games, which takes place every four years. If in a given year there is no number shown, this indicates that France did not qualify for the World Cup in that particular year.



Source: Wikipedia: Die Ergebnisse der französischen Nationalmannschaft bei den Fußballweltmeisterschaften von 1974 bis 2014, http://en.wikipedia.org/wiki/France_at_the_FIFA_World_Cup, Accessed: 25.01.2016

Which of the following statements is or are correct?

I. The French national football team was among the top 3 in 2006 and 1986 and won the World Cup in 1998.

II. The French national football team was not able to qualify for the World Cup in 1990 and in 1994. However, the team was able to make it to the quarter finals in 2010, 2002 and 1978. The quarter finals are carried out between the 8 leading teams.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: France made second place in 2006, won in 1998 and was third in 1986. Thus, statement I is correct.

Statement II: The French national football team did not qualify in 1990 and in 1994. However, the team did not make it to the quarter finals (top 8 teams) in 2010, 2002 and 1978. Therefore, statement II is not correct.

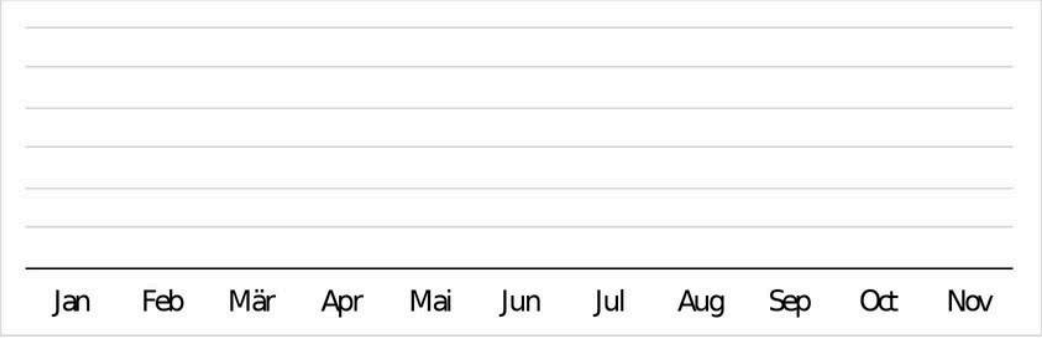
LINE CHART

The line chart shows a tendency, a process or a trend (e.g. as a function of time). It is often used to observe development processes within a timeframe.

EXAMPLE

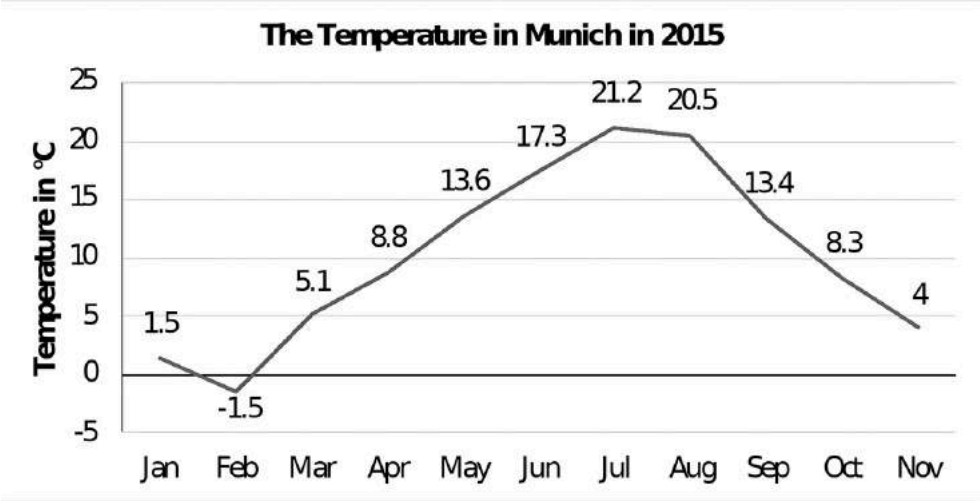
The following table shows the average temperature in Munich in Celsius for the various months of 2015.

Month	Temperature in °C		Month	Temperature in °C
January	1.5		July	21.2
February	-1.5		August	20.5
March	5.1		September	13.4
April	8.8		October	8.3
May	13.6		November	4
June	17.3			



Answer:

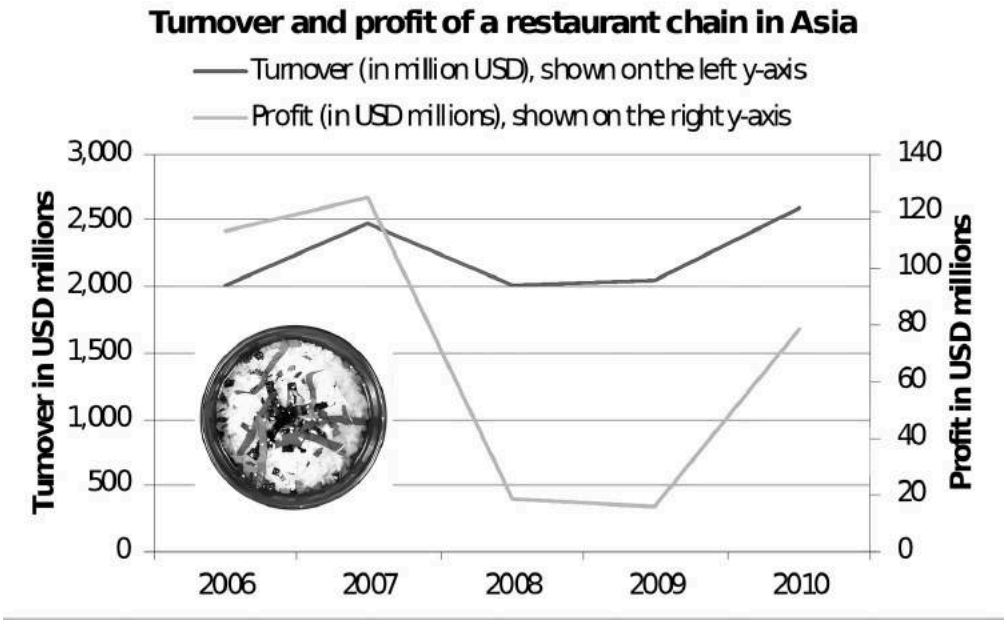
The following line chart shows the data from this table.



Source: Monats- und Jahreswerte für München, http://www.wetterkontor.de/de/wetter/deutschland/monatswerte-station.asp?id=10870, Accessed 01.12.2018.

EXAMPLE

The following graphic shows the turnover and profit (after taxes) of a fast food restaurant chain in Asia.



Which of the following statements is or are correct?

I. The greatest change to the fast food turnover was seen between 2009 and 2010, while the greatest change to the profit was recorded between 2006 and 2007 (both compared to the previous fiscal year).

II. Profit and turnover increased continuously every fiscal year between 2008, 2009 and 2010.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: D

Statement I: The first part of statement I pertaining to the greatest change of turnover in 2010 is true. The second part, however, is false. The largest change to profit was seen between 2007 and 2008. Thus, the statement is not correct.

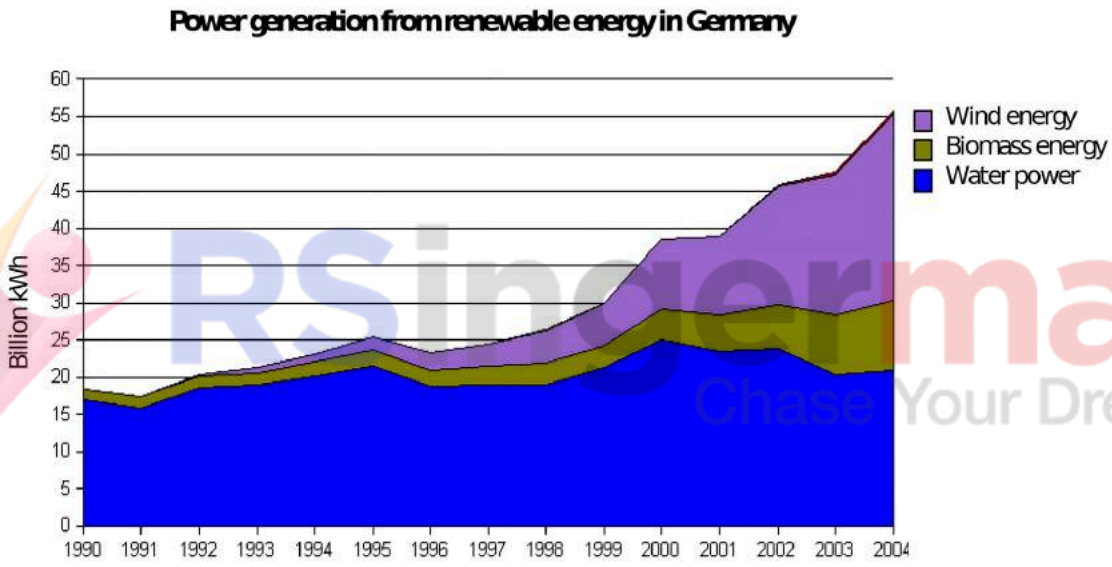
Statement II: Even though the turnover figures between 2008, 2009 and 2010 increased, profit did not increase between 2008 and 2009, but instead decreased slightly. Therefore, statement II is not correct either.

AREA DIAGRAM / MARIMEKKO

The area diagram is a version of the curve diagram in which lines are stacked upon each other. The areas between the lines add up to a total value which is expressed by the top most line.

EXAMPLE

In the following diagram, you can see the portions of renewable energy which make up Germany's power supply.



Source: Angaben des Wochenberichts des DIW Berlin, Nr. 29/2005; http://wikis.zum.de/dsb/Datei:Stromerzeugung_Erneuerbar_brutto_Deutschalnd.png, Accessed: 31.1.2019

Which of the following statements is or are correct?

I. In 1999, Germany's entire power supply was 30 billion kilowatt hours (kWh).

II. Between 2002 and 2003, 45-50 billion kWh of electricity from the entire power supply was produced by renewable energy.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: Within the diagram, the entire power supply for Germany is not displayed, but just the amount which was produced by renewable energy. This amount was indeed 30 billion kWh in 1999. However, the entire power supply was more than 550 terawatt hours (1 billion kWH = 1 TWh), which is much higher. Since this information is not given in the graphic, statement I is not correct.

Statement II: The title of the diagram makes it clear that only the power supply produced by renewable energy is being displayed and not the entire power supply of Germany. Indeed, 45-50 billion kWh were produced and we know from the title that this amount is only a portion of the entire power supply of Germany, which is not displayed within the diagram. Thus, Statement II is correct.

COLUMN CHART

The column chart helps to show size relationships which can be displayed in comparison to each other. Information is displayed in vertical bars. With column charts, the length of a bar clearly expresses the size of a number.

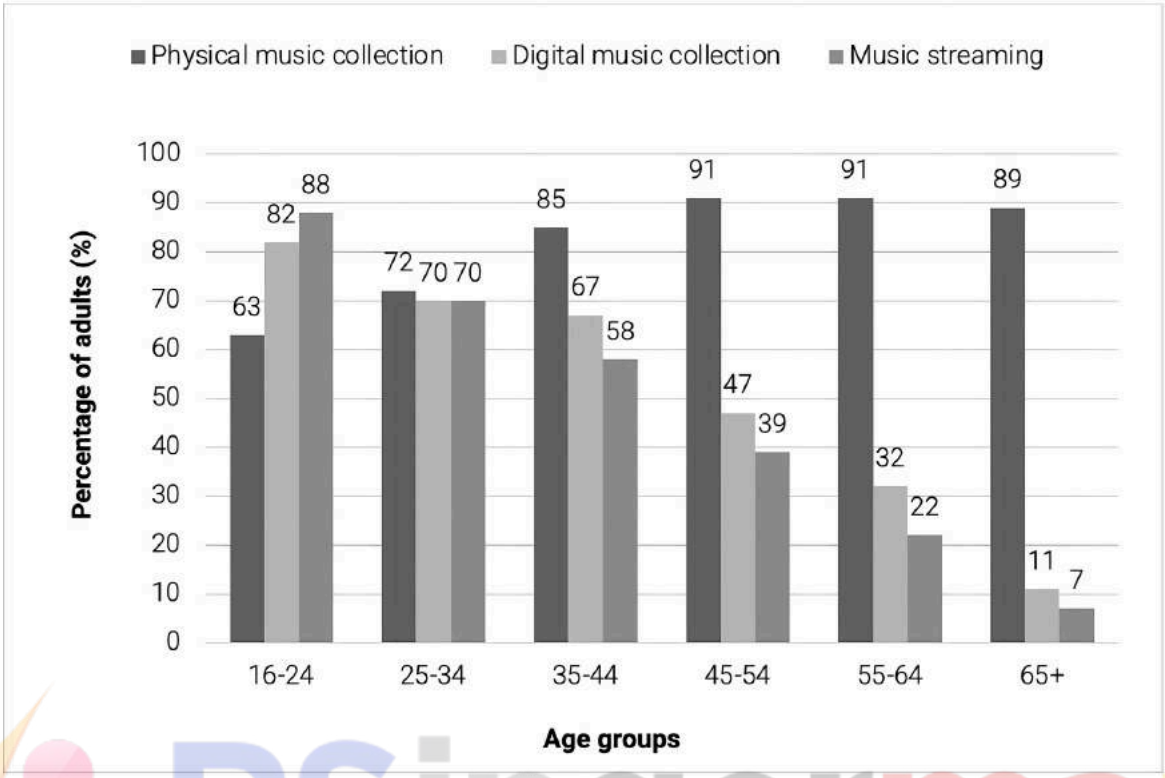
EXAMPLE

The following table shows how various age groups access music. As a basis for this research, the usage behavior of 2,026 adults (defined as people over 16 years of age) from the United Kingdom is analysed. Physical music includes records, cassettes and CDs.

	Use of sources for accessing music		
	Physical music collection	Digital music collection	Music streaming
Age groups			
16-24 years old	63	82	88
25-34 years old	72	70	70
35-44 years old	85	67	58
45-54 years old	91	47	39
55-64 years old	91	32	22
≥ 65 years old	89	11	7

Source: Kantar Media Omnibus 2014

Below the data is displayed in the form of a column chart.



Source: Kantar Media Omnibus 2014

Answer the following questions in order to test your understanding.

- What is depicted by the light grey column? Which age group(s)
- access more music through a physical music collection than a digital music collection or music streaming?
- Which age groups use a physical music collection more than a digital music collection and music streaming combined?
- Which age groups use a digital music collection more than music streaming?
- Which age group above 24 years of age uses music streaming the most?
- A music streaming provider wants to target the age group which has the greatest number of people using music streaming. Which group would this be?

Answers:

- *Light grey shows the percentage of people who use a digital music collection. For example, 82% of the 16-24-year-old participants use a digital music collection. Within the participants who are 65 years old, this percentage is, as to be expected, much lower: 11%.*
- *All age groups, except the 16-24 years old group, use the physical music collection more than the digital music collection and music*

  streaming. For the age group 25-34, the difference is not very big (72% physical music collection vs. 70% digital music collection and music streaming). The oldest participants, however, seem to prefer
- *CDs, cassettes, and records.*
- *45-54, 55-64 and 65+.*
- *35-44, 45-54, 55-64 and 65+.*
- *25-34-year-old participants.*

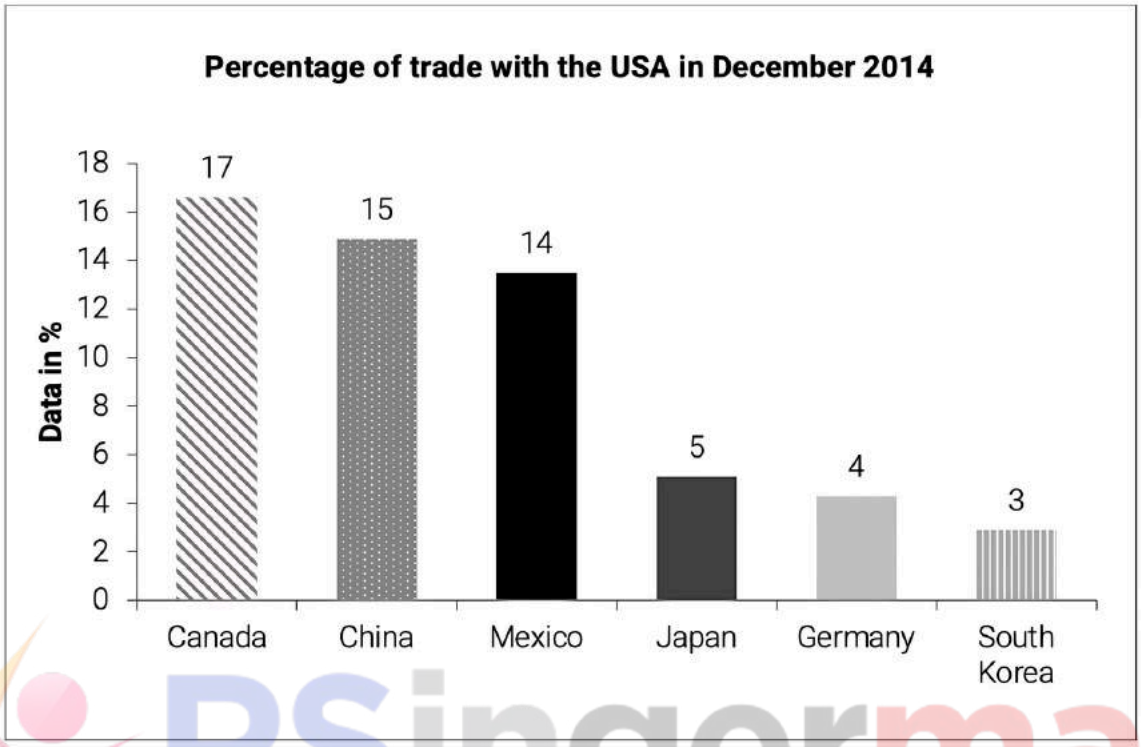
We do not have the necessary data in order to answer this question. We know that 2,026 people took part in the study. However, we do not know how many people are in each age group. It could be, for example, that only 10 participants are younger than
25 years old. In this case, it would not be a good idea to use the 16-24 years old group as the target group. We could have answered the question with the "16-24 age group" if
the question would have been phrased as follows: Let us assume that each age group contains the same number of participants.

Such questions do appear within the test in order to test students overall understanding of what is being asked.

EXAMPLE

This column chart shows the top 6 countries which traded with the USA in December 2014. The net amount traded with the American

government was $3,969 billion.



Source: Year-to-Total Trade, U.S. Census Bureau, December 12, 2015, http://www.census.gov/foreign-trade/statistics/highlights/toppartners.html, Accessed: 25.01.2019

Which of the following statements is or are correct?

I. Trade between the USA and Canada, China, and Mexico in December 2014 was $675 billion, $553 billion, and $558 billion, respectively.

II. According to the chart, China and Canada were responsible for the highest imports, with $467 billion and $346 billion each.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: D

Statement I: The corresponding trade figures are true for Canada, but not for Mexico and China. Within the chart, China has a higher percentage than Mexico. However, in the answer the total amount is lower, which is, of course, impossible. You could calculate the trade figures using the net trade mentioned in the question. Statement I is not correct.

Statement II: There is not enough data to calculate China's and Mexico's imports, respectively. Thus, statement II is not correct.

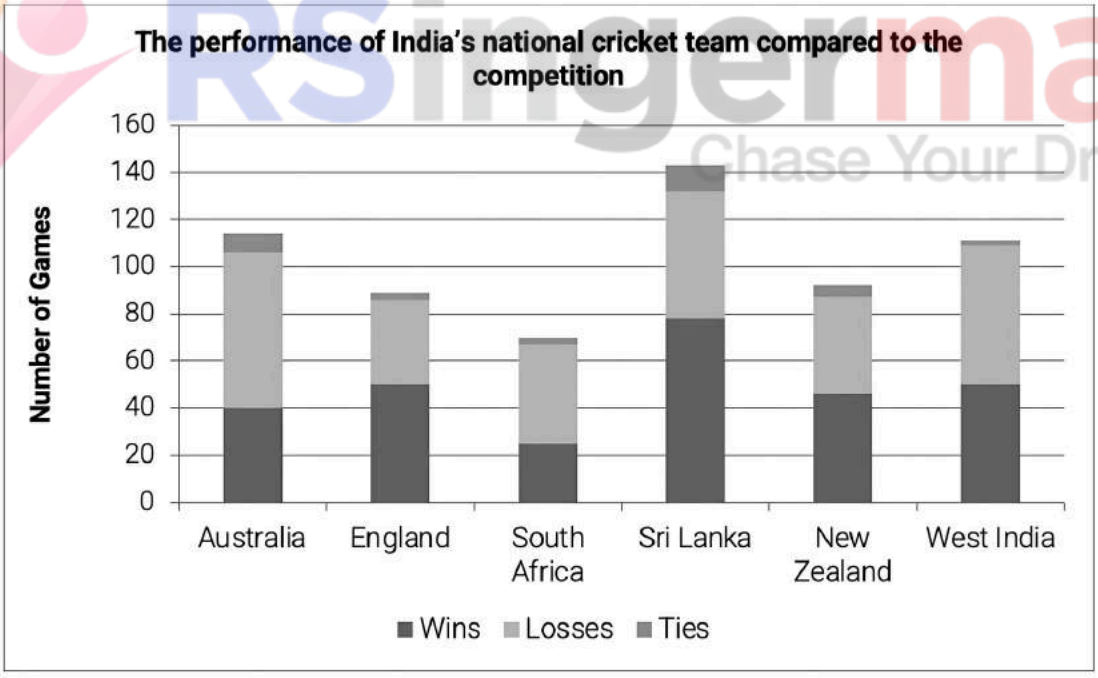
STACKED COLUMN CHART

Have a look at the column chart below. Do you notice a difference between it and a regular column chart?

If there are multiple pieces of data which are relevant to each data row, they can be stacked upon each other to form a column. Columns are created from the stacking of such segments. When columns are made up of stacked segments of corresponding data, the diagram is called a stacked column chart.

EXAMPLE

The following graph represents the performance of India's national cricket team compared to that of other countries within one year's time.



Which of the following statements is or are correct?

I. The cricket teams from Australia, South Africa, West India and England have a positive track record against India's cricket team.

II. According to the chart, India's cricket team won more games against England than they did against Australia.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

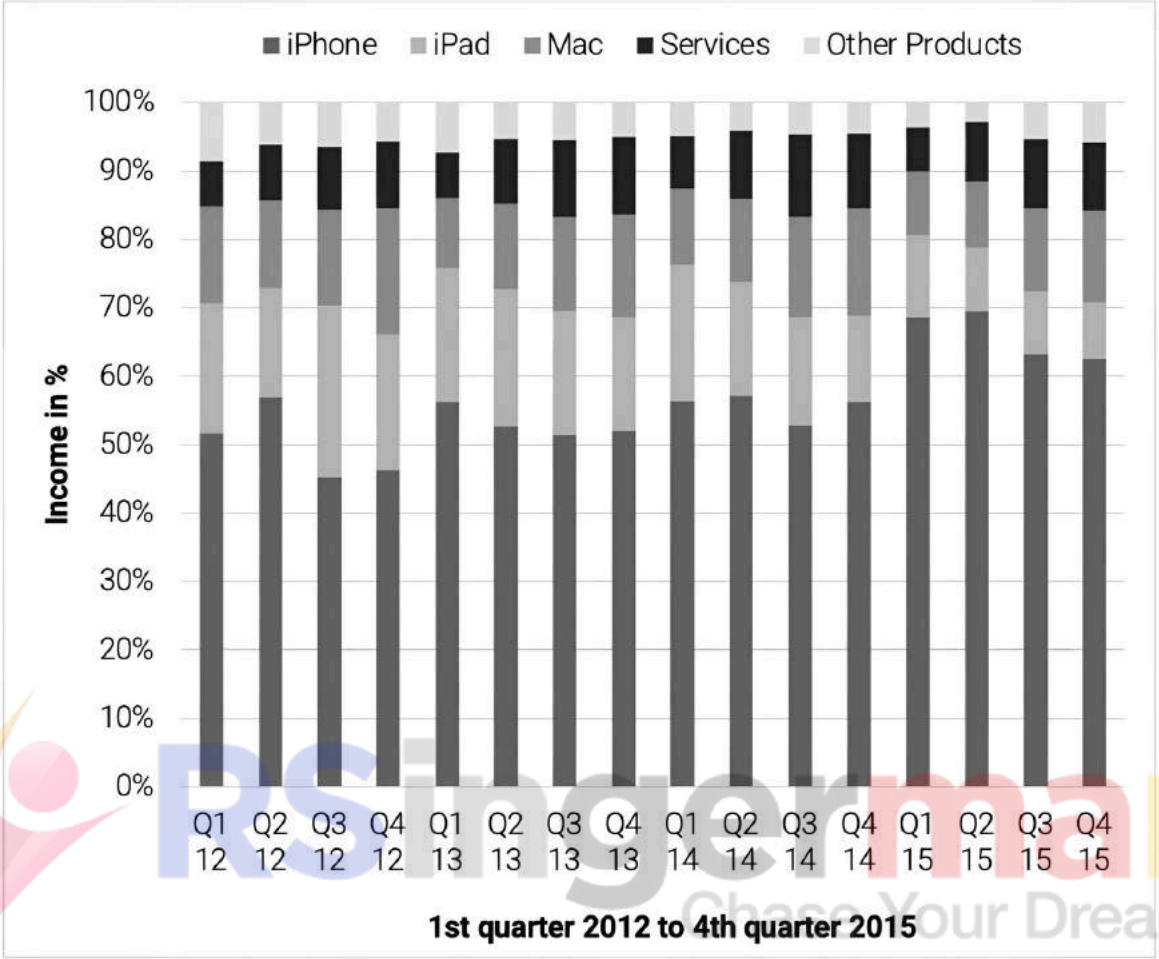
Statement I: One look at this diagram and we can see that Australia, South Africa and West India have a positive track record against India; the grey area (representing times India lost to this team) is larger than the darker area for wins and ties. England, however, does not have a positive record, with India's national cricket team winning approximately 55% of the time against England. Statement I, therefore, is incorrect.

Statement II: The number of games won can be seen by comparing the darkest areas. India won approximately 40 games against Australia and approximately 50 games against England. Statement II is correct.

If percentages are displayed within a stacked column chart, the individual sections of each bar add up to a value of 100%.

EXAMPLE

The following chart shows the income of Apple, Inc. quarterly between 2012 and 2015.



Source: Apple Website (http://investor.apple.com/results.cfm), Accessed 25.01.2019

Which of the following statements is or are correct?
I The diagram shows that in the second quarter of 2013 and the fourth quarter of 2013, roughly the same number of iPhones were sold.

II. According to the diagram, in the first quarter of 2015, a higher income was recorded compared to the fourth quarter of 2014 and the third quarter of 2014 together.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: D

Statement I: In order to validate this statement, we need two additional pieces of information: The average price of iPhones from both quarters, and the entire turnover within these quarters. Due to the lack of information, Statement I is not correct.

Statement II: This chart does not give us any information about the total income amount. We only know how the income is divided per product category. It could be, for example, that Apple's turnover doubled in 2015 compared to the previous year. Due to the lack of information, the statement is unclear. Statement II is not correct.

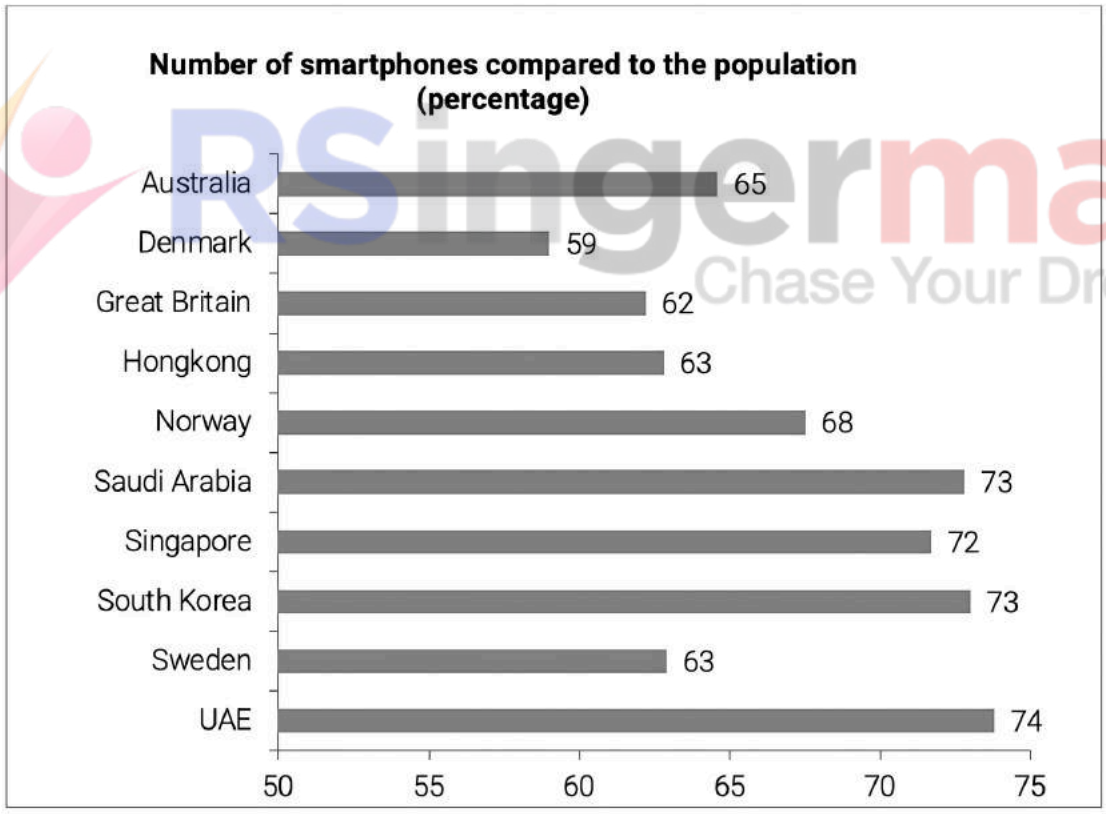
Please note: The answer to statements I and II should actually be "one does not know". In cases where there is insufficient data to evaluate the statement, the statement is considered false.

BAR CHART

The bar chart expresses information using horizontally positioned bars. The bar chart is a column chart which has been rotated by 90°. Within the bar chart, the various data (amount, percentages) are easily compared. Similarities, differences and, in simple cases, even trends can be displayed.

EXAMPLE

This bar chart shows the top 10 countries with the highest smartphone saturation, meaning how many inhabitants possess a smartphone.



Source: Garcia, N.: Top countries with most smartphones users in the world, 25.10.2014, Our Mobile Planet by Google, http://zeendo.com/info/top-countries-with-most-smartphones-users-in-the-world/, Accessed 25.01.2019

Which of the following statements is or are correct?

I. The United Arab Emirates, Norway, Singapore, South Korea and Australia have a higher smartphone saturation than Hongkong, Sweden, Great Britain and Denmark.

II. Norway, Sweden, Great Britain and Denmark all have a comparatively high saturation among the age group of 25-30 years.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: The first group of countries listed represents the top countries with the highest saturation; each of these countries has a higher saturation compared to each of the countries in the second group. The longer the length of the bar, the higher the smartphone saturation. Statement I is, therefore, correct.

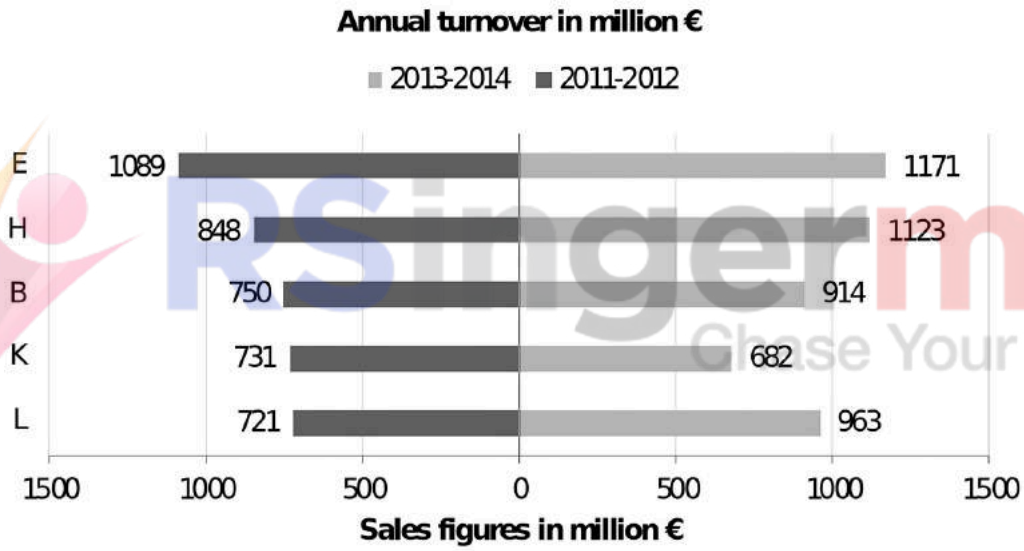
Statement II: There is not enough information to determine the smartphone saturation among the age group of 25-30 years. Thus, statement II is not correct.

DOUBLE BAR CHART

The double bar chart is generally the same as a normal bar chart, just with two sets of data side by side. The double usage of bars (for example, one bar to the right, one to the left and both from a zero point) function to clearly display related information and/or to be able to compare two different values.

EXAMPLE

This chart shows the annual turnover of five companies for the years 2011-2012 and 2013-2014. The sales figures are in million Euros.



Which of the following statements is or are correct?

I. L and H are the two companies with the largest differences between the annual turnovers of both time periods.

II. The combined annual turnover of the five companies changed more than 5% between the two time periods (2011-2012 and 2013-2014).

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: C

Statement I: The difference between the annual turnovers is the largest for companies L and H. The difference is 242 million € (25%) and 275 million € (24%), respectively. Statement I is correct.

Statement II: After we have taken a look at the differences between the annual turnovers of E and K, we now know that the difference is less than 10%. The calculation of the annual turnover for all five companies between the years 2011 and 2012:
721 + 1,089 + 731 + 750 + 848 = 4,139 million €.

The calculation of the annual turnover for all five companies between the years 2013 and 2014:
963 + 1,171 + 682 + 914 + 1,123 = 4,853 million €. The calculation of the percentage difference between the first and second annual turnover:
(4,853 – 4,139) ÷ 4,139 = 17%.

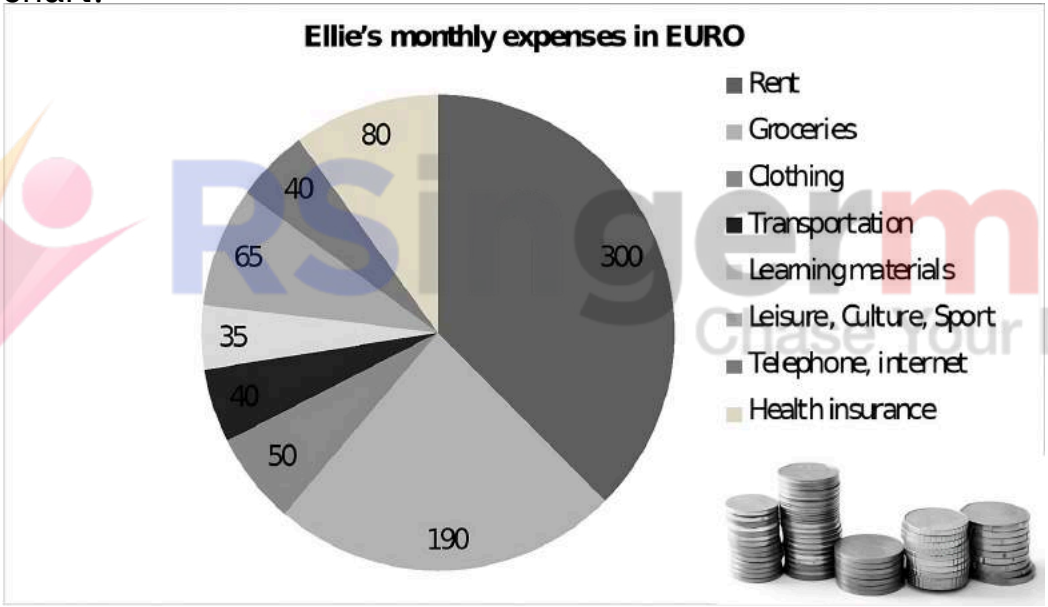
Statement II is correct also.

PIE CHART

The pie chart expresses the proportions of an entirety. It is used to display the portions of a group. It is especially useful when comparing quantities.

EXAMPLE

Ellie started her bachelor studies just a couple of months ago. She no longer lives with her parents, and her expenses are high. In order to gain control over her expenses, she has listed all of her expenses for one month, which are presented in the following pie chart:



Please answer the following questions:

- What expense consumes the largest part of her income?
- What expense consumes the smallest part of her income?
- How much does she spend per month?
- What percentage of her expenses is spent on rent?
- What percentage of her expenses is spent on transportation, telephone and internet?

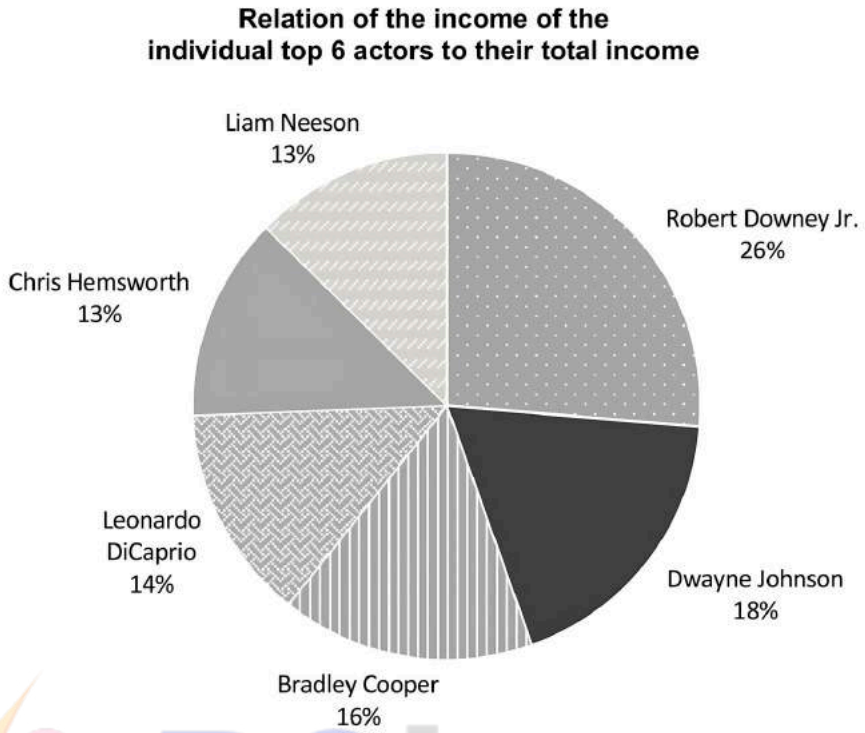
- This month, Ellie makes a one-time purchase of 400 € for a new mobile phone. Let us assume that all of her other expenses remain the same and that she has no additional expenses. What percentage of her expenses did she use to purchase the new phone?

Answers:

- *Rent Learning materials 300 + 190 + 50 + 40 + 35 + 65 + 40 + 80 =*
- *800 € 300 ÷ 800 = 37.5% (40 + 40) ÷ 800 = 10% 400 ÷ (400 + 800) =*
- *33% (This gives us the ratio of the mobile*
- *phone expense to total expenditure. She typically spends 800 €*
- *monthly, as we know from step 3. In this particular month, her*
- *total*
- *expanses have an additional 400 € due to the mobile phone purchase.)*

EXAMPLE

This pie chart shows the top 6 best paid Hollywood actors of 2014. The total income of all of these actors was $285 million that year.



Source: Hollywood's Highest Paid Actors 2014, http://www.forbes.com/pictures/mfl45ekhem/the-highest-paid-actors/T, Accessed 30.01.2019

Which of the following statements is or are correct?

I. The average income of the top 3 best paid actors including Robert Downey, Jr., Dwayne Johnson and Bradley Cooper is $57 million.

II. Robert Downey Jr. earned twice as much as Leonardo DiCaprio in 2014.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: You can calculate the net income of each celebrity using his income percentage and the gross income of all of the celebrities. The average income of these actors is $57 million. The calculation resembles the following: (0.16 + 0.18 + 0.26) ÷ 3 = 0.20;

0.20 × 285 million = 57 million. Thus, statement I is correct.

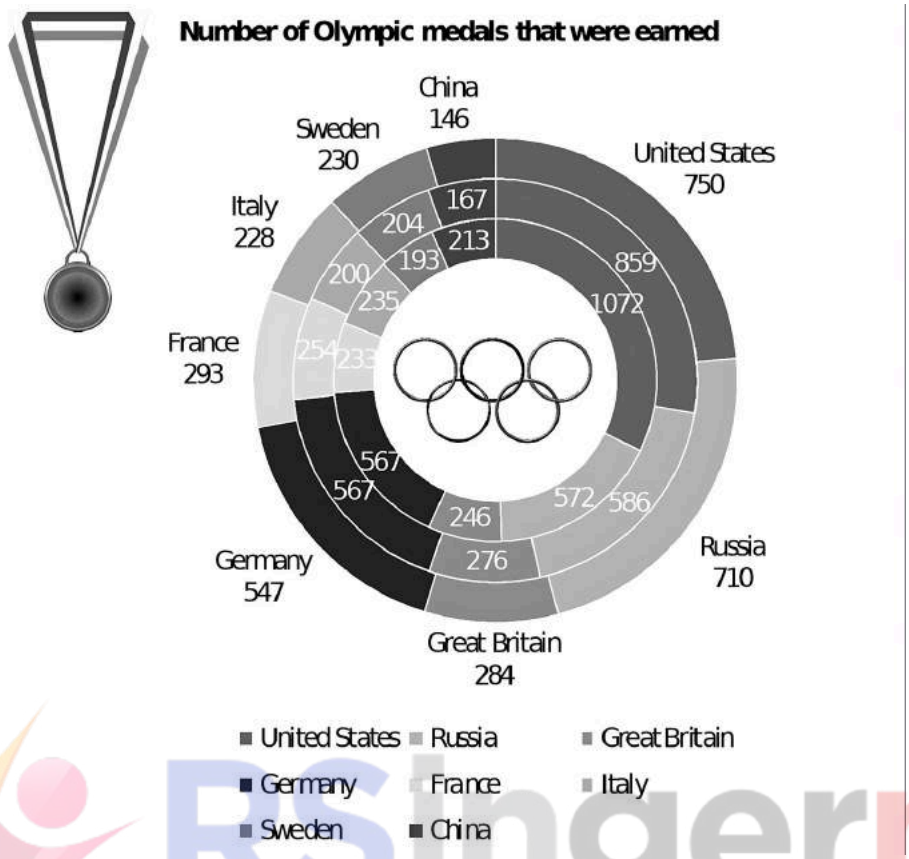
Statement II: Robert Downey Jr. did not earn twice as much as Leonardo DiCaprio, which can clearly be seen within the pie chart. You can see that Robert Downey Jr.'s income is not double that of Leonardo DiCaprio by looking at the percentage distribution (26% versus 14%). A double income would be 28% versus 14%. Therefore, statement II is not correct.

DOUGHNUT CHART

A doughnut chart is a special kind of pie chart. It is specifically used to express percentages of an entirety. The individual segments which each represent a specific percentage together make up a whole. The advantage of a doughnut chart over a pie chart is that many different situations can be compared with one another. The doughnut hole often contains an explanatory comment.

EXAMPLE

The doughnut chart below shows the total number of Olympic medals earned by eight different nations. The three doughnuts represent the bronze medals (inner doughnut), silver medals (middle doughnut) and gold medals (outer doughnut). The corresponding numbers for the gold medals are next to the name of the nationality outside of the doughnut.



Source: All times Olympic games medal table, https://en.wikipedia.org/wiki/All-time_Olympic_Games_medal_table, Accessed 28.01.2019

Footnote: Russia includes both the Soviet Union as well as the Russian Federation.

Which of the following statements is or are correct?

I. The United States won more gold medals than Russia because more American sportsmen and women took part in the Olympic Games than Russian sportsmen and women.

II. Sweden won the fewest number of bronze medals of all countries listed.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: It is true that the United States won more gold medals than Russia. However, we cannot determine whether or not more American sportsmen and women took part than Russian sportsmen and women and, because of this, won more medals. More information is needed to determine this. Statement I is, therefore, not correct.

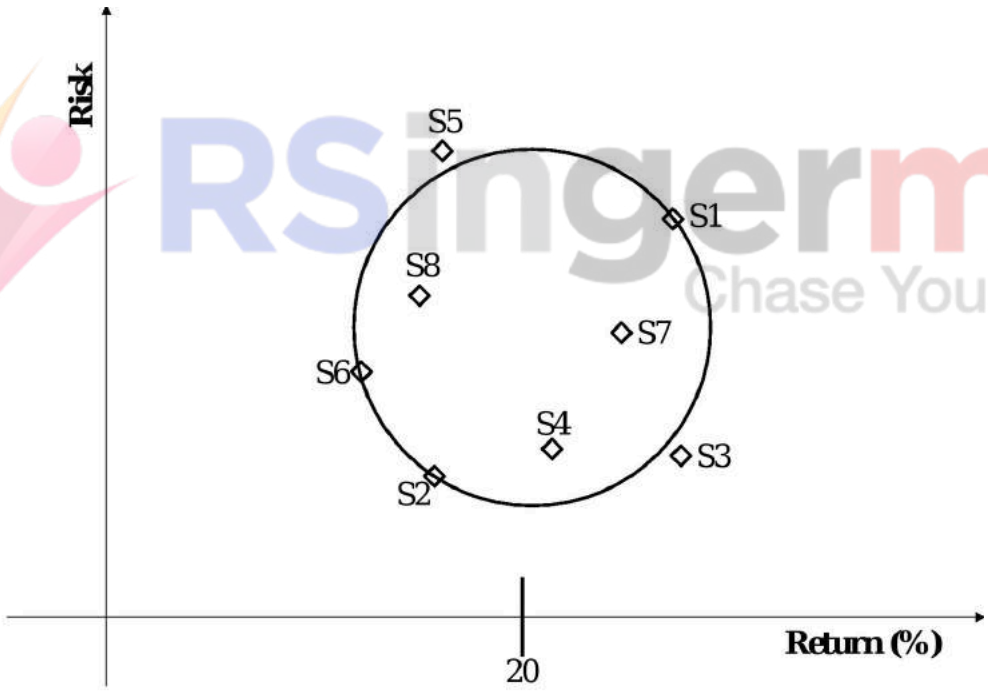
Statement II: According to the chart, Sweden has the fewest number of bronze medals. Statement II is correct.

SCATTER PLOT

A scatter chart, also called scatter plot or scatter graph, presents specific results or features for two independent situations. This way, the development of a specific aspect can be displayed graphically and values can be compared. Another type of a scatter chart is the bubble chart. We will take a closer look at this type later.

EXAMPLE

The investment of a fund manager is based on risk and return. The higher the risk, the less attractive it is for the fund manager; the higher the return, the more attractive.



Which of the following statements is or are correct?

I. If a manager has the choice between S1 and S3, he would always choose S3.

II. The dots on the circle always mean a better investment than those found within the circle.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

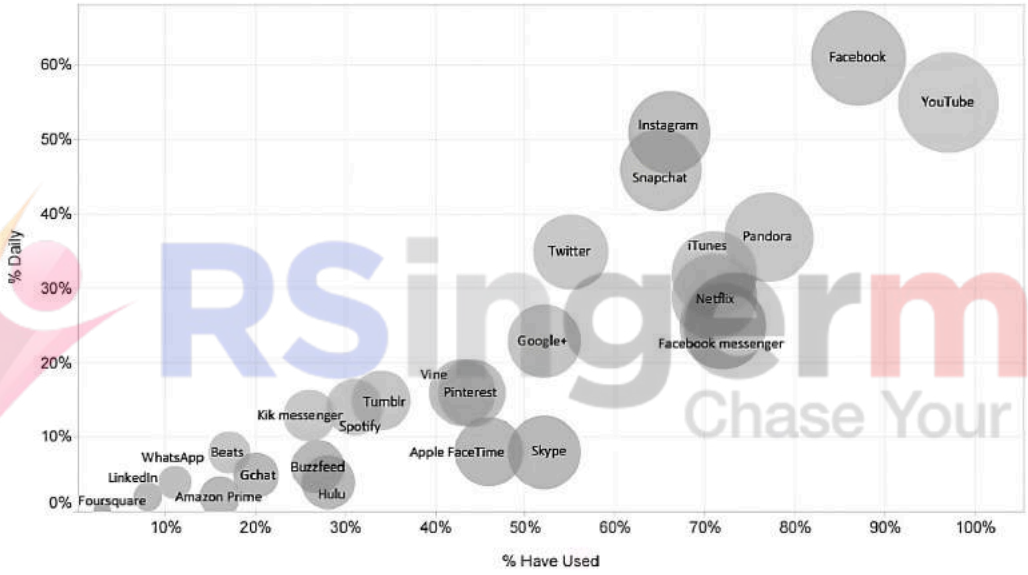
Statement I: S3 offers a better return and comparably little risk. Statement I is correct.

Statement II: The deciding criteria for a better investment are little risk and high return. The points on the circle do not have any connections to these criteria and are, therefore, of no interest for the investment. Thus, statement II is not correct.

BUBBLE CHART

A bubble chart is an expansion of the scatter chart. It follows the same principles as the scatter chart. The special feature is that the dots within a bubble chart have various sizes and can, therefore, express an additional value.

EXAMPLE



Source: The Best and Worst: Meia Habits of the Class of 2014, June 2014, https://ink.niche.com/best-worst-media-habits-class-2014/, Stand 25.01.2019

% Daily	Expresses the percentage of all people who use one of the listed internet pages on a daily basis.
% Have used	Expresses the percentage of all people who have ever used one of the listed internet pages.

This example shows how intensively the common social networks and the comparably popular internet pages are used on a daily basis. We see differently sized bubbles each with a name inside of it.

The larger the bubble, the more people use the social network. The smaller the bubble, the fewer people use it.

On the y-axis (left and vertical), the percentage of all users who visit one of the listed internet pages daily is displayed. On the x-axis (at the bottom and horizontal), we see the percentage of all users who have ever used one of the listed internet pages.

Some core statements taken from the bubble chart:

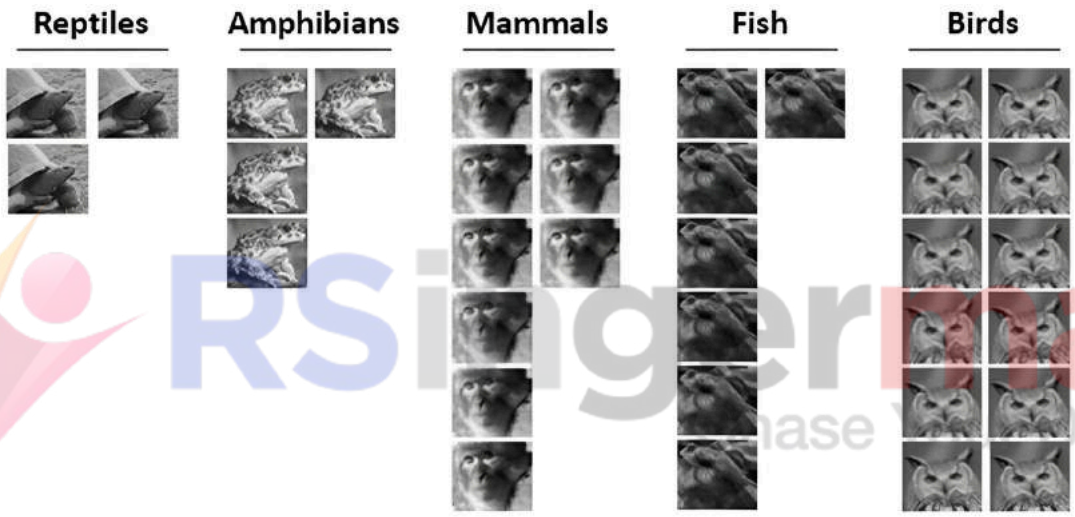
- Facebook has the most daily users.
- YouTube has been used the most.
- Foursquare is used the least per day has had the fewest overall users.

PICTOGRAM

Pictograms make comparisons using symbols. Below, you can see an example.

EXAMPLE

This pictogram expresses the number of vertebrate species found in the country of XYZ. Each symbol represents 10,000 animals of this type.



Source: Wikipedia: Featured pictures: Animals,12.1.2016, https://en.wikipedia.org/wiki/Wikipedia:Featured_pictures#Animals, Accessed 20.01.2019 (Aldabra giant tortoise, by Muhammad Mahdi Karim; Balearic green toad, by Richard Bartz; Barbary macaque, by Christopher Buttigieg; Mandarinfish, by Lviatour; Eurasian eagle-owl, by Kadellar)

The following table shows the growth rate of the number of each depicted animal type.

	Reptiles	Amphibians	Mammals	Fish	Birds
Growth rate per year	+10%	-20% due to illnesses	+5%	+10%	-10%

Which of the following statements is or are correct?

I. In 3 years, there will be more reptiles in the country than amphibians.

II. If, after 5 years' time, all amphibians die out due to the current illnesses and the current growth rate per year for birds does not change, then the bird population will only be 50% of its present value.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: Already after one year's time, the number of amphibians will be only 32,000 and the reptiles will populate to 33,000. Thus, statement I is correct.

Statement II: Here, you are tempted towards an incorrect answer through the knowledge that the amphibians will die out after 5 years' time. Assuming there is 100% in the initial year, the bird population after 5 years' time is calculated as follows:

1st year: 100% – (100% × 10%) = 90%

2nd year: 90% – (90% × 10%) = 81%

3rd year: 81% – (81% × 10%) = 72.9% etc.

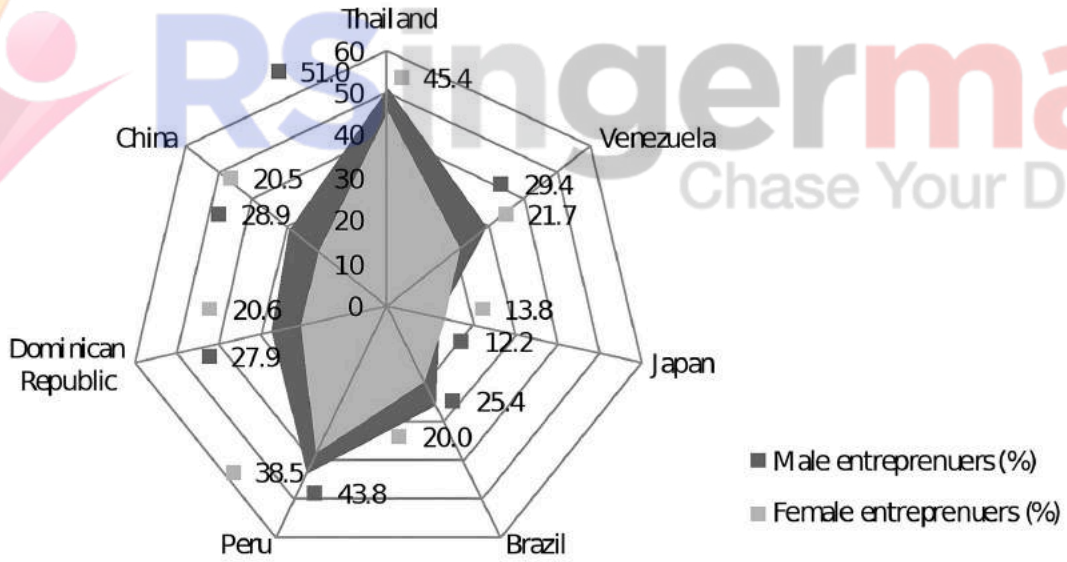
Therefore, the bird population is still above 50% of its starting value after 5 years' time. Therefore, statement II is incorrect.

RADAR CHART

A radar chart is a representation of values which are based on numerous criteria of a situation. The values are displayed graphically in the form of a spider web and the illustrated dots form an area on the net. Radar charts are especially useful for evaluating set criteria of a situation. The areas spread out, depending upon the situation, towards a corner of the web; meaning towards a specific criterion.

EXAMPLE

This graphic shows the percentage distribution of the gender of entrepreneurs within seven countries. The percentages in the following chart are based on the total number of the males and females within that country.



Source: Global Entrepreneurship Monitor, 2007. Zitiert in dem Artikel: Goldman, Leah: The 20 Countries With The Highest Percentage Of Female Entrepreneurs, November 2010, http://www.businessinsider.com/women-in-business-2010-11?IR=T, Accessed 30.12.2018

Which of the following statements is or are correct?

I. Of the countries presented, Thailand, Peru and Venezuela are the top 3 countries as far as the total percentage of entrepreneurs is

concerned, whereas Japan, Brazil and the Dominican Republic are the countries with the lowest total percentage of entrepreneurs.

II. Concerning the difference between the percentage of male and female entrepreneurs, the countries ordered from lowest difference to highest is as follows: Japan, Brazil, Peru, Thailand, Dominican Republic, Venezuela and China. However, concerning the *total* number of male and female entrepreneurs, the descending order is Thailand, Peru, China, Venezuela, Brazil, Japan and Dominican Republic.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: You calculate the percentage of entrepreneurs by adding the number of male and female entrepreneurs of the country. The calculation shows that statement I is correct. As an alternative, you can see within the graphic that statement I is clearly documented.

Statement II: Since there is no data concerning the population, no statement can be made pertaining to the number of male and female entrepreneurs in total. Thus, statement II is not correct. Tip: By first taking a look at the obviously incorrect 2nd half of statement II and not bothering to evaluate the first half, we can save ourselves a lot of valuable time. For practice purposes: The 1st half of statement II (pertaining to the differences in percentages of male and female entrepreneurs) is correct. You calculate the difference by subtracting the percentage of female entrepreneurs from the number of male entrepreneurs. The order is correct.

STACKED COLUMNS AND LINES

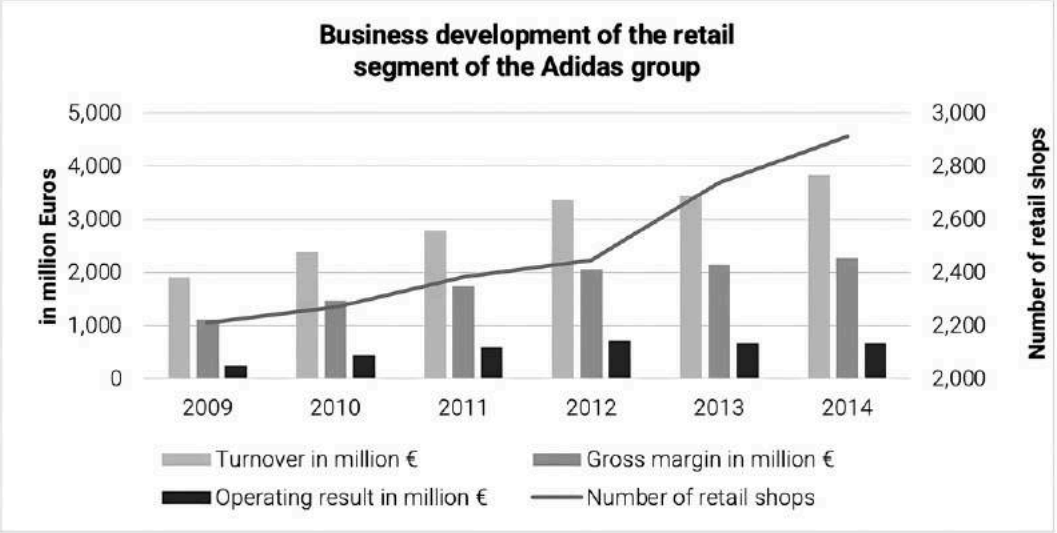
The stacked column chart expresses the values of various situations side-by-side. Thus, general comparisons can be made or individual categories of an entirety can be viewed in comparison to one another. The large number of columns, often combined with lines, can sometimes be difficult to take in. There are often two y-axes.

It is important to recognize which data series belongs to which y-axis.

EXAMPLE

The company Adidas™ has divided its sales activities into three report segments: wholesale, retail, and other sales. The diagram below shows the development of sales for the retail segment.

The turnover shows the return of the sales of goods from the Adidas™ group assortment within their retail shops. The gross margin shows the turnover minus the production costs of the sold goods. The operating result shows the turnover remaining after all of the costs such as production costs, rent, personnel costs, bookkeeping and taxes have been deducted.



Source: adidas™ Group Geschäftsberichte 2010, 2012 and 2014

Which of the following statements is or are correct?
I. Between the years of 2012 and 2013, the costs of the Adidas™ group retail segment grew faster than the turnover growth.

II. The number of retail shops has roughly doubled between the years of 2012 and 2014.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: We do not see the exact values, but an optical comparison shows us that the operating result in 2012 was higher than in 2013. This means that the operating result in 2013 was lower than in 2012. The operating result is calculated by subtracting the costs from the turnover. Since turnover increased, the operating result can only be smaller if the costs increased more than the turnover. Thus, statement I is correct.

Statement II: The number of retail shops is displayed on the second y-axis. It starts with 2,000 and not with zero. The increase is from roughly 2,400 to 2,900. Statement II is, therefore, not correct.

Throughout the exam, questions may come up which seem complicated, are explained in lengthy paragraphs, or about which you have no previous knowledge. Do not get discouraged. In the case of such questions, the information provided in the question will be sufficient to answer the question.

CALCULATING WITH QUARTERS

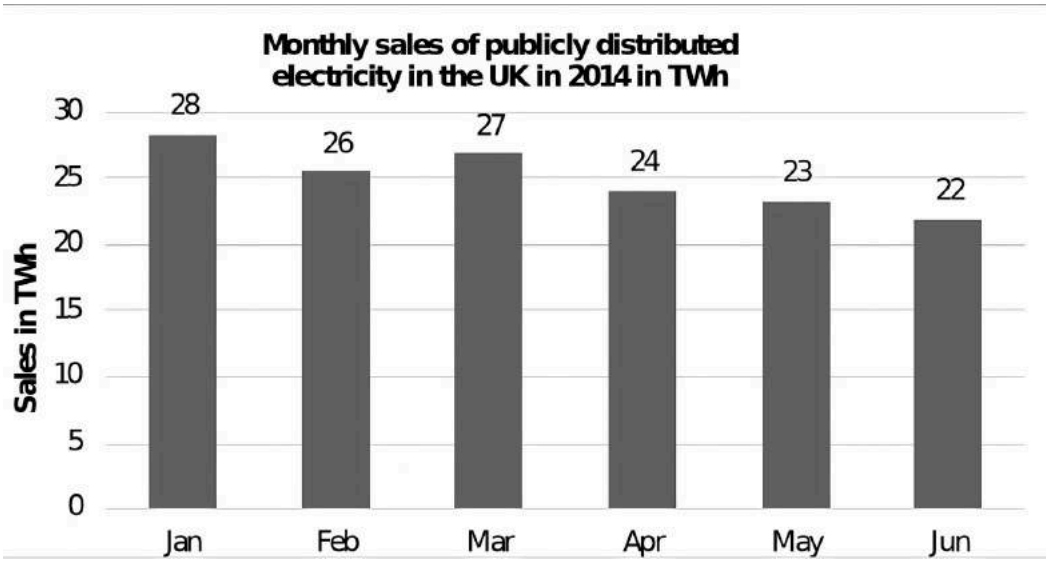
Below, we give you examples of terms which are often seen on the test.

QUARTER

A quarter describes a time period of three months and is often used in financial reports. A year is made up of four quarters: January, February, March (Q1); April, May, June (Q2); July, August, September (Q3); and October, November, December (Q4). The sales from Q2 2015 include, for example, all sales within the second quarter (the sum of all sales in April, May, and June) of 2015.

EXAMPLE

How high were the sales of publicly distributed electricity in the UK during the first quarter of 2014 (in terawatt hours (TWh))?



Source: The Statistics Portal: Monthly sales of publicly distributed electricity in the UK in 2014 in terawatt- hours, 2016, http://www.statista.com/statistics/322972/monthly-sales-of-publicly-distributed-electricity-in-the-united-kingdom/, Accessed 25.03.2019

Answer:

The column chart above shows that the monthly sales were 28 TWh in January, 26 TWh in February and 27 TWh in March. After this, sales decreased so that in June only 22 TWh were sold.

Calculating the sales in Q1 2014:

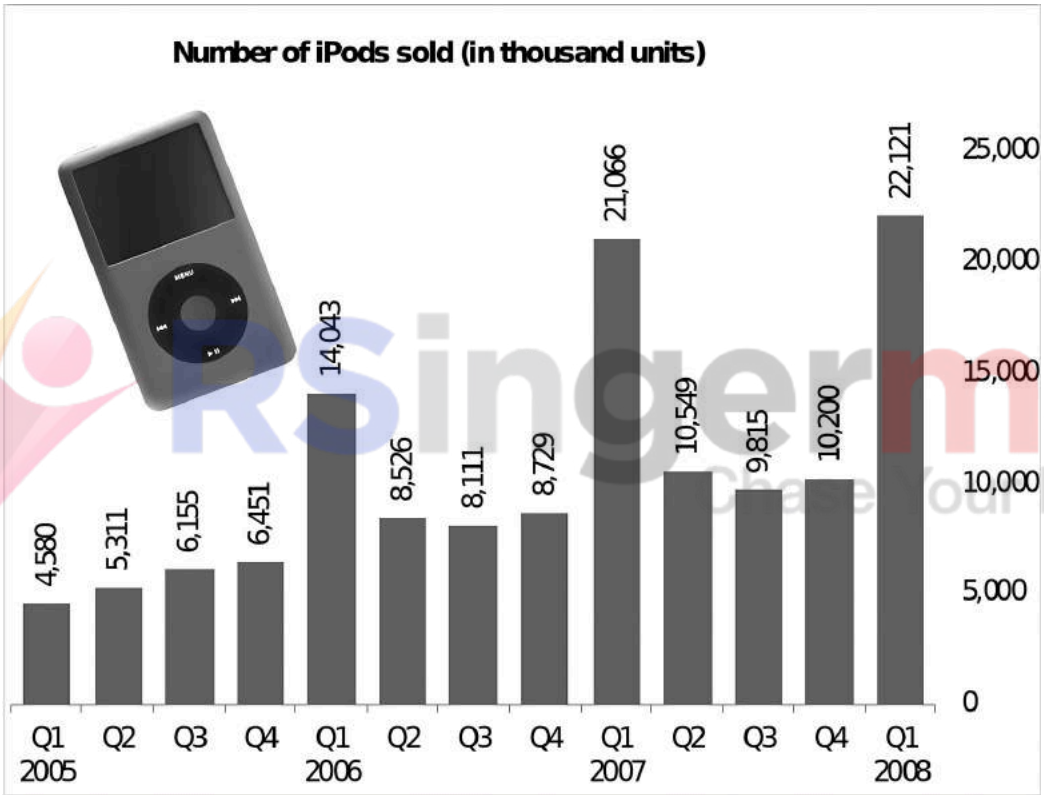
28 TWh + 26 TWh + 27 TWh = 81 TWh

The sales of publicly distributed electricity in the UK in Q1 2014 were 81 TWh.

ANNUAL COMPARISONS OR CHANGES WHEN COMPARED TO THE PREVIOUS YEAR

This concerns a method which expresses changes in specific values such as sales or customers on an annual basis. The change can be measured as the actual difference or a percentage difference.

EXAMPLE



Source: Apple Inc. Financial statements, http://images.macworld.com/images/news/graphics/131754-fy08q2ipodsales.gif, Accessed: 30.01.2019

Calculate the number of iPods sold for 2007 compared to the previous year.

Answer:

Calculate the actual change:

Total sales in 2006: 14,043 + 8,526 + 8,111 + 8,729 = 39,409

Total sales in 2007: 21,066 + 10,549 + 9,815 + 10,200 = 51,630

51,630 – 39,409 = 12,221

Calculate the percentage change:

Percentages are used to express shares of a whole. The formula is as follows:

$$p\% = \frac{W}{G}$$

"G" stands for the base value. "p%" stands for the percentage. And "W" stands for the percentage value.

12,221 ÷ 39,409 = 31%.

GOOD TO KNOW: Always use the previous year as the base year. In this case, the number of iPods sold for 2006 (39,409) is the basis of the calculation for the percentage difference in 2007.

CHANGES IN COMPARISON TO THE PREVIOUS QUARTER

Now we examine a method of measuring differences between two quarters.

NOTE: This method corresponds to the annual comparison but focuses on quarters rather than years.

EXAMPLE

NUMBER OF IPODS SOLD

Calculate the quarterly difference of the number of iPods sold both as an actual change as well as a percentage change for the third quarter of 2006 (compared to the second quarter of 2006).

Answer:

Calculate the actual change: 8,111 – 8,526 = -415 This means that in Q3 2006, when compared with Q2 2006, there was a decrease of 415 sold iPods.

Calculate the percentage change:

(8,111 – 8,526) ÷ 8,526 = -415 ÷ 8,526 = -0,049 = -4.9%

This means that in Q3 2006, when compared with Q2 2006, the amount of iPods sold decreased by 4.9%.

ANNUAL QUARTERLY COMPARISON

With this, we refer to the change in comparison to the same quarter of the previous year.

A method to measure the difference between specific quarters in comparison to the same quarter of the previous year. As with prior change comparisons, you can calculate the actual change or the percentage change.

EXAMPLE

NUMBER OF IPODS SOLD

Calculate the change in the number of iPods sold in comparison to the same quarter of the previous year, both as actual change as well as percentage change, for the fourth quarter of 2007 (in comparison to the fourth quarter of 2006).

Answer:

Calculate the actual change: 10,200 – 8,729 = 1,471 This means that

1,417 more iPods were sold in Q4 2007 than in the same quarter of the previous year.

Calculate the percentage change:

(10,200 – 8,729) ÷ 8,729 = 1,471 ÷ 8,729 = 0.169 = 16.9%

This means the number of iPods sold in Q4 2007 increased by 16.9% in comparison to Q4.

Typically, on the actual test, there are numerous questions based on these fundamental concepts of change comparison. There may also

be, however, questions which seem more complex. These questions are only trying to confuse you. Since you will have gained ample experience working with the various graphics presented in this book, you will have the necessary knowledge to answer even the most difficult questions.

EXAMPLE

If sales in Q3 2012 increased by 8% compared to Q3 2011, sales in Q3 2013 increased by 9% compared to Q3 2012, and sales in Q3 2014 decreased by 17% compared to Q3 2013, would the total for Q3 2014 be higher, lower or the same as the total for Q3 2012?

Answer:

This question appears to be difficult, but in reality, it is quite simple. The answer is lower.

Explanation: In total, there was an increase of 17% in sales between Q3 2011 and Q3 2013 and a decrease of 17% between Q3 2013 and Q3 2014. Thus, many people believe that the sales must be the same between Q3 2014 and Q3 2011. However, this is not true because we are not talking about an actual change in units, but rather a percentage change which results in a change of the actual units. Let us assume that Q3 2011 is equivalent to 100 units of chocolate.

An increase in 8% in Q3 2012 means 8 units of chocolate more in Q3 2012. However, an increase in 9% for Q3 2013 does not mean 9 units of chocolate because the base value has changed - the base value is no longer 100 but now 108 units of chocolate. This is why there is an increase of 9.72 units in Q3 2013 compared to Q3 2012 (9% of 108, our new base) - to a total of 117.72 units. A 17% increase in Q3 2014 is definitely higher than the percentage of 17%

between Q3 2011 and Q3 2013, since the base value in Q3 2013 was the highest. Thus, the 17% decrease between Q3 2013 and Q3 2014 is higher than the total 17% increase between Q3 2011 and Q3 2013. For this reason, there would be less than 100 units of chocolate in Q3 2014, the starting amount in Q3 2011.

Calculation:

Q3 2012: 100 + 8% = 100 + 0.08 × 100 = 108, or 100 × 1.08 = 108

Q3 2013: 108 + 9% = 108 + 0.09 × 108 = 117.72, or 108 × 1.09 = 117.72

Q3 2014: 117.72 – 17% = 177.72 – 0.17 × 177.72 = 97.7076, or 177.72 × 0.83 = 97.7076

Alternative method of calculation:

1.08 × 1.09 × 0.83 = 0.977076

EXAMPLE

If the profit of “Minotaur Inc.” increases in 2003 by 10%, in 2004 by 10% and in 2005 by 10% and decreases by 30% in 2006, is the profit from “Minotaur Inc.” in 2006 higher, lower or the same as in 2003?

Answer:

It is lower. The same principle in the above example is also true here, except for an additional year of change.

Calculation:

$1.1 \times 1.1 \times 1.1 \times 0.7 = 0.9317$. This means that in 2006 93.17% of the profit from 2003 was made. Thus, the amount of the actual profit decreased by 6.83% when comparing 2003 and 2006.

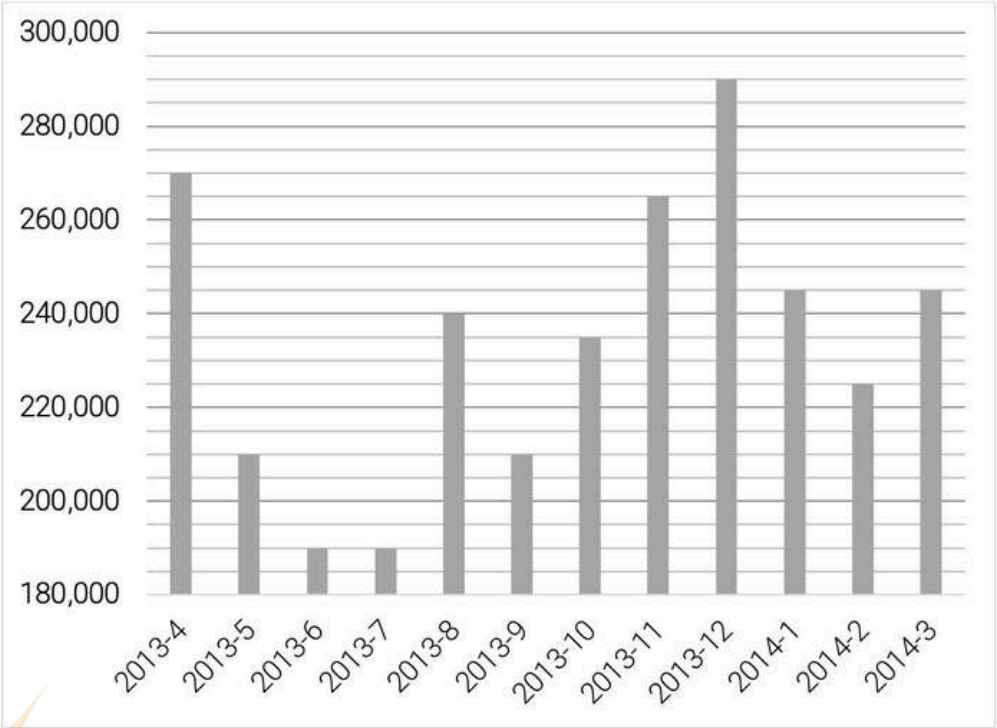
FREQUENTLY RECURRING PITFALLS

Focus especially on recurring pitfalls. One is in interpreting scale. Differences in numbers and size may be disproportionately illustrated through subtle changes in unit or scaling of the axes. For example, specific time periods with a positive development of numbers can be inflated to make the change appear larger than it really is. Below you find examples of such confusing illustrations.

THE START OF THE AXIS SCALE IS NOT ZERO

In some column or bar charts, the axis scale does not start with zero. In these cases, you should view the difference between the column heights rather critically. The difference can be much smaller than the chart suggests at first glance.

EXAMPLE



Source: Ferry Bopender, http://www.electricmonk.nl/log/wp-content/uploads/2014/07/3.png, Accessed 30.01.2019

How high is the percentage change from 2013-5 to 2013-8? At first glance, the chart appears to show that the amount has doubled which would be an increase of 100%. However, you have to take a closer look at the y-axis: It starts with 180,000!

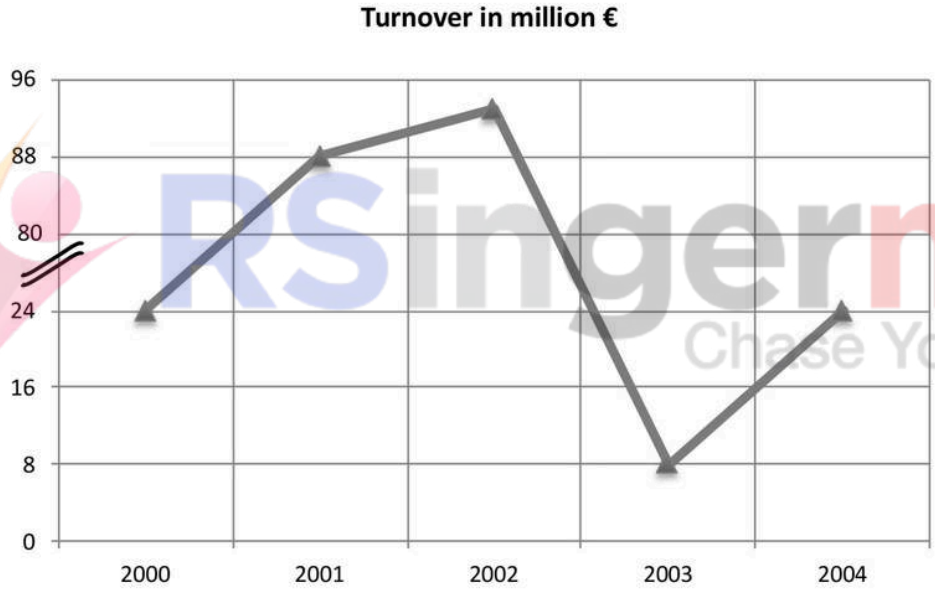
Answer:

The percentage increase is thus (240,000 – 210,000) ÷ 210,000 = 14.3%. Even though at first glance it appears to be an increase of 100%, it is really only an increase of roughly 14%.

THE Y-AXIS CAN MAKE JUMPS

When analysing a chart, it is important to look at the primary (and, if available, the secondary) y-axis. It is irrelevant how the increase is visualized in the diagram, only the numbers are important. Sometimes there are diagrams in which the spacing between 0 to 50 looks exactly that of 50 to 500. It does not matter how large an increase within a chart looks. It is only important how the exact numbers change, which can, in this case, be seen on the y-axis.

EXAMPLE



At first glance, it appears to be that the turnover difference between 2000-2001 and 2003-2004 is exactly the same in size. The name of the y-axis, however, shows the exact values and thus the actual change.

Turnover growth between 2000 and 2001: 88 – 24 = 62 million €

Turnover growth between 2003 and 2004: 24 – 8 = 16 million €

Always pay attention to the numbers on the axes instead of just relying on the optical effect of a chart. This is especially true when

you have to calculate percentage changes. In the exam, you will probably come across a couple of questions like this.

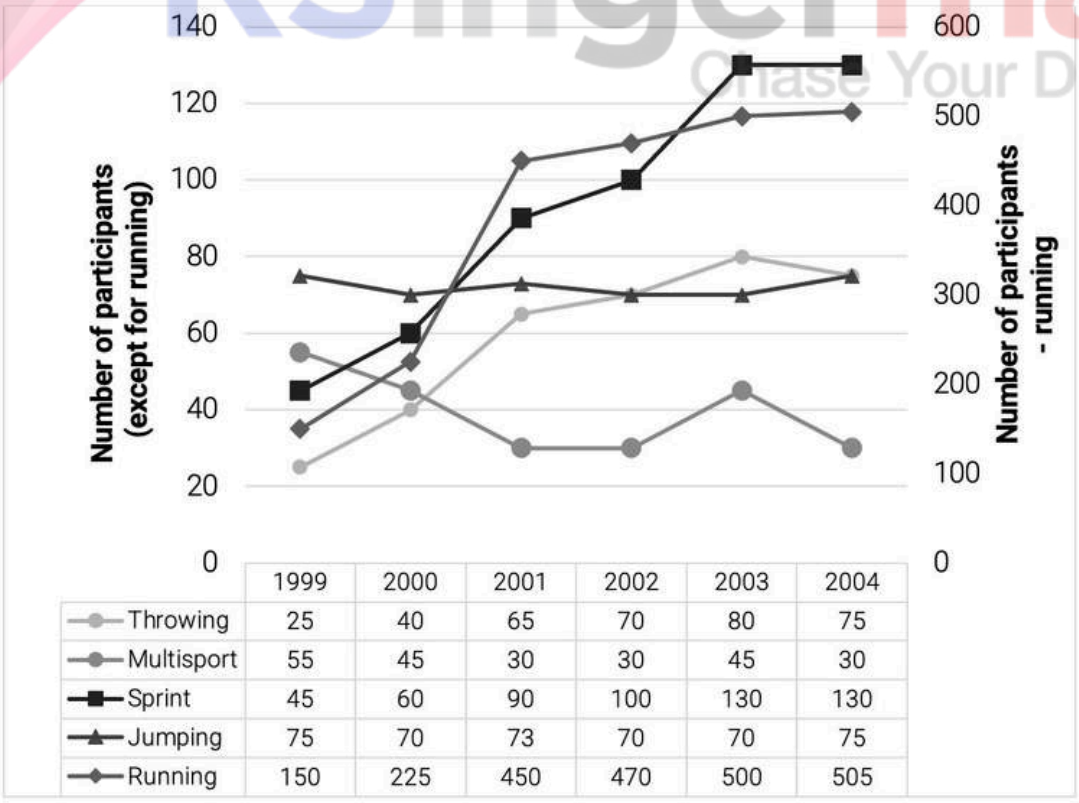
The interruption of an axis by two diagonal lines or a jagged line always means a gathering of values. This means that the changes skip so many values that a better overview can be created by omitting them.

THERE ARE TWO Y-AXES

If numerous data series are displayed, then two different y-axis scales (one to the right and another to the left) may be used. If you see a y-axis on the right-hand side, then you should pay close attention to which scale a row of columns belongs to. Such a diagram can optically suggest a development for the displayed data series which is not really there because the scale is different. Be extra careful when evaluating the data before you make a statement concerning the tendency of development.

EXAMPLE

The chart below shows the number of participants for an annual track and field event in Australia. Each participant of the track and field event can only take part in one of the disciplines per year.



	1999	2000	2001	2002	2003	2004
Throwing	25	40	65	70	80	75
Multisport	55	45	30	30	45	30
Sprint	45	60	90	100	130	130
Jumping	75	70	73	70	70	75
Running	150	225	450	470	500	505

Which of the following statements is or are correct?

I. Between 1999 and 2004, the largest growth in the number of participants was in sprint.

II. Throwing was the only sports event of the track and field event in which less than 10% of the total number of participants took part during the each of the years listed in the chart.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: Optically, it looks as if sprint has the strongest growth curve. However, the growth in the number of running participants is much higher – from 2000 on, runners made up more than 50% of all participants. This statement is not correct.

Statement II: Over the course of the years, throwing had less than 10% of the total participants. Statement II is correct.

3. PRACTICE QUESTIONS

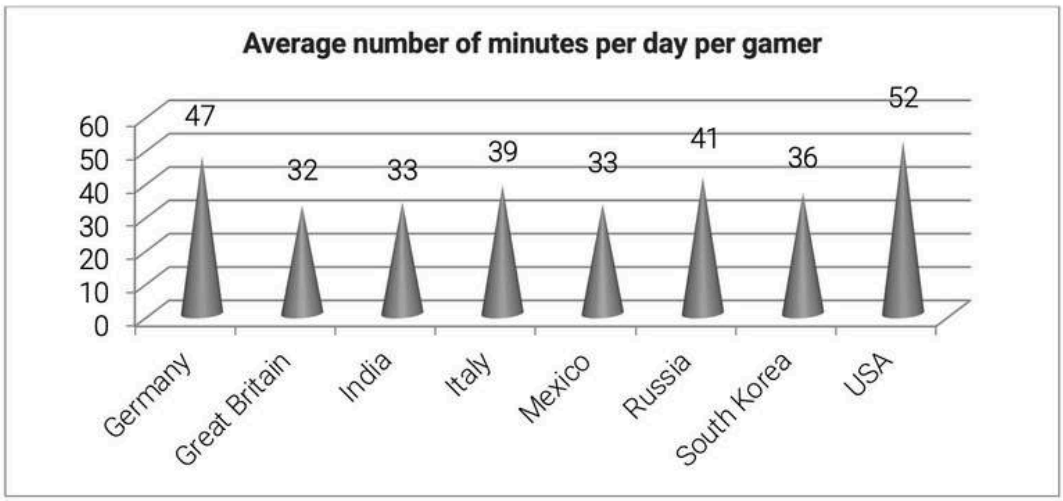
In the rest of the book, we have provided you with a number of practice questions in order to simulate the broad range of questions found in the actual test. Our questions are somewhat more difficult than the ones found in the official test so that, before the exam day, you will have become an expert in diagrams and can confidently answer the questions.
You will see that there are numerous time-consuming calculations. This is intentional. On the day of the test you will be required to manually (without a calculator) solve a series of simple but time-intensive calculations. For this reason, we kindly ask that you try to solve our practice questions without using a calculator. The faster you are at calculating manually, the more time you will have for the harder questions on the test. Remember, our calculations can be somewhat more difficult than those on the official test, but this is a good way to prepare for the test day.
After completing these practice questions, you will have a good feeling of what you should pay attention to on a diagram or table. With this experience, you will be able to estimate numerous calculations and be able to answer questions faster. In some questions, the solution is not an exact number, but rather a statement of comparison between various values. You can save yourself time on such questions when you estimate the numbers.
Please try to answer our questions as much as possible with a rough and quick estimate.

PRACTICE EXAMS

EXAM 1

1.1.

This chart shows the average time gamers from various countries spend with computer games (gaming).



Source: Euston, Jarah: Gaming: The Lingua Franca of Mobile, September 18, 2014, Flurry Analytics, http://www.flurry.com/blog/flurry-insights/gaming-lingua-franca-mobile, Accessed 30.01.2019

Which of the following statements is or are correct?

I. The gamers in the USA spent roughly 60-65% more time with computer games than gamers in Great Britain.

II. Among the countries listed in the graphic, Great Britain, Mexico, Russia, India and South Korea are the five countries in which gamers spend the least amount of time gaming.

(A) Only statement I is correct.

(B) Only statement II is correct.

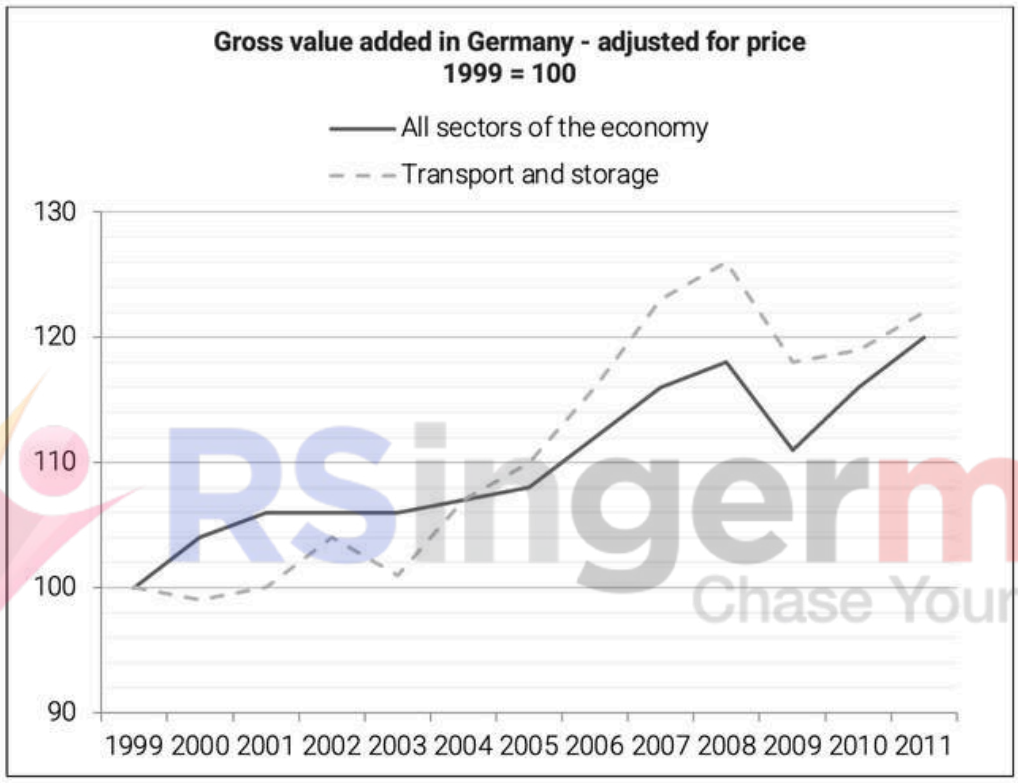
(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.2.

Transport is an important economic factor for Germany. In 2010, the German transport industry reached a value of 88 billion Euro, which is

3.9% of the German gross value added (GVA). The chart below shows the development of the gross value added of the transport industry compared to the total German gross value added. The values were indexed for the reference year 1999. This means that the value for 1999 is displayed as 100, and the subsequent years show how this indexed value has developed.



Source: Verkehr auf einen Blick - Ausgabe 2013, Statistisches Bundesamt, 23.04.2013, https://www.destatis.de/DE/Publikationen/Thematisch/TransportVerkehr/Querschnitt/BroschuereVerkehrBlick0080006139004.pdf, Accessed 29.01.2019

Comment 1: Gross value added is the “production value minus inputs for individual economic sectors; therefore, it only includes the added value created in the production process, since the primary products produced by other economic units are deducted”.

Source: Statistisches Bundesamt, Verkehr auf einen Blick, 2013, page 53, Accessed 04.02.2019

Comment 2: “Price adjustment is the deduction of price influences. The price adjustment takes place on the basis of an annually changing price basis (previous year’s price basis), the results are expressed in prices of the respective previous year (e.g. results for the year 2009 in prices of 2008).”

Source: Glossar zur volkswirtschaftsliche Gesamtrechnung, Statistisches Bundesamt, https://www.destatis.de/DE/ZahlenFakten/GesamtwirtschaftUmwelt/VGR/_Doorpage/Glossar_VGR.html, Accessed 04.02.2019

Which of the following statements is or are correct?

I. The value added within the “transport and storage” sector grew from 1999 to the pre-crisis year 2008 with an increase 26% stronger than the entire value added, which increased by 18%.

II. The gross value added for “transport and storage” grew continuously in the years listed except for two years.

(A) Only statement I is correct.

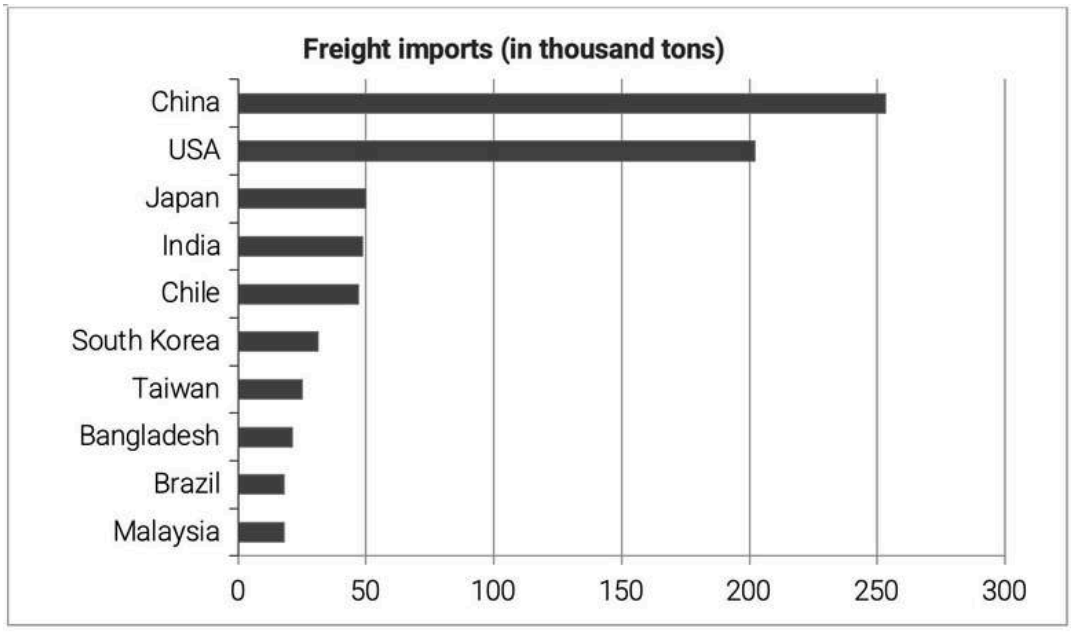
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.3.

The following table shows the country of origin for freight imports to Germany in 2012.



Sources: Die Top-10-Herkunftslländer in der Luftfrachteinfuhr im Extrahandel Deutschland 2012, Luftverkehrsbericht 2012, Statistisches Bundesamt, DLR, p.116, http://www.dlr.de/fw/Portaldata/42/Resources/dokumente/pdf/LVB2012.pdf, Accessed: 31.01.2019

Which of the following statements is or are correct?
I. The largest amount of freight imports originated from China and the USA.

II. 50,000 tons of freight imports came from Japan, which is less than 30% of what was imported from the USA.

(A) Only statement I is correct.

(B) Only statement II is correct.

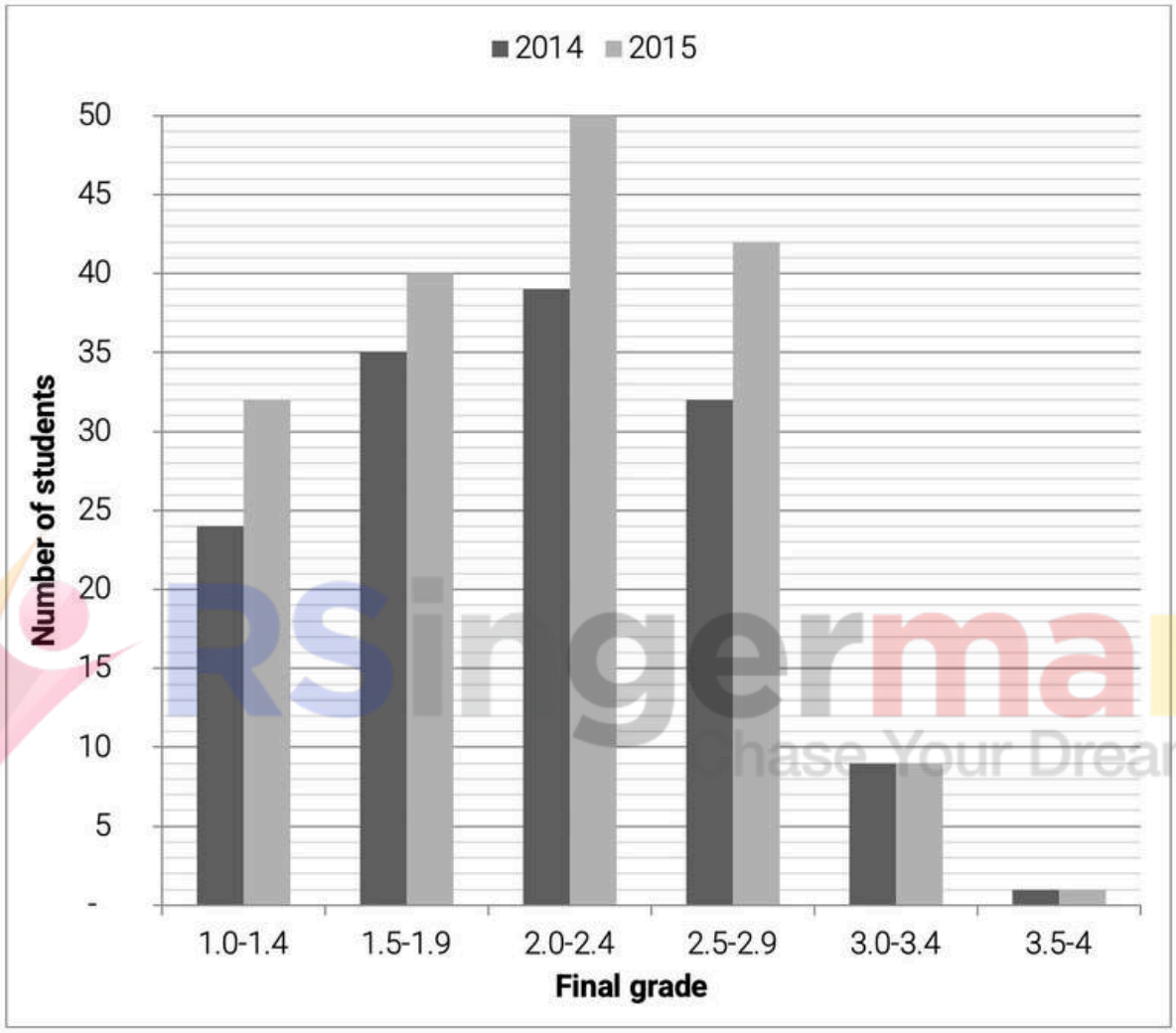
(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.4.

The following bar chart shows the A-level exam results for students of a German high school (Gymnasium) for 2014 and 2015. The grade

system used for the A-levels is a system of 1 to 6. The lower the grade, the better the grade. The best possible grade is 1.0. Students need at least a 4.0 to pass the A-levels.



Source: Abiturstatistik, Humboldt-Gymnasium Berlin-Tegel, http://www.humboldtschule-berlin.de/index.php/profil/abiturstatistik, Accessed 05.02.2019

Which of the following statements is or are correct?

I. In 2015, 34 more students passed the A-levels than in 2014. II.

When you view the number of students with a grade between 1.0 and 1.4, you can see that a third more students achieved this outstanding grade compared to the previous year.

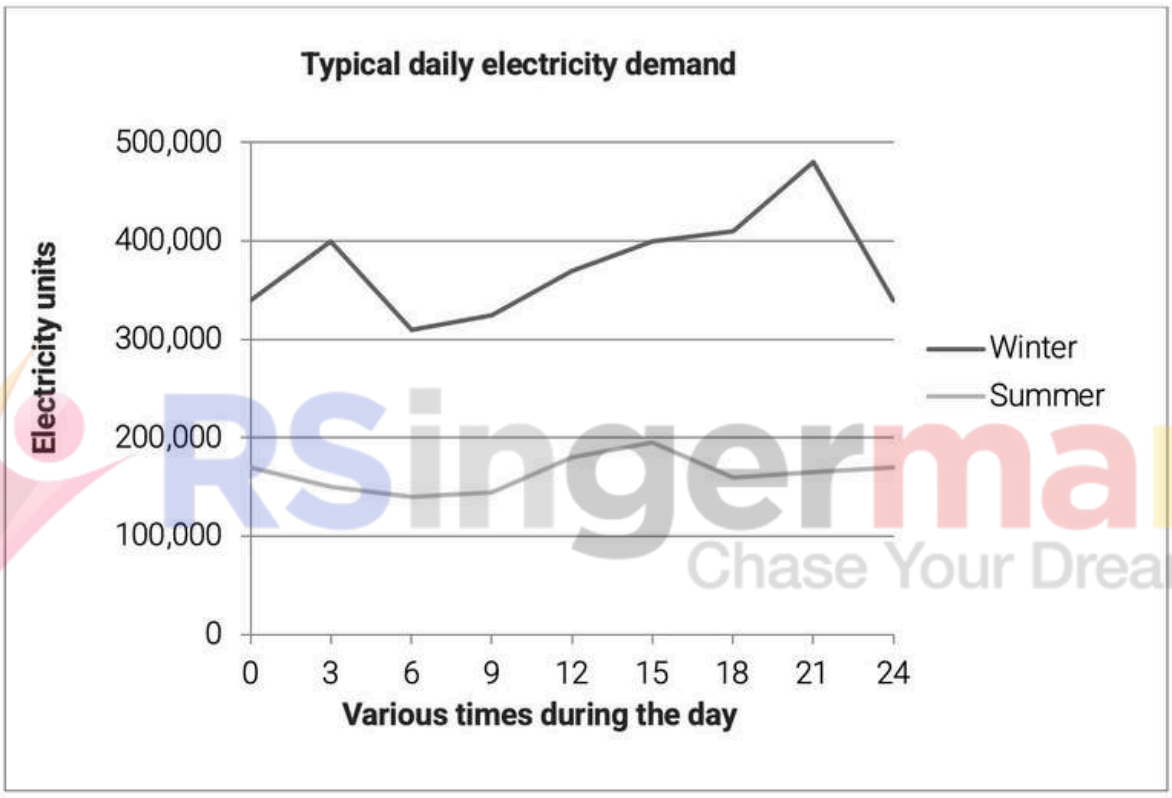
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.5.



Source: Academic IELTS Writing task1 Sample 90, Demand for electricity in England during typical days in winter and summer, 24. October 2015, http://www.ielts-mentor.com/writing-sample/academic-writing-task-1/1027-academic-ielts-writing-task-1-sample-90, Accessed 20.01.2019

Which of the following statements is or are correct?

I. During summer, there is no demand for electricity.

II. During winter, at 15:00, 400,000 units of electricity are in demand.

(A) Only statement I is correct.

(B) Only statement II is correct.

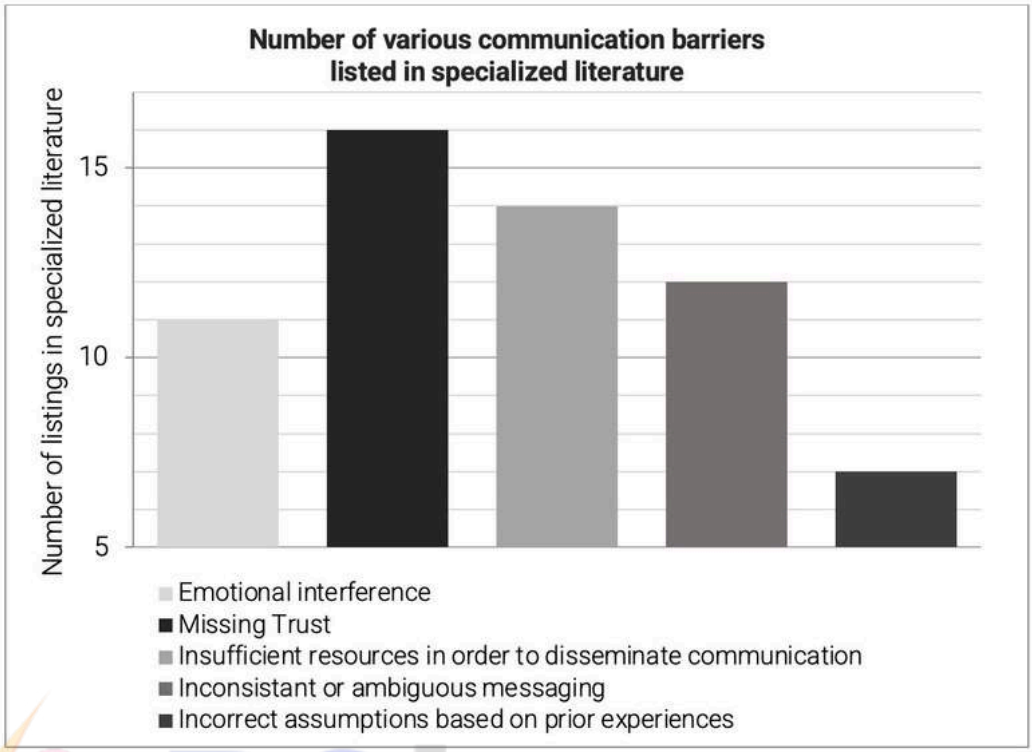
(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.6.

Risk communication plays a crucial role in preparing for, responding to, and recovering from public emergencies. Examples of such emergencies are natural catastrophes, radioactive accidents, and contagious illnesses.

An effective risk communication must achieve the following goals: individuals must be able to access information, process the information, and respond based on the information available. Specific, especially vulnerable population groups, such as small children, older individuals, chronically ill individuals, and individuals with limited regional language skills, have special needs which make it harder for them to achieve the risk communication goals. The following graphic shows five barriers to successfully communicating risk events to vulnerable population groups and depicts how often each barrier is mentioned in specialized literature.



Source: Enhancing emergency preparedness, response, and recovery management for vulnerable populations: Literature Review, https://aspe.hhs.gov/sites/default/files/pdf/75866/emergfrA.pdf, page 19, Accessed 19.01.2019

Which of the following statements is or are correct?

I. If we use the specialized literature numbers as a determining factor, then "missing trust" is the largest barrier for the success of communication. "Missing trust" is listed by just as many specialized literatures as the second largest and smallest barrier combined.

II. In specialized literature, a number of additional barriers which appear less frequently are mentioned. If we were to group these additional barriers under a category "Others", the number of listings would be 23. This number is the same amount as the total of number of combined listings of "emotional interference" and "inconsistent and ambiguous messaging".

(A) Only statement I is correct.

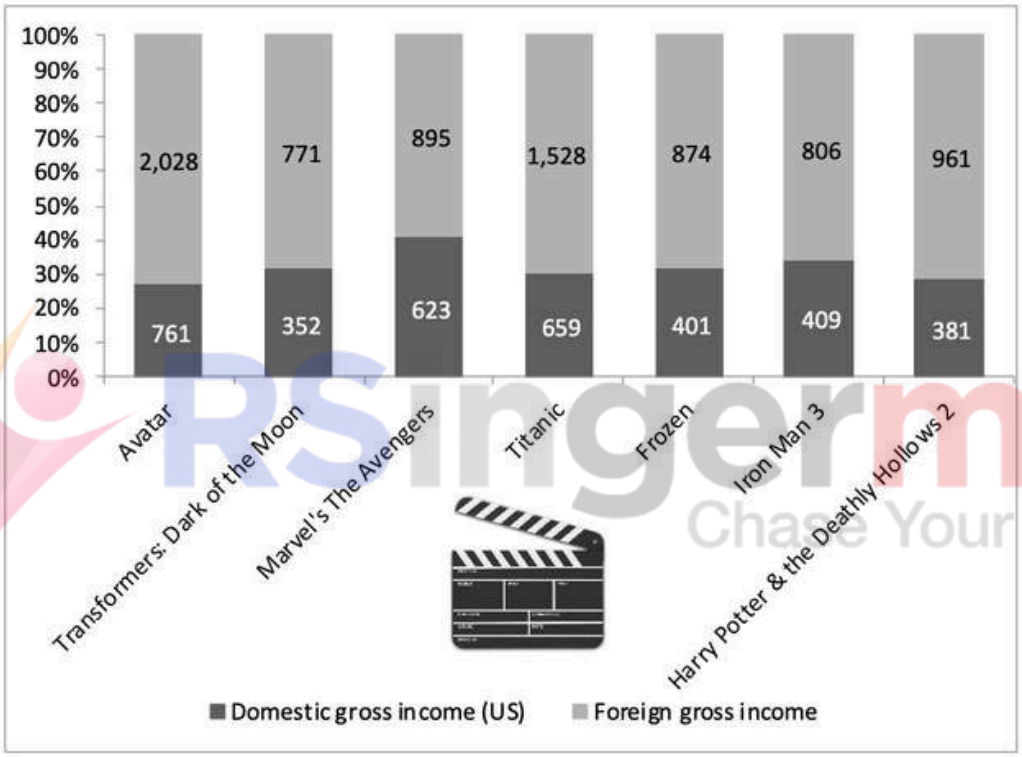
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.7.

This chart shows the top 7 highest-grossing Hollywood movies of all time (as of May 2015) by the revenues from theatrical exhibition.



Source: Box Office Mojo, http://boxofficemojo.com/alltime/world/, Accessed 30.01.2019

Which of the following statements is or are correct?

I. The domestic gross incomes of these following movies are in ascending order: Transformers: Dark of the Moon, Harry Potter & the Deathly Hollows II, Iron Man 3, Marvel's The Avengers, Titanic, Frozen, Avatar.

II. The total worldwide income for Avatar is less than the worldwide income for Titanic and the domestic income for Marvel's The Avengers combined.

(A) Only statement I is correct.

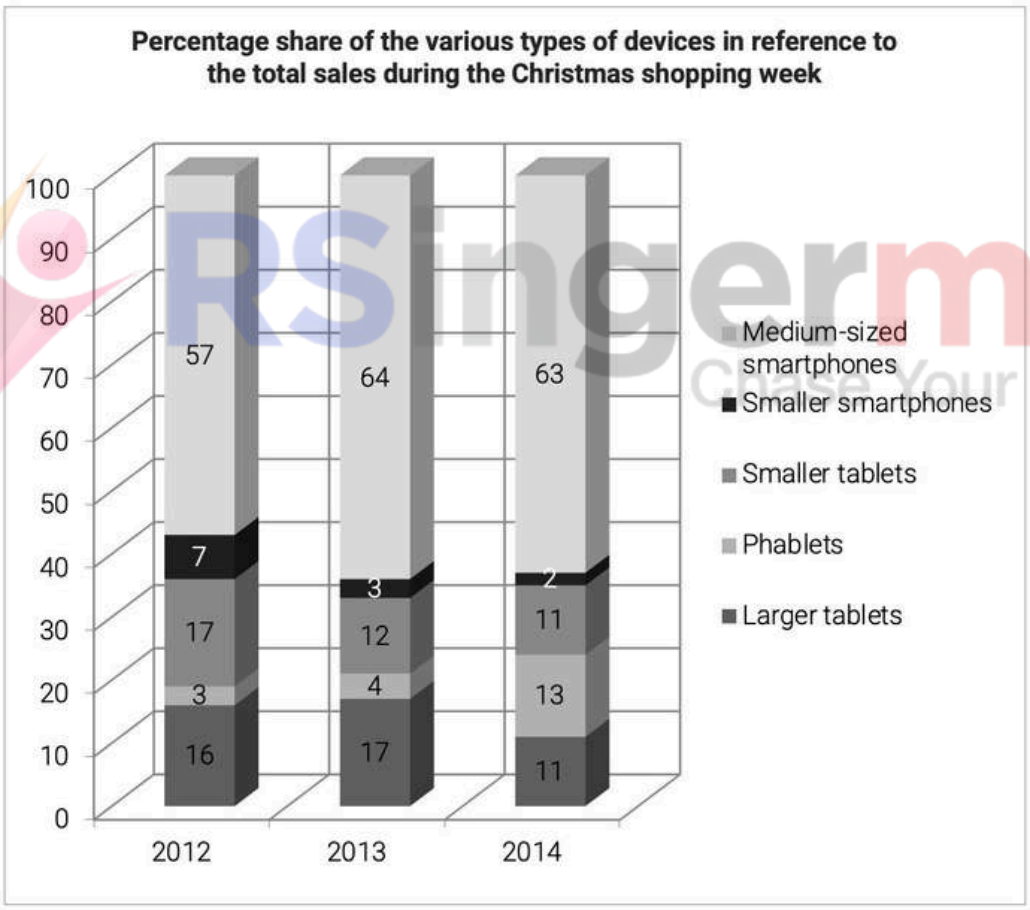
(B) Only statement II is correct.

(C) Both statements are correct.

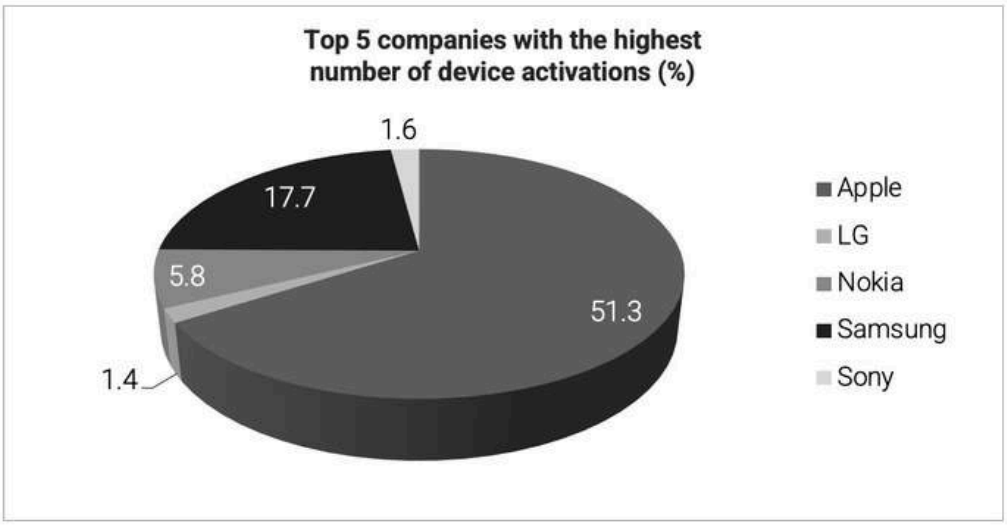
(D) Neither of the two statements is correct.

1.8.

These numbers represent the sale of mobile devices the week before Christmas in 2014.



Source: Distribution of new devices by form factor week leading to Christmas. Flurry Analytics, December 19-25, 2014, http://www.flurry.com/blog/flurry-insights/apple-and-apps-dominated-christmas-2014, Accessed 25.03.2019



Source: Top 5 Device Activations by Manufacturer. Flurry Analytics, December 19-25, 2014, http://www.flurry.com/blog/flurry-insights/apple-and-apps-dominated-christmas-2014, Accessed 30.01.2019

Which of the following statements is or are correct?

I. The number of phablets increased in all of the subsequent years, whereas the sales for smaller smartphones decreased in all of the subsequent years.

II. In all of the years listed, the sales of Apple devices helped to push the sales of medium-sized smartphones.

(A) Only statement I is correct.

(B) Only statement II is correct.

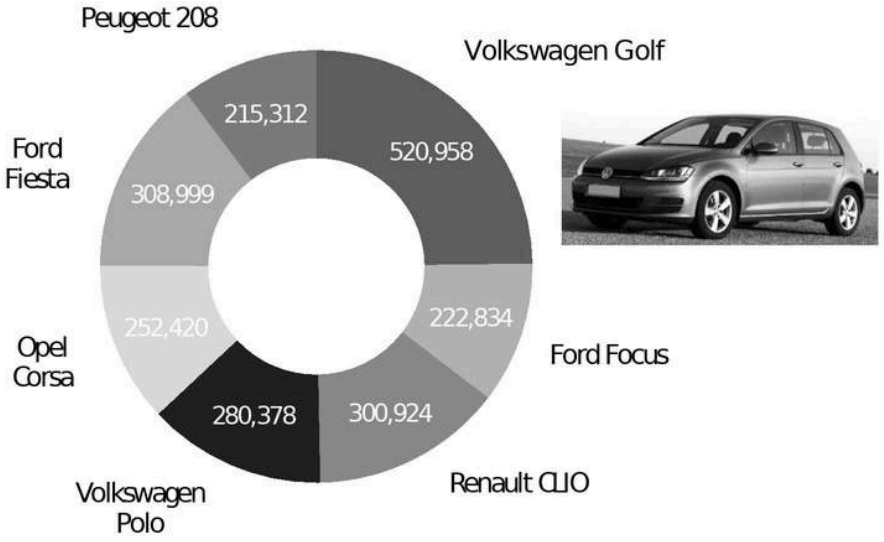
(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.9.

The following doughnut chart shows the top 7 best-selling automobiles in Europe for 2014.

Bestselling automobiles in Europe for 2014



Source: MSN, http://www.msn.com/en-gb/cars/news/europe%E2%80%99s-best-selling-cars-of-2014/ss-AA8uofg#image=2, Accessed 30.01.2019

Which of the following statements is or are correct?

I. In 2014, the sales of Volkswagen Golf surpassed the sales of Renault CLIO by more than 66.7%.

II. The combined sales of Peugeot 208 and Renault CLIO could not surpass the sales of the most sold automobile in Europe for 2014.

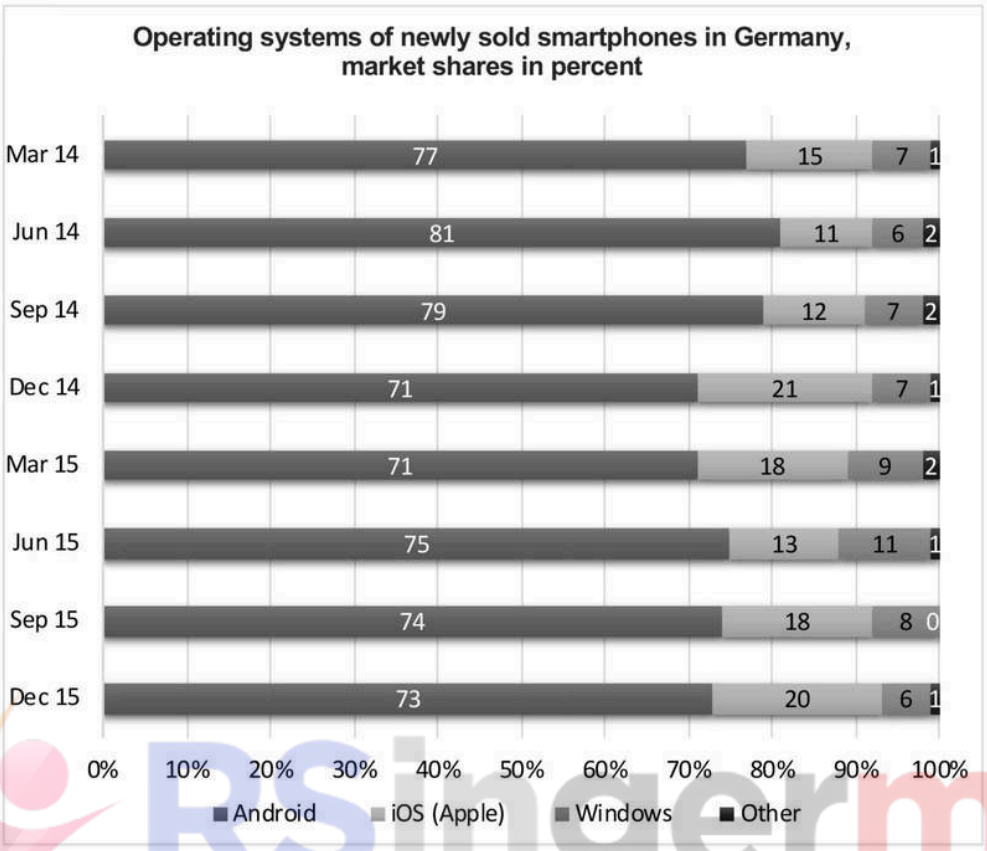
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.10.
The following diagram shows the market share of smartphones sold each month using iOS, Android, Windows, or another operating system.



Source: Kantar Worldpanel ComTech, Smartphone OS sales market share, http://www.kantarworldpanel.com/global/smartphone-os-market-share/, Accessed 05.02.2016

Which of the following statements is or are correct?

I. The number of smartphones sold with Android was the same in December 2014 and March 2015.

II. The comparison of June 2015 with the previous year shows that the market share of the Windows operating system, in comparison to the previous year, has increased the most among newly sold smartphones. Windows' share has grown more than 80%.

(A) Only statement I is correct.

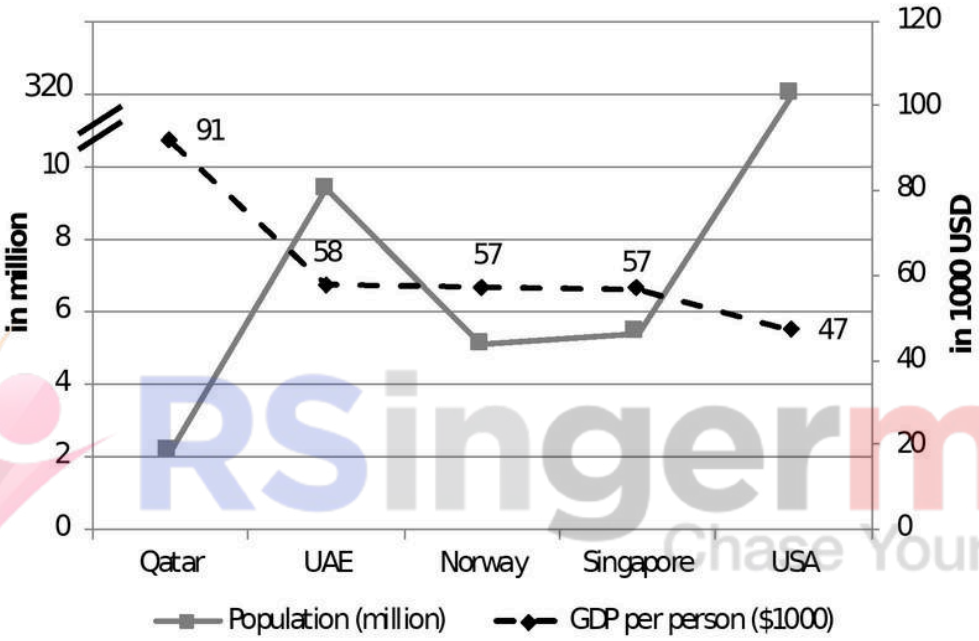
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.11.

This line chart shows six rich countries in the world according to their gross domestic product (GDP) per person as well as the corresponding population.



Source: World Atlas: The Richest Countries In The World, August 2014, http://www.worldatlas.com/articles/the-10-richest-nations-in-the-world.htm, Accessed 26.01.2019

Which of the following statements is or are correct?

I. The GDP of the USA is the lowest of the countries shown.

II. Comparing only the shown countries, one can conclude: the lower the population, the higher the GDP per person.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.12.

The following illustration shows the seven largest companies in the world as far as market capitalization is concerned up to March 31, 2014.

Company	Market capitalization (billion €)	Share price (status 23.02.2015)	Number of employees
Apple Inc.	€46	€131.16	98,000
Exxon Mobil Corp.	9	€89.18	75,000
Google Inc.	€41	€535.67	53,600
Microsoft Corp.	6	€43.82	128,076
Berkshire Hathaway Inc.	€40 9	€221,259.50	302,000
Roche Holding AG	€216	€259.80	88,509
Johnson & Johnson	€261 €28 6	€100.51	128,100

Sources: PWC, http://www.pwc.com/gx/en/audit-services/capital-market/publications/top100-market-capitalisation.jhtml, Accessed 26.01.2019

Which of the following statements is or are correct?

I. Microsoft Corp. has roughly a 32% lower market capitalization than Apple Inc., but employs exactly 1/4 more employees than Apple.

II. The combined net market capitalization of Apple Inc. and Microsoft Corp. surpasses the combined net market capitalization of Berkshire Hathaway, Roche Holding and Johnson & Johnson.

(A) Only statement I is correct.

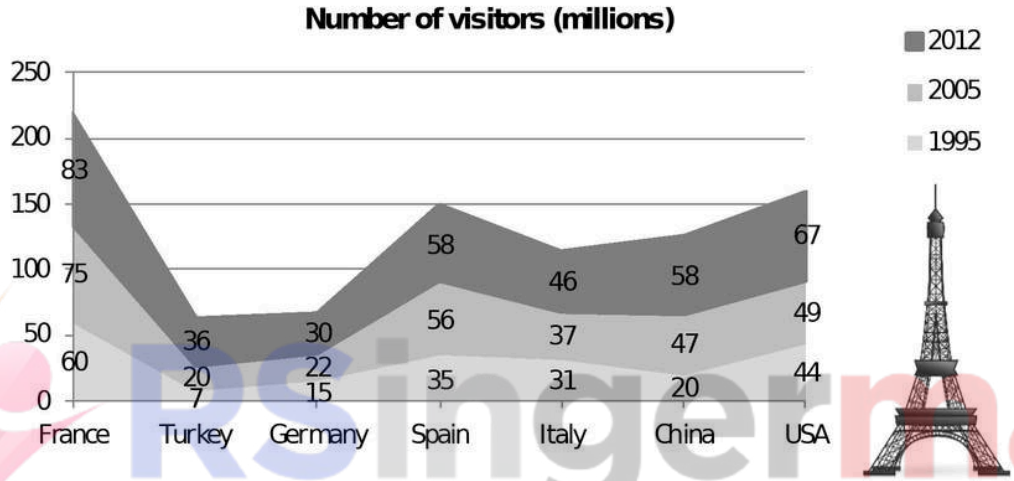
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.13.

This graph shows the top 7 countries visited by tourists from around the world.



Source: World Development 2014, Huang,Ven-Dee: International tourism data, February 2014, http://blogs.worldbank.org/opendata/international-tourism-data-top-destinations-number-arrivals-and-more, Accessed 30.12.2019, World Development Indicators

Which of the following statements is or are correct?

I. France was visited by twice as many tourists as Italy in 2012, 2005 and 1995, respectively.

II. Spain saw an almost 60% increase in tourists in 2005 compared to 1995 and a 10% increase in tourists in 2012 compared to 2005.

(A) Only statement I is correct.

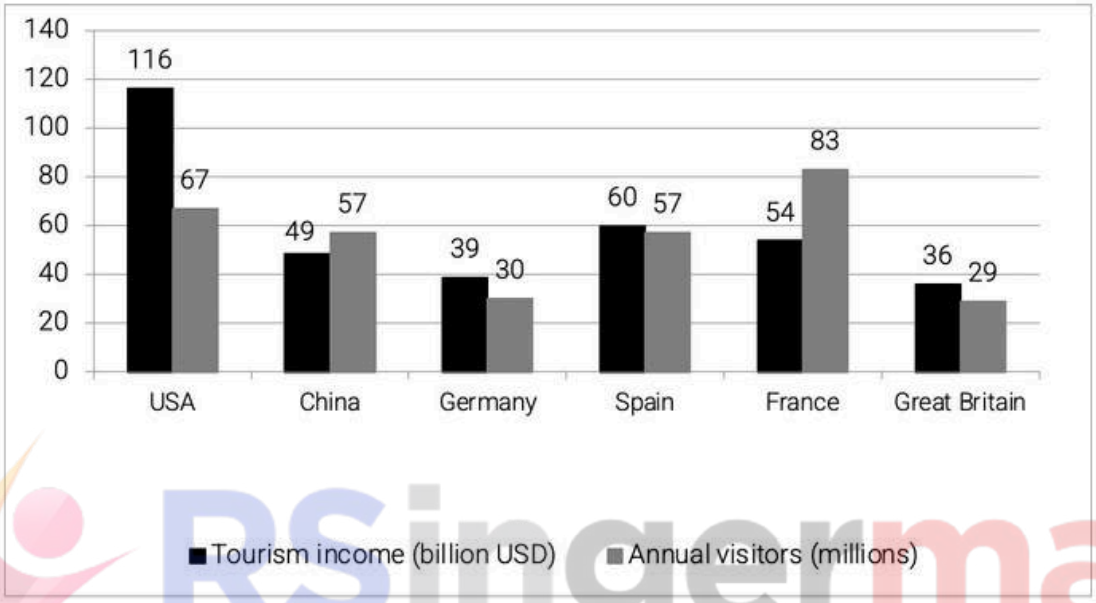
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.14.

This chart shows the top 6 tourist destinations worldwide as far as tourism income and number of tourists are concerned.



Source: Which country: Top 10 Most visited Countries in the World, http://www.whichcountry.co/top-ten-countries-earning-most-from-tourism/ and http://www.whichcountry.co/top-10-most-visited-countries-in-the-world/, Accessed 27.01.2019

Which of the following statements is or are correct?

I. Spain had 10 million fewer visitors than the United States, and its tourism income is more than 50% less than that of the USA.

II. The average number of tourists that visit these countries is approximately 54 million, and these countries generate an average tourism income of approximately $59 billion.

(A) Only statement I is correct.

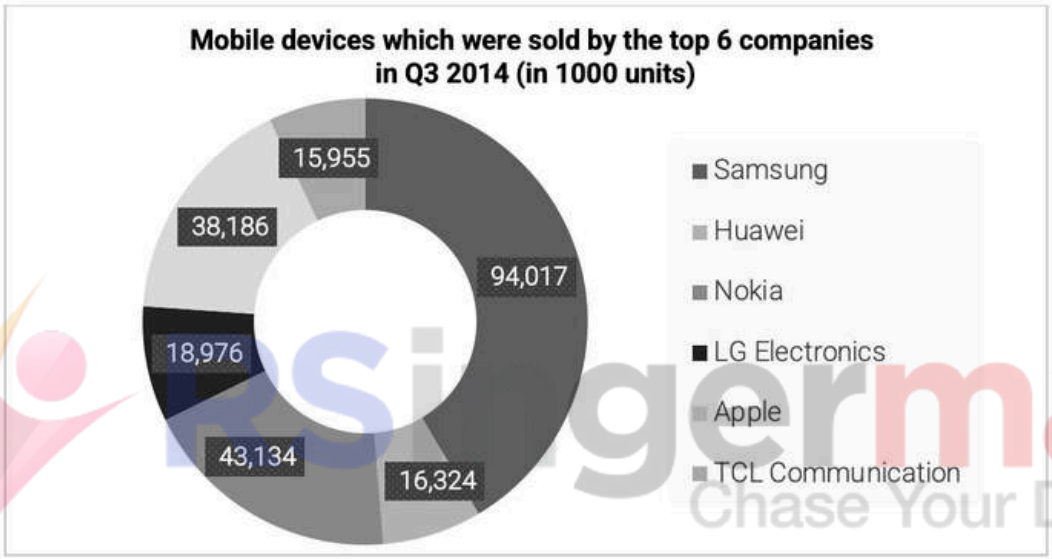
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.15.

This doughnut diagram shows the number of mobile devices which are sold by the six leading companies of this sector worldwide as well as the corresponding market share in the third quarter of 2014 (in thousand units).



Source: Gartner: Worldwide Mobile Phone Sales to End Users by Vendor in 3Q14, Table 3, December 2014, http://www.gartner.com/newsroom/id/2944819, Accessed 30.01.2019

Which of the following statements is or are correct?

I. Samsung sold more mobile devices than the devices of Huawei, Nokia, LG Electronics and TCL Communication combined.

II. In the third quarter of 2014, Apple sold more than 133.3% more mobile devices than Huawei.

(A) Only statement I is correct.

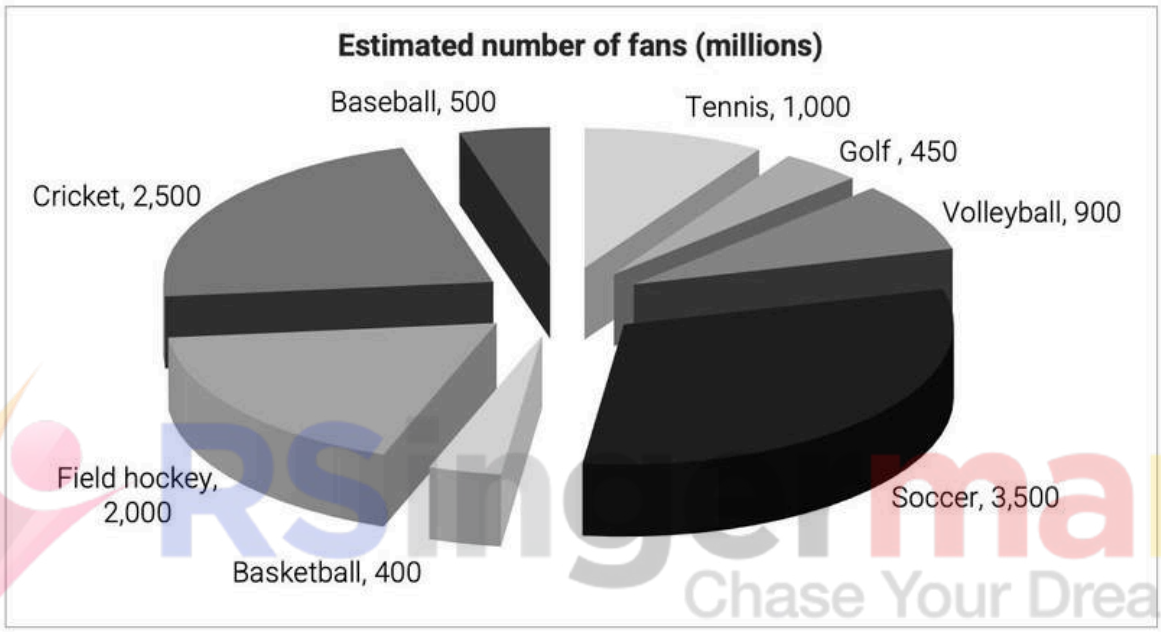
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.16.

Here is a list of the top 7 most popular sports worldwide as far as the number of fans is concerned.



Source: Top End Sports: Top 10 List of the Internet Worlds´ Most Popular Sports, http://www.topendsports.com/world/lists/popular-sport/fans.htm, Accessed 16.01.2019

Which of the following statements is or are correct?

I. Soccer has more fans worldwide than volleyball, golf, tennis, basketball and baseball combined. Furthermore, cricket has more fans than volleyball, golf, basketball and baseball combined.

II. The number of fans and the number of players of the various sports increase in the same order.

(A) Only statement I is correct.

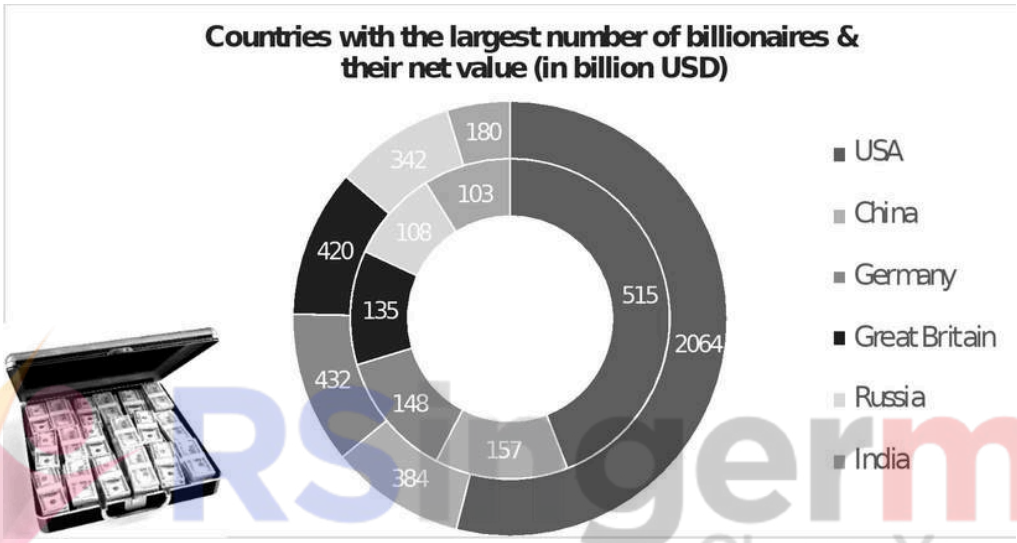
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.17.

The chart below shows the top 6 countries with the largest number of billionaires (inner doughnut) and their net worth in billion $ (outer doughnut, a88s of 2013).



Source: Rediff Business: Top 10 countries with most billionaires, November 2013, http://www.rediff.com/business/slide-show/slide-show-1-top-10-countries-with-most-billionaires/20131107.htm, Accessed 28.01.2019

Which of the following statements is or are correct?

I. China has a larger number of billionaires, but their net values are behind those of billionaires in Great Britain and Germany.

II. The total net value of the billionaires in Russia is more than 10% less than in China and 90% higher than in India.

(A) Only statement I is correct.

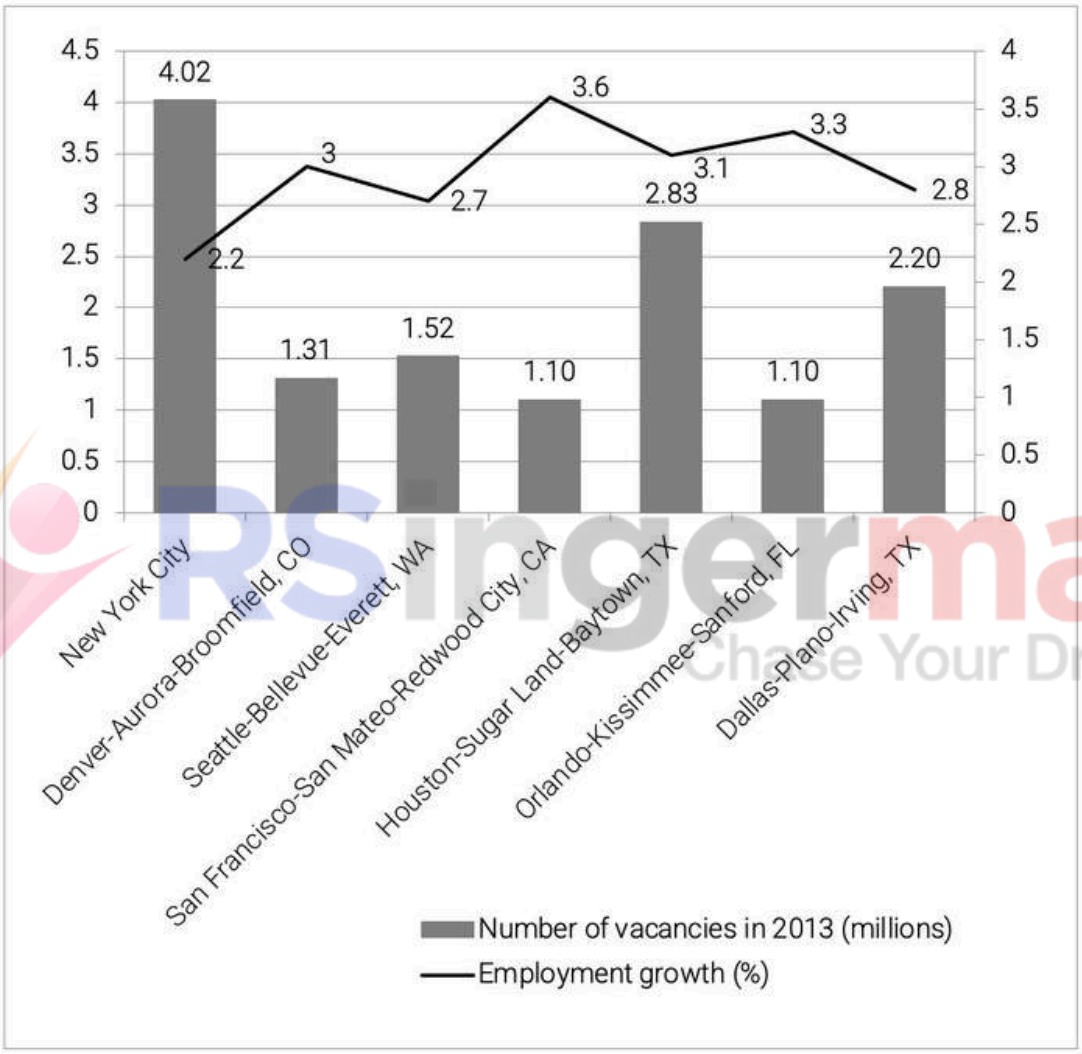
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.18.

The graph contains cities with the most job vacancies in the United States for 2013.



Source: Forbes: The Best Big Cities for Jobs 2014, http://www.forbes.com/pictures/edgl45gfih/methodology-21/, Accessed 29.01.2019

Which of the following statements is or are correct?

I. San Francisco-San Mateo-Redwood City, CA, as well as Orlando-Kissimmee-Sanford, FL and Houston-Sugar Land-Baytown, TX are

cities in which there is the largest employment growth. However, when combined, they still have fewer vacancies than New York City.

II. As far as employment growth is concerned, the ascending order is as follows: New York City; Seattle-Bellevue-Everett, WA; Dallas-Plano-Irving, TX; Houston-Sugar Land-Baytown, TX; Orlando-Kissimmee-Sanford, FL; Denver-Aurora-Broomfield, CO; San Francisco-San Mateo-Redwood City, CA.

(A) Only statement I is correct.

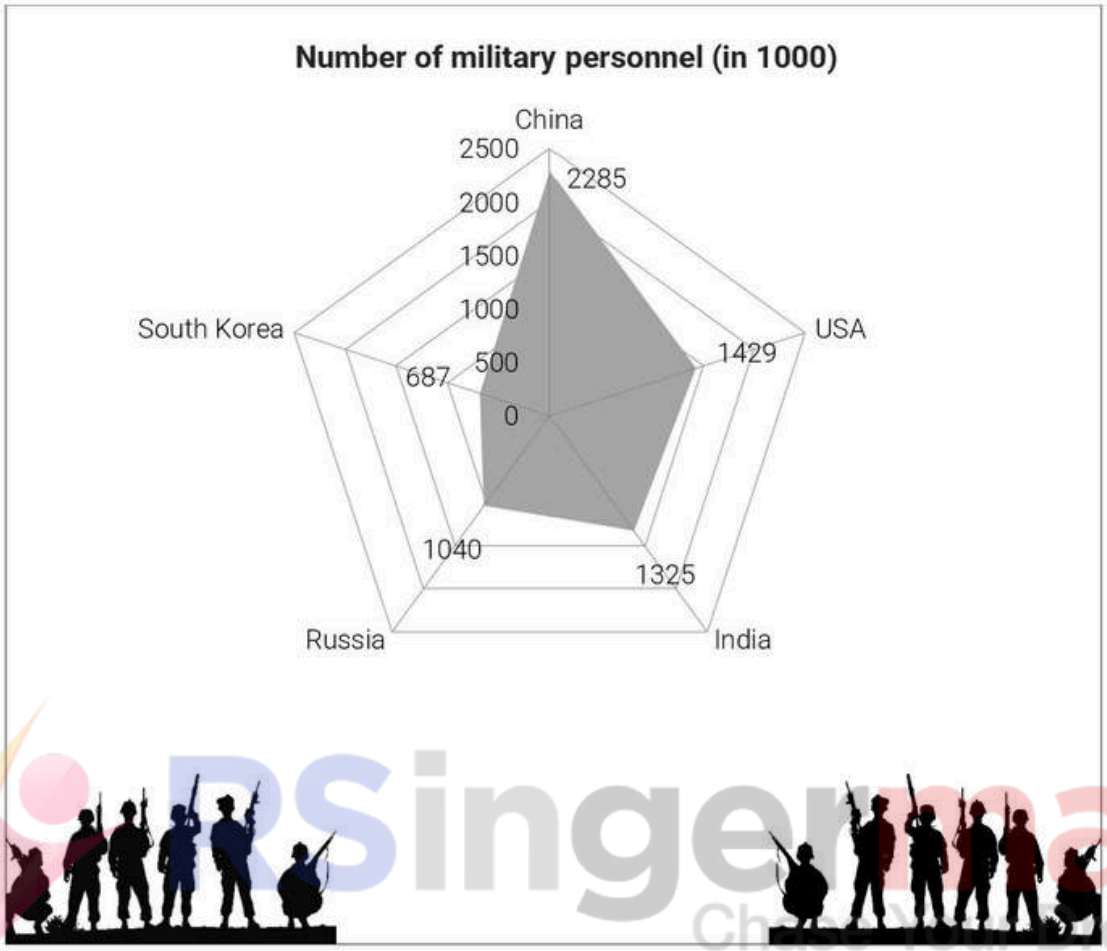
(B) Only statement II is correct.

(C) Both statements are correct.

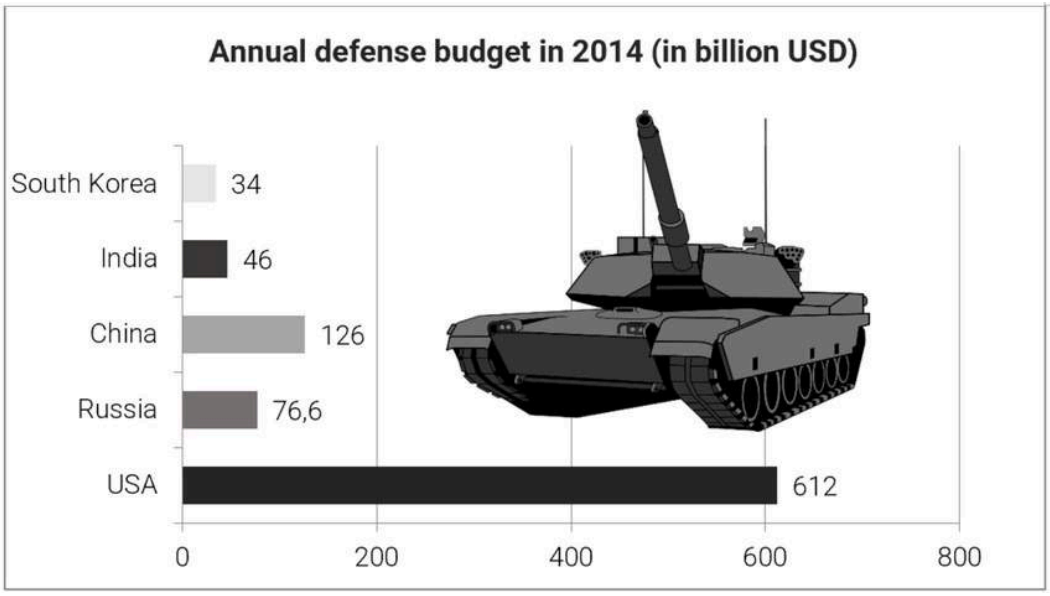
(D) Neither of the two statements is correct.

1.19.

This chart represents leading global military forces as far as the number of military personnel and their annual defense budget is concerned for 2014.



Source: Wikipedia: List of countries by number of military and paramilitary personnel, http://en.wikipedia.org/wiki/List_of_countries_by_number_of_military_and_paramilitary_personnel, Accessed 31.01.2019



Source: Business Insider, http://www.businessinsider.in/The-11-Most-Powerful-Militaries-In-The-World/articleshow/34126552.cms, Accessed 30.01.2019

Which of the following statements is or are correct?

I. The annual defense budget of the USA is higher than the combined budget of the other four countries in the chart. The total number of US military personnel is, however, lower than the combined military forces of any two specific countries in the chart.

II. The annual defense budget of China is 63% higher than that of India, and its military force is also almost 63% higher than that of India.

(A) Only statement I is correct.

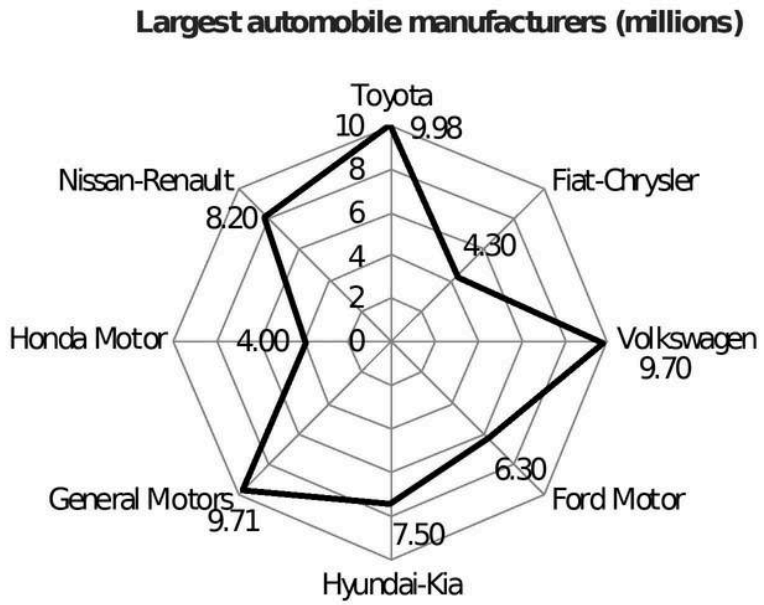
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.20.

This chart shows the most successful automobile manufacturers worldwide for 2013 by number of cars sold.



Source: Driving:The top 10 largest automakers in the world, http://driving.ca/toyota/corolla/auto-news/news/the-top-10-largest-automakers-in-the-world, Accessed 30.01.2019.

Which of the following statements is or are correct?
I. In ascending order, the number of sold automobiles is as follows: Honda Motor, Fiat-Chrysler, Ford Motor, Nissan-Renault, Hyundai- Kia, Volkswagen, General Motors and Toyota.

II. The production of Honda Motor was almost 60 per cent lower than that of Toyota in 2013, whereas Ford produced almost 37 per cent fewer automobiles than Toyota.

(A) Only statement I is correct.

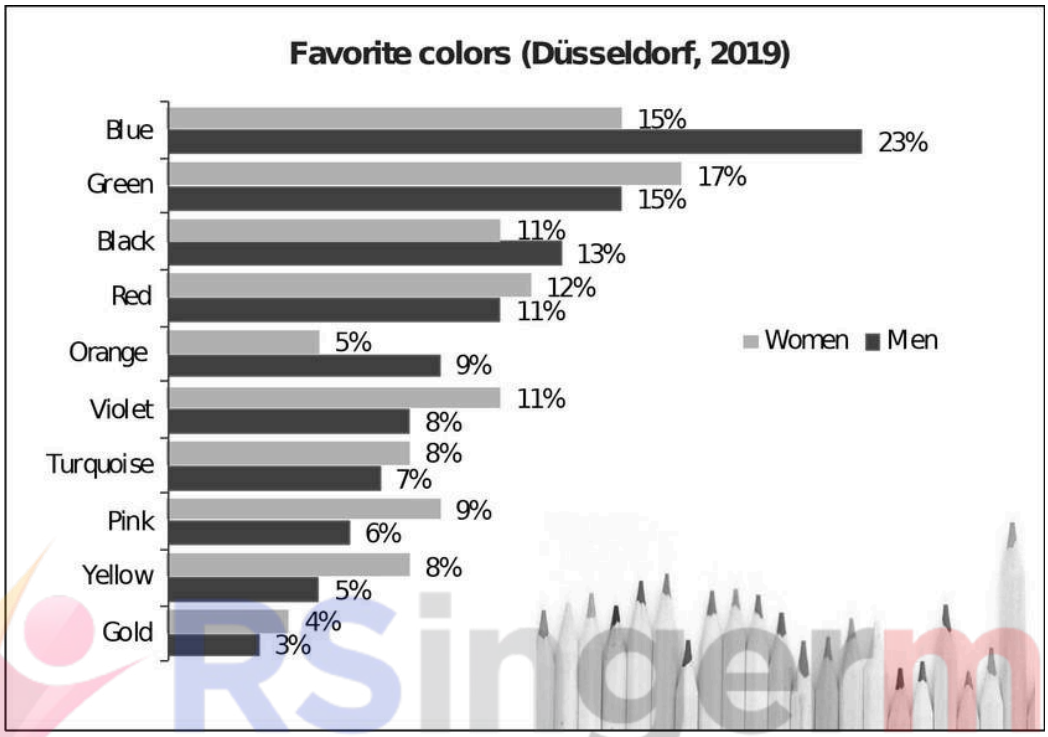
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.21.

A survey by the Institute "Statistica" in the pedestrian zone in Düsseldorf asked a total of 293 people about their favorite colors. They found out the following results:



Which of the following statements is or are correct?

I. Approximately 5 men said gold was their favorite color.

II. In Düsseldorf, blue is more often listed as a favorite color by men than women.

(A) Only statement I is correct.

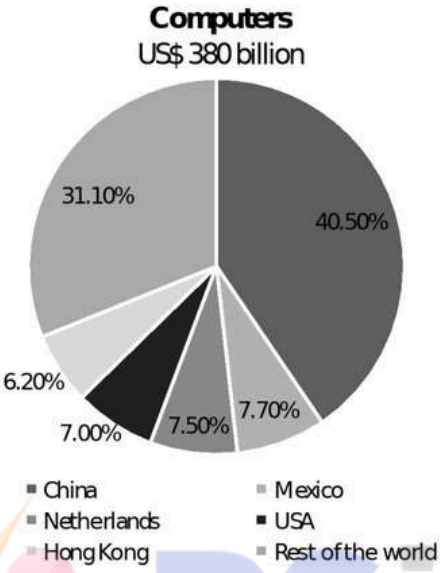
(B) Only statement II is correct.

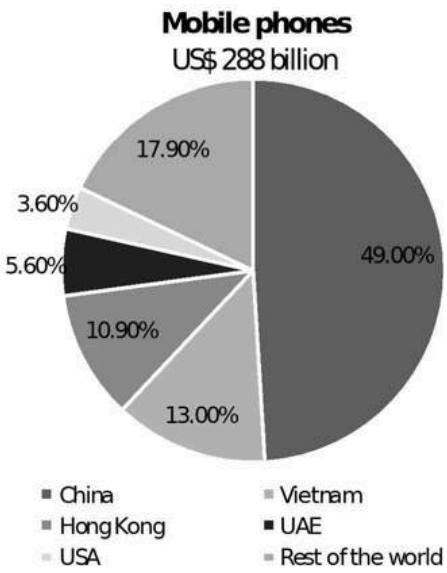
(C) Both statements are correct.

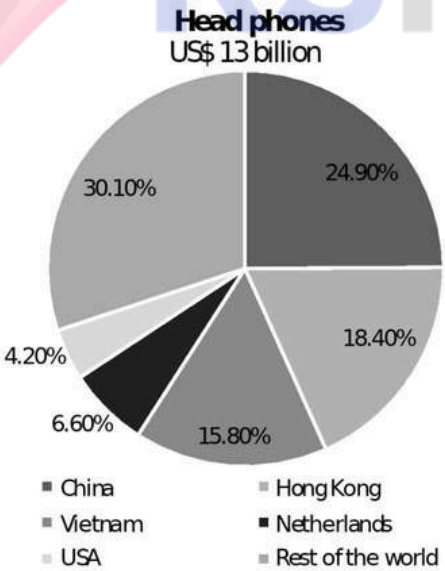
(D) Neither of the two statements is correct.

1.22.

The following pie charts show the international sales of exported computer devices, mobile phones and headphones by country in 2018. The five countries that sold the highest value in US dollars of devices, and the rest of the world, are shown.







Source 1: Daniel Workman, Computer Device Exports by Country, 01.05.2019: http://www.worldstopexports.com/computer-device-exports-country/, Accessed 01.08.2019

Source 2: Daniel Workman, Computer Device Exports by Country, 27.07.2019: http://www.worldstopexports.com/cellphone-exports-by-country/, Accessed 01.08.2019

Source 3: Daniel Workman, Computer Device Exports by Country, 06.07.2019: http://www.worldstopexports.com/headphones-exporters/, Accessed 01.08.2019

Which of the following statements is or are correct?

I. China exported approximately US$ 298 billion worth of computers, mobile phones and headphones in 2018.

II. Asian countries exported approximately US$ 210 billion worth of mobile phones in 2018.

(A) Only statement I is correct.

(B) Only statement II is correct.

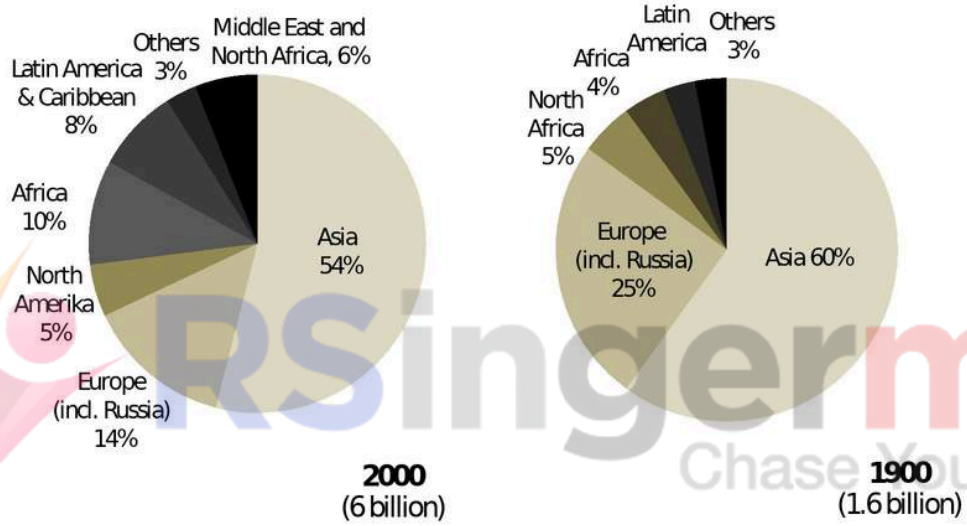
(C) Both statements are correct.

(D) Neither of the two statements is correct.

EXAM 2

2.1.

The size of the world population (in percent) by region in 1900 and 2000:



Source: IELTS Writing Task 1 #91, World Population 1900 and 2000, http://www.ielts-exam.net/images/graphs/IELTS_Writing_Task_1_139.png, Accessed: 17.07.2019

Which of the following statements is or are correct?

I. The world population grew by 275% between 1900 and 2000.

II. The population of Latin America & the Caribbean was larger in 2000 than the population of Europe (including Russia) in 1900.

(A) Only statement I is correct.

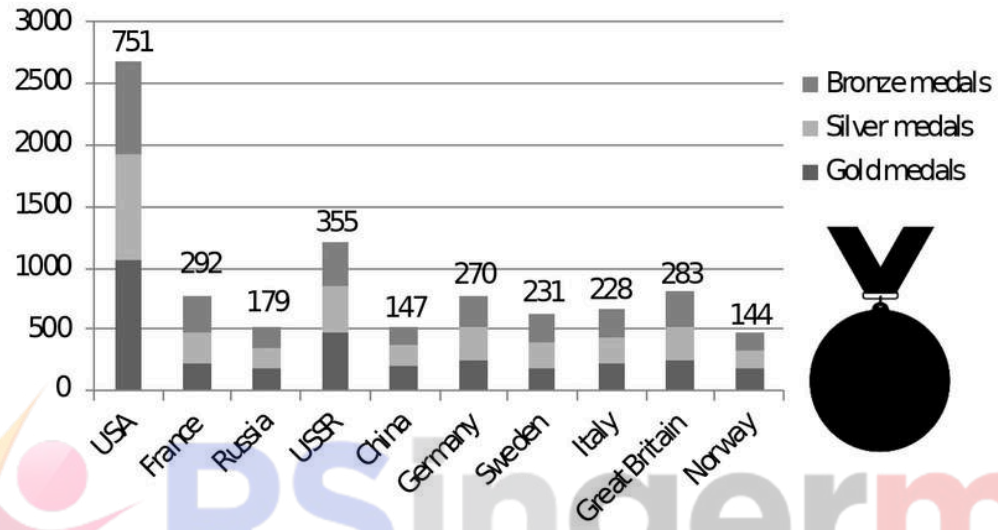
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.2.

This graphic shows the number of Olympic medals that countries have won overall and the number of bronze medals won during the last Olympic Games (numbers above the bars).



Source: Medal Summer Games, http://www.olympic.it/english/medal-summer-games, Accessed 17.07.2019

Which of the following statements is or are correct?

I. The following countries are sorted in descending order by number of total medals: Norway, China, Russia, Italy, Sweden, Germany, Great Britain, France, USSR, and the United States.

II. Italy won about 20% fewer bronze medals than Great Britain.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.3.

The table shows the number of domestic flights in Germany in 2015:

Airports	Number of domestic flights
Berlin – Munich	14,913
Berlin – Frankfurt	14,884
Hamburg – Munich	13,027
Düsseldorf – Munich	12,645
Frankfurt – Hamburg	11,043
Cologne/Bonn – Berlin	11,010
Frankfurt – Munich	10,008
Cologne/Bonn – Munich	9,952
Düsseldorf – Berlin	9,436
Berlin – Stuttgart	9,010
Hamburg – Stuttgart	6,072
Düsseldorf – Hamburg	6,002
Munich – Hannover	5,452
Frankfurt – Leipzig/Halle	4,983
Cologne/Bonn – Hamburg	4,951

Source: Luftverkehr in Deutschland, Mobilitätsbericht 2015, p.19, https://www.dfs.de/dfs_homepage/de/Presse/Publikationen/DFS_Mobilita%CC%88tsbericht_2015.pdf, Accessed 05.06.2019

Which of the following statements is or are correct?

I. Munich was the city where the most flights took off and landed in 2015.

II. In 2015 there were more flights from Hamburg than from Düsseldorf.

(A) Only statement I is correct.

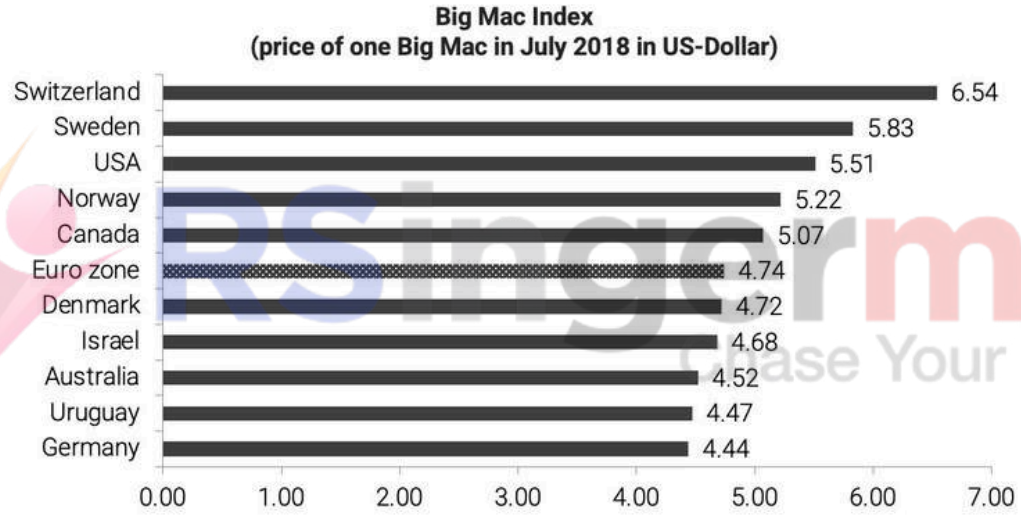
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.4.

The Big Mac Index is used as an indicator to compare the purchasing power of different currencies. Specifically, the prices for a Big Mac in different countries are compared with one another by converting the prices in the respective currency into the US Dollar. The graphic shows the data as of July 2018.



Source: The Economist, McDonald's, Informationen aus dem Institut der deutschen Wirtschaft, 07.2018, https://www.iwd.de/artikel/big-mac-index-der-etwas-andere-wechselkurs-399656/, Accessed 17.07.2019

Which of the following statements is or are correct?

I. In the United States, a Big Mac costs around 9% more than on average in Canada.

II. In the most expensive country displayed, a Big Mac is about 1.8 times as expensive as in the cheapest country.

(A) Only statement I is correct.

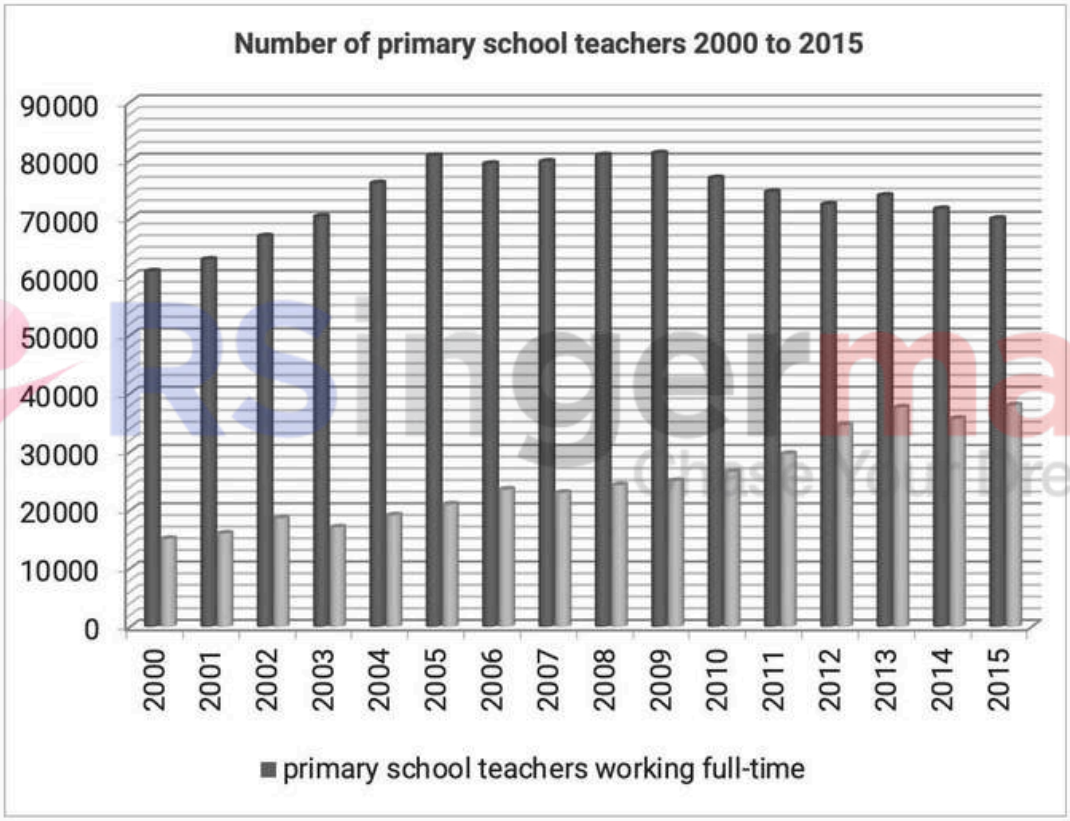
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.5.

The following diagram shows the development of the employment of primary school teachers working full-time and part-time in the country of “Meuji” in the years 2000 to 2015.



Which of the following statements is or are correct?

I. The number of full-time teachers stagnated between 2005 and 2009.

II. In 2000, 2001 and 2002 there were on average around 4 times as many primary school teachers working full-time as working part-time.

(A) Only statement I is correct.

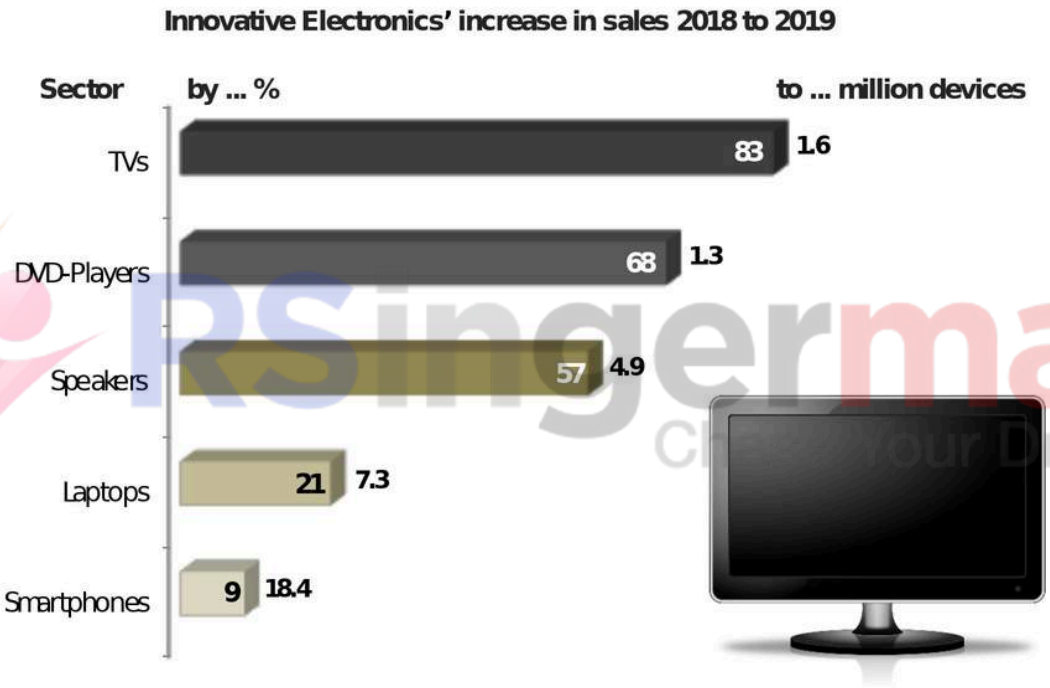
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.6.

The diagram shows the expected increase in sales from last year to this year by the manufacturer “Innovative Electronics.”



Which of the following statements is or are correct?

I. Last year, more TV sets were sold than DVD players.

II. “Innovative Electronics” expects that among the products shown, the number of TVs sold will be the largest this year.

(A) Only statement I is correct.

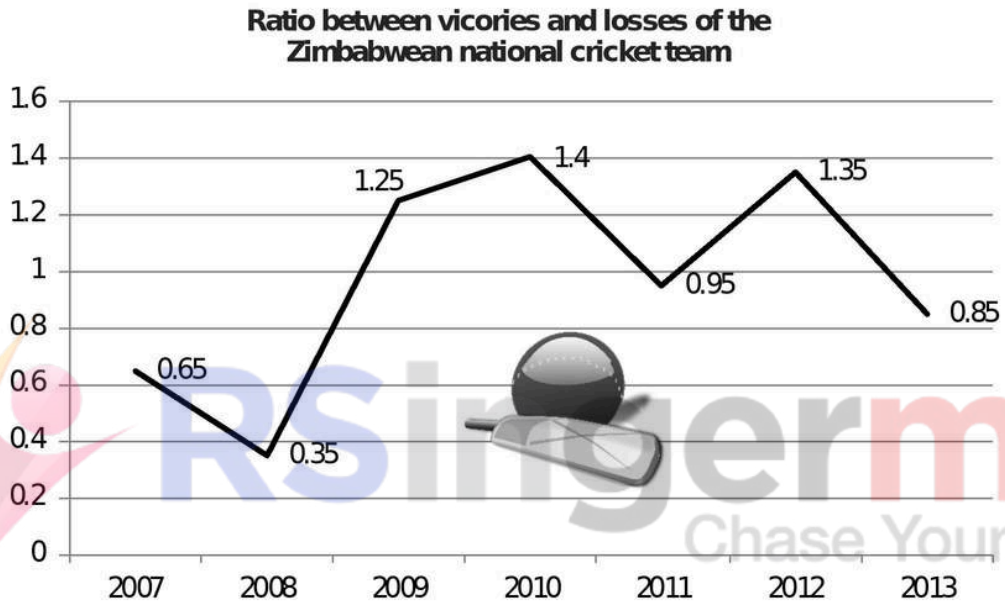
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.7.

The line graph represents the ratio of One-Day International (ODI) games over the past seven years.



Which of the following statements is or are correct?

I. Between 2009 and 2012, the Zimbabwean ODI team won more international ODI matches each year than it lost.

II. According to the chart, the percentage increase in number of victories for the Zimbabwean cricket team between 2009 and 2010 was 12%.

(A) Only statement I is correct.

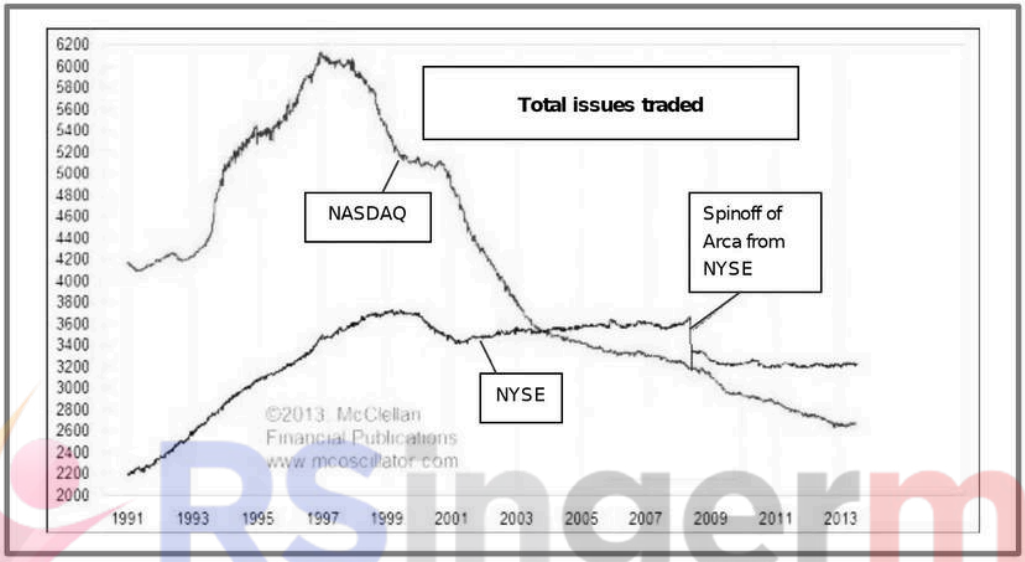
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.8.

The following figure shows the values of the NASDAQ, the largest electronic stock exchange in the USA, and the NYSE, the largest stock exchange in the world, between 1991 and 2013.



Which of the following statements is or are correct?

I. Between 2005 and 2013, the NASDAQ did not trade more than the NYSE.

II. The NYSE doubled in value between 1995 and 1999.

(A) Only statement I is correct.

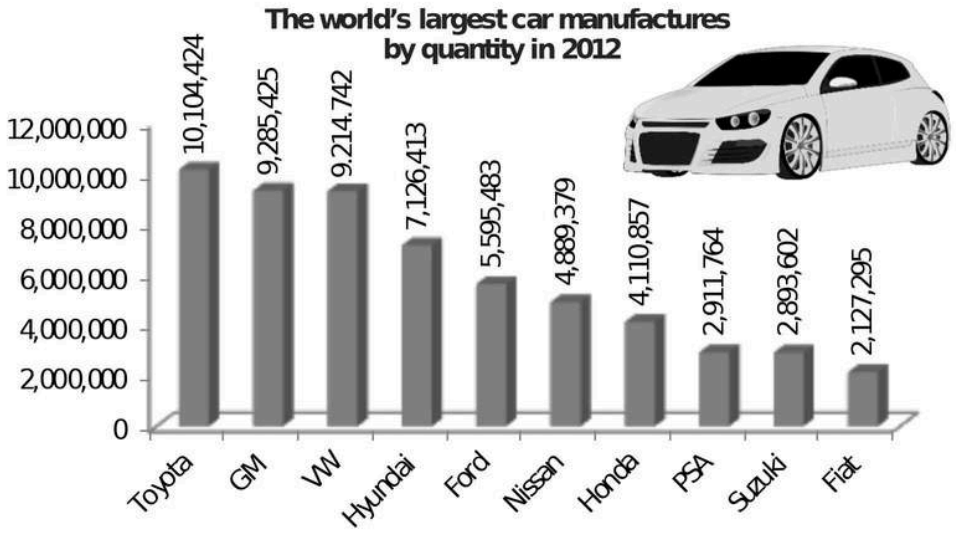
(B) Only statement II is correct.

(C) Both statements are correct.

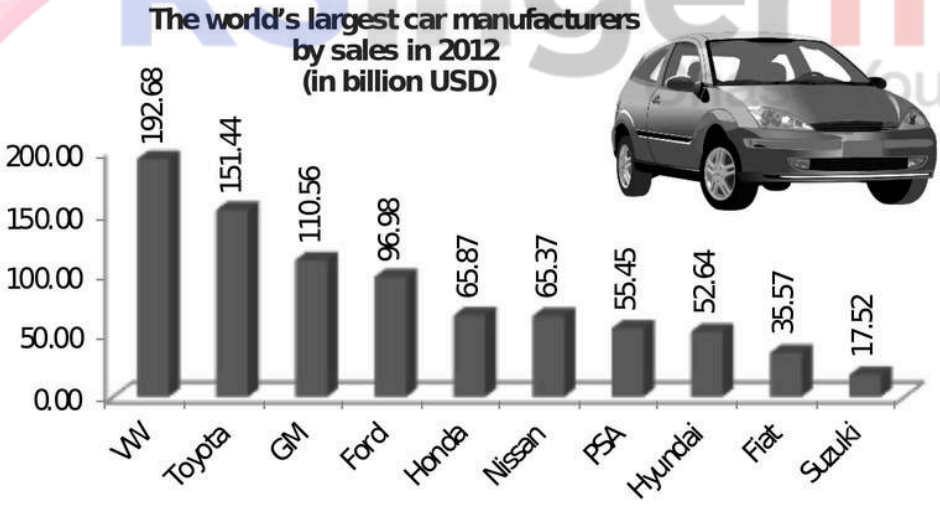
(D) Neither of the two statements is correct.

2.9.

The two figures show the quantities and sales of the world's ten largest car manufacturers in 2012.



Source: Wirtschaftszahlen zum Automobil, 2012, Automobilproduktion nach Ländern nach Angaben der OICA, https://de.wikipedia.org/wiki/Wirtschaftszahlen_zum_Automobil, Accessed 03.06.2019



Source: Automobilindustrie, Beschäftigte in der Automobilindustrie, 2012, https://de.wikipedia.org/wiki/Automobilindustrie#Besch%C3%A4ftigte_in_der_Automobilindustrie_in_der_E8U, Accessed 03.06.2019

Which of the following statements is or are correct?

I. VW made about 27% more in sales than Toyota, but sold about 10% fewer cars.

II. Hyundai had higher price per car than Fiat.

(A) Only statement I is correct.

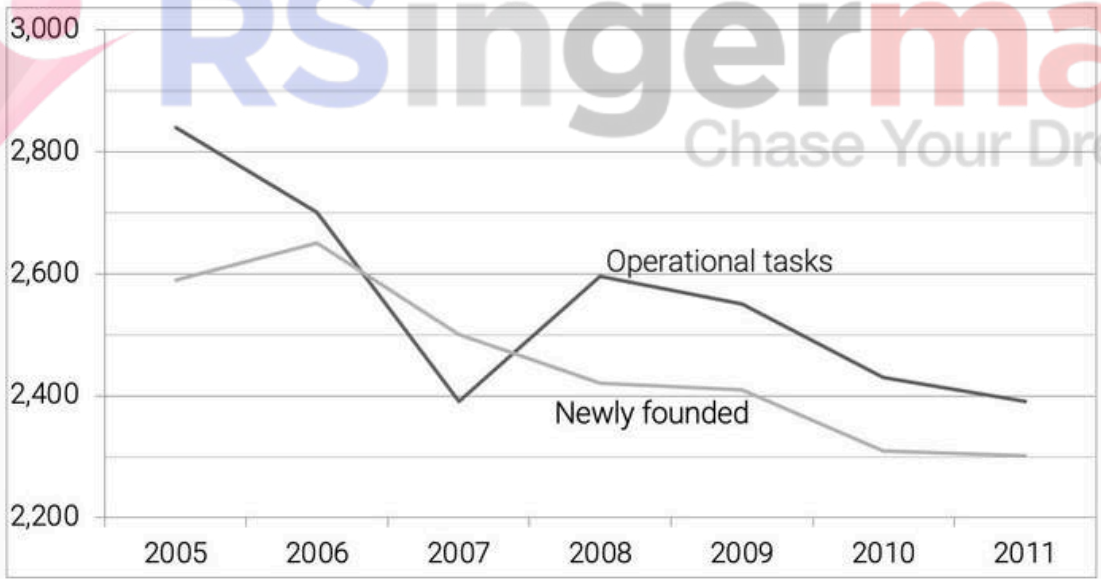
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.10.

The following line diagram shows the number of operational tasks and the number of newly founded companies between 2005 and 2011.



Source: Destatis, 2012, https://www.destatis.de/DE/Publikationen/Thematisch/TransportVerkehr/Querschnitt/BroschuereVerkehrBlick0080006139004.pdf?__blob=publicationFile, Accessed 13.07.2019

Which of the following statements is or are correct?

I. The number of operational tasks and the number of newly founded companies decreased by at least 50% between 2008 and 2011.

II. The number of operational tasks increased by around 200 between 2007 and 2008, while the operational tasks decreased by more than 10% between 2006 and 2007.

(A) Only statement I is correct.

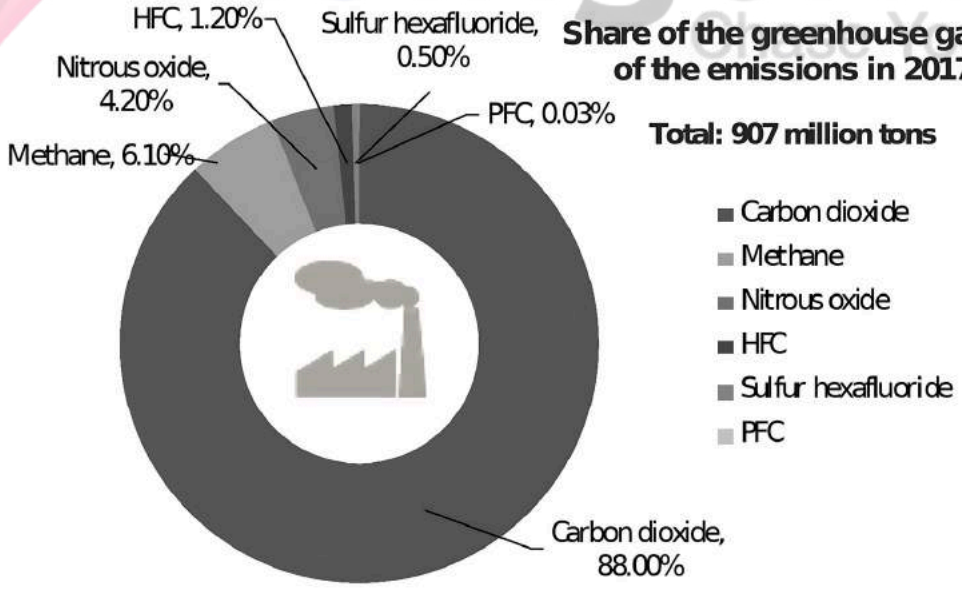
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.11.

The following graphic illustrates the contribution of various greenhouse gases to Germany's total emissions in 2017.



Source: Umweltbundesamt, Treibhausgas-Emissionen in Deutschland, https://www.umweltbundesamt.de/daten/klima/treibhausgas-emissionen-in-

deutschland#textpart-3,
Accessed 08.07.19

Which of the following statements is or are correct?

I. About 55 million tons of methane were emitted.

II. The three gases listed that emitted the least, together account for less than 1/50 or less than 20 million tons of the total emissions.

(A) Only statement I is correct.

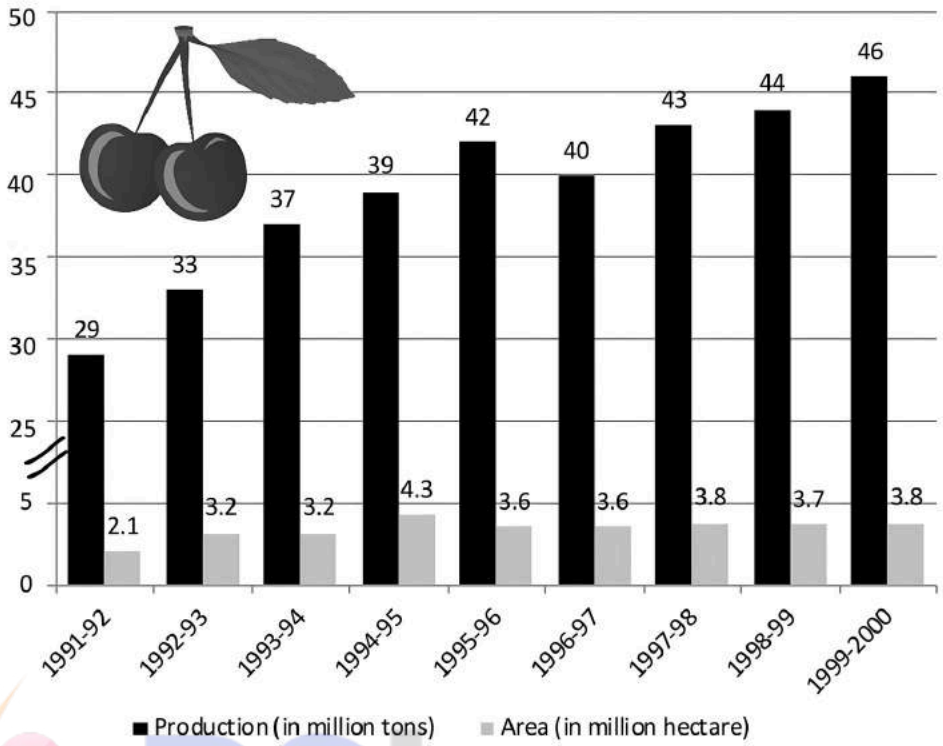
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.12.

The graphic shows the production of fruit in India, as well as the area needed for production.



Source: Ministry of Agriculture, Government of India, http://agricoop.nic.in/hort/hortrevo5.htm, Accessed 23.06.2019

Which of the following statements is or are correct?

I. The change in total fruit production in India was greatest in 1999-2000 (compared to the previous year).

II. Due to the increase in production areas in 1995-96, 1996-97 and 1997-98, fruit production also increased during these years.

(A) Only statement I is correct.

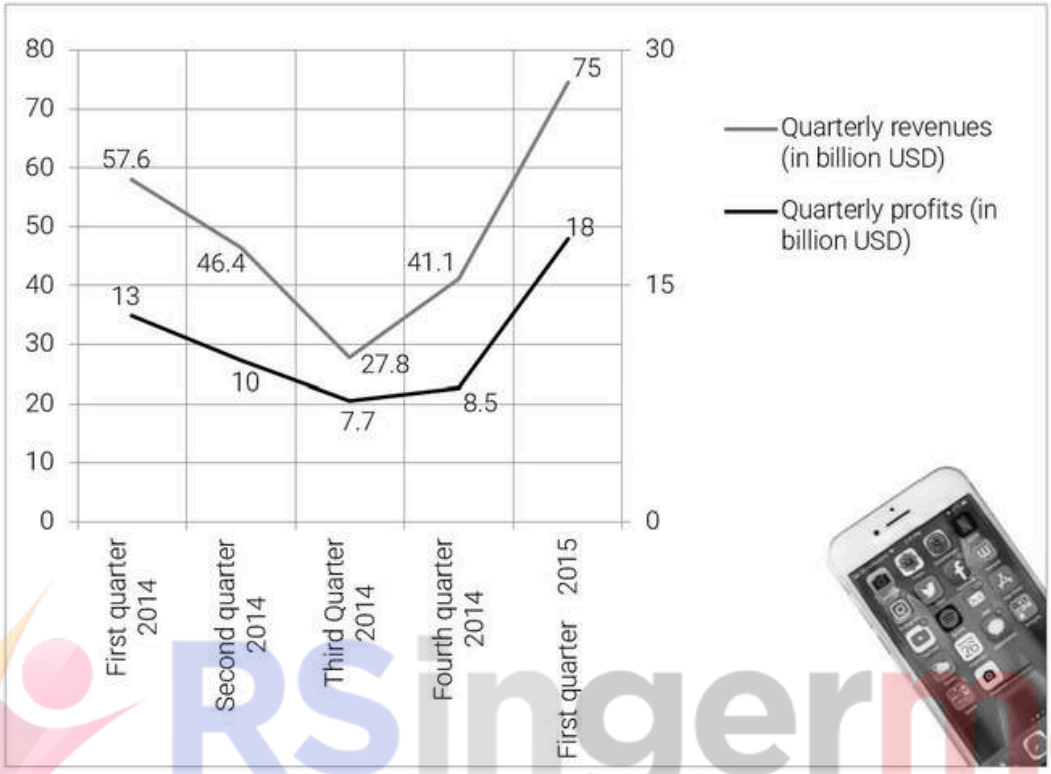
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.13.

The chart below shows Apple Inc.'s quarterly revenue and profit for five quarters in 2014 and 2015.



Source: Apple Official Website, http://investor.apple.com/results.cfm, Accessed 23.06.2019

Which of the following statements is or are correct?

I. Apple Inc.'s revenues decreased approximately 20% in the second quarter of 2014 and approximately 40% in the third quarter of 2014. Profits improved approximately 10% in the fourth quarter of 2014 and approximately 112% in the first quarter of 2015%.

II. A lower revenue was reported in the first quarter of 2015 than in the fourth quarter of 2014 and the third quarter of 2014 combined.

(A) Only statement I is correct.

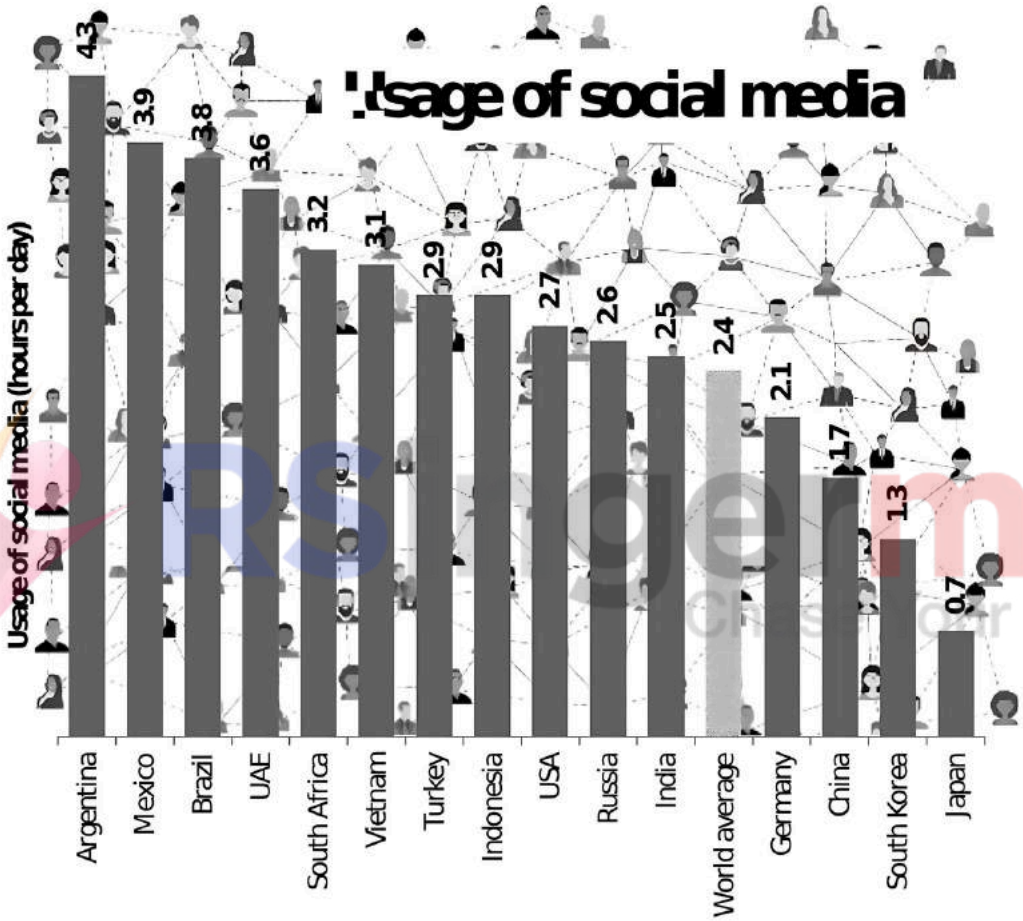
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.14.

This graphic shows the average time that users spent on social media such as Facebook or Instagram in January 2015, per country and as a global average, in descending order.



Source: We Are Social, Statistics, http://wearesocial.net/tag/statistics/, Accessed 06:07.2019

Which of the following statements is or are correct?

I. Users in Japan spent more than 70% less time using social media than the world average. UAE users, on the other hand, spent 50% more time on social media than the global average.

II. The total time spent in Argentina on social networks per day is greater than the total time spent in Japan, China and South Korea combined.

(A) Only statement I is correct.

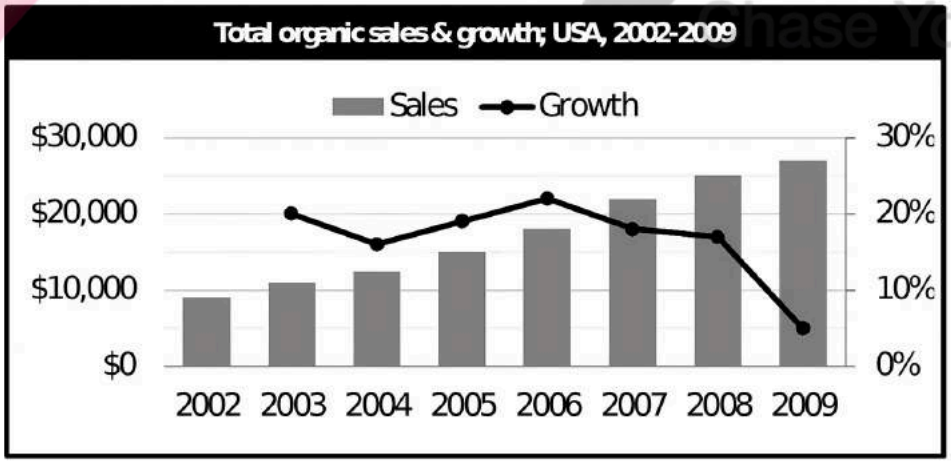
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.15.

The following bar chart and line chart show the total sales and growth of the organic company "Modern Solutions Agriculture" (MSA) in the USA between 2002 and 2009. The company closed due to bankruptcy in 2010 because its growth and international (outside of the United States) sale of the "Organic Seaweed Fertilizer" did not sufficiently recover from the financial crisis.



Source: Organic Trade Association's 2010 Organic Industry Survey Conducted 1/21/2010 – 3/3/2010 (consumer sales), Accessed 19.07.2019

Which of the following statements is or are correct?

I. In 2009, the company "Modern Solutions Agriculture" sold the most "Organic Sea-weed Fertilizer" compared to the other years

shown. II. The number of sales increased slightly less than 2/3 between
2003 and 2006, but the growth decreased from approx. 22% to approx. 5% between 2006 and 2009.

(A) Only statement I is correct.

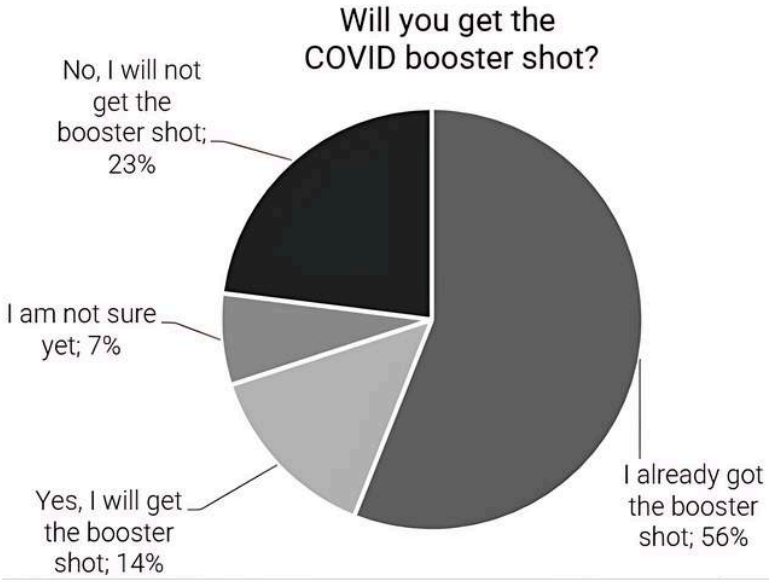
(B) Only statement II is correct.

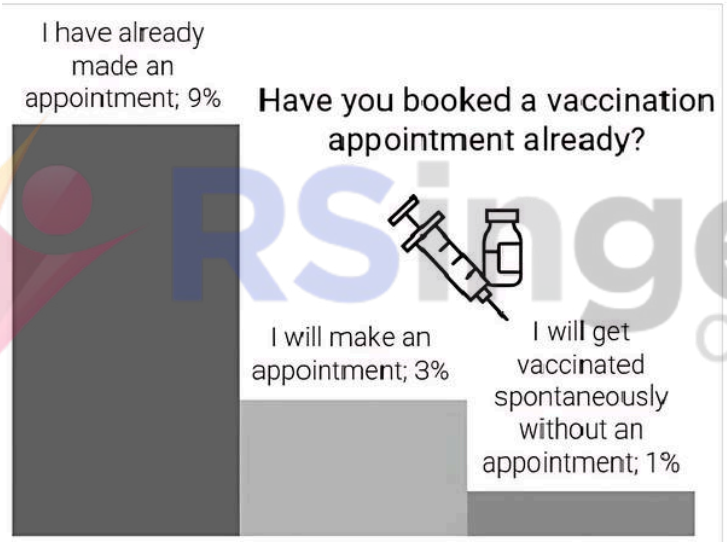
(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.16.

In January 2022, a survey was conducted among adults in Berlin, in which the participants were asked whether they will be getting the COVID booster shot and whether they had already made an appointment for it. Approximately 90% of appointments that have been made are kept.





Which of the following statements is or are correct?

I. Over 50% of those who want to have a booster shot have already booked an appointment.

II. At least 12% of people will show up for the vaccination appointment.

(A) Only statement I is correct.

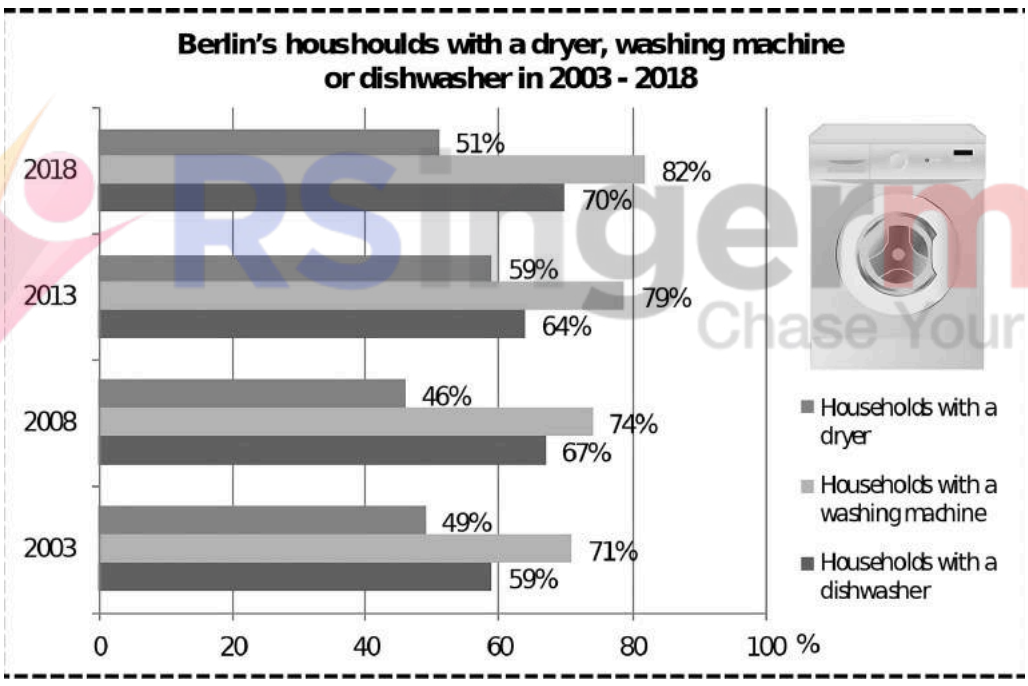
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.17.

The following illustration was created on the basis of a population survey. The authors of the survey wanted to find out how good the energy consumptions of individual devices are in Berlin's households. However, the exact data are not listed here, but only how many households have a dryer, washing machine or dishwasher. The total number of households (the number of which has increased steadily) in the respective survey year was set to 100%.



Which of the following statements is or are correct?

I. In 2003, no more than 50% of households owned all three devices.

II. In 2018, at least 51% of households owned all three devices.

(A) Only statement I is correct.

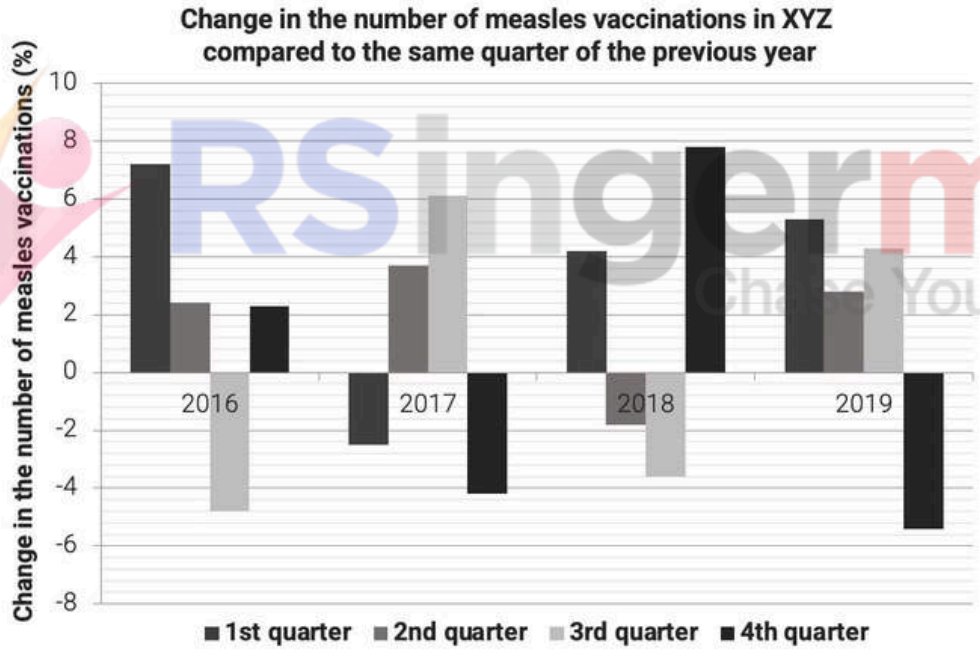
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.18.

The diagram shows the change in the number of measles vaccinations in the country of XYZ from 2016 to 2019. For each year, the percentage change of vaccinations given in the 1st, 2nd, 3rd and 4th quarters is shown in comparison to the same quarter of the previous year.



Which of the following statements is or are correct?

I. In the third quarter of 2017, the number of measles vaccinations was slightly less than 10% greater than in the third quarter of 2018.

II. In the fourth quarter of 2019, the number of measles vaccinations was more than 5% less than in the same quarter of 2018.

(A) Only statement I is correct.

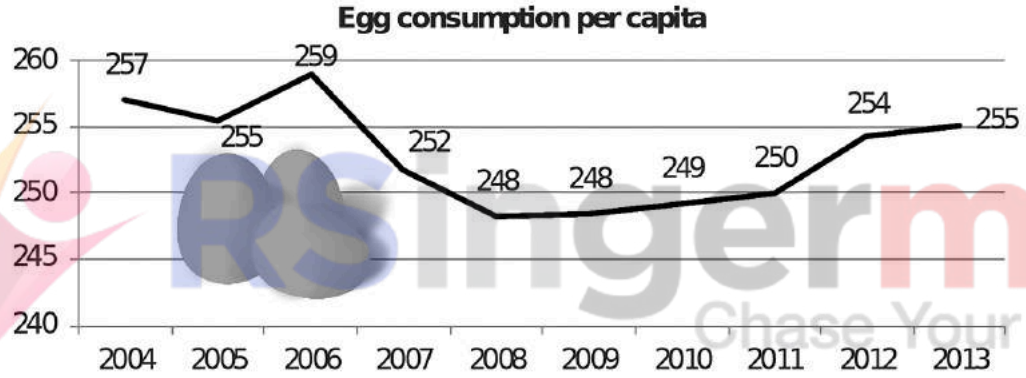
(B) Only statement II is correct.

(C) Both statements are correct.

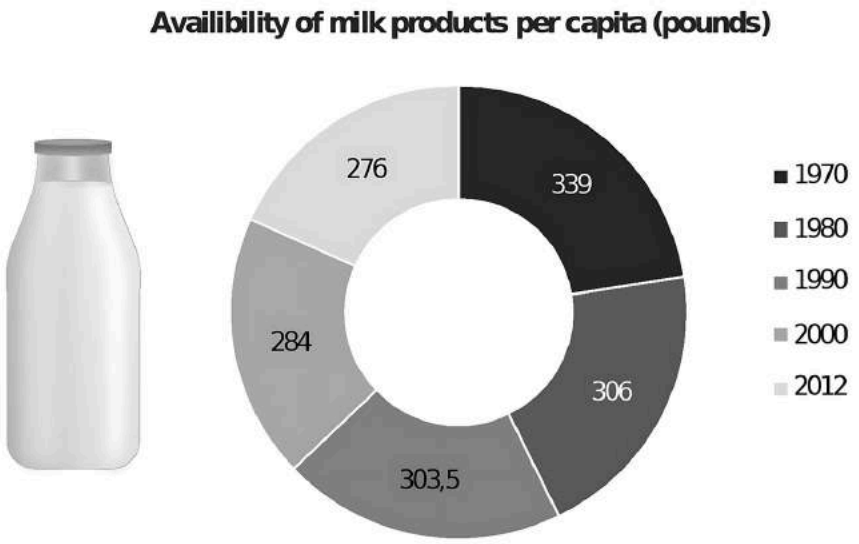
(D) Neither of the two statements is correct.

2.19.

The figures show how many eggs US citizens consumed per capita on average over the past 10 years and how many pounds of milk products were available on average per capita since 1970.



Sources: 1. United Egg Producers, http://www.unitedegg.org/GeneralStats/default.cfm, Accessed 15.07.2019;
2. USDA, http://www.ers.usda.gov/amber-waves/2014-june/trends-in-us-per-capita-consumption-of-dairy-products,-1970-2012.aspx, Accessed 15.07.2019



Source: CIA World Factbook
https://www.cia.gov/library/ publications/the-world-factbook/fields/2010.html, Accessed 15.07.2019

Which of the following statements is or are correct?

I. Per capita the egg consumption in 2011 was almost 3% lower than in 2004. The availability of dairy products in 1990 was almost 10% higher than in 2012.

II. The decrease in the availability of dairy products (in pounds per capita) between 2012 and 2000 was larger than the decrease in egg consumption per head between 2007 and 2006 (in eggs per capita) – absolute numbers, no percentages.

(A) Only statement I is correct.

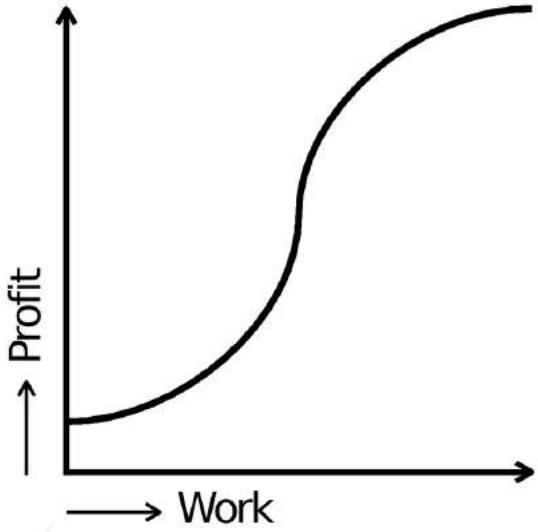
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

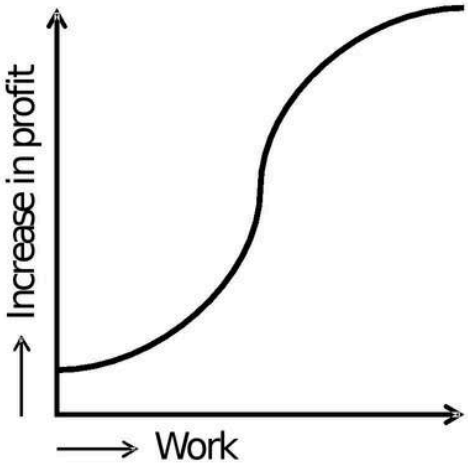
2.20.

In the economy, more work often does not, as one might expect, lead to a linear increase in profit. If you look at the profit as a function of the work done, you get a graph that looks like this:

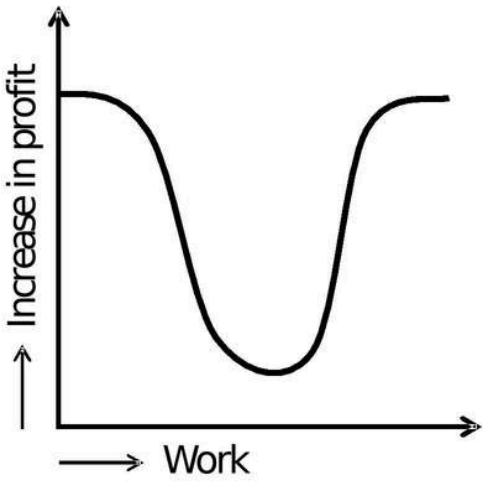


Which of the following graphs correctly shows the increase in profit in relation to the profit development displayed above?

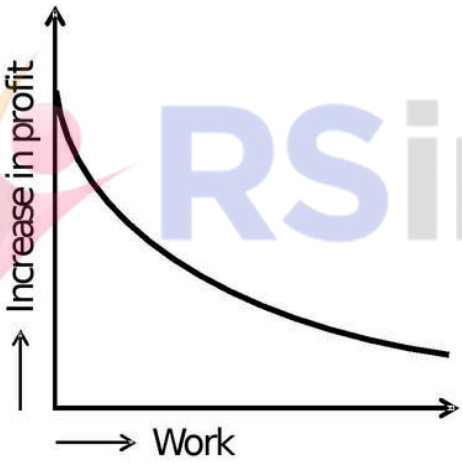
(A)



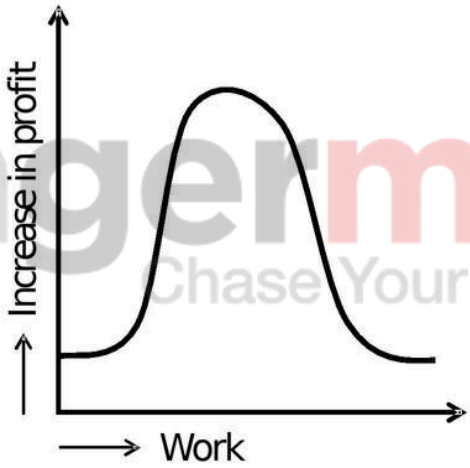
(B)



(C)

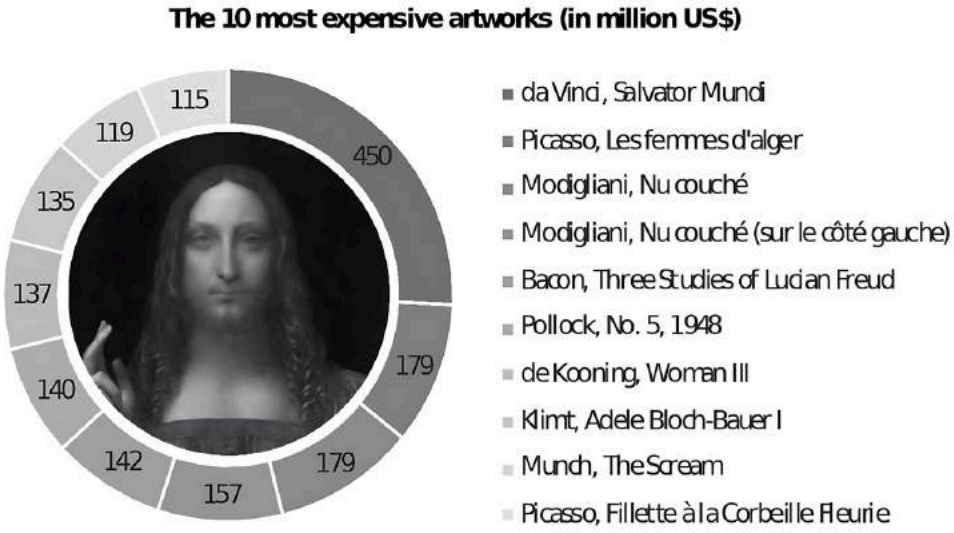


(D)



2.21.

The graphic below shows the prices for the ten pieces of art which were sold worldwide for the highest price. It compares only the most expensive paintings sold, not the most valuable paintings existing. Although works of art are valued for insurance purposes, there is no way to give artwork such as the “Mona Lisa” a monetary value; it is considered priceless.



Source, https://de.wikipedia.org/wiki/Liste_der_teuersten_Gem%C3%A4lde, Accessed 29.07.2019

Which of the following statements is or are correct?

I. All Modigliani paintings ever sold made more money overall than all Picasso paintings ever sold.

II. Da Vinci's "Salvator Mundi" is 56% more expensive than Munch's "The Scream". Klimt's "Adele Bloch-Bauer I" is 5% less expensive than Bacon's "Three Studies of Lucian Freud".

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.22.

The table below shows the number of foreigners who lived in Munich in 2018, broken down by nationality. Only countries, from which 10,000 or more people moved, are shown.

The foreign population in Munich by nationality in 2018

Part of the earth	Nation	Number of foreigners
Europe		
EU	Bulgaria	12 575
	France	10 239
	Greece	26 560
	Italy	27 821
	Croatia	38 137
	Austria	21 046
	Poland	19 101
	Romania	17 980
the rest of Europe	Bosnia and Herzegovina	19 692
	Kosovo	11 428
	Serbia	14 115
	Turkey	37 876
total		326 513
Africa		
total		20 135
America		
total		16 188
Asia		
	Iraq	12 237
total		68 458
Australia, New Zealand and Oceania		
total		1 097
Stateless and unknown nationality		952

Total number of foreigners		433 343

Source: Landeshauptstadt München, https://www.muenchen.de/rathaus/Stadtinfos/Statistik/Bev-lkerung/Bev-lkerungsbestand.html, Accessed 01.08.2019

Which of the following statements is or are correct?

I. European foreigners made up 75% of the total number of foreigners.

II. Munich had more residents from Iraq than from Syria.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

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ANSWER KEYS

EXAM 1			EXAM 2	
Question	Answer		Question	Answer
1.1.	A		2.1.	C
1.2.	A		2.2.	B
1.3.	C		2.3.	A
1.4.	C		2.4.	A
1.5.	B		2.5.	C
1.6.	B		2.6.	A
1.7.	B		2.7.	D
1.8.	A		2.8.	A
1.9.	C		2.9.	A
1.10.	B		2.10.	B
1.11.	D		2.11.	C
1.12.	D		2.12.	D
1.13.	D		2.13.	A
1.14.	B		2.14.	C
1.15.	B		2.15.	B
1.16.	A		2.16.	A
1.17.	C		2.17.	A
1.18.	D		2.18.	B
1.19.	A		2.19.	C
1.20.	B		2.20.	D
1.21.	D		2.21.	D
1.22.	A		2.22.	C

DETAILED ANSWERS

EXAM 1

1.1. Answer: A

Statement I: The calculation is as follows: (52 ÷ 32 – 1) = 62.5%. Statement I is correct.

Statement II: The five countries where gamers spend the least amount of time gaming, according to the statistic, are Great Britain (= 32), Mexico (= 33), India (= 33), South Korea (= 36) and Italy (= 39). Russia does not belong on this list. Thus, statement II is not correct.

1.2. Answer: A

Statement I: Thanks to the gridlines which display a scale unit of 2, we see that the value for "transport and storage" grew from 100 in 1999 to 126 in 2008. "All sectors of the economy" grew less, from 100 to 118. Thus, statement I is correct.

Statement II: In the following three years, the demand was less than in the previous year: 2000, 2003 and 2009. Thus, statement II is not correct. As you can see, here the readers are tested as to whether or not they can differentiate between unimportant and important information. In this example, the difficult terms which are explained in a lengthy manner are not needed in order to answer the question. This is why you should always read the question first and determine afterwards what you have to focus on.

1.3. Answer: C

Statement I: This diagram clearly shows that the most freight imports came from China and the USA. Thus, statement I is correct.

Statement II: 50,000 tons of freight imports came from Japan, and more than 200,000 tons of freight imports came from the USA. Since 50 is less than 30% when compared to 200, statement II is correct as well.

1.4. Answer: C

Statement I: In order to answer this question, we have to take a look at the gridlines. The gridlines show an increase in increments of 1 and help us to understand the exact numbers. 2014: 24 + 35 + 39 + 32 + 9 + 1 = 140 2015: 32 + 40 + 50 + 42 + 9 + 1 = 174 Increase from 2014 to 2015: 174 – 140 = 34. Statement I is correct.

Statement II: $\frac{32 - 24}{24} = \frac{8}{24} = \frac{1}{3}$. *Statement II is correct.*

1.5. Answer: B

Statement I: During summer, there is a demand for electricity. Thus, statement I is not correct.

Statement II: According to the diagram, 400,000 units of electricity are in demand at 15:00 during winter. Thus, statement II is correct.

1.6. Answer: B

Statement I: Here, there is an optical illusion. The y-axis starts with 5. For this reason, we have to ignore the optical impression and read the values found on the axis with the help of the columns. The values are: Missing trust = 16

#1 barrier

Insufficient resources = 14 #2 barrier
Incorrect assumptions = 7 #5 barrier
16 is less than 14 + 7. Thus, statement I is not correct.

Statement II: Emotional interference = 11

Inconsistent / ambiguous messaging = 12
11 + 12 = 23, the same amount as in the category "Others".
Statement II is correct.

1.7. Answer: B

Statement I: In the given order, Frozen is wrongly placed and should be listed in front of Iron Man 3. Thus, statement I is not correct.

Statement II: You can calculate the worldwide income from Titanic and the domestic gross income from The Avengers. The total is more than the worldwide income of Avatar.
Calculation:
Avatar worldwide: 2,028 + 761 = 2,789
Titanic worldwide and The Avengers domestic: 1,528 + 659 + 623 = 2,810
Therefore, the income from Avatar is less. Thus, statement II is correct.

1.8. Answer: A

Statement I: If we take a look at the first graphic which displays the percentages of the various types of devices that were sold in total during the Christmas shopping week for these three years, we see that the sales numbers for phablets have increased, while the sales numbers for smaller smartphones have decreased for the same time period. Thus, statement I is correct.

Statement II: We do not have enough information to determine the
sales of Apple devices. Thus, statement II is not correct.

Please note: The answer in statement II should actually be "one does not know". In such cases where there is insufficient data to evaluate the statement, the statement is considered false.

1.9. Answer: C

Statement I: If the sales surpass each other by more than 66.7%, or 2/3, then we can confirm this through a simple rough calculation. 2/3 of 300,924 is 200,616 ⇒ (300,924 + 200,616) < 520,958. This calculation shows that the sales even exceed 66.7%. Thus, statement I is correct. Statement II: The combined sales of Peugeot 208 (= 215,312) and of Renault CLIO (= 300,924) are 516,236, which is slightly less than the 520,958 sold by Volkswagen Golf. Therefore, statement II is correct.

1.10. Answer: B

Statement I: The text and the diagram do not express anything pertaining to the entire size of the market for the corresponding years, and this is why we cannot make any statement concerning the size. Thus, statement I is not correct.

Statement II: The market share change between June 2014 and June 2105 is as follows:
Android: 75 – 81 = -6 Android lost 6% of the market share.
iOS: 13 – 11 = 2 Apple iOS gained 2% of the market share.
Windows: 11 – 6 = 5 Windows' market share has almost doubled. From 6%, it increased to 11%, which is an increase of 83%.
Other: 1 – 2 = -1 The other category was only half as large in June 2015 when compared to June 2014.
Statement II is correct.

1.11. Answer: D

Statement I: To calculate the GDP, we need to multiply the GDP figure per person with the population. The USA has a GDP of 320 × 47 = 15,040. Now we need to find one country where the GDP is lower than the USA's. Qatar, for instance, has a GDP of 91 × 82. Thus, statement I is not correct.

Statement II: Were this statement correct, the two lines would have to change in opposite directions. As the GDP per person line decreases, the population line should have increased. This is not the case. UAE, compared to Norway, has a higher population, but also a higher GDP per person. Statement II is, therefore, not correct

1.12. Answer: D

Statement I: You can calculate the difference in market capitalization and employees using Apple as the base value. Calculation: 1 – (€318 billion ÷ €469 billion) = 32.2%. If, however, you try to roughly estimate 125% of 98,000, you will quickly realize that this is less than 125,000 – and thus also less than 128,076. Therefore, statement I is not correct.

Statement II: The combined market capitalization of Apple (= €469 billion) and Microsoft (= €318 billion) is €787 billion, whereas the combined market capitalization of Berkshire Hathaway Inc. (= €286 billion), Roche Holding AG (= €266 billion) and Johnson & Johnson (= €261 billion) is €813 billion. Thus, statement II is not correct.

1.13. Answer: D

Statement I: In 1995 and 2005, this statement could roughly be true. However, we can see that it is not true for 2012 (46 × 2 > 90).

Statement II: This statement is made up of two parts. You can calculate the number of tourists for 2005 by using the number of tourists in 1995 as the base value, for which the result is almost

60%. Calculation: (56 ÷ 35 – 1) = 60%. This calculation can be quite difficult without a calculator. The number of tourists in 2012 was, in comparison to 2005 however, not 10% (the number would be more than 60 in this case), but roughly 4%. Calculation: (58 ÷ 56 – 1) = 4%. Only the first part of statement II is correct. Therefore, statement II is not correct.

In the case of statement II, a quick estimation is sufficient to determine that the statement is wrong. 10% of 56 is 5.6. 56 + 5.6 > 58.

1.14. Answer: B

Statement I: Even though Spain is visited by 10 million fewer tourists than the USA, the tourism income is not more, but slightly less, than 50% when compared to the USA. Thus, statement I is not correct.

Statement II: You can calculate the average tourism income and average number of visitors by adding the respective numbers together and then dividing them by 6.
Calculate the average number of visitors per country:
(67 + 57 + 30 + 57 + 83 + 29) ÷ 6 = 53.8.
Calculate the average tourism income per country:
(116.3 + 48.5 + 38.8 + 59.9 + 53.8 + 35.9) ÷ 6 = 58.9.
According to this, both numbers are correct. Because of this, statement II is correct.

1.15. Answer: B

Statement I: You can add the number of sold Huawei, Nokia, LG Electronics and TCL Communication devices together and compare the result with the number from Samsung. While the four companies together sold 94.4 Million devices, Samsung only sold 94.0 Million devices during the same time period. Thus, statement I is not

correct. (You can also add the percentages and compare the result to the percentage of Samsung).

Statement II: Calculation: 133.3% corresponds to 4/3. If we add 1/3 of 16.3 million and 16.3 million together, we get 21.7 million devices. This number is less than the number of devices sold by Apple, namely 38.2 million devices. Therefore, statement II is correct.

1.16. Answer: A

Statement I: You can calculate the number of fans for both statements: 1) 900 + 450 +1,000 + 400 + 500 = 3,250; 3,500 > 3,250 2) 900 + 450 + 400 + 500 = 2,250 < 2,500 Thus, statement I is correct.

Statement II: Trick question (the number of players per sport is not mentioned). We do not have enough information to determine the number of players. Therefore, statement II is incorrect

1.17.

Answer: C

Statement I: You can see that China (157) has a higher number of billionaires than Germany (148) and Great Britain (136). Furthermore, the net value of the Chinese billionaires (384) is less than that of German (432) and British (420) billionaires. Thus, statement I is correct.
Hint: Pay attention to the statement. Statement I says that Great Britain and Germany both have fewer billionaires, but have a higher net value!

Statement II: In the first part of the statement, it is stated that the total net value of all Russian billionaires is more than 10% less than the Chinese billionaires.
Calculation I: 384 ÷ 10 = 38.4

384 – 38.4 = 345.6 > 342

Calculation II: 180 + (180 ÷ 100) × 90 = 342
Statement II is correct.

1.18. Answer: D

Please note: The titles of the y-axes have been omitted on purpose. The students need to conclude these by themselves. Please look at the values shown in the diagram, for instance the first column showing the number of vacancies in New York City. This has a value of 4.03 (as shown right above the column). This value matches only the values depicted on the primary y-axis shown on the left.

Statement I: By taking a look at the chart, we see that these three cities have the largest employment growth. However, they also offer more vacancies combined than New York City:
1.1 + 2.83 + 1.1 = 5.03 > 4.02
Thus, statement I is not correct. Statement II: Denver-Aurora-Broomfield, CO should have been listed
before Houston-Sugar Land-Baytown, TX. Therefore, statement II is also incorrect.

1.19. Answer: A

Statement I: This statement makes two assumptions. (1) The annual budget of the USA is $612 billion; the budget of the remaining four countries combined is $283 billion (= 76.6 + 126 + 46 + 34). (2) Simultaneously, the USA has a smaller number of military personnel than two specific countries from the chart combined. In the graph above, Russia and South Korea have the smallest number of

military personnel among the countries listed, however their combined armies would be larger than the US army. Both parts of the statement are correct. Thus, statement I is correct.

Statement II: Both calculations use the Chinese value as the base value. Calculation of the first part: (126 ÷ 46 – 1) = 173.9%. Therefore, the first part is incorrect, and thus statement II is incorrect. In case you want to calculate the second part, the calculation is as follows: (2,285 ÷ 1,325 – 1) = 72.5%. The second part is also incorrect.

1.20. Answer: B

Statement I: In the statement, Hyundai-Kia should be listed in front of Nissan-Renault. Statement I is not correct.

Statement II: You can roughly estimate the value by using the values given. In this case, both ratios are correct. Calculation of the first part of the statement II: (4 ÷ 9.98 – 1) = -59.9%. Calculation of the second part: (6,3 ÷ 9.98 – 1) = -36.9%. Thus, statement II is true. You can answer this question with a rough estimate, since 9.98 is almost 10.0.

1.21. Answer: D

Statement I: We do know how many people participated in total. We do not know how many of them were women and how many were men. Therefore, statement I is correct.

Statement II: A greater proportion of men say their favorite color is blue than women. However, since we do not know how many men and how many women participated, we cannot conclude that blue is listed as a favorite color more often by men than women.

1.22. Answer: A

Statement I: Calculation: computer: $380 \times 0.405 \approx 154$, *mobile phones:* $288 \times 0.49 \approx 141$, *head phones:* $13 \times 0.249 \approx 3$, *total:*

$154 + 141 + 3 = \text{US\$ } 298 \text{ billion.}$ *Statement I is correct.*

Statement II: Only the countries with the highest numbers of mobile phones sold are shown in the graphic. How much all Asian countries sold in total in 2018 cannot be seen.

EXAM 2

2.1. Answer: C

Statement I: The world population was 1.6 billion in 1900 and 6 billion in 2000. Calculation: 1.6 + 1.6 × 2.75 = 6. Therefore, statement I is correct.

Statement II: 8% of 6 billion is 480 million people (calculation: 0.08 × 6 billion = 0.08 × 6,000 million = 480 million). 25% of 1.6 billion is 400 million people. Therefore, the population of South America & the Caribbean in 2000 is larger than the population of Europe (including Russia) in 1900. Hence, statement II is correct.

2.2. Answer: B

Statement I: Sweden should come before Italy in the list because it has fewer medals overall. Therefore, statement I is not correct.

Statement II: Calculation: $1 - \frac{228}{283} \approx 20\%$ *. Italy has won about 20% fewer bronze medals than the UK. Statement II is correct.*

2.3. Answer: A

Statement I: If you look at the table, you can see that most of the flights must have started and landed either in Munich or Berlin. You can now either move on or, to be sure, calculate exactly: Calculation Munich: 14,913 + 13,027 + 12,645 + 10,008 + 9,952 + 5,452 = 65,997 Calculation Berlin: 14,913 + 14,884 + 11,010 + 9,436 + 9,010 = 59,253 It is now clear that the most flights took off and landed in Munich. Statement I is correct.

Statement II: Now you have to look at how many flights have started from Hamburg and Düsseldorf:
Calculation Hamburg: 13,027 + 6,072 = 19,099
Calculation Düsseldorf: 12,645 + 9,436 + 6,002 = 28,083
So, more flights started from Düsseldorf than from Hamburg.
Statement II is not correct.

2.4. Answer: A

Statement I: The statement can be easily calculated by multiplying the price of a Big Mac in Canada by the percentage: $5.07 × 1.09 ≈ $5.52. Since a Bic Mac costs $5.51 in the USA, statement I is correct.

Statement II: $6.54 ÷ $4.44 ≈ 1.5. Therefore, statement II is not correct.

2.5. Answer: C

Statement I: Since the number of full-time teachers remained roughly the same from 2005 to 2009, Statement I is correct.

Statement II: Average part-time teacher: (15,000 + 16,000 + 1,800) ÷ 3 ≈ 16,300.
Average full-time teacher: (60,000 + 62,000 + 66,000) ÷ 3 ≈ 62,700.
62,700 ÷ 16,300 ≈ 4. Statement II is also correct.

2.6. Answer: A

Statement I: We first calculate how many televisions were sold in the previous year: 1.6 ÷ 1.83 ≈ 0.87 million devices. DVD player: 1.3 ÷

1.68 ≈ 0.77 million devices. More TVs were sold than DVD players, statement I is correct.

Statement II: We only have to look at the graphic to see that 18.4 million smartphones are expected to sell this year, whereas only 1.6 million televisions are expected to sell. Accordingly, statement II is not correct.

2.7. Answer: D

Statement I: The cricket team from Zimbabwe won more matches than it lost in 2009, 2010 and 2012 because the ratio of victories to losses was greater than 1. The same does not apply to 2011. Therefore, statement I is not correct.

Statement II: There is no suitable data to calculate the increase in the number of victories between 2009 and 2010. Therefore, statement II is not correct.

2.8. Answer: A

Statement I: Looking at the line graph, it can be seen that between 2005 and 2013 the NASDAQ traded less than the NYSE, making Statement I correct.

Statement II: At first glance it might look as if the NYSE had doubled in value between 1995 and 1999. However, if you take a closer look at the y-axis, it becomes clear that the NYSE has increased from 3,100 to 3,800, which is much lower than a doubling (increase by 100%). Statement II is not correct.

2.9. Answer: A

Statement I: We calculate: 151 *1.27 =192. So, VW made 27% more in sales. We calculate approximately: 92*1.1=101. VW therefore had 10% fewer employees than Toyota. Statement I is correct.

Statement II: We calculate: Hyundai: 53 ÷ 7 ≈ 7.6 and Fiat: 36 ÷ 2 ≈ 18. Fiat produced more than two times the amount of cars.
Therefore, statement II is not correct.

2.10. Answer: B

Statement I: At first glance, it appears that both the number of business tasks and the number of newly founded companies decreased by more than 50% between 2008 and 2011. However, the y-axis does not start at 0, but at 2,200. Therefore, statement I is not correct.

Statement II: The line diagram shows that the number of operational tasks decreased by around 200 between 2007 and 2008. Therefore, the first part of statement II is correct. In addition, operations decreased by more than 10% between 2006 and 2007. Calculation: (2,700 – 2,400) ÷ 2,700 = 11.1%. Thus, the second part of statement II is correct. Statement II is correct.

2.11. Answer: C

Statement I: Calculation: 907 × 0.061 ≈ 55. Approx. 55 million tons of methane were emitted. Statement I is correct.

Statement II: Part 1: Calculation: 1.2% + 0.5% + 0.03% = 1.73%. 2% are 2/100 = 1/50, 1.73% are less than 1/50. The first part is correct.
Part 2: Invoice: 907 × 0.02 ≈ 18.
So, they accounted for less than 20 million tons. The second part is therefore also correct. Statement II is correct.

2.12. Answer: D

Statement I: India reached its highest production volume in 1999-2000, but the greatest change in fruit production was observed in 1992-93. 1992-93 saw an increase of (32.95 ÷ 28.63 – 1* 100 =) 15.09%, which is higher than the production increase of (45.5 ÷ 44.04 – 1 *100 =) 3.32% in 1999-2000. Therefore, statement I is not correct.
Statement II: Total production increased in 1995-96 and 1997-98, but in 1996-97 a decline in production was observed. Thus, statement II is not correct.

2.13. Answer: A

Statement I: Calculation of the percentage change in the second quarter of 2014: (45.6 ÷ 57.6 – 1) = -19.4%. Calculation of the percentage change in the third quarter of 2014: (27.8 ÷ 46.4 – 1) = -40.0%. Calculation of the change in profit in the fourth quarter of 2014: (8.5 ÷ 7.7 – 1) = 10.4%. Calculation of the change in profit in the first quarter of 2015: (18 ÷ 8.5 – 1) = 111.8%. These percentages are correct. Therefore, statement I is correct.

Statement II: Calculation: 27.8 + 41.1 = 68.9, which is less than 75.

The combined revenues from the third and fourth quarters of 2014 are therefore lower than the net revenues of the first quarter of 2015. Therefore, statement II is not correct.

2.14. Answer: C

Statement I: You can calculate the time users in Japan and the UAE spend on social media using the average time as a base. Calculation (Japan): 0.7 ÷ 2.4 – 1 = -70.8%, which is higher than 70%. Therefore, the first part of statement I is correct. Calculation (UAE):

3.6 ÷ 2.4 – 1 = 50%. Additionally, the second part of statement I is correct. Overall, statement 1 is correct.

Statement II: You can calculate the average time that users in Japan, China, and South Korea spend on social media, the result being 3.7 (0.7 + 1.7 + 1.3 = 3.7). This value is below the value of Argentina (4.3). Therefore, statement II is correct.

2.15. Answer: B

Statement I: The graph is about the total sales and not the individual sales (such as the "Organic Seaweed Fertilizer"). Therefore, statement I is not correct.

Statement II: The number of sales increased from $20,000 (2003) to around $22,500 (2006), which is almost a 2/3 increase (1/3 of $ 20,000 is around $ 6,666, 2/3 of 20,000 is about $13,332) Give or take, the sales increase is slightly less than 2/3. The first part of the statement is correct. The change in growth can be found when looking at the graph, from 22% to 5% (2006-2009) is correct. Therefore, statement II is correct.

2.16. Answer: A

Statement I: 14% of the people questioned would like to get the booster shot and 9% have already arranged a vaccination appointment. 9 out of 14 is over 50% because 7 out of 14 would be exactly 50%. Therefore, statement I is correct.

Statement II: The text states that 90% of all appointments are kept. However, only 9% of the people surveyed have already made an appointment. Therefore, only at least 8% of people will show up for the vaccination appointment (9 × 0.9 = 8.1). What is important here is the percentage of people who have booked an appointment and not the percentage of people who want to get the vaccination. Statement II is therefore false.

2.17. Answer: A

Statement I: Only 49% owned a dryer. Therefore, it would be impossible for greater than this percentage to own all three devices. Statement I is correct.

Statement II: The statement cannot be deduced from this illustration, since the graphic does not show how many households were in possession of all three devices. So, it is very likely that some households only had one or two devices.

2.18. Answer: B

The hardest part of this question is to realize that we are looking at a change compared to the previous year and not an absolute change. For example: in the 1st quarter of 2016, the amount of measles vaccinations was approximately 7% higher than the previous year.

Statement I: In the third quarter of 2017, the amount was around 3.5% higher than in 2018 (in 2018 it was around 3.5% lower than in 2017). Statement I is not correct. Statement II: If we look at the bar, the statement is confirmed: in the fourth quarter of 2019, the amount of measles vaccinations was more than 5% lower than in the fourth quarter of 2018. Thus, statement II is correct.

2.19. Answer: C

Statement I: If you calculate the decline in egg consumption with 2004 as the base value, you receive approx. 3%.
Calculation: (249/257 – 1) $\approx$ -3%.
The same applies to the availability of dairy products in 1990, but the base value in this case is 2012. Calculation: 275 $\times$ 110% $\approx$ 303.

Statement I is correct.

Statement II: Calculation: Decrease of the milk products 51 pounds/year: 283 – 275 = 8. Decrease of eggs/year: 258 – 251 = 7. Therefore, statement II is correct.

2.20. Answer: D

When little work is done, little profit is made. If you then put in more work, the profit will continue to increase. At some point, however, it is no longer worthwhile to work more, therefore you make less and less profit. Graph D is the only one that reproduces this process correctly.

2.21. Answer: D

Statement I: Only the 10 most expensive paintings in the world are shown in the illustration. Since we do not know which other paintings by the two artists have been sold, we cannot make any statement as to whose works of art have sold for more money overall. Statement I is not correct.

Statement II: Da Vinci's "Salvator Mundi" is 278% more expensive than Munch's "The Scream" because $\frac{450}{119} - 1 \approx 278\%$ *. Thus, statement II is not correct either.*

2.22. Answer: C

Statement I: $\frac{326{,}513}{433{,}343} \times 100\% \approx 75\%$ *, thus, statement I is correct.*

Statement II: Since the table shows only the countries of which 10,000 or more foreigners lived in Munich, and Iraq is listed, but not Syria, more foreigners came from Iraq than from Syria. Statement II is correct.

4. APPENDIX: ANSWER SHEETS

Exam 1				
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Exam 2				
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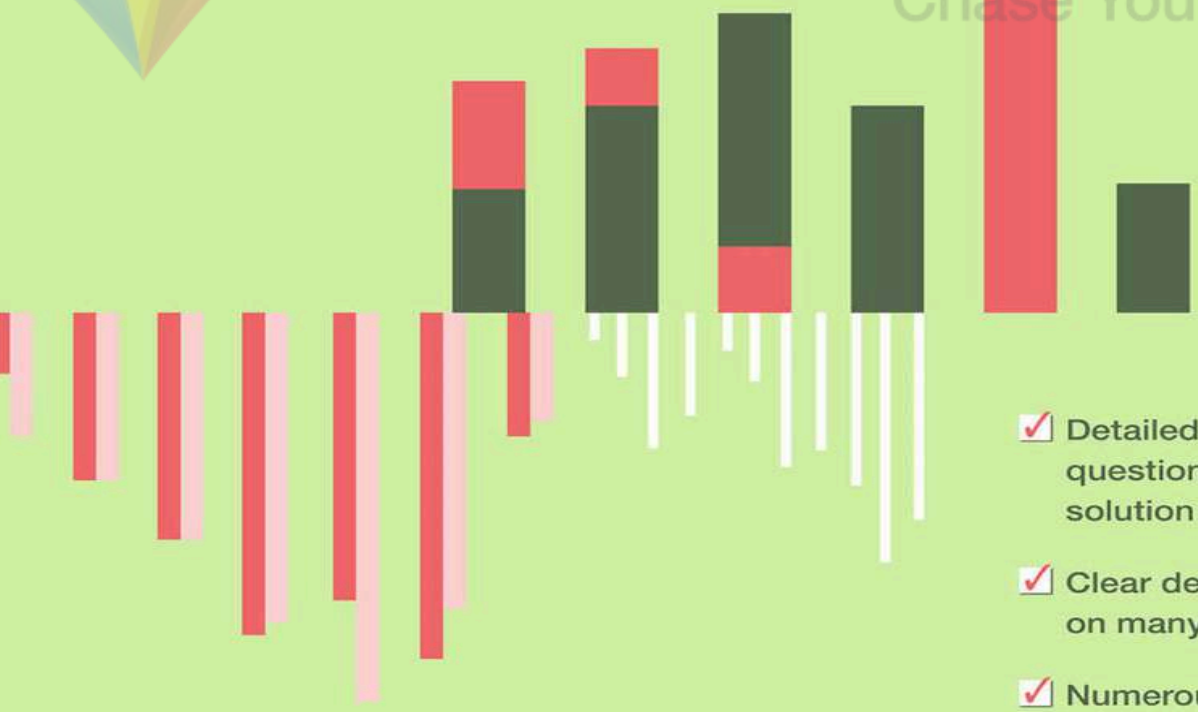

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- ☑ Clear descriptions based on many examples
- ☑ Numerous exercises with comprehensive and easy to understand solutions

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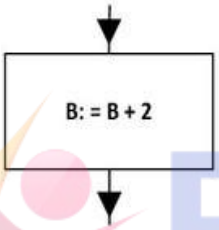
2. Preparation Book for the TestAS Economics: Analyzing Processes

WHAT IS A PROCESS FLOW CHART?

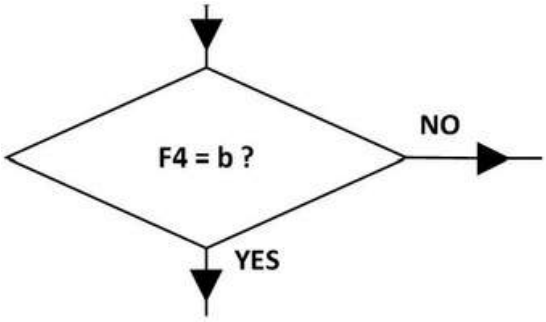
A flowchart is a visual representation of the individual steps in a sequence. In principle, it is a method in which a process or decision is described visually. Most flowcharts contain four types of symbols:

1. Ovals, which signify the start or end of a process.

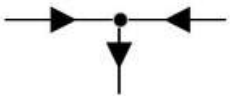
2. Rectangles, which show instructions or actions. We refer to these as operation points.



3. Diamonds, which highlight where you must make a decision. In this ebook, we refer to these as decision points. You need to answer the question with a yes or a no.



4. Arrows connect the symbols and show process flow. Dots show that two or more arrows are joined together to one arrow.



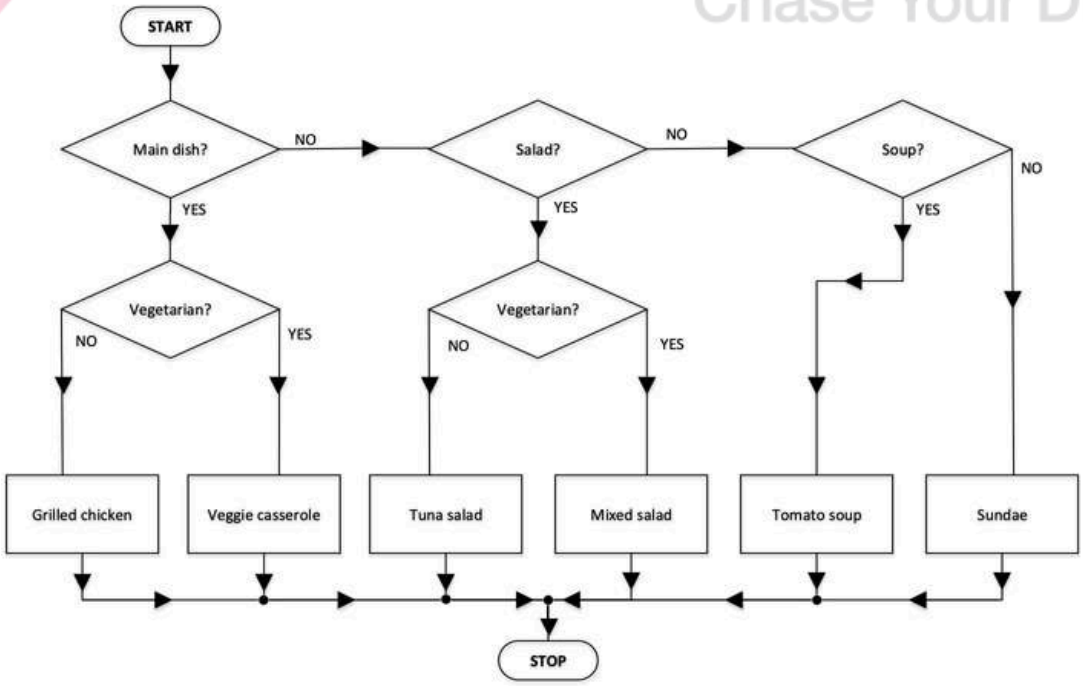
Let's look at a simple example.

EXAMPLE 1

In a restaurant there are six different meals offered. The restaurant manager would like to help the indecisive guests make a decision correctly (and quickly) and created the flow chart below.

The manager thinks that the order of the dish depends on a few different criteria. First, the customers need to determine whether they are hungry and are looking for a main dish. These customers should eat grilled chicken or veggie casserole. If they want something smaller than a main dish, a salad – which can be vegetarian or with fish – could be chosen. If the customers do not fancy salad either, they can get a soup or – for the ones wanting something sweet – a sundae.

The graphic shows the decision process of the customers, as envisioned by the restaurant manager.



EXAMPLE 1 – Question 1

Which of the following statements is or are correct?

I. If a customer is a vegetarian, veggie casserole is always chosen.

II. If a customer is a vegetarian, tomato soup is never chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: D

Statement I: There are other dishes for vegetarians. If a customer does not want a main dish but a salad, the mixed salad would be chosen. The statement is not correct.

Statement II: If the customer neither wants a main dish nor a salad, he will choose a tomato soup or a sundae. At this decision point it is irrelevant if the customer is vegetarian or not. The statement is not correct.

EXAMPLE 1 – Question 2

Which of the following statements is or are correct?

I. If a customer doesn't want a soup, the sundae will always be chosen.

II. If a customer is not very hungry and wants a salad, the veggie casserole will never be chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: There are other dishes. This statement is only correct if the customer doesn't want either a main dish or a salad. The statement is not correct.

Statement II: It doesn't matter if the customer is vegetarian or not, if he wants a salad and not a main dish, he will never choose the veggie casserole because this is a main dish and not a salad. The statement is correct.

As with some of the questions you will encounter in the exam, the text description of the question can be lengthy and rather repetitive of the visual. As seen in this question, sometimes you do not need to read the lengthy text. Rather, it is sufficient to look at the diagram and the question statements. This is especially applicable for the first few questions, which are the easiest ones.

There are different types of flowchart questions. Let's review these.

TYPES OF QUESTIONS

TYPE 1 – JUST LIKE A PARAGRAPH

In this question type, the flow chart is the visual version of the given text. The decision and operation points in the flow chart need to be inspected to determine the relationship between them. Most of the time, there are three decision points, meaning that the decisions are not very complex. However, toward the end the questions, there may be an excess of ten decision points and a total of 16 decision and operation points.

Almost always the visual will have at least the same information, and oftentimes more information, than the long explanatory text. Because of this, you may be able to skip reading the lengthy text, but you cannot skip the flowchart. You may try the following strategy to answer the questions quickly:

- Step 1: Read the question statements.
- Step 2: Review the flowchart. You may be able to answer the questions already!
- Step 3: If you can't answer the questions based on the visual only, read the lengthy introductory text preceding the flowchart.

Try and see if this works for you. This approach will not work with flowchart questions when there are missing/unspecified values.

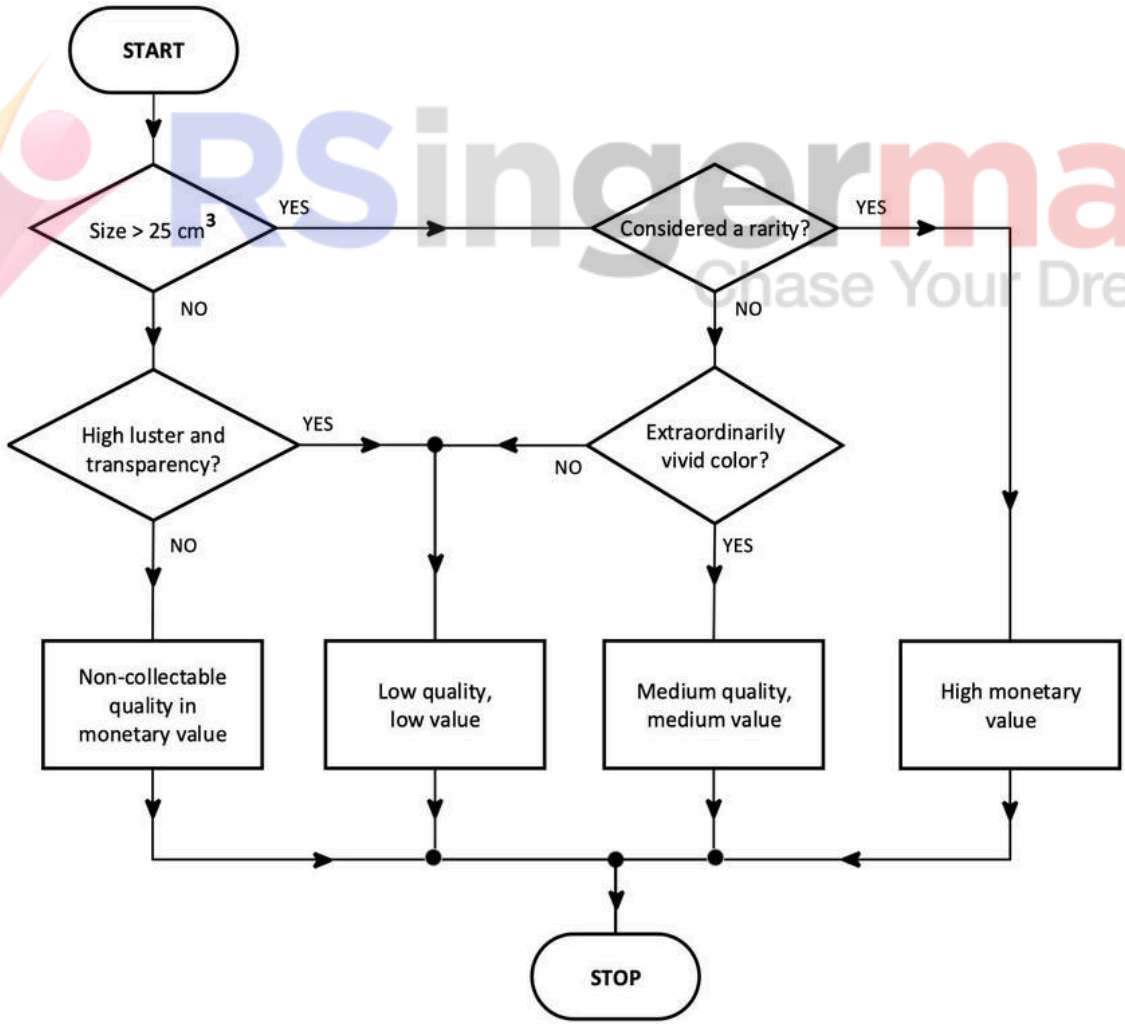
EXAMPLE 2

Mineral collecting is the hobby of systematically collecting, identifying and displaying mineral specimens. People pursue this hobby for different reasons. Some merely like the act of collecting and putting

together a collection. Others collect minerals because of their beauty and some just love the thrill of hunting the perfect mineral and possibly making a good income. This last category of hobbyists have a clearly defined criteria to determine how valuable the collected minerals are.

- The size of the specimen
- Luster (=shininess) and transparency of the stone
- Color of the specimen
- Rarity of the species

The following flowchart illustrates the process used by these collectors.



Which of the following statements is or are correct?
I. If a mineral is considered a rarity, it will command a high market value.

II. There is no monetary value for collecting a stone in the shape of a sphere with a diameter of 4 cm unless its luster or color are extraordinary. (Volume of a sphere: 4/3 πr3).

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A
Statement I is correct. If a mineral is considered a rarity, it will have a high monetary value.

Statement II is not correct. A sphere with a diameter of 4 cm has a radius of 2 cm. Entering the radius in the given formula, we get a volume of 33.5 cm3. This is above the given size limit of 25 cm3. According to the flow chart any stone above this size has a monetary value if its color, not its luster, is extraordinary.

As with this example, some question will require you do simple arithmetic, but there is no need to memorize anything in advance. All necessary information/formulae will be provided. Additionally, this problem could be easily solved without needing to read the text paragraph located before the flowchart.

TYPE 2 – MISSING VALUES

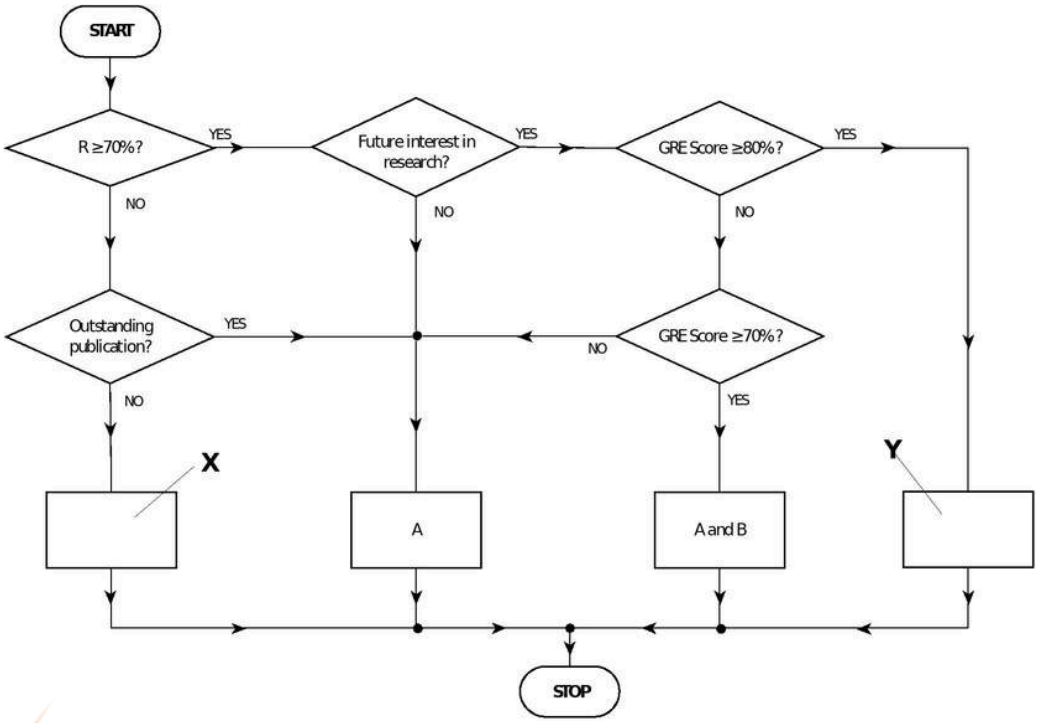
In the second frequently encountered question type, some of the information in the flow chart is missing. Oftentimes the question is whether the missing information can be substituted with the given statements. The easy questions will have one or two decision and operation points missing, while toward the end you can have six decision and operation points missing.

Below we provide an easy example.

EXAMPLE 3

While selecting students for a PhD program, US universities review a variety of prerequisites. The most important criteria are the grade point average results (R) of the last course (Master, if a Master has been completed, otherwise Bachelor), which can be a maximum of 100%, the score for the GRE exam (standardized test for admission to US graduate schools), and the student's attitude towards research (is he/she interested in research? Has he/she already published outstanding publications?). Three universities are considered in this question: A, B and C. For someone with an average final grade below 70% of the maximum number of points, it is very difficult to be accepted into a PhD program. The only exception is when the student has excellent publications. University A has the least stringent criteria of the three universities and accepts everyone who qualifies for B or C. If you want to receive all three offers, you must have good grades (at least 70% of the best possible score), be among the top 20% in the GRE exam, and show real interest in research.

The following flowchart can be used to determine which students qualify for which universities:



EXAMPLE 3 – Question 1

Which of the following statements is or are correct?

I. Here, X could mean “Acceptance by none of the universities”.

II. Y could mean “Acceptance by all of the universities”.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: C

Here you have to transfer the information from the text to the graphic and then check if it is correct. If you have difficulties doing this, you may wish to write it down in the form of a formula X = ..., Y =

..... This way, you have an overview and a better understanding of the statement.

In this example question, you know from the context that only "not accepted to any university" is possible for X since none of the prerequisites have been fulfilled. For Y, however, all of the necessary conditions have been fulfilled, so it stands for "accepted at all universities" and is therefore also correct.

EXAMPLE 3 – Question 2 Which of the following statements is or are correct?

I. To be admitted by University A, the applicant must have a GRE score of at least 70%.

II. Applicants have a chance of being admitted to University C if they graduated with grades in the top 10% of the possible range and would like to conduct research.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

The first statement is incorrect because the diagram shows that University A does not consider the GRE score.

The second statement is correct because the diagram shows that applicants can be admitted to University C with the stated criteria as long as the GRE score is at least in the 70th percentile. Therefore, an

applicant whose grade point average is in the top 10% would also be admitted to University C.

EXAMPLE 3 – Question 3

Which of the following statements is or are correct?

I. "B" is the university where you need a research interest if you do not have a GRE score of 70%.

II. If your grades from your most recent diploma are in the top 30%, you are guaranteed a spot at University A.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

If you have a GRE score less than 70%, then you will not be admitted to University B. Statement I is incorrect.

It is sufficient to have grade point average results (R) of over 70% to get admitted to University A. Statement II is correct.

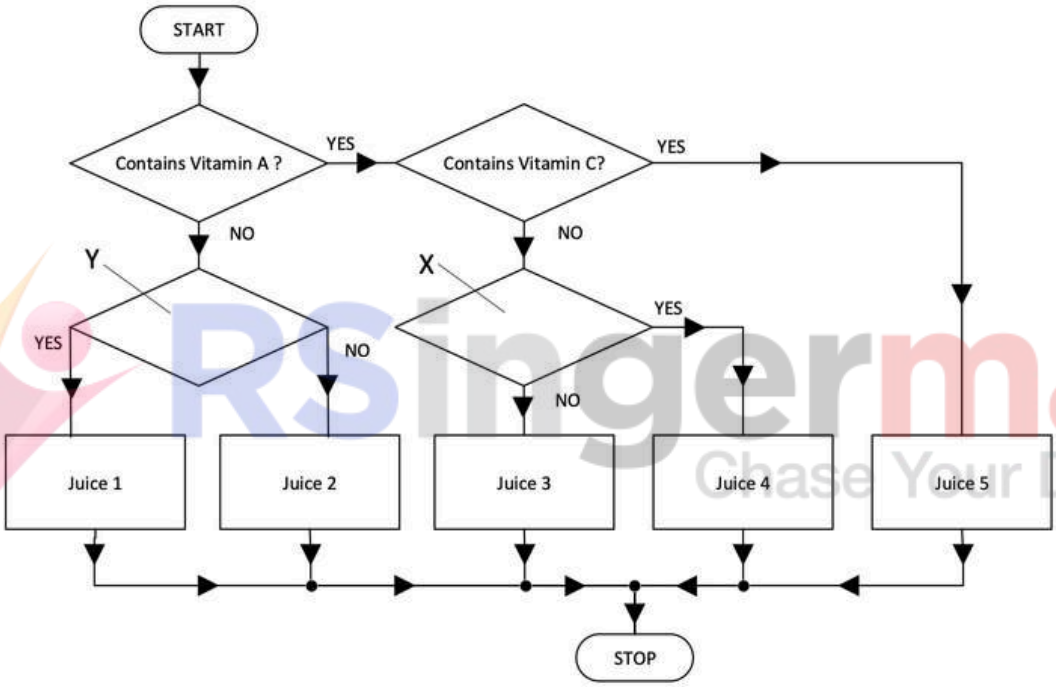
EXAMPLE 4

There are various vitamins found in fruit juices. There are 5 fruit juices: Juice 1, Juice 2, Juice 3, Juice 4 and Juice 5. Each of the

juices contains various combinations of vitamin A, vitamin B6, vitamin C, or vitamin E.

Juices 3, 4 and 5 contain vitamin A; Juices 1, 3 and 4 contain vitamin B6; Juice 5 contains vitamin C; and Juices 2, 3 and 5 contain vitamin E. (See graphic. “Vit.” is the abbreviation for vitamin).

Juice 1	Juice 2	Juice 3	Juice 4	Juice 5
Vit. B6	Vit. E	Vit. A Vit. B6 Vit. E	Vit. A Vit. B6	Vit. A Vit. C Vit. E



EXAMPLE 4 – Question 1

Which of the following statements is or are correct?

I. If decision point X is labelled “Contains vitamin E?”, the flow chart may be correct.

II. If decision point Y is labelled “Contains vitamin E?”, the flow chart may be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: D

Statement I: Juice 3 contains vitamin E (see description above). If "Contains vitamin E?" is found at decision point X, then Juice 3 would not have vitamin E since the arrow at Juice 3 would point to "No". The statement is not correct.

Statement II: If "Contains vitamin E?" is found at decision point Y, then Juice 1 would have vitamin E and Juice 2 would not. In fact, it is exactly the other way around: Juice 1 does not contain vitamin E, Juice 2 contains vitamin E. The statement is not correct.

EXAMPLE 4 – Question 2

Which of the following statements is or are correct?

I. If decision point X is labelled "Contains vitamin B6?", the flow chart may be correct.

II. If decision point Y is labelled "Contains vitamin B6?", the flow chart may be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: The statement is not correct. Juice 4 contains vitamin B6 and is correctly displayed with "Yes". However, the arrow towards Juice 3 says "No", and in this case, this would mean that no vitamin B6 should be found within the juice. According to the introduction, the exact opposite is true: The juice contains vitamin B6. The statement is not correct.

Statement II: The statement is correct. The arrow towards Juice 1 says "YES" for vitamin B6, which Juice 1 indeed contains. For Juice 2, the arrow says "NO" for vitamin B6, which is also correct because this juice contains only vitamin E.

TYPE 3 – EQUATIONS IN THE FLOW CHART

In this question type, there are simple calculations/equations which you need to conduct to derive the answer. The following notation is used:

B: = 2 This means that B is now equal to 2.

M: = M + 1 This means that the value of M is increased by 1. If M was 102 before, it is now 103.

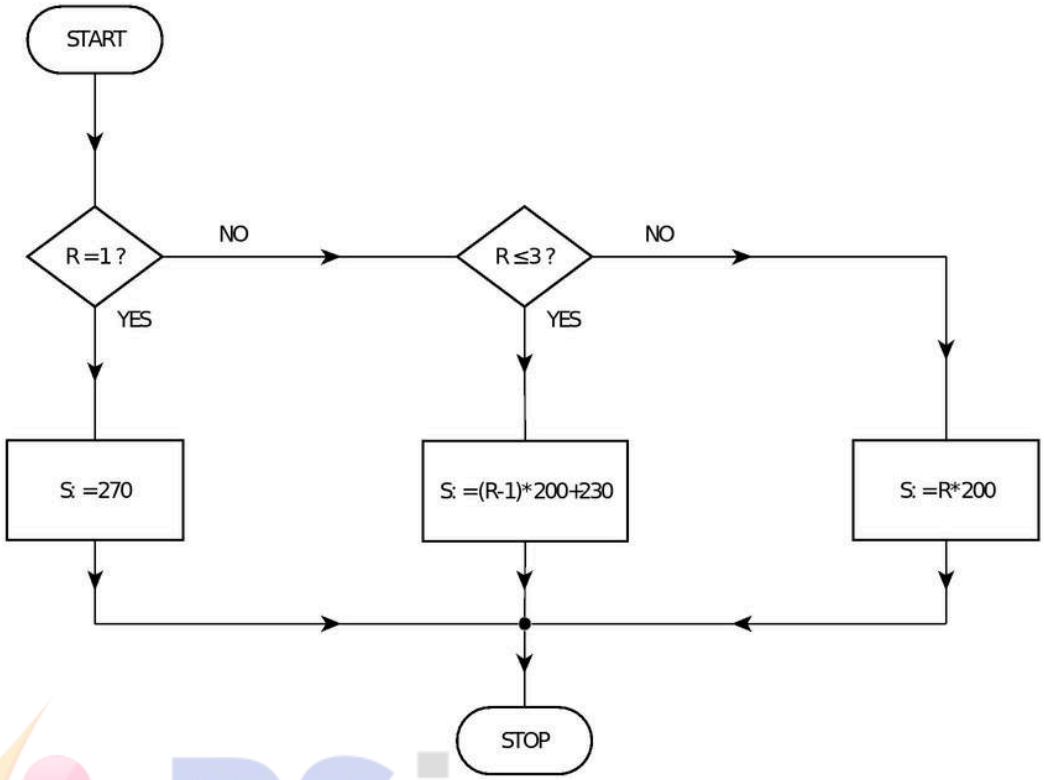
Q: = Q – R The value of Q is decreased by the value of R. E.g., if Q = 22 and R = 5, after this operation point Q will be 17.

EXAMPLE 5

In country ABC, students receive a monthly scholarship from the government depending on the number of children in the family studying and receiving a scholarship.

R: The number of children in the family receiving the scholarship.

S: The total € amount of the scholarship given to the family for all children.



Which of the following statements is or are correct?

I. If a child has two siblings, the total scholarship amount for the family is 430 €.

II. If in a family a fourth child starts using the scholarship, the family will receive an additional 170 € each month.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: B

Statement I: The total amount for three children (child plus the two siblings) is

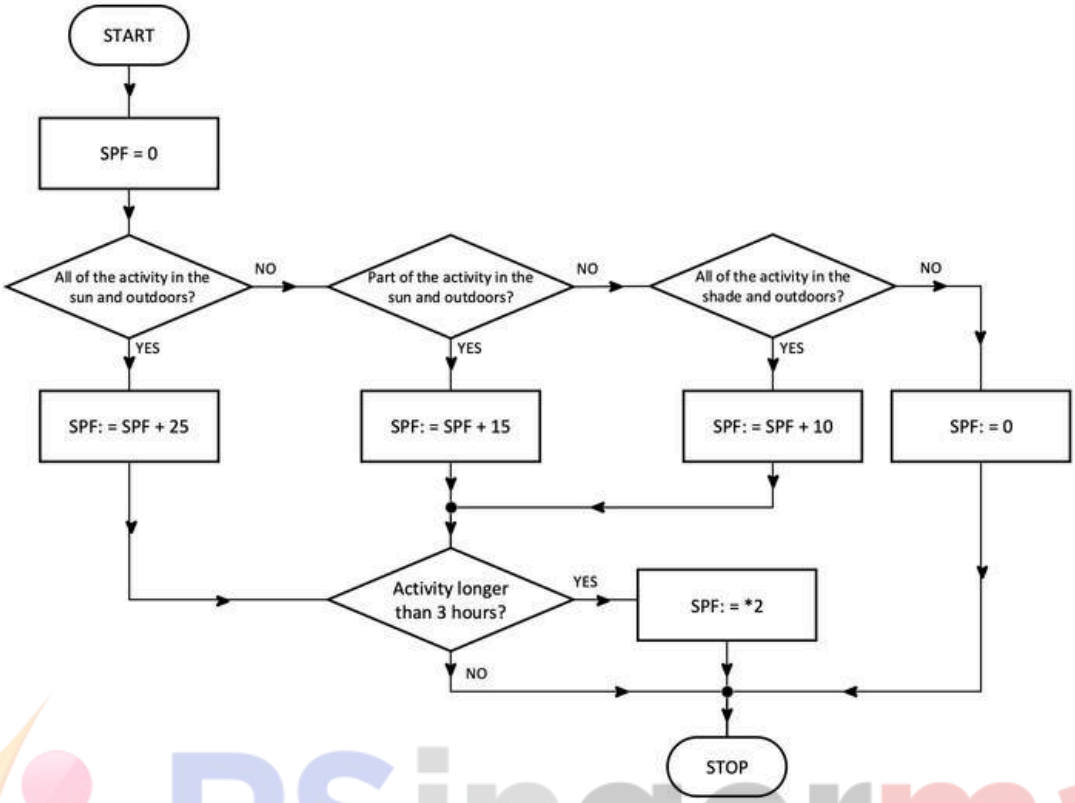
(3 – 1) × 200 € + 230 € = 2 × 200 € + 230 € = 400 € + 230 € = 630. The statement is not correct.

Statement II: The difference between scholarship for 3 children (630 €) and for 4 children (4 × 200 € = 800 €) is 170 €. The statement is correct.

EXAMPLE 6

During the summer, people spend a lot of time outside. There is seldom a better time for hiking or swimming. Too much UV radiation found in sunlight can, however, result in immediate injuries such as sunburn or, in the long-term, could lead to skin diseases. It is especially important to protect yourself appropriately, for example, by using a sunscreen lotion with a sun protection factor (SPF). Even when in the shade, you should lotion yourself anyway since almost 50% of the sun's direct rays can still reach you.

The flowchart below expresses the decision criteria that a teacher should follow for summer school.



Which of the following statements is or are correct?

If the activity takes place outdoors for 7 hours and is equally divided between time in the sun and time in the shade, then a sunscreen with SPF50 should be applied.

II. If the activity takes place outdoors, but only in the shade, then no sunscreen is needed as long as the time outdoors does not exceed 3 hours.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TIP

First read statements I and II. There you can see what information you need to answer. Next, look at the graphic to see where you can find this information. Information may also appear in the text before the flowchart. When you have gathered all the information, look at the relationships between the information and check whether the statements are correct or incorrect.

Answer: D

Statement I is not correct.

1st decision field 2nd decision field (partly in the sun and outdoors) *No* *Yes, then SPF = 15*

3rd decision field (Activity > 3 hours?)

SPF 30 (not SPF 50) *Yes, then SPF 15* × *2 =*

Statement II is not correct. One needs a sunscreen with SPF 10 outdoors if it is shady. Only when the activity does not take place outdoors, no sunscreen is needed.

! NOTE:

At this point we would like to emphasize again what we said at the beginning of this chapter:

In the test, there are several questions which consist of a long and sometimes redundant text and flow charts. It is highly recommended to first have a look at the statements and the flowchart, and then only read the text when needed.

NEW LOGIC EXERCISES

In the section “Understanding Formal Depictions” most of the questions are based on process charts. In recent tests, there have been few new questions styles (only 1-2 questions per test). They all test the ability to read a text, interpret the given visual, and make a conclusion based on the given information. Below we provide a few examples.

EXAMPLE 7

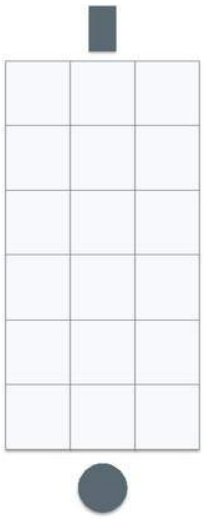
The drawing shows a game for two players (the circle and the rectangle). The two players begin at opposite sides of the board.

Each player is allowed to choose a starting square in the first row, from which they will start the game.

The players may only move in two directions: forward and sideways.

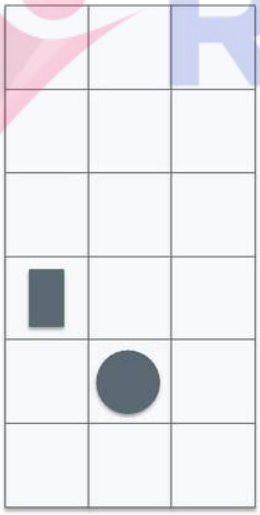
Each player chooses one of these directions for their first move. For their second move, they must switch to the other direction. On their third move, they revert back to the original direction. One player begins by moving forward. The first move must be forward. They must then move sideways, then forward again.

The game is won when one of the players meets the other one and blocks their way, preventing them from making any more moves.



EXAMPLE 7 – Question 1

Which of the following statements describes what will happen on the next move if the rectangle must move sideways?



(A) The circle loses.

(B) The circle could lose.

(C) The rectangle loses.

(D) The rectangle could lose.

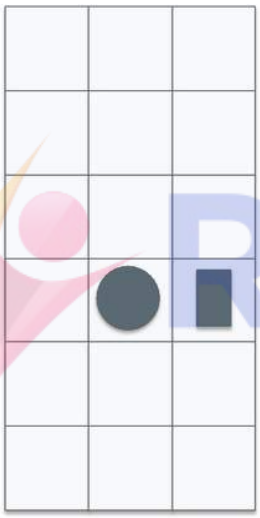
Answer: B

If the circle has to move forward *The circle loses.*

If the circle has to move sideways *Nothing happens.*

EXAMPLE 7 – Question 2

Which of these statements is true for the next move?



(A) If it is the circle's turn to move, it will not lose. (B) If it is the circle's turn to move, it will win. (C) If it is the rectangle's turn to move, it will lose. (D) The game is a draw.

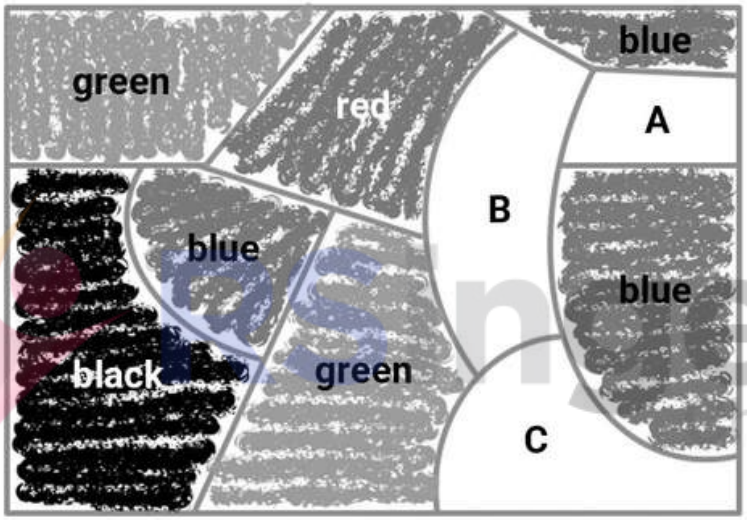
Answer: A

Answer B cannot be true, since the circle must move either forward or to the left. C is not necessarily true, since it could be that the rectangle must move forwards. D is not necessarily true, since it

could be that the rectangle is now required to move sideways (in which case it has lost).

EXAMPLE 8

Which statements are correct if two regions of the same color cannot be directly touching? There are four colors to choose from: red, blue, green and black.



(A) A must be red.

(B) A and C must have the same color.

(C) C could be red or black.

(D) B must be black. A and C can have the same color.

Answer: D

Start by looking at Area B since it is touching the largest number of different colors already (red, green and blue). This means that B must be black. Area C is now touching the colors green, blue and black and must therefore be red; this means that Answer C is

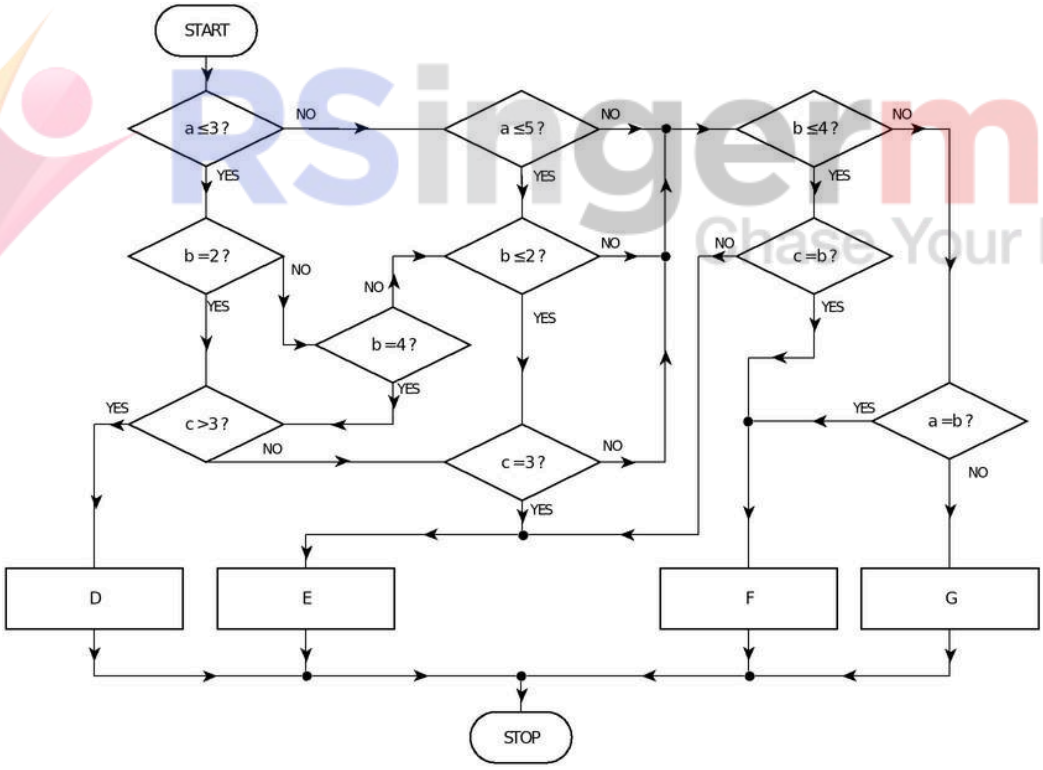
incorrect. Area A is the only area remaining and is already touching blue and black; this means it could be either red or green. Accordingly, Answer A and B are incorrect and Answer D is correct.

TACTIC FOR DIFFICULT QUESTIONS – BACKTRACK

In complex flow charts – if the question statement asks whether a certain output is possible, it may be easier to backtrack. So, start from the outcome and then go back step by step.

EXAMPLE 9

The graphic shows the decision for option D, E, F or G depending on the parameters a, b and c.



EXAMPLE 9 – Question 1

Which of the following statements is or are correct?

I. If a = 4 and b = 3, then only option E or F can be chosen.

II. If b = 1 and c = 4, then only option E or F can be chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

Answer: A

Statement I: If a = 4 and b = 3 and one follows the flow, then one ends at the decision point c=b?. If yes, then F and if no, then E. The statement is correct.

Statement II: First we run the scenario that a $\leq$ *3; b = 1; c = 4. We end with option E.*

Now we need to check whether or not F can also be an outcome. We already know that b = 1 and c = 4, so we need to check the decision point with a $\leq$

b. This is not the case, whether the question a $\leq$ *b is answered with Yes or No. F is not an option in these cases. The statement is not correct.*

Alternatively, you can backtrack from the stopping point F. To end at F, you either need b = c, which is according to the statement not the case, or a = b to be true; this could be true according to the question statement. So, you need to go back one step further. Is b $\leq$ 0? No, this is not the case. The statement cannot be correct.

NOTE: If the question mentions a precise output, it may be faster to backtrack from the end.

EXAMPLE 9 – Question 2
Which of the following statements is or are correct?
I. If c = b is true, then option F is always chosen.
II. If option F is chosen, then b is always less than 4.
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.
Answer: D
Statement I: Another option can also be chosen, for example, D if b = c = 4 and a = 3 are true.
This question seems easy to answer when we take the decision point c = b into consideration. This is, however, misleading because this decision point is found deep within the process and we do not yet know how the 3rd decision criterion behaves. In order to answer this question, we have to test various scenarios. As soon as we find a combination of a, b and c, and when b = c F is not true, then we can disprove the statement. To solve this problem, it is best that we start systematically. This means starting at the far left with a 3 Yes.
Step 1: a 3 Yes. We assume, for example, that a = 3.
Step 2: b = 2 Yes. We assume that b = 2. Now we have to see where we would end up if c = 2. We end up at F.
Now we will start again with the next scenario. Step 1: a 3 Yes. Step 2: b = 2 No. Step 3: b = 4 Yes. Now let us test where we end up when b = c = 4. We end up at option D. The statement is not correct.

NOTE: It is important to test the various scenarios
systematically. This way you will be fast and will not overlook possible options.
Statement II: If a = b is true, then it is possible to reach option F even when b is greater than 4. E.g. a = b = 6.

OVERVIEW OF THE MOST IMPORTANT TIPS

- Be systematic. If a question is complex with many decision and operation points, some students panic and look wildly at the flowcharts for hints. Instead, go systematically from the start, decision point by decision point. You will be quicker and also avoid falling into easy traps.
- Practice for speed. This question type is one of the easiest subtests to train for. Once you get used to reading the flow charts, you will see them as a concise way of expressing a long decision process.
- Solve a few questions the day before the exam. Many students
- forget about this question type and lose precious time reading the instructions during the test.
- Don't give up – everyone is tired, like you. The goal is to beat the average, so make an extra effort in this section where some test takers have already given up.
- First read the question statements and then review the flow charts. In questions without missing values, you may already be able to answer the questions without reading the lengthy text.
- Don't be afraid to choose option D, "Neither of the two statements is correct", especially if the question statement uses absolutes like "always" and "never".
- If the flow chart is complex with many nodes and the question asks for a final outcome, you can consider starting from that end point and backtracking to each connecting node.
- If a question asks for gaps to be filled (e.g., "if X is 10, could the flow chart be correct?"), consider taking notes on the test booklet with a pencil. It makes calculations easier.
- When you feel tired, it is easier to make simple mistakes in this [illegible] type. In such cases, make notes as you evaluate the flow chart. Act[illegible]llow the move across the process chart, [illegible] your fingers [illegible] but not passively with just your

eyes. You will be more likely to make mistakes if you try to work from memory alone.

- In calculation flow charts, you need to make a few simple calculations as you progress through the flowchart.
  If you write down the result of each calculation, you will be less likely to make mistakes.

3. PRACTICE QUESTIONS

In total, you have 85 minutes in the TestAS exam to complete the 22 questions in the section “Analyzing Processes”.

For an optimal exercise result, we recommend that you complete the exercises with a stopwatch. This will allow you to test how well you can manage under the time constraints. At the end of the chapter you will find the solution key, as well as detailed explanations for the solutions.

TASK BLOCK

EXAM 1

TEXT AND FLOW CHART FOR QUESTIONS 1.1. AND 1.2.

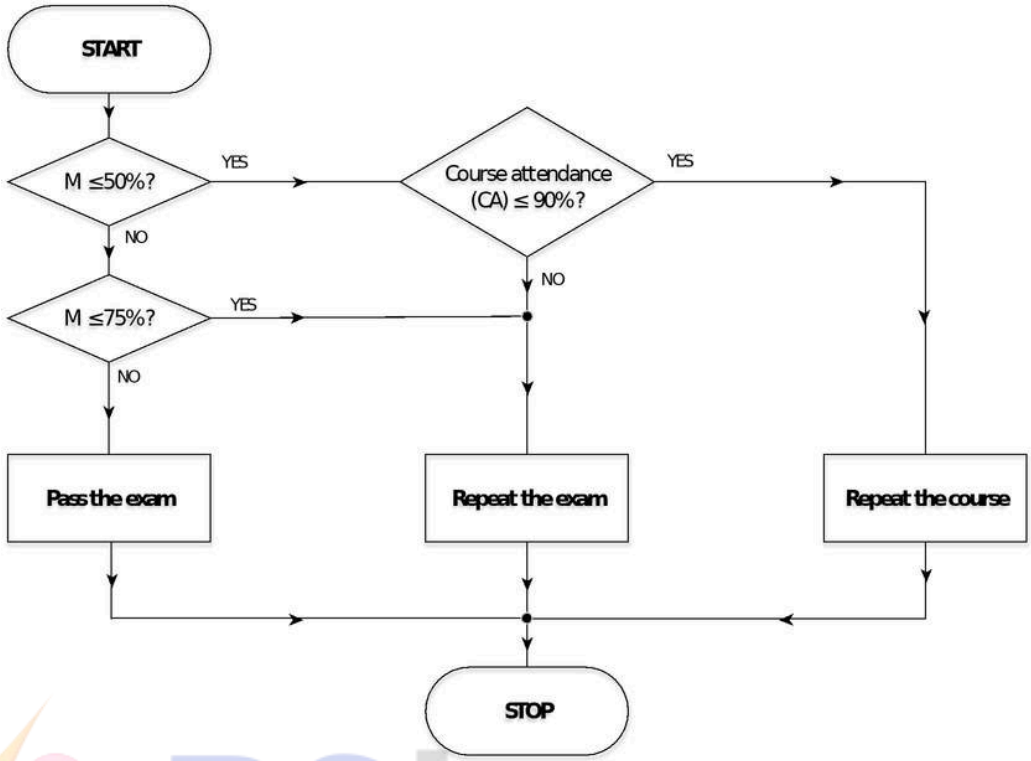
The results from one exam are divided into 3 categories (Mark = M).

M $\leq$ 50%; M $\leq$ 75% and M $\leq$ 100%.

The participant of a course has three options:

- repeat the course
- repeat the exam
- pass the exam

The following flow chart shows how a decision can be made.



1.1. Which of the following statements is or are correct?

I. If a student attended (CA) less than or exactly 90% of the course, the exam is always repeated.

II. If the CA ≤ 90% for all students, then all of the students will repeat the course.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.2. Which of the following statements is or are correct?

I. With mark M = 75%, the student always has to repeat the exam.

II. With CA = 100%, the student never has to repeat the exam.

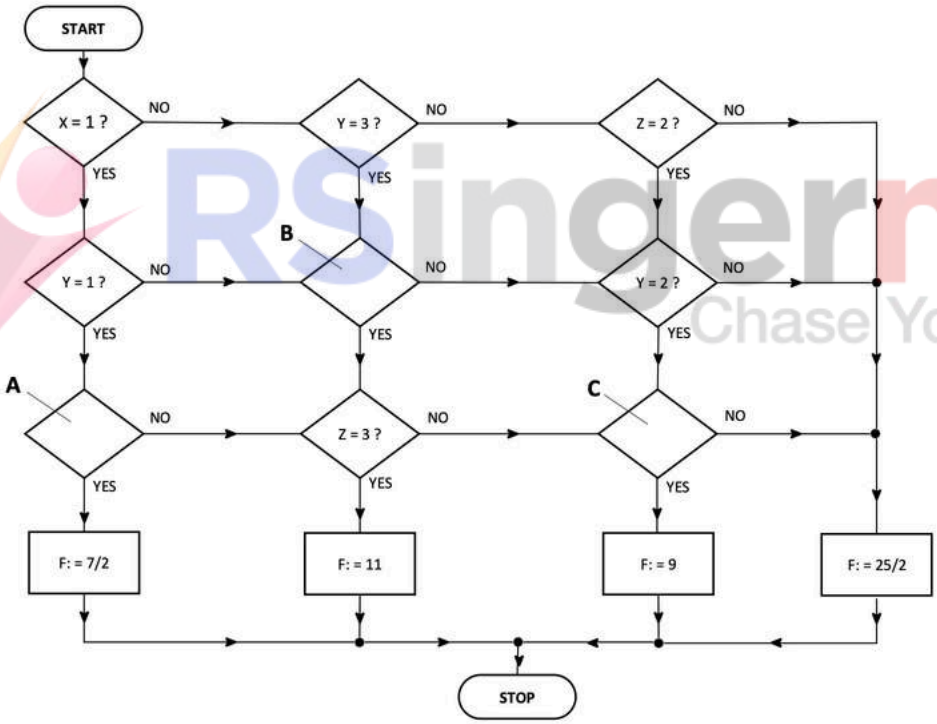
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.3. We have the following equation: F = $\frac{1}{2}$ x + y + 2z. The following flow chart shows the result of F for specific values of x, y, z.



Which of the following statements is or are correct?

I. We need to place "X = 4 ?" in decision point B to have F: = 11 as a result.

II. For F to be equal to $\frac{7}{2}$ decision point A needs to be "Z = 1".

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.4.

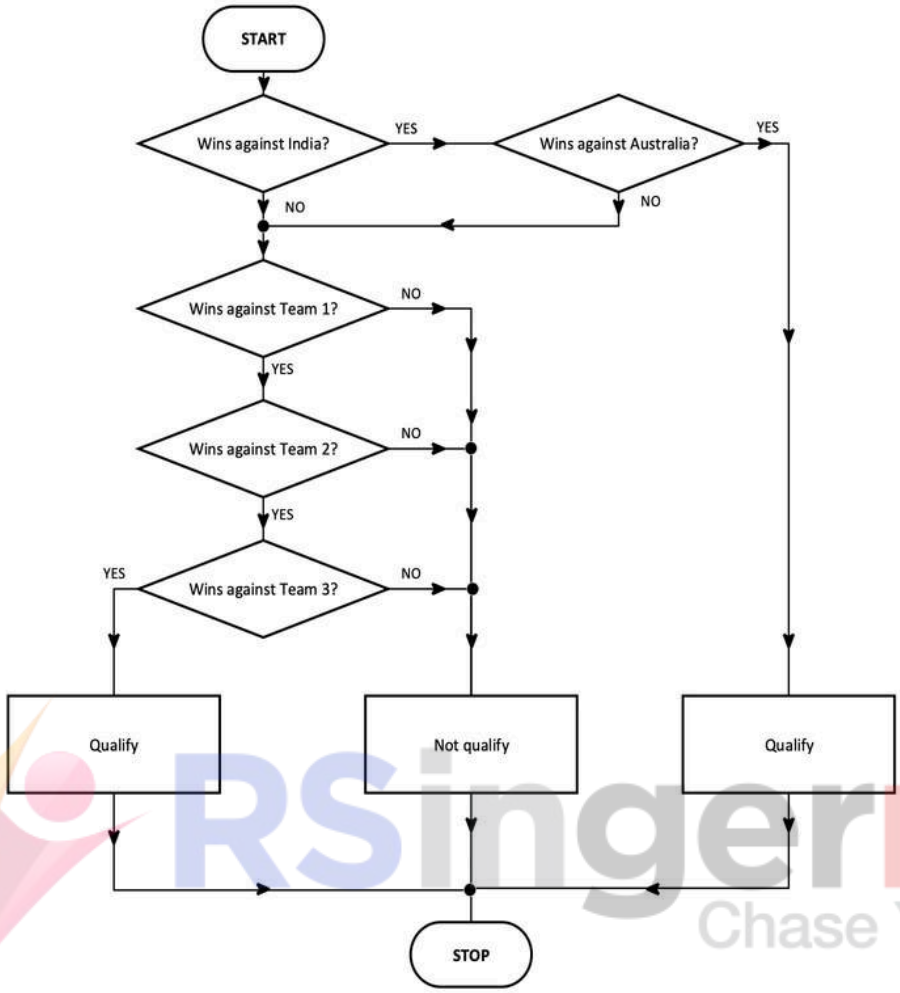
In the last phase of Round I of ICC Cricket World Cup 2015, quarter-finalists are decided depending on the performance of cricket teams against the top players. The only two teams that have qualified include India (I) and Australia (A).

The other teams competing against each other in the same group in the tournament include South Africa (SA), Ireland (IR), Pakistan (PK), and Sri Lanka (S). The flow chart below shows how it is decided if a team qualifies or not.

Team 1, Team 2 and Team 3 stand for the other teams in the group.

For example, if we look at the qualification of the South African team: Team 1, Team 2 and Team 3 would stand for Ireland, Pakistan and Sri Lanka.

Yes = Win; No = Loss



Which of the following statements is or are correct?

I. PK qualifies for the quarter-final if they win against I, S, SA, and IR in the first round of ICC World Cup 2015.

II. Team S qualifies for the quarter-final if the team wins its match against India, loses its matches against Australia, but manages to win two out of its remaining matches with other teams.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.5. AND 1.6.

In a fictional university, there are four subjects: Arts, English Studies, Mechanical Engineering, and Architecture. In the German grading system, grades vary from 1 to 6. The lower the number, the better the grade! At this university, school grades determine the course.

Definition of the school marks:

1 = very good performance

2 = good performance

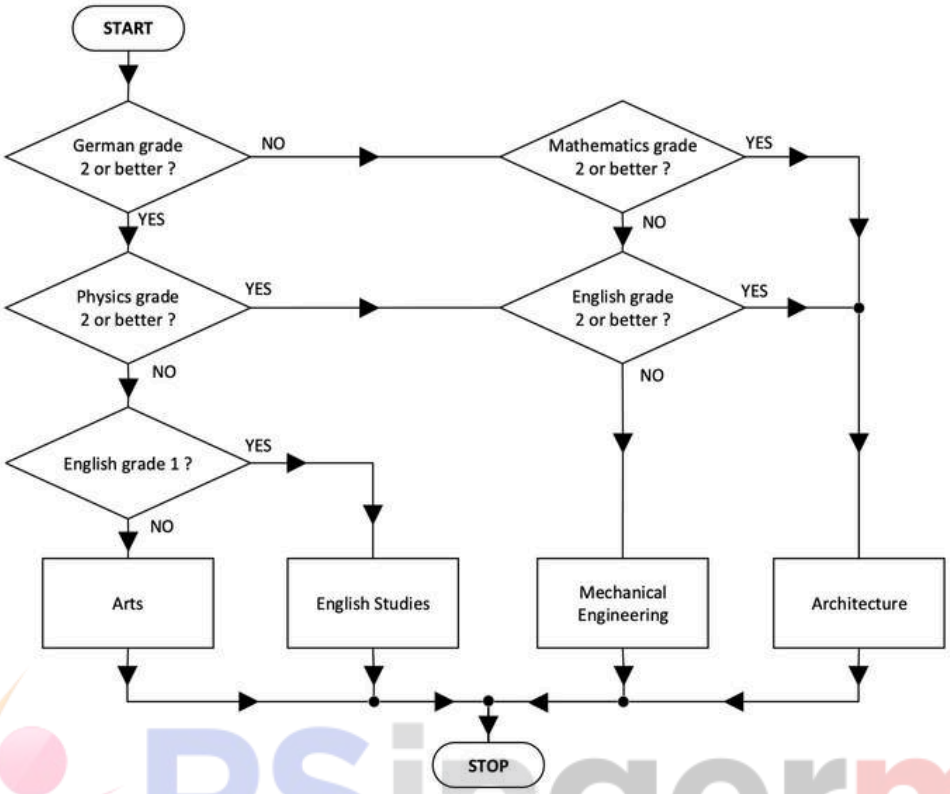
3 = satisfactory, average performance

4 = sufficient, average performance except for a few limitations

5 = unsatisfactory (failed), fundamental knowledge is however present

6 = poor (failed), expectations were not met.

The flow chart expresses which grades for the subjects of German, Mathematics, Physics and English lead to which decisions.



1.5. Which of the following statements is or are correct?

I. If the grade for German = 3, Architecture cannot be chosen.

II. If the grade for English = 1, English Studies is always chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.6. Which of the following statements is or are correct?

I. If the grade for German = 2 and the mark for Mathematics = 4, Art can be chosen.

II. If the grade for German = 3, Art cannot be chosen.

(A) Only statement I is correct.

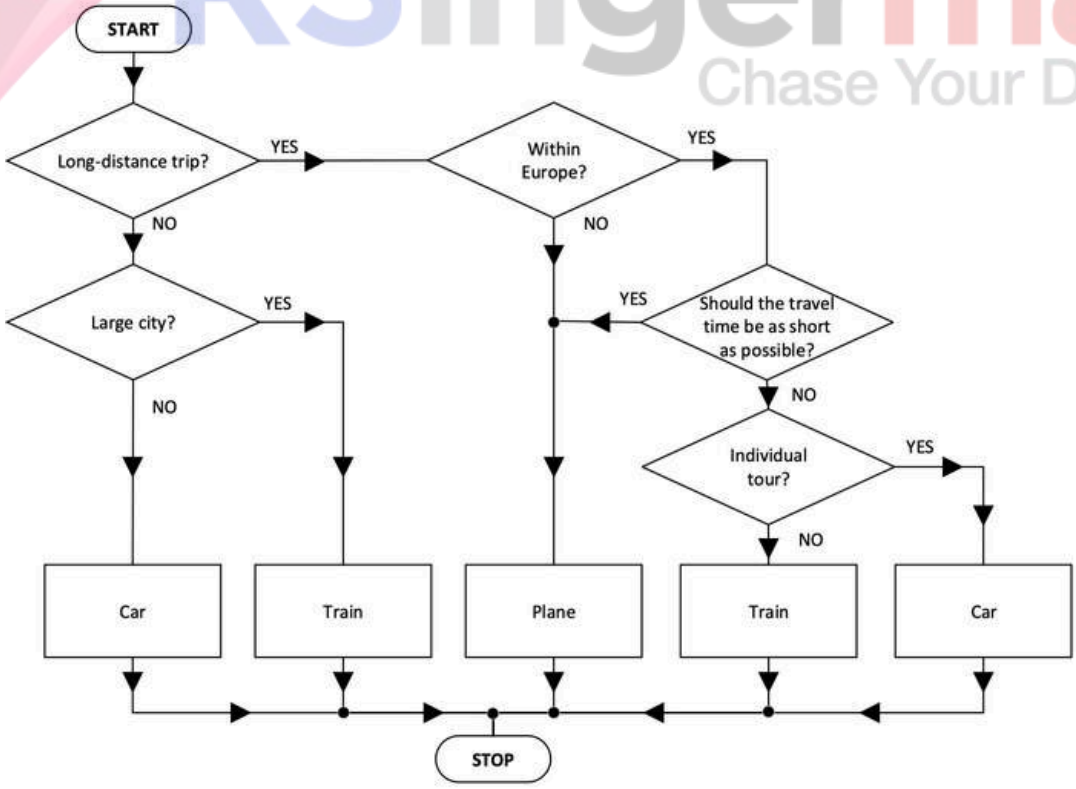
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.7. AND 1.8.

The travel company XYZ from Germany wants to offer better travel packages to its customers. The flowchart shows the process of deciding which means of transportation the customer booking the trip will prefer. The company defines a long-distance trip as all destinations that are either outside of Germany or where the customer needs more than three hours by car from their starting point.



1.7. Which of the following statements is or are correct?

I. If the destination is not within Europe, one will always choose to take the plane.

II. If one does not travel far, one will never choose to take the plane.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.8. Which of the following statements is or are correct?

I. If one wants a short travel time, then one will always choose to take the plane.

II. If one travels within Europe and plans an individual tour, then one would never choose to take the train.

(A) Only statement I is correct.

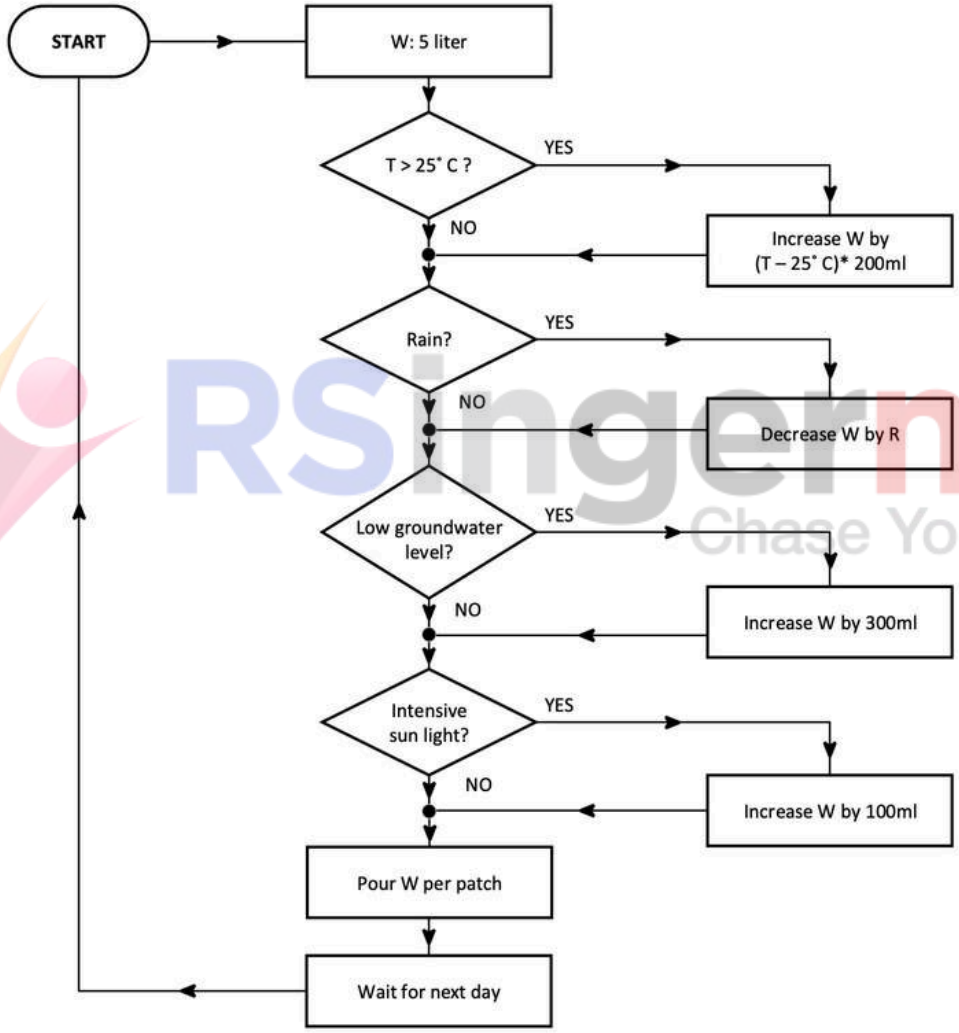
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.9. AND 1.10.

A gardener has prepared eight patches. In order to give each of the plants the ideal amount of water, the gardener follows a list every day. The standard is 5 liters of water per patch. The gardener takes the temperature T in °C, rain (R) in ml/patch, ground-water level as well as sunlight into consideration. W corresponds to the water in ml per patch.



1.9. Which of the following statements is or are correct?

I. It is true for every parameter that the higher the parameter, the higher the amount of water for the patches.

II. If the ground-water level is low for a longer period, then the water is increased by 300 ml for each day passed with low groundwater level values.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.10. Which of the following statements is or are correct?

I. It can be that on a certain day the gardener uses less than 100 ml of water per patch.

II. It can be that on a certain day the gardener uses more than 20 liters of water per patch.

(A) Only statement I is correct.

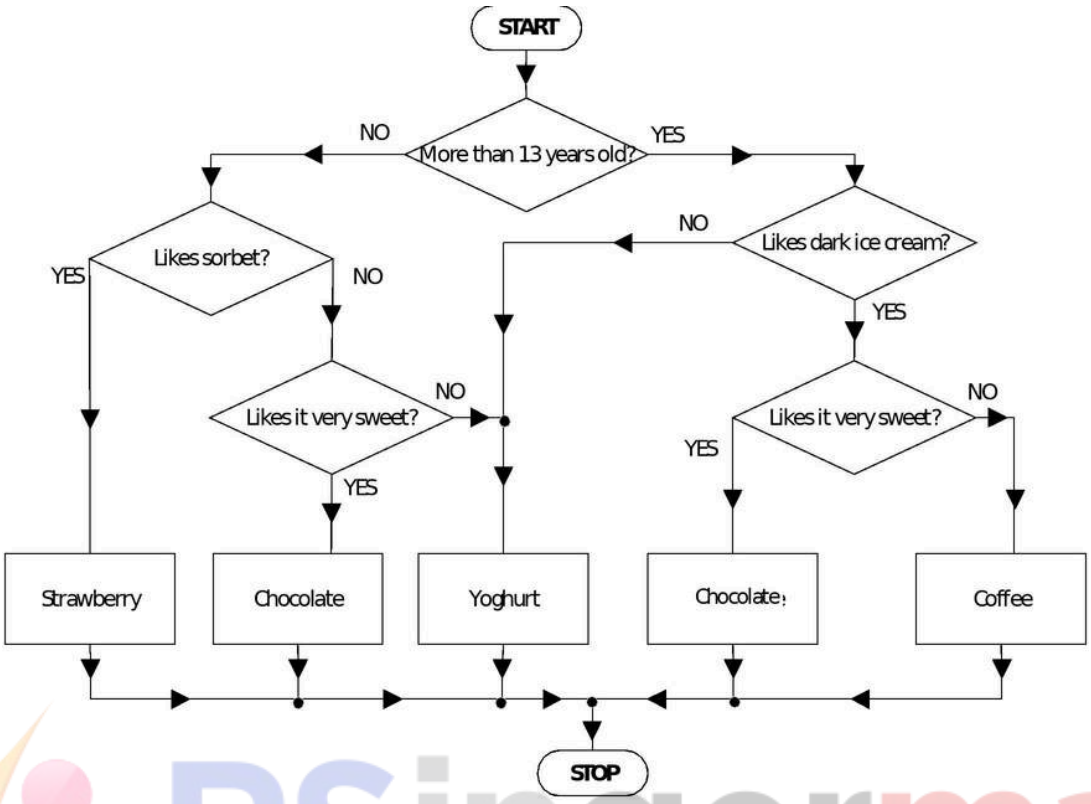
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.11. AND 1.12.

An ice cream salesman has four types of ice cream. If a customer cannot decide which type to buy, the ice cream salesman helps out. The salesman has developed a procedure using several questions in order to find the perfect ice cream type for the customer. The flowchart lists the questions and decisions.



1.11. Which of the following statements is or are correct?

I. If a customer is younger than 13 years old and likes sorbet, then the decision will always lead to strawberry.

II. If the customer is older than 13 years old and likes dark ice cream, then the decision will always lead to coffee.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.12. Which of the following statements is or are correct?

I. If the decision leads to chocolate, then the customer likes sweet ice cream flavors.

II. If the decision leads to coffee, then the customer is always older than 13 years old.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.13.

Geneticists examine four short gene sequences. They consist of three nitrogen-containing bases and can be made up of adenine (Ad), thymine (Th), cytosine (Cy) and guanine (Gu). The graphic shows the analytical process. All four bases can be used for the parameters U, V, and W.

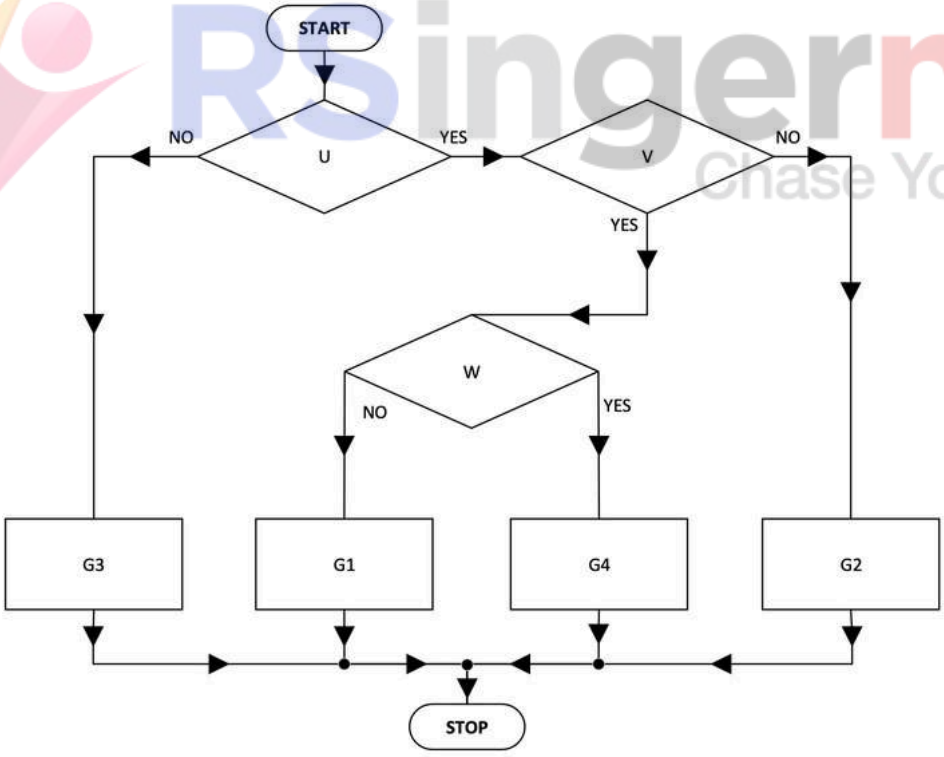
Gene sequence 1 (G1): Ad; Th; Cy

Gene sequence 2 (G2): Ad; Cy; Gu

Gene sequence 3 (G3): Th; Cy; Gu

Gene sequence 4 (G4): Ad; Th; Gu

The order of the bases cannot be changed (e.g., G1 is only Ad; Th; Cy and not Ad; Cy; Th).



Which of the following statements is or are correct?

I. If “Is the first base Ad?” is at decision point U, then the flow chart can be correct.

II. If “Does the sequence end with guanine?” is at decision point W and “Is Cytosine in the second position of the gene sequence?” is at decision point V, then the flow chart can be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

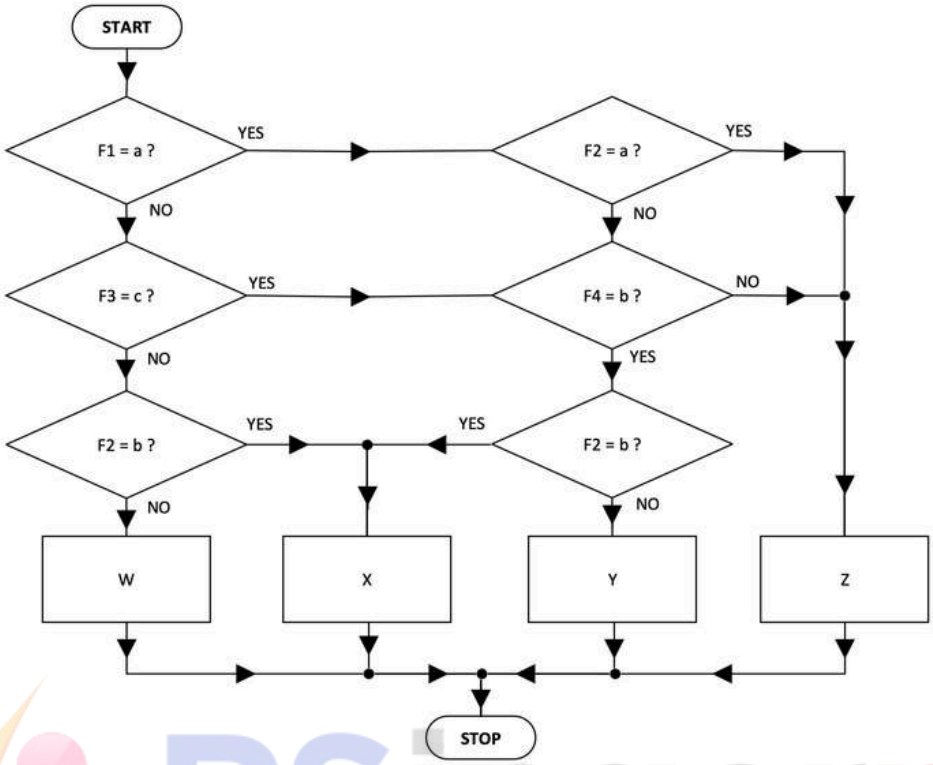
(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.14. AND 1.15.

There are four decision options W, X, Y and Z which are dependent upon the four factors F1, F2, F3 and F4.

F1 can have the value a or b. F2 can have the value a, b or c. F3 can have the value a or c. And F4 can have the value b or d. The flowchart expresses which factors lead to which decisions.



1.14. Which of the following statements is or are correct?

I. If F2 = a and F4 = d, then Z is always chosen.

II. If F2 = b, then neither W nor Y is chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.15. Which of the following statements is or are correct?

I. If X is chosen, then it is possible to assign exactly one value to a maximum of three factors (assuming that one knows which decision path has been taken.)

II. Z is chosen, then every factor can be assigned exactly one value (assuming that one knows which decision path has been taken.)

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

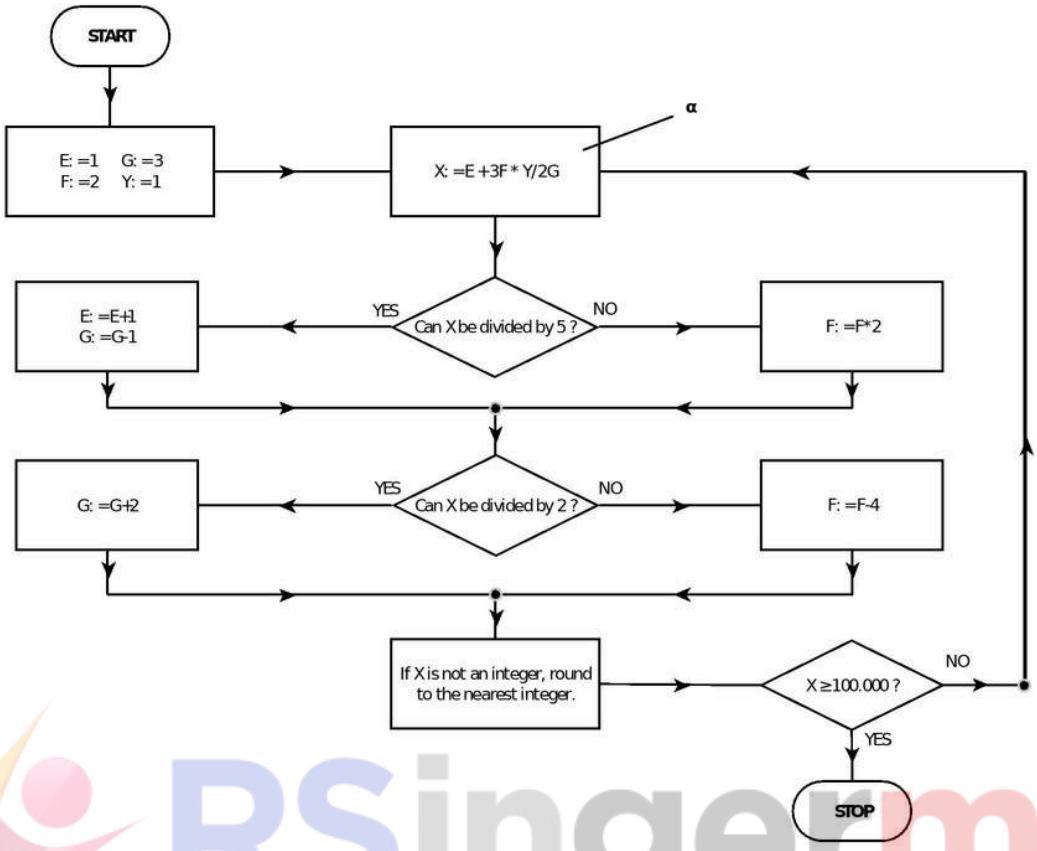
TEXT AND FLOW CHART FOR QUESTIONS 1.16. AND 1.17.

A computer science student has received the task of illustrating a number of calculations as a process. Below, you can see her error- free illustration.

In the first step, X has to be solved using an equation. The next steps depend on whether or not X can be divided by a certain number. (A number “a” can be divided by another number “b”, when there are no remainders for the division of a:b. For example, a number is divisible by 4 if its last two positions are divisible by 4. Thus, 112, 100, 60 and 36 are divisible by 4, but 11, 15 and 99 are not divisible in this way. For example: 112 ÷ 4 = 28 vs. 99 ÷ 4 = 24,75. Only whole numbers can be divided.)

Then, it is tested whether or not X is a whole number. (Whole numbers are numbers which only have a zero after the decimal point. Examples: -200, -4, -3, 0, 1, 2, 300.) If it is not a whole number, then X is rounded to the next whole number (integer). (In order to round to the next whole number, the position behind the decimal point is taken into account. 0-4 is rounded down and 5-9 is rounded up. For example: 72,3 72 and 72,8 73 or 81,45 81 and 81,51 82.)

This calculation is performed until X is 100,000.



1.16. Which of the following statements is or are correct?

I. If F becomes negative once, then X can never again become positive.

II. If the number $\frac{1}{30}$ is obtained instead of 1 for Y, then an endless loop would be created.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.17. Which of the following statements is or are correct?

I. At the end of the first round, X = 2.

II. With the starting values for E, F, G and Y as shown in the diagram, an endless loop would be created.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

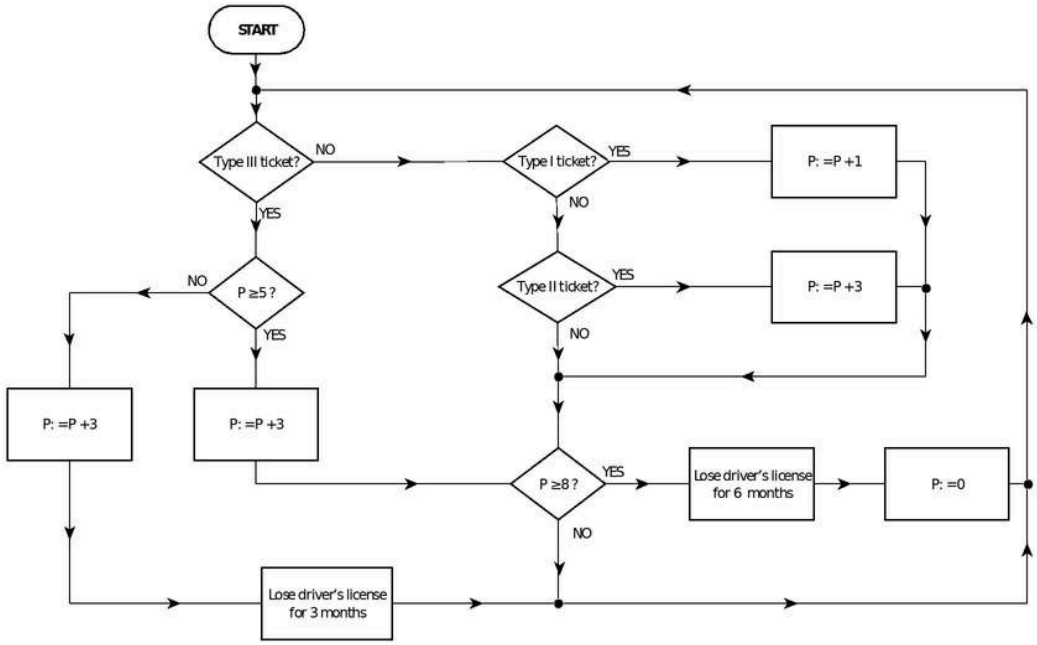
1.18.

In the country of ABC, drivers get points for certain delicts, which differ depending on the seriousness of the delict. If a driver gathers a certain number of points, he or she has to surrender their driver's license for a period of time. There are three types of delicts for which the drivers are punished with points (in addition to monetary punishment.)

Type I: Delicts with low threat to the safety of overall traffic and inhabitants, e.g., holding a mobile phone while driving or driving up to 25 km/h faster than the speed limit without causing accident (1 point).

Type II: Delicts with serious threat to safety, such as driving through a red light or overtaking where forbidden (2 points without losing the driver's license). Type III: Delicts which seriously threaten the safety of traffic and
inhabitants, such as driving with a high level of alcohol or driving away from an accident (3 points, the driver loses their driver's license).

The chart summarizes the process of gathering points.



Which of the following statements is or are correct?

I. After a Type I ticket, there is no loss of the driver's license.

II. Any given year, it is possible for a driver to have his/her driver's license removed for 6 months twice in that year.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.19.

In mathematics there is the $\Delta = b^2 - 4ac$ discriminant.

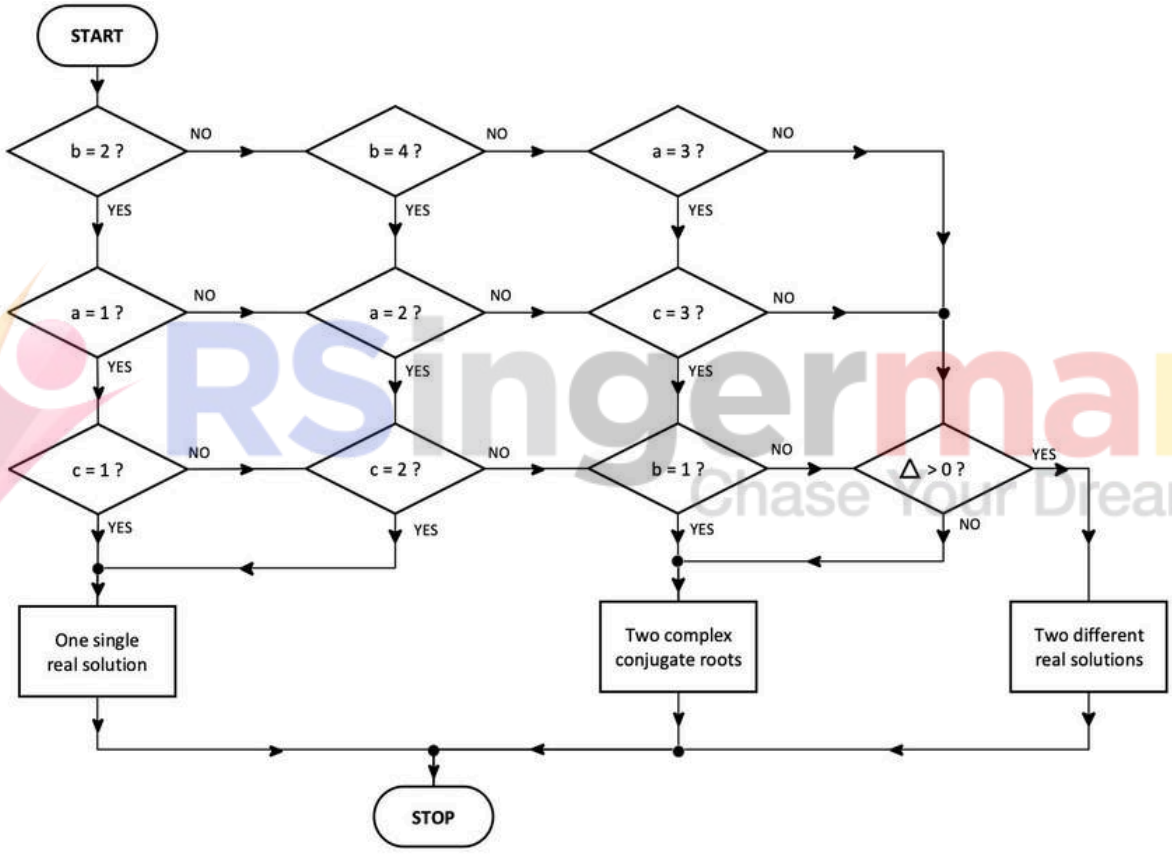
The discriminant applies for these $ax^2 + bx + c$ equations.

The discriminant can tell us information about the solution:

- It can have two different real solutions.
- It can have two (non-real) solutions with complex conjugate roots.
- It can have one single real solution.

The following flowchart shows the relations between discriminant and the solutions of secondary equations. In our flowchart a, b and c can take specific numbers:

a: 1, 2, 3, 4, 6 b: 1, 2, 3, 4 c: ¼, 1, 2, 3, 7



Which of the following statements is or are correct?

I. The discriminant should be less than zero to get two different real solutions.

II. The discriminant must be zero to get two solutions with complex conjugate roots. ($\Delta = 0$).

(A) Only statement I is correct.

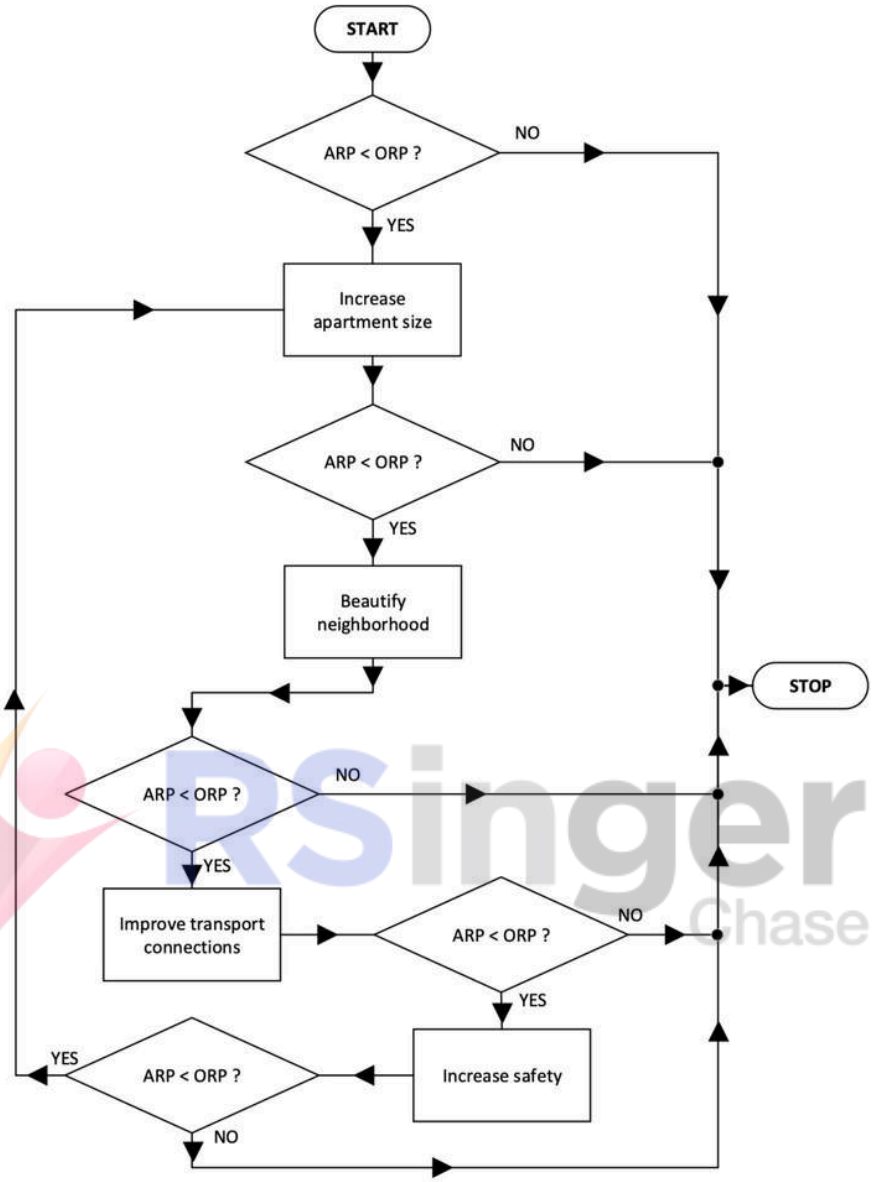
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 1.20. AND 1.21.

A district municipality wants to improve the image of the district and demand higher rent prices. For this, various measures for improving the image of the district and the prices are calculated. The objective is to make the average residential price (ARP) equal to the optimal residential price (ORP). In the beginning, the ARP is lower than the ORP. The diagram describes the process of planning.



1.20. Which of the following statements is or are correct?

I. If larger apartments are planned, the ARP will always become equal to the ORP.

II. It can be that the ARP becomes equal to the ORP by improving the infrastructure of public transportation.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.21. Which of the following statements is or are correct?

I. It can be that the infrastructure of public transportation is improved upon without the apartments becoming bigger.

II. It can be that the ARP will not become equal to the ORP even though each measure was used once.

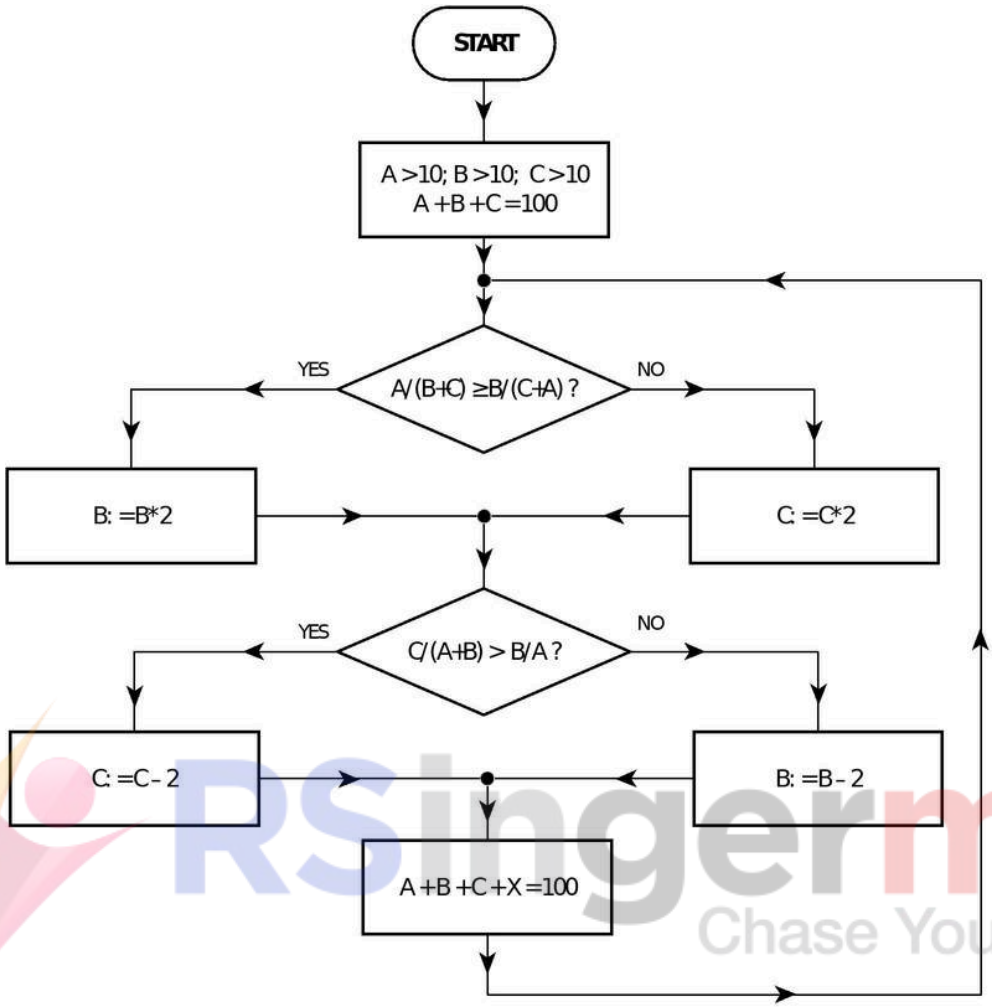
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

1.22. Within the following flow chart, a calculation is expressed. In the last step, X is chosen so that A + B + C + X always results in 100, meaning that X varies each round.



Which of the following statements is or are correct?

I. If A = 50, then X will be a negative number in the first run.

II. If A < B, then B will double after the $\frac{A}{B+C} \geq \frac{B}{C+A}B$ field.

(A) Only statement I is correct.

(B) Only statement II is correct.

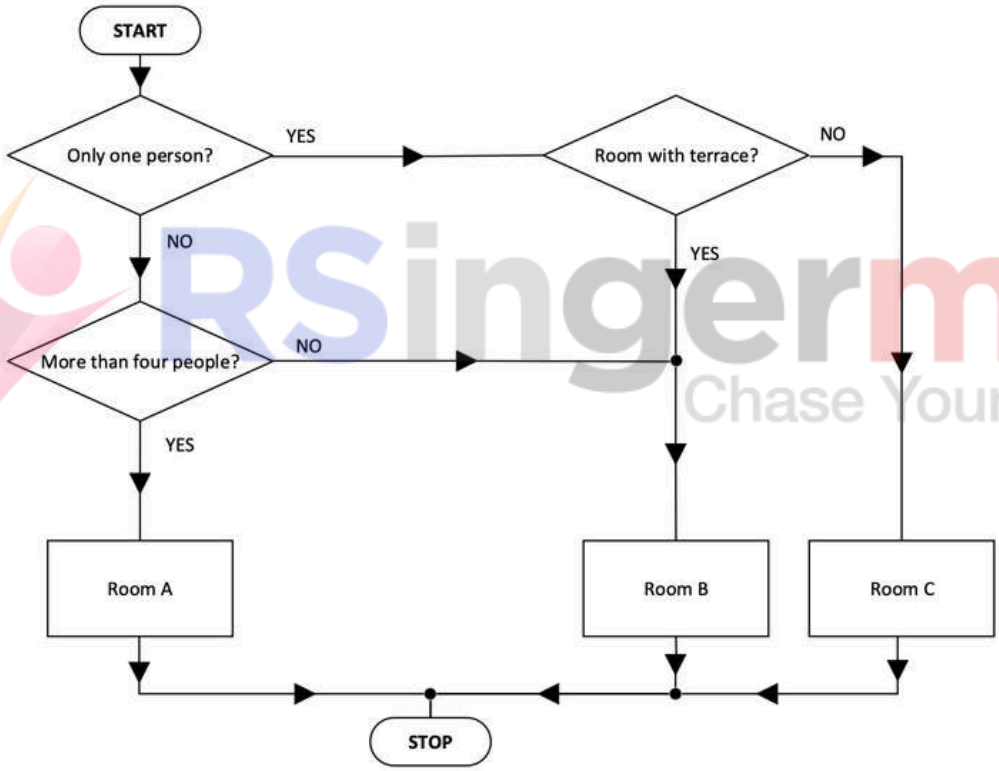
(C) Both statements are correct.

(D) Neither of the two statements is correct.

EXAM 2

TEXT AND FLOW CHART FOR QUESTIONS 2.1. AND 2.2.

In a small bed and breakfast, there are three rooms: Room A, Room B, Room C. Room A has room for six people and has a large terrace, Room B has room for four people and a small terrace and Room C is the smallest and most inexpensive room. The graphic expresses how a room is chosen.



2.1. Which of the following statements is or are correct?

I. If the room should have a terrace, then Room B is always chosen.

II. If there are more than four people, then Room A is always chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.2. Which of the following statements is or are correct?

I. Room B is only chosen when the number of people is between two and four.

II. If just one person stays the night, then Room C is always chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

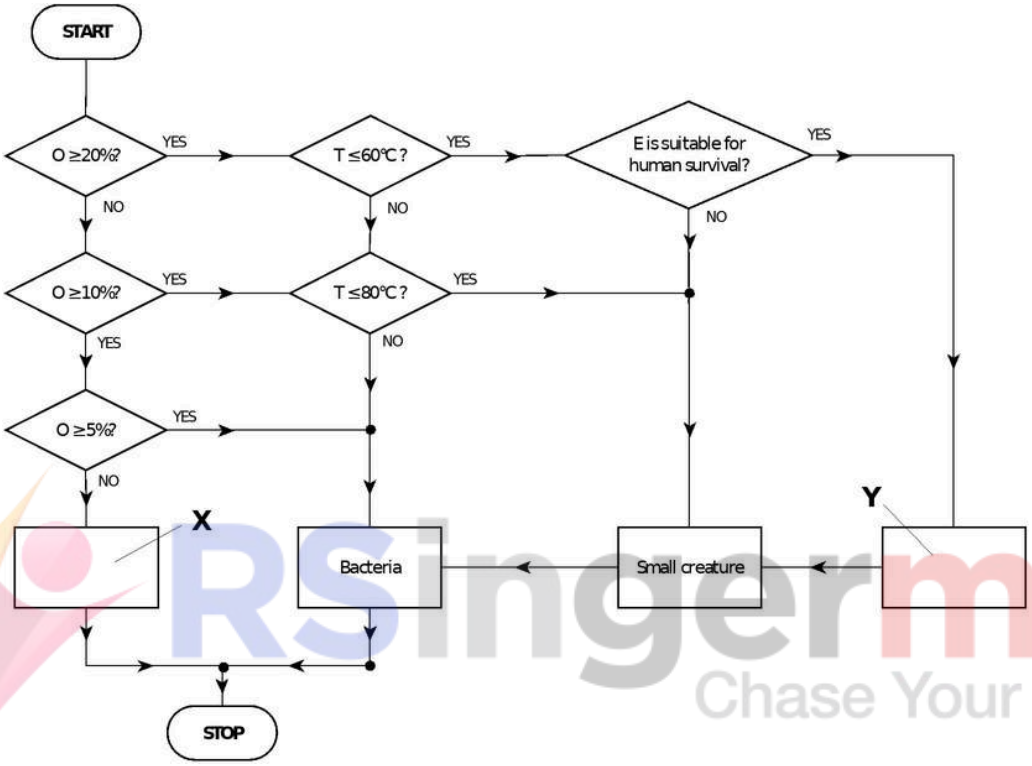
(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.3. AND 2.4.

Scientists are trying to find another planet where human beings can survive. They have found a number of planets that might be suitable. Based on some important criteria, such as presence of Oxygen (O) in the atmosphere, Temperature (T) and overall Environment (E), they are going to determine whether these planets are habitable for humans, smaller creatures, and bacteria. Humans can survive in temperatures up to 60 degrees Celsius and require at least 20% oxygen in the atmosphere. Smaller creatures can survive in temperatures up to 80 degrees Celsius as long as the oxygen is at least at 10% of the air. Bacteria require a much less favorable setting to survive. As long as the oxygen is at 5%, some bacterial strains will survive. This means that if humans can survive, smaller creatures and bacteria will always survive. (Please note that the values in this

question are only figurative and do not indicate actual survival settings.)

The following flow chart shows how the scientists determine the planet's suitability:



2.3. Which of the following statements is or are correct?

I. Here, Y represents a planet where nothing can survive.

II. Here, X represents a planet where all listed creatures can survive.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.4. Which of the following statements is or are correct?

I. If the temperature is 89 degrees and oxygen is 0.5%, then bacteria can survive.

II. If bacteria can survive, then the smaller creatures may perhaps survive.

(A) Only statement I is correct.

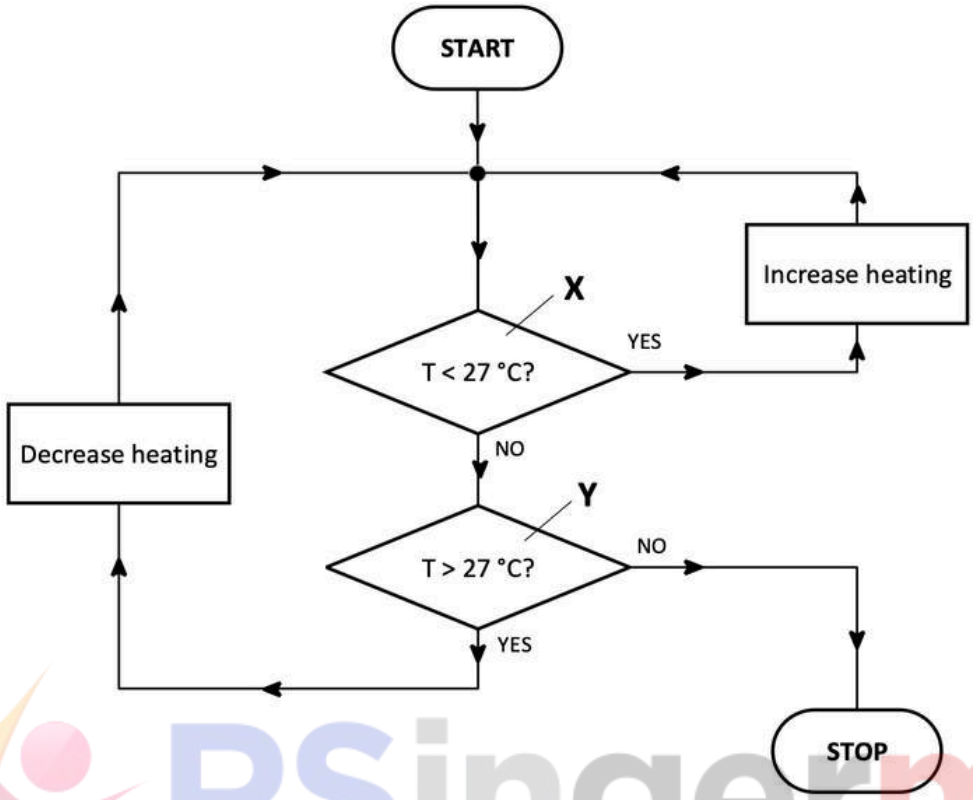
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.5. AND 2.6.

The thermostat we have in our homes for central heating uses an easy algorithm to regulate the heating and the temperature of the house. One couple has put the temperature at 27 degrees Celsius and the thermostat has to reduce or increase heating according to the room's temperature. The following flowchart shows the procedure in which the thermostat affects the temperature of a house.



2.5. Which of the following statements is or are correct?

I. If the temperature is lower than 27 °C, the heating is increased.

II. If the temperature is already lower than 27 °C, the heat will be reduced even further.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.6. Which of the following statements is or are correct when the contents of decision points X and Y are exchanged?

I. An already high temperature is further increased.

II. An already low temperature is further reduced.

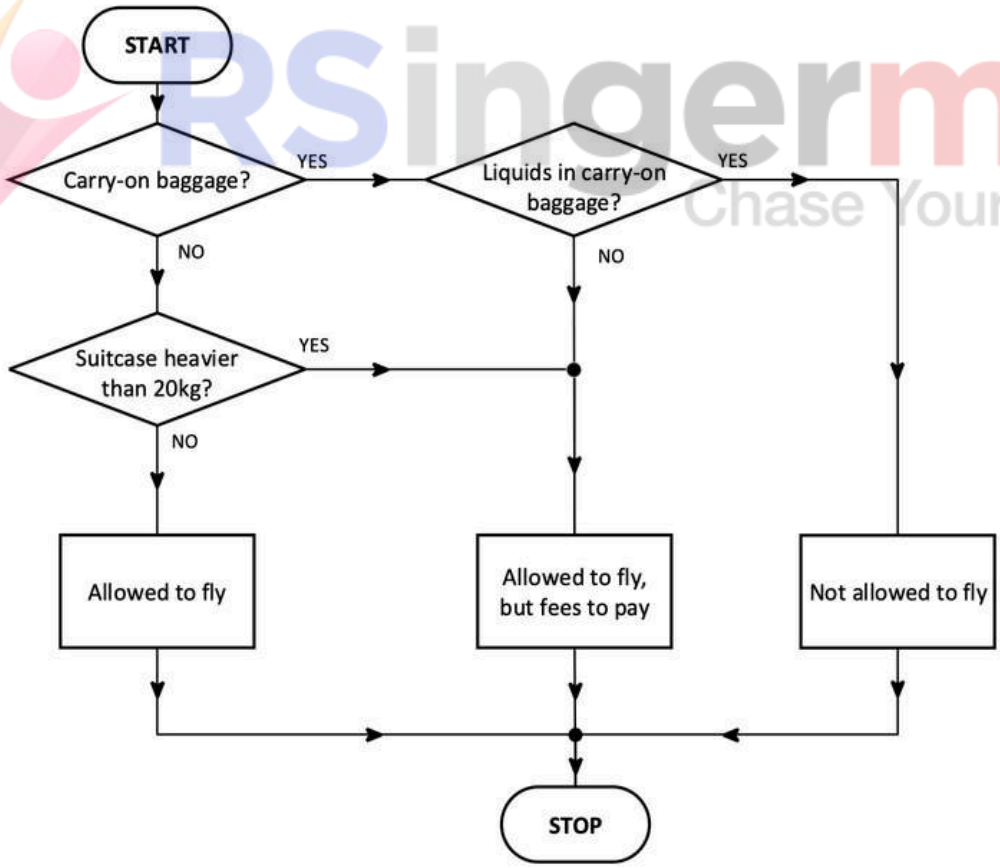
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.7. There are some rules which have to be followed in order to have permission to attend a flight. These rules may apply to customers' baggage and their contents. The following flow chart shows these rules.



Which of the following statements is or are correct?

I. If the suitcase is heavier than 20 kg, you cannot attend the flight.

II. If you want to carry a liquid in a carry-on baggage, you have permission to fly.

(A) Only statement I is correct.

(B) Only statement II is correct.

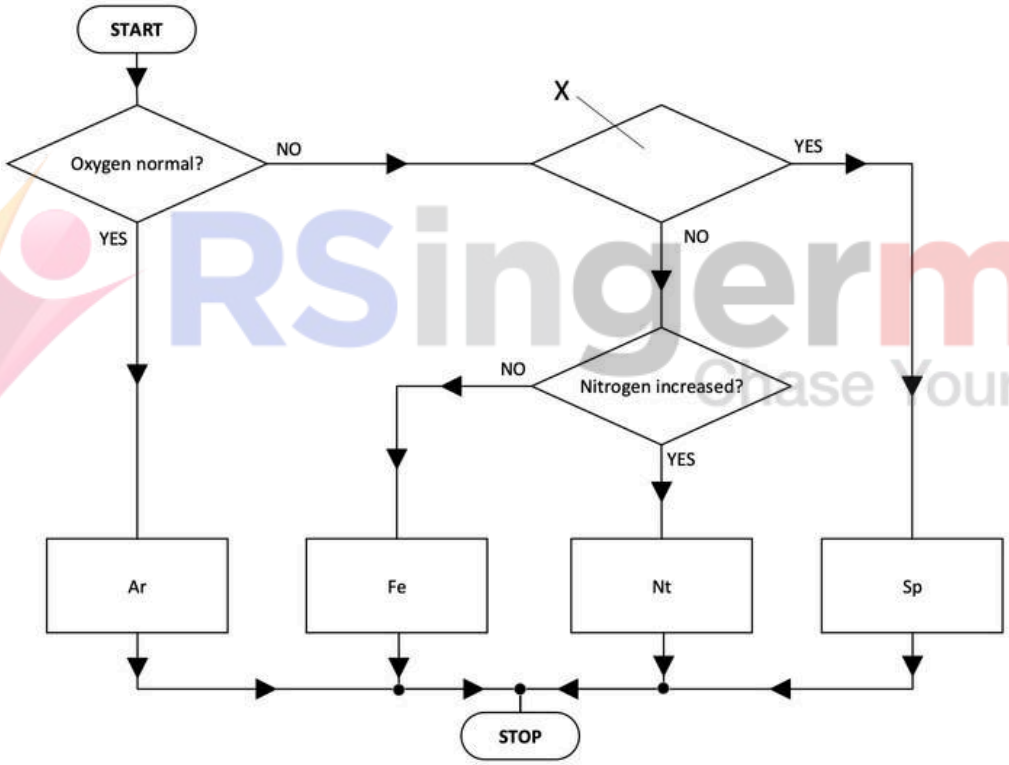
(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.8. A biologist is researching an alga in water and would like to determine the algae type with a test. There are four algae types: Ar, Sp, Nt and Fe. These algae produce various substances when they are in water.

- The Nt and Sp types produce nitrogen.
- The Fe, Sp and Nt types produce oxygen.
- The Ar and Sp types produce carbon dioxide.
- The Fe type produces methane.

The graphic displays how the test works.



Which of the following statements is or are correct?

I. If at the decision point X "Normal concentration of carbon dioxide" is found, then the graphic can be correct.

II. If at the decision point X "Increased concentration of methane" is found, then the graphic can be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

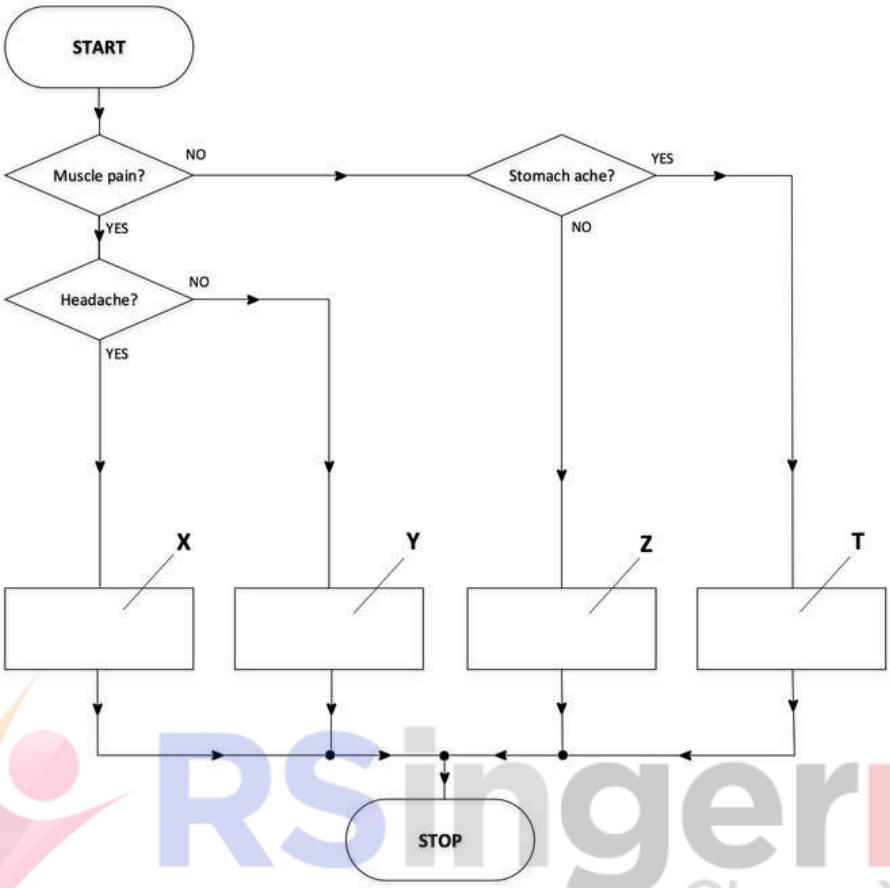
(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.9. AND 2.10.

Aa, Ab, Ad and Ae are substances.

- Aa and Ab help with headaches
- Aa and Ad help with stomach aches
- Ab and Ae help with muscle pains

The flow chart expresses which substances are to be taken for which symptoms. For this, the substance to be taken is always exactly the substance meant for the symptoms displayed.



2.9. Which of the following statements is or are correct?

I. If "Aa" is found at the position X, then the flow chart can be correct.

II. If "Ad" is found at the position T, then the flow chart can be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.10 Which of the following statements is or are correct?

I. If “Ae” is found at position Y, then the flowchart can be correct.

II. If “None” is found at position Z, then the flowchart can be correct.

(A) Only statement I is correct.

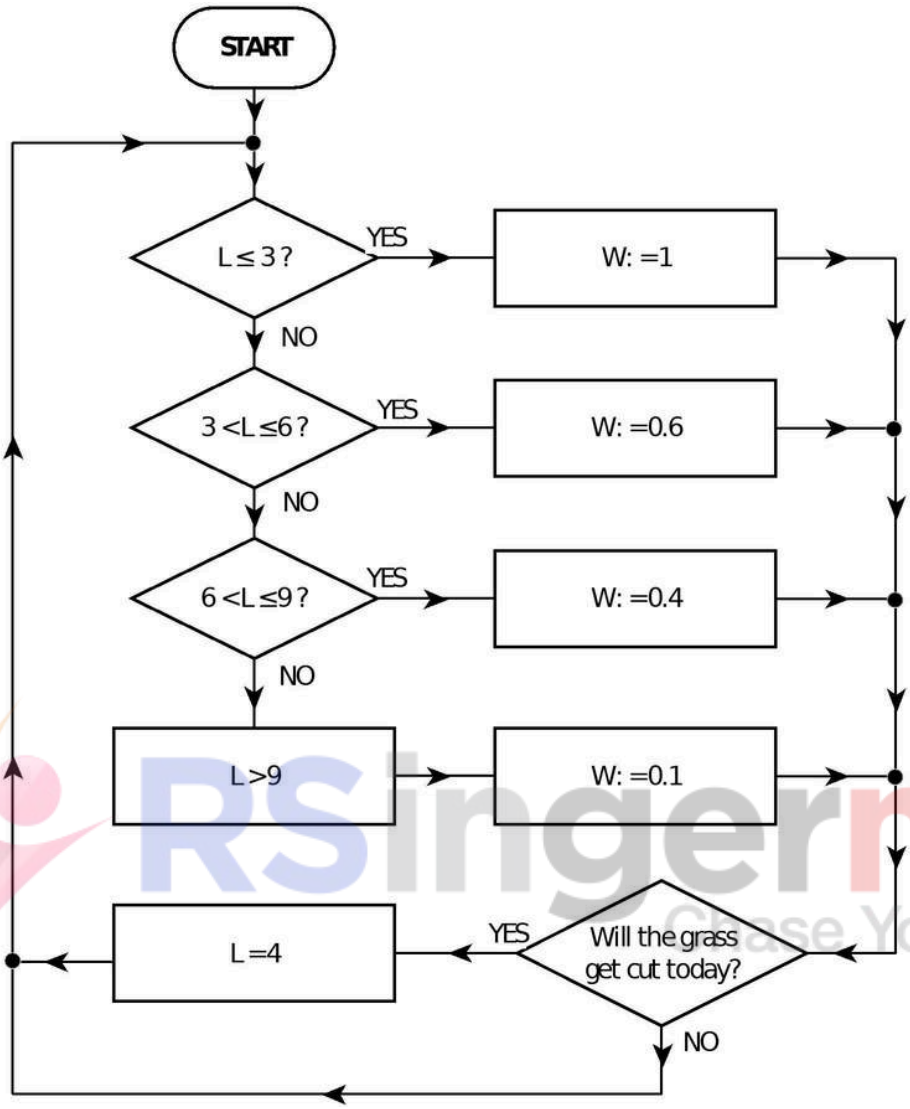
(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.11. AND 2.12.

The grass of a lawn grows slower the longer it gets. The following graphic illustration expresses the growth of the lawn. The length of the grass L is expressed in cm and the growth of the grass W in mm/day.



2.11. Which of the following statements is or are correct?

I. If the grass is 2.7 cm tall at the end of the day, then it will be taller than 4 cm 20 days later (assuming it will not be cut).

II. If the grass is cut from 7 cm down to 2 cm and not cut it again, then it will grow back to its original length in less than 100 days.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.12. Half of the lawn gets fertilized. Thanks to the fertilizer, the corresponding growth rate is doubled. Which of the following statements is or are correct?

I. If there are two blades of grass of the exact same length in each lawn half, it could be that the blade of grass in the fertilized half will grow at a slower rate than the blade in the unfertilized half.

II. If two blades of grass of the exact same length start to grow, one in each half of the lawn, then the blade of grass in the fertilized half will always grow twice as fast as the other blade of grass.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

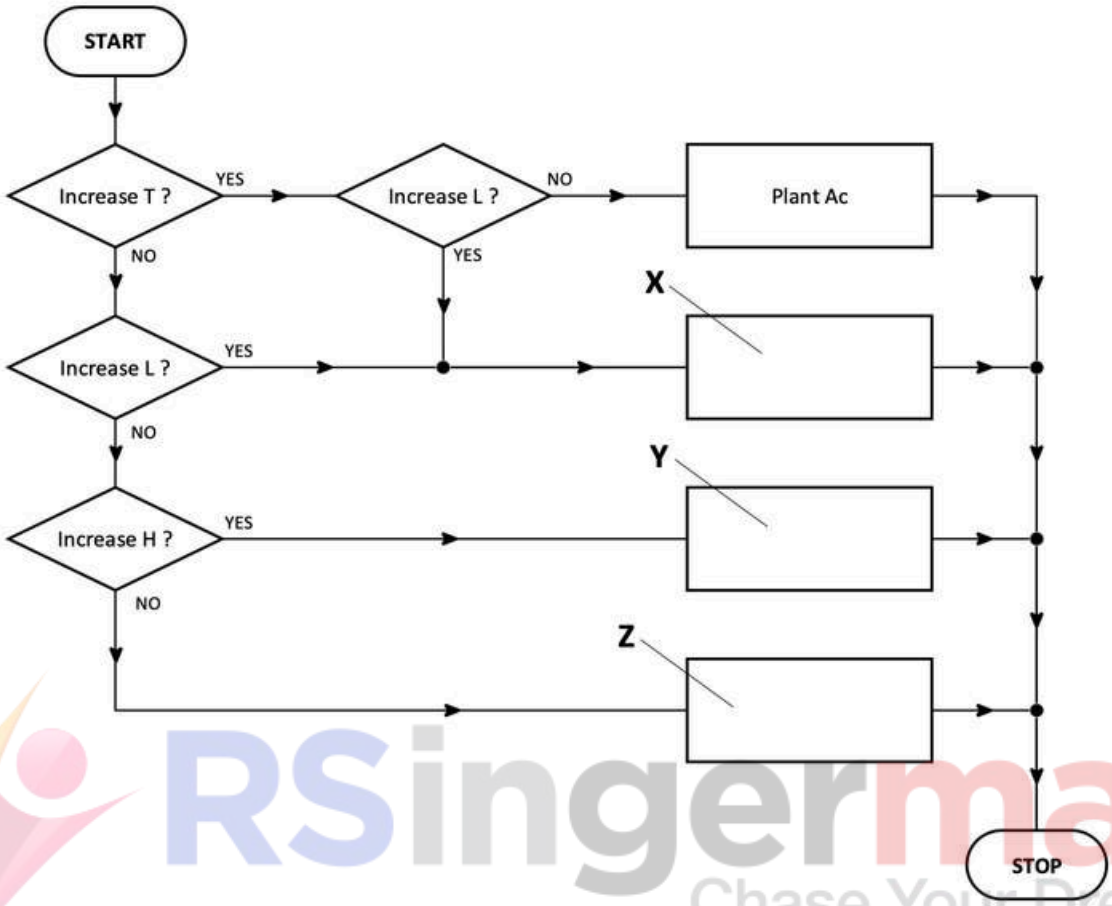
(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.13. AND 2.14.

Four plants react to three factors: temperature (T), light (L) and humidity (H).

- When temperature is increased, a faster rate of growth is observed in plants Pn and Ac.
- When humidity is increased, plants Ec and Ac grow much faster. Ec does not react to any other factor.
- When light intensity is increased, larger changes in growth are observed in plants Fm and Pn.

If an experiment is performed, growth depending on T, L and H can be proven. The flow chart shows several correlations.



2.13. Which of the following statements is or are correct?

I. If “Plants Fm and Pn” is found at operation X, then the flow chart could be correct.

II. If “Pn, Ac, Ec and Fm all grow at the same rate” was found at the position Z, then the flow chart can be correct.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.14. Which of the following statements is or are correct?

I. If “Plants Pn and Ac” was found in position Z, then the flow chart could be correct

II. If “Plants Ec and Ac” or “Plants Ec and Fm” was found in position Y, then the flow chart could be correct.

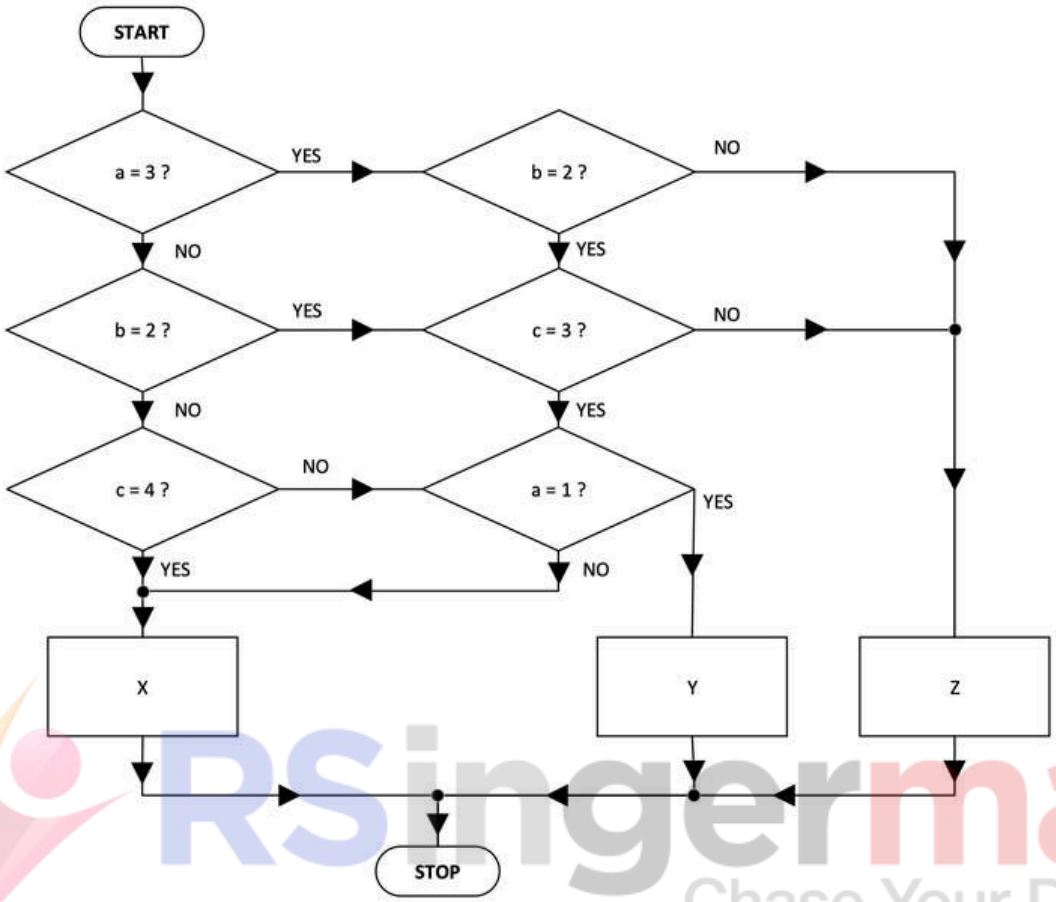
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.15. AND 2.16.



2.15. Which of the following statements is or are correct?

I. If a = 3 and b = 1, then Z is always chosen.

II. If b = 2, then Y is always chosen.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.16. Which of the following statements is or are correct?

I. If a = 2 and b = 2, then X is always chosen.

II. If b = 2, then Z is never chosen.

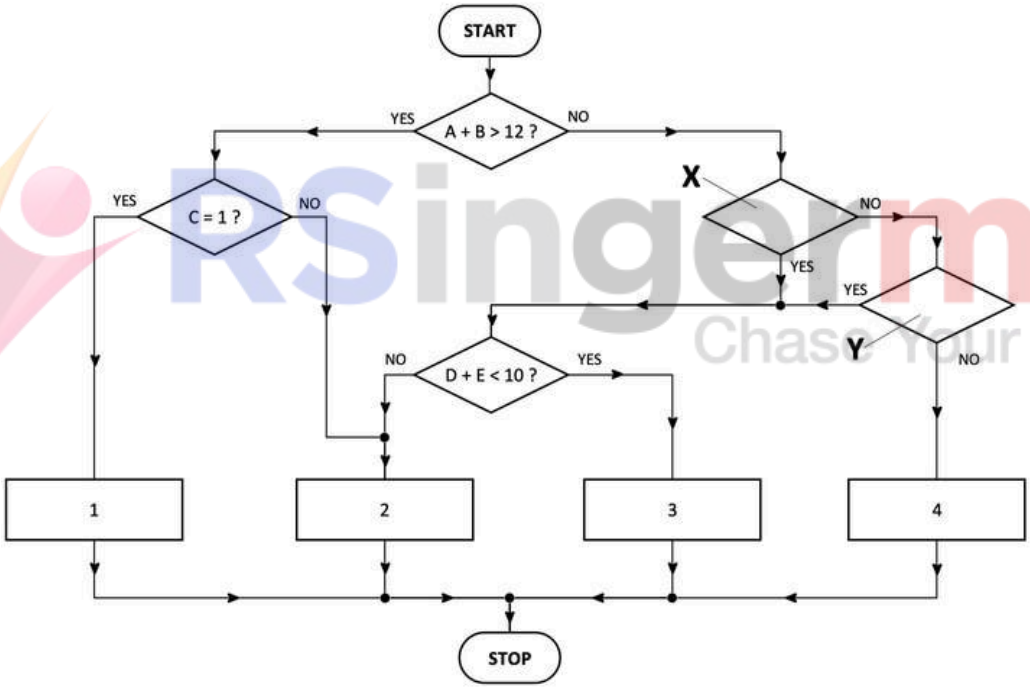
(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

TEXT AND FLOW CHART FOR QUESTIONS 2.17. AND 2.18.



The parameters of the flow chart are always integers.

2.17. Based on the flow chart, which of the following statements is or are correct?

I. If (A + B + C) = 12, then you will reach operation point 1.

II. Even if C = 1, you can still reach operation point 2.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.18. Which of the following statements is or are correct?

I. It can be that you reach option 3 if the following is found in field X: "A + B + C + D = 25 ?"

II. If "C + D > 10 ?" is found in field X and "E > 6 ?" is found in field Y, then no variable (A, B, C, D, E) can be larger than 6 in order to reach option 4.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.19.

A manufacturer produces high quality porcelain plates. The sales price is 400 € per plate. During production, numerous costs incur such as raw materials, staff, shipping etc. The costs vary depending on the quantity produced. For example, the production costs per plate are high when a very small quantity is produced because there has to be at least one person at every part in the production chain (such as purchasing raw materials, production within the factory, packaging and shipping).

The costs can be calculated using the following formula:

$\frac{50x}{2\sqrt{x}}$

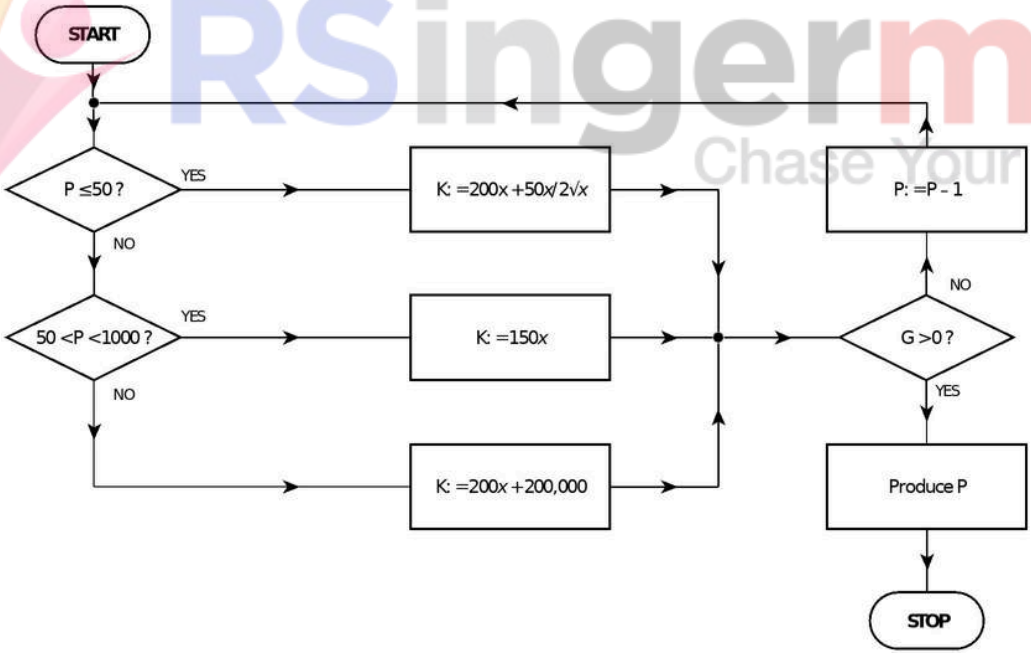
For a production volume of up to 50 plates per day: 200 x

For a production volume between 51 and 999 plates: 150 x

For a sum of more than 1,000 plates per day: 200 x 200,000

x stands for the number of porcelain plates produced.

In order to achieve a positive profit, the manufacturer adapts its production according to the current demand. The profit is the sales price minus the costs of production. In the case of a negative profit, even with high demand, the manufacturer still only produces plates as long as the profit remains positive. The following flow chart expresses the procedure:



Which of the following statements is or are correct?

I. With a high profit and a constant demand in the future, it is reasonable to increase production as long as the quantity remains under 999 plates per day.

II. If the manufacturer produces twice as much due to a very high demand, then the costs of production also double.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

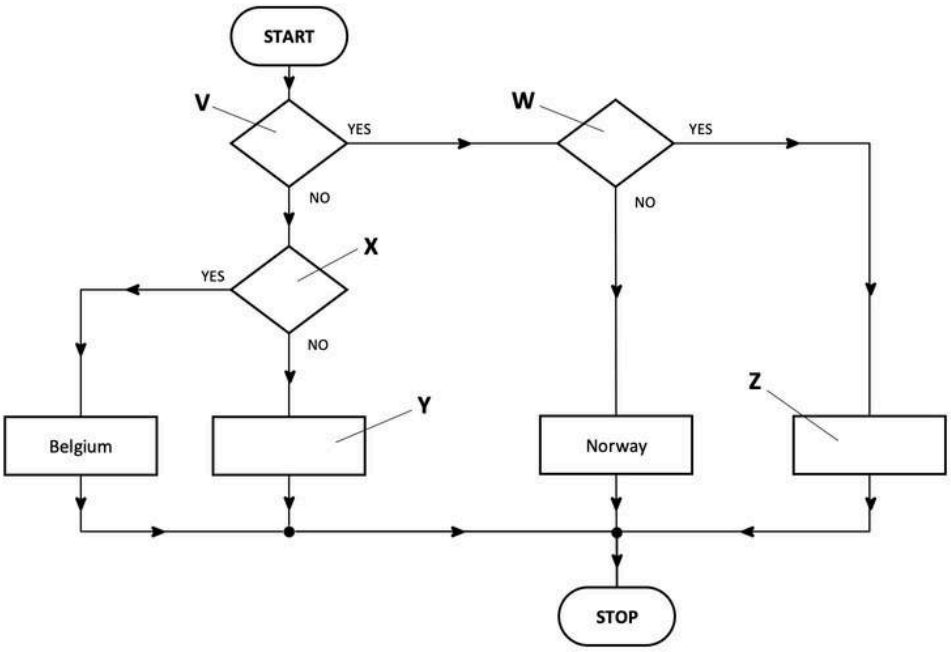
TEXT AND FLOW CHART FOR QUESTIONS 2.20. AND 2.21.

SARS and the H3N2 influenza are two diseases that have had a high mortality rate in some regions of the world in the recent years. Depending on their country of residence, inhabitants have been exposed to either both diseases, only one of the diseases, or neither of the diseases.

For our study, we randomly selected four countries. The table below shows whether these countries are affected by the two diseases, to either a high or low extent.

Algeria	Low SARS level	Low H3N2 level
Belgium	High SARS level	High H3N2 level
Malaysia	High SARS level	Low H3N2 level
Norway	Low SARS level	High H3N2 level

The following flowchart shows the statistical data according to four countries in relation to the two diseases.



2.20. Which of the following statements is or are correct?

I. Decision point V could be "SARS patients low?" and operation point Y could be "Malaysia".

II. The flow chart can be correct if we switch the operation point Belgium with the operation point Z.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.21. Which of the following statements is or are correct?

I. If decision point V is "SARS level low?", then decision point X should be "H3N2 level high?" for the flow chart to be correct.

II. If decision point V is "SARS level low", and decision point W is "H3N2 level low", then Z should be "Algeria".

(A) Only statement I is correct.

(B) Only statement II is correct.

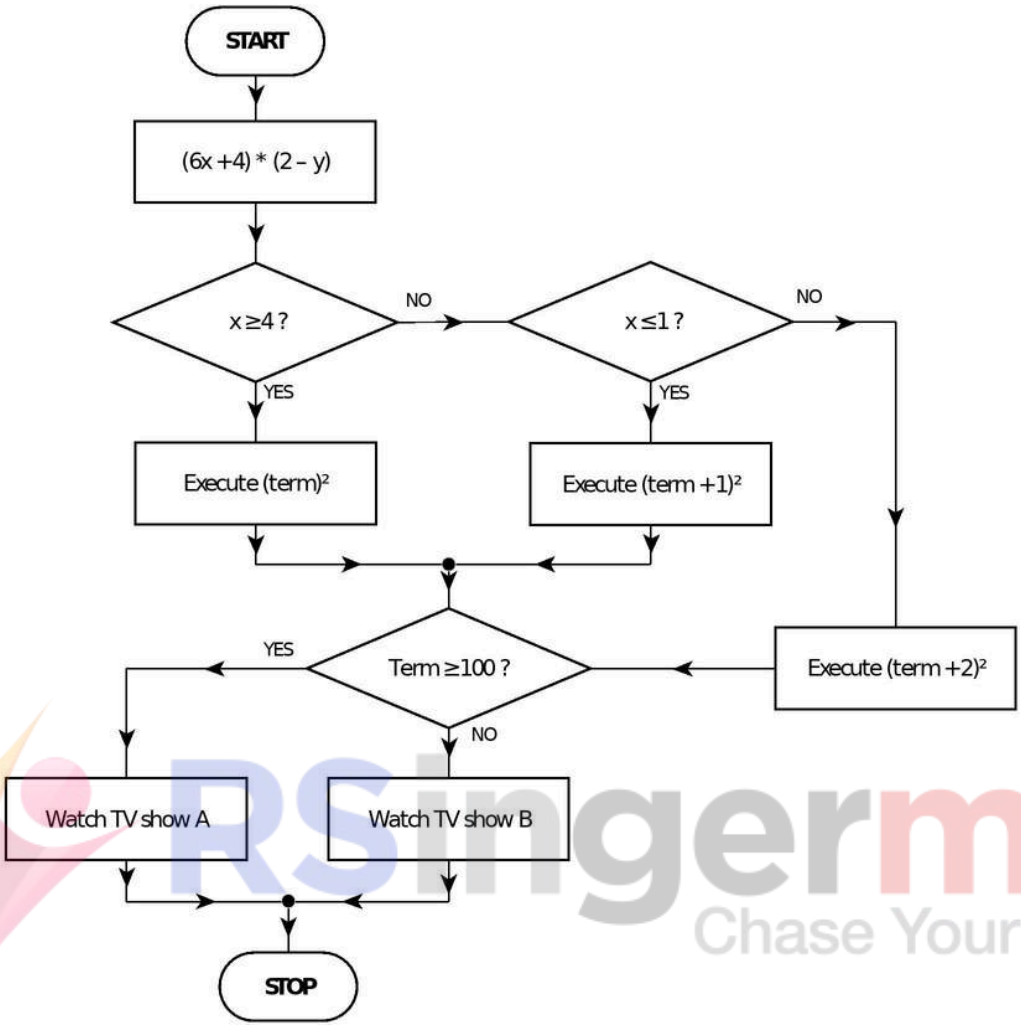
(C) Both statements are correct.

(D) Neither of the two statements is correct.

2.22.

Alin and her flat mate Jens cannot agree on which television show they should watch.

Alin prepared the following flow chart and suggested solving this decision democratically. Each day one of them determines the x value. The other then determines the y value for that day. The next day the order is changed (when Alin determines the x value today, then Jens determines the y value today and determines the x value tomorrow).



Which of the following statements is or are correct?

I. Today Jens determines the x value. If he chooses 1, Alin could choose 1 for the y value in order to reach the television show A.

II. Tomorrow Alin determines the x value. She definitely wants to watch show A, so she chooses 100 for x. This way she is guaranteed to watch show A.

(A) Only statement I is correct.

(B) Only statement II is correct.

(C) Both statements are correct.

(D) Neither of the two statements is correct.

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ANSWER KEY

Exam 1			Exam 2	
Question	Answer		Question	Answer
1.1.	D		2.1.	B
1.2.	A		2.2.	D
1.3.	C		2.3.	D
1.4.	A		2.4.	B
1.5.	D		2.5.	A
1.6.	C		2.6.	C
1.7.	C		2.7.	D
1.8.	B		2.8.	D
1.9.	D		2.9.	B
1.10.	A		2.10.	C
1.11.	A		2.11.	C
1.12.	C		2.12.	A
1.13.	A		2.13.	A
1.14.	B		2.14.	D
1.15.	D		2.15.	A
1.16.	C		2.16.	D
1.17.	C		2.17.	B
1.18.	B		2.18.	A
1.19.	D		2.19.	D
1.20.	B		2.20.	C
1.21.	B		2.21.	C
1.22.	A		2.22.	A

DETAILED SOLUTIONS

EXAM 1

1.1. Answer: D

Statement I: If the student has a grade of more than 75%, then the exam is passed. It does not matter how often the student has attended the course. The statement is not correct.

Statement II: See explanation for statement I. The statement is not correct.

1.2. Answer: A

Statement I: The exam is only passed when a percentage of MORE than 75% is achieved. With exactly 75%, the exam is always repeated. Thus, the statement is correct.

Statement II: If the grade is less than or exactly 75%, then the exam has to be repeated without taking course attendance into consideration.

1.3. Answer: C

Put the values from the paths leading to the results given in the statements in F and solve for the unknown. If the result is the same number as it should stand for in point A or B, this statement is correct.

Statement I:

For y = 3, z = 3 and F = 11:

$11 = \frac{1}{2}x + 3 + 2 \times 3$

$x = 4$

Statement II:

For x = 1 and y = 1 and F $= \frac{7}{2}$*:*

$\frac{7}{2} = \frac{1}{2} \times 1 + 1 + 2z$

$Z = 1$

Both statements are correct.

1.4. Answer: A

Statement I: Since Pakistan won against SA, IR and S, represented by teams 1-3 in the flow chart, they qualified for the quarter finals. Statement II is correct.

Statement II: There are two conditions for entering the quarter-final which include winning against India and Australia or winning against the other three teams. However, team S does not qualify because it lost against Australia and won only two instead of three matches. Statement I is incorrect.

1.5. Answer: D

Statement I: The statement is not correct. Even if the grade for German is 3, one can study Architecture with a good grade in English.

Statement II: There is also the possibility of studying Architecture with a grade of 1 in English. The statement is not correct.

1.6. Answer: C

Statement I: The statement is correct. Grade 2 in German is sufficient for Arts. The Mathematics results are irrelevant.

Statement II: It is actually true that it is not possible to study Arts with a 3 in German (see first decision point "German").

1.7. Answer: C

Statement I: If one chooses "No" at the decision point "Within Europe", then the plane will actually always be chosen. This statement is correct.

Statement II: If one chooses "No" at the decision point "Long-distance trip", then the only means of transportation are the car or train, but not the plane. This statement is correct.

1.8. Answer: B

Statement I: For short travels ("No" at "Long-distance trip"), the plane is never chosen. This statement is not correct.

Statement II: Indeed, when travelling within Europe, one can only come to the field "Train" if one chooses "No" at the decision point "Individual tour?". This is why, when one wants to plan an individual tour, one would never choose the train. This statement is correct.

1.9. Answer: D

Statement I: For the "Rain" parameter, it is the exact opposite – the more rain there is, the less water is given. The same applies to the groundwater level – if it is high, less water needs to be given. The statement is incorrect.

Statement II: Every day starts off with the base value of 5 liters of water. Even if the ground-water level is low for a longer period, each day W is only increased by 300 ml. This statement is not correct.

1.10. Answer: A

Statement I: When there is a lot of rain, the gardener may water less than 100 ml or nothing at all. Statement I is correct.

Statement II: You have to check whether there could be a combination of the parameters (T, R, groundwater levels and sunlight), where the gardener has to pour more than 20 liters of water in a single day per (flower) patch. If more water must be used due to low groundwater level and excessive sunlight, this would require an additional 400 ml = 5,400 ml.

At least 14,600 ml would have to be added due to the high temperature. Now check if this is realistic. To do this, solve the following equation for T:

$$(T - 25\ °C) \times 200\ ml = 14{,}600\ ml$$

$$T - 25\ °C = 73$$

$$T = 98\ °C$$

98 °C is not a realistic value for the temperature, so the statement is incorrect.

1.11. Answer: A

Statement I: If one chooses "Yes" for both the "Younger than 13?" as well as the next field "Likes sorbet?", then the decision will always be strawberry. This statement is correct.

Statement II: If the customer is older than 13 and likes dark ice cream, then the options are coffee and chocolate. This is why the decision is not always coffee. It depends upon whether or not the customer likes it sweet. This statement is not correct.

1.12. Answer: C

Statement I: For this statement, one must work "backwards". It is actually true that, for chocolate, the customer must always fulfil the condition of liking sweet ice cream flavors, independent of age. This statement is correct due to the fact that a preference for sweet ice cream flavors is a prerequisite for the selection of "Chocolate".

Statement II: The "Coffee" option is not possible for the path "Customer is under 13 years old". This is why this "backwards" deduction is also correct.

1.13. Answer: A

Statement I: If, at point U, the decision is made whether or not the sequence begins with Ad, then one can see that G1, G4 and G2 correctly begin with Ad, whereas this is not the case for G3. Since the description of the gene sequences within the introduction agrees with this statement, the statement is correct.

Statement II: At point W, the decision would be made whether or not the sequence ends with Gu. If yes, one reaches G4, if no, then one matches G1. This corresponds to the description within the introduction. Now, we must check the second part, meaning whether or not cytosine is in the second position of the gene sequence. If we answer this with YES, only G2 and G3 are possible; however, this does not coincide with the flow chart. The statement is not correct.

1.14. Answer: B

Statement I: To get to Z, there are three options:

1) For F1 = a? YES, F2 = a? YES

2) For F1 = a? YES, F2 = a? NO and F4 = b? NO

3) For F1 = a? NO, F3 = c? YES and F4 = b? NO

We look at the process from the start and try to find a path which doesn't lead to Z. This applies to F1 = a? NO and F3 = c? NO. If this is the case, we will end at W for F2 = a and F4 = d. As no statement was made on the value of F1 and F3, it must be true for all possible values, for the statement to be correct.

An example to end at W would be: F1 = b, F2 = a, F3 = a, and F4 = d. Thus, the statement "If F2 = a and F4 = d, then Z is always chosen." Is incorrect. Alternative approach: F2 = a and F4 = d are given. First, it is decided whether factor F1 has the value a or b. If F1 = b and F3 = a, then W is chosen. If F1 = a, then Z is chosen. The statement is not correct.

Statement II: Y and W are indeed only chosen when F2 is NOT b. Vice versa, if b = 2, then W or Y can never be chosen. This can be derived from each decision point immediately above W or Y. Thus, the statement is correct.

1.15. Answer: D

Statement I: There are three ways to reach X:

1) F1 = a ? NO F3 = c ? NO F2 = b ? YES

2) F1 = a ? NO F3 = c ? YES F4 = b ? YES F2 = b ? YES

3) F1 = a ? YES F2 = a ? NO F4 = b ? YES F2 = b ? YES

The first way involves three decision-making points. So, maximum number of factors that can be determined is also three. At this point, there is no contradiction to the statement.

The other two ways, however, involve four decision-making points. This means that a maximum of four factors can be determined, which would contradict the statement. You need to check whether at least one of these two ways defines four factors.

Let's look at path 2). The factors F3, F4. And F2 are known, since the corresponding decision points are answered with YES; i.e. F3 = c, F4 = b, and F2 = b. At the decision point F1 = a?, NO is chosen. Since F1 can only assume the values a or b, F1 is also precisely determined; F1 = b.

So, there is at least one possibility for X, in which four factors can be precisely assigned. Statement I is wrong.

Statement II: In order to check this statement, we should follow all decision points which lead to decision option Z against the direction of the arrows back to the start. For this, we start at Z. If we follow the flowchart against the direction of the arrows, we go from Z to "F4 = b ?" and "F2 = a ?". Let's first have a look at the path which crosses F4. Here, "F4 = b ?" has to be answered with NO. Thus, F4 = d. If we continue working backwards, we will reach "F2 = a ?" which also has to be answered with NO. Thus, F2 can have the value b or c, which is not conclusive. Via the direct way to the decision point "F2 = a ?", we now check whether or not all factors can be assigned exactly one value. If "F2 = a ?" can be answered with YES, we will then reach "F1 = a ?" which also has to be answered with YES. Next, this path will take us to START. Consequently, neither F3 nor F4 can be assigned a unique value. The statement is not correct.

In short, the flowchart shows that there are a maximum of three decision points up to the result Z. Therefore, it is not possible to determine all four parameters going backwards from the field Z, since Z is independent of the value of F3.

1.16. Answer: C

Statement I: If F becomes negative once, then it can never again become positive. F is either multiplied by 2 or subtracted by 4. Both of these calculations reduce F. This statement is correct.

Statement II: In this case, the numbers are also always getting smaller because the term $\frac{3F \times Y}{2G+1}$ *would become smaller and, thus, X would never be larger than or equal to 100,000. Statement II is correct.*

1.17. Answer: C

Statement I: We start Round 1 with:

$X = 1 + \frac{3 \times 2 \times 1}{2 \times 3} = 2$

X cannot be divided by 5. So, F is now 2 $\times$ *2 = 4.*

X can be divided by 2. So G is now 3 + 2 = 5.

Since X is a whole number, we do not need to round it.

Statement I is correct.

Statement II: To answer this question, look at the results of the next round of calculation:

1. Round: *X = 2 with F = 4, G = 5*

2. Round: *Starting values: E = 1, F = 4, G = 5, Y = 1*

$X = 1 + \frac{3 \times 4 \times 1}{2 \times 5} = 2{,}2$

X is not divisible by 5. So, F now becomes 2 $\times$ *4 = 8*

X is not divisible by 2. So, F now becomes 8 – 4 = 4

X is not a whole number. Now X is rounded: X = 2.

X = 2 with F = 4, G = 5, E = 1, F = 1

It can be seen that the result for X and the values of E, F, G, and Y in the second round are identical to those in the first round. In the third

round, the result for X will therefore be exactly the same as in the second round. This also applies to all subsequent rounds. X will always have the value of 2 at the end of the round, therefore, the stop point of 100,000 will never be reached and it is an eternal cycle. Statement II is correct.

1.18. Answer: B

Statement I: If the driver already has 7 points, he/she will lose his/her license even though it is just a Type I delict.

Statement II: Yes, for example, the driver might lose it in January and again in September, after he/she has accumulated 8 or more points again through speeding tickets. The statement is correct.

1.19. Answer: D

Statement 1: We are at the first decision point. If b = 2, we answer "Yes", and go down. If a = 1, we answer "Yes" and go to the last decision point. If c = 1, we get the result "two different real solutions".
Let's look at the discriminant: Δ > 0. Therefore, Δ must be greater –
and not less – than zero. The statement is incorrect.

Alternatively, you can go backwards here: In order to land in the field
"two different real solutions", the decision above "Δ > 0" must be answered with YES. The statement that the discriminant must be less than 0 for two different real solutions is therefore incorrect.
Statement II: We are at the decision-making point where we are asked whether a = 3. If this is the case, we answer "Yes" and go down. If c = 3, we answer "Yes" and go to the last decision point. If b = 1, we get the result "two complex conjugate roots". The value of the discriminant is Δ = -35 < 0. This means that Δ < 0 must apply in order to achieve two solutions with complex numbers. The statement [illegible]

1.20. Answer: B

Statement I: Even in the case of larger apartments, the ARP can stay lower than the ORP. In this situation, additional measures will be implemented. This statement is not correct.

Statement II: It is quite possible that, by improving upon the infrastructure of public transportation, the ARP = ORP and thus "No" will be chosen for the "ARP<ORP?" field. This statement is correct.

1.21. Answer: B

Statement I: In order to reach the "improve infrastructure of public transportation" field, it is necessary to pass the "Larger apartments" and "Beautify neighborhood" field. This statement is not correct.

Statement II: If the ARP is still lower than the ORP, even after applying each measure, the entire procedure begins with "Larger apartments" again. This statement is correct.

1.22. Answer: A

Statement I: With such complicated-looking equations, often there is the option to determine the correct answer through estimation.

In this case, we know that A, B, and C > 10 and the sum of them all is 100. In the next steps, either B or C will be doubled and then subtracted by 2. The doubling increases the value of the number more than the subtracting of 1 (it does not matter if this affects A, B or C). At the end of the first run, A + B + C has to be > 100. This means that X must be a negative number in order for A + B + C + X = 100.

You can reach this conclusion by testing a couple of values. In order to test a conservative scenario, we assume that the smallest number

among A, B, and C is to be multiplied. For example:

A = 50

B = 11

C = 39

$\frac{A}{B+C} \geq \frac{B}{C+A}$ *Yes*

B is doubled, so B = 22

$\frac{C}{B+A} > \frac{B}{A}$ *YES*

C is 37.

A + B + C + X = 100

50 + 22 + 37 + X = 100

X = -9

This question is much more difficult than others found in this test. Through such questions, you can see that, with the help of shortcuts, even difficult questions can be solved in less than 2 minutes. For many students, the time for this section of the test is not sufficient. Estimations make it possible to answer questions with less guess work:

$\frac{A}{B+C} \geq \frac{B}{C+A}$

$\frac{A}{B} \geq \frac{B+C}{A+C}$

Statement II: To answer this question, we change the formula so that the size ratios can be better compared (we multiplied crosswise):

$\frac{A}{B+C} \geq \frac{B}{C+A}$

$\frac{A}{B} \geq \frac{B+C}{A+C}$

According to the statement, A < B applies. You can see immediately that the left side of the equation must therefore be less than 1. For

the right side, the following applies: If A < B, then B + C is greater than A + C. Thus, the numerator of the fraction is greater than the denominator, and the value of the fraction is greater than 1. The inequation is therefore not satisfied. Therefore the "NO" option is chosen and C is doubled. The statement is wrong.

EXAM 2

2.1. Answer: B

Statement I: Room A also has a terrace. This is why this statement is not correct.

Statement II: The only room which has enough space for more than 4 people is Room A. This statement is correct.

2.2. Answer: D

Statement I: If it is just one person, but this person wants to have a terrace, then Room B is also chosen. This statement is not correct.

Statement II: See explanation for statement I. Even one individual person can choose Room B. This statement is not correct.

2.3. Answer: D

Statement I: It is actually the other way around; Y stands for a state where all creatures can survive. Statement I is false.

Statement II: X stands for a state where nothing can survive.
Statement II is wrong.
Hence, answer D is correct.

2.4. Answer: B

The first statement is false as bacteria require at least 5% oxygen, not 0.5%.

The second statement is true. For instance, if oxygen is 11% and temperature is 82 degrees Celsius, both the smaller creatures and

the bacteria will survive. Therefore, answer B is correct.

2.5. Answer: A

The couple wants the room temperature to be 27 degrees Celsius. If the temperature is lower than 27, the thermostat has to increase heating in order to reach that temperature. Statement I is correct.

We are at the first decision point, which asks if the temperature is less than 27 degrees. If it is, we will answer "YES" and we will move to the "Increase heating" operation point. It will not be further reduced. Statement II is false.

2.6. Answer: C

If we exchange them, then the first decision point will ask if the temperature is greater than 27 degrees Celsius. If we answer "YES", we will move to the "Increase heating" operation point, and the temperature will be further increased. Statement I is correct.

Likewise, if the temperature is lower than 27 degrees and we answer "YES", we will move to the "Decrease heating" operation point, and the temperature will be further reduced. Statement II is correct.

2.7. Answer: D

Statement I: We are in the decision point which is asking about the weight of the suitcase. If we answer "YES", which means that the suitcase is indeed heavier than 20 kg, we go to the decision point "allowed to fly but fees to pay". The statement is not correct.

Statement II We are in the decision point which is asking about the existence of liquids in a carry-on baggage. If we answer "YES", we go to the "not allowed" decision point.

2.8. Answer: D

Statement I: The algae Ar and Sp produce carbon dioxide. In the graphic, if at position X it reads "Carbon dioxide normal?" and the path followed is "YES", you will get to the algae Sp. However, as Sp produces carbon dioxide, it should have an increased carbon dioxide level. The statement is incorrect.

Statement II: The algae Fe produces methane. If at X it reads "Increased concentration of methane?" and the answer is "YES", the path must lead to the algae that produces methane. In the diagram,
the path would lead us to Sp, which does not produce methane. The statement is false.

2.9. Answer: B

Statement I: Aa helps with stomach aches and headaches but not with muscle pains. Thus, the statement is not correct.

Statement II: Ad helps with stomach aches. Thus, the statement is correct.

2.10. Answer: C

Statement I: Ae helps with muscle aches. This is expressed correctly within the flowchart. Thus, this statement is correct.

Statement II: All of the substances listed help with at least one of the symptoms. If "None" is found at the position Z, then the flow chart is correct because no symptom is present. What matters here is that "can be" is included in

the statement. There may be other
possibilities, but "no" is one of the correct answers. This statement is correct.

NOTE: Not all possible combinations of symptoms are shown in the flowchart. A flowchart is only incorrect if it contains illogical or

incorrect processes, decision-making points, or operations. It is not always necessary to have all possible decision-making points.

It always depends on the purpose of the diagram. For example, medication in a certain group of patients may not be administered if the person only has a headache, but only if there is muscle pain or abdominal pain. Sometimes processes are deliberately simplified in order to analyze only a partial aspect. If the statement was "The diagram is sufficient to make a decision regarding the possible treatment of all listed symptoms", then this statement would be incorrect. If this were the case and you do not have muscle pain but have abdominal pain, you would no longer be checked whether there is a headache. The diagrams are about interpreting the information given in the question and the diagrams. The diagrams represent the processes in a very simplified manner; lifelike processes would be too complex for the purpose of this test.

2.11. Answer: C

Statement I: There are two growth phases here, the grass grows 0.1 cm a day until it reaches a height of 3 cm. Then it grows at 0.06 cm per day.
This phase lasts (6 cm – 3 cm)/0.06 cm = 50 days. Therefore, the third growth phase is never reached in this question.

1. Growth phase (L ≤ 3) cm: L = 2.7 cm + 0.1 cm/Day × W ≤ 3 cm
W = 3 Days

2. Growth phase (3 < L ≤ 6) cm: L = 3 cm + 0.06 cm/Day ×
W = 4 cm
L = 3 cm + 0.06 cm/Day × 17 Days
L = 4.02 cm

After 20 days, the grass is 4.02 cm long. The statement is correct.

Statement II:

1. Phase (L ≤ 3) cm: L = 2 cm + 0.1 cm/Day × W ≤ 3 cm W = 10 Days

2. Phase (3 < L ≤ 6) cm: L = 3 cm + 0.06 cm/Day × W ≤ 6 cm W = 50 Days

3. Phase (6 < L ≤ 9) cm: L = 6 + 0.04 cm/Day × W = 7 cm W = 25 Days

It takes 10 + 50 + 25 = 85 days until the grass is 7 cm high again. This is less than 100 days, so this statement is correct.

2.12. Answer: A

Statement I: Here you must pay attention to the process. To prove a statement as right or wrong, one example or counterexample can be sufficient. If, for example, through time, the blade of grass in the fertilized half becomes taller than 9 cm while the blade of grass in the unfertilized half is still shorter than 9 cm, then the blade of grass in the unfertilized half will grow faster. The growth rate is faster despite the grass being shorter. This statement is correct.

If two blades of grass of exactly the same size grow on both halves of the lawn from the start, it could be that a blade of grass in the fertilized part always grows slower than a blade of grass in the non-fertilized part. The statement would be wrong.

NOTE: In the test, it is often the case that with more difficult tasks, you need to pay close attention to the wording. The statements are formulated in such a way that only the most necessary information is included. The statements are clear, but not everything is always pointed out separately.

Statement II: Since the blades do not grow at the same speed, one of the blades will grow longer earlier and thus experience a change in growth rate faster. From that point on, growth is no longer twice as long. The statement is incorrect.

2.13. Answer: A

Statement I: There are two ways to reach field X. With both options, the question of whether B has been increased must be answered with "YES". Pn and Fn are the only two plants that respond to an increase in B. The statement is correct.

Statement II: The Z operation can only be reached when neither T, L, nor H is increased. Thus, none of the plants experiences a faster growth rate due to one of the three factors. This is why the plants maintain their original growth rate. However, the text does not mention whether the plants grew at the same rate before being subjected to the influence of one or more of the three factors. Due to this, no statement can be made as to whether or not they all grow at the same rate. Statement II is not correct.

2.14. Answer: D

Statement I: If the position Z were "Plants Pn and Ac", the plants should not be influenced by an increase in temperature, lighting, or air humidity. However, this is a contradiction to the text from the statement since, according to this, each plant depends on any of the three factors. The statement is therefore incorrect.

Statement II: To reach the end point Y, the following path needs to be taken:

1) Temperature T

No. Of the four plants Ac, Ec, Fm, Pn, we can eliminate Ac and Pn.

2) Light L No. Of the remaining two plants Ec and Fm, we can eliminate Fm.

3) Humidity H Yes. Humidity L has a positive correlation with the growth of Ec. For the flowchart to be correct, only "Plant Ec" needs to be in position Y. Statement II is false.

2.15. Answer: A

Statement I: If you follow the path (a = 3 YES; b = 2

NO) then you will always reach field Z. As long as b is not equal to 2 (e.g. b = 1), then the statement is correct.

Statement II: If a is not 1, then you will never reach field Y. It does not matter what b is. This statement is not correct.

2.16. Answer: D

Statement I: If c ≠ 3, then you will not come to the field X. The statement is incorrect.

Statement II. If c ≠ 3, you can come to the Z field, even if b = 2. The statement is incorrect.

2.17. Answer: B

Statement I: Option 1 can only be achieved in one way:

(A + B) > 12 ? YES
C = 1 ? YES

If (A + B) is already greater value than 12 and C = 1, then the value of (A + B + C) is guaranteed to be greater than 12 (and therefore not equal to 12). The condition from the statement is therefore a contradiction to the diagram. Statement I is wrong.

Statement II: There are two possibilities for Option 2:

Possibility 1: (A + B) > 12 ? YES
C = 1 NO

Possibility 2: (A + B) > 12 NO
X or Y YES
(D + E) < 10 NO

With the second option, it is probable that we will end up with Possibility 2, even if C = 1.

2.18. Answer: A

Statement I: Option 3 can be achieved in two ways:

Possibility 1: A + B > 12 ? => NO
X ? => YES
D + E < 10 ? Possibility 2: A => YES
+ B > 12 ? => NO
X ? => NO
Y ? => YES
D + E < 10 ? => YES

In order to answer this question, it is crucial that "X ? => "YES" as well as "X" ? => "NO" are both possible to reach. Regardless of the statement "X", you can go to option 3 (with option 2 this depends on
Y, but since Y is not specified in this statement, you can ignore this). Statement 1 is therefore correct. Statement II: This question is also about an endpoint. We should
begin with option 4 and go backward step by step.
First of all, we must have answered Y with "NO".

E.g. E must be ≤ 6, and E must not be greater than 6, which is in agreement with the statement. (Note: If Y had been "E > 7?", our conclusion would be that E must be ≤ 7. Since E was not

mentioned in the previous steps, we could have described the statement as incorrect. We need just the first proof that the statement is wrong. We don't have to look further after that.)

We also have to answer X with "NO". E.g. C + D ≤ 10.

In this case there would be many variants, with C or D being greater than 6. For example:

C = 0 D = 10

or C = 2 D = 8

or C = 20 D = -30

Since the previous step is only about A and B, we can stop here. The statement is incorrect because C and D (and possibly A and B) can be greater than 6 if option 4 is selected.

2.19. Answer: D

Statement I: If demand does not increase any more, it would not be reasonable to continue production because the additionally produced plates cause production costs but cannot be sold. For example, if there is a demand for 100 plates and we, to be on the safe side, produce 110 plates, then our profit is:

40,000 – 16,500 = 23,500 €.

Statement II: The formula for calculating costs from a production quantity of 1000 plates is 200x + 200,000. The addition of 200,000 means that the total number of plates and the production costs are not exactly proportional:

x = 1000: Cost = 200 € × 1000 + 200,000 € = 400,000 €

x = 2000: Cost = 200 € × 2000 + 200,000 € = 600,000 €

As you can see, we don't need to do any calculations on this question. There are always questions that seem very complex, but in

reality, are only asking for a small amount of information from the task.

2.20. Answer: C

Statement I: If the decision point V would be "SARS patients low?" and we would answer "NO", then we would go to the next decision point, which is the X. This decision point should ask about H3N2 level. If H3N2 level would be high, then we are talking about Belgium. If H3N2 level would be low, then we are taking about Malaysia. We have two possible solutions, but the element Y could be "Malaysia", so this means that statement I is correct.

Statement II: Belgium can indeed be at the operation point Z, if V and W have the following text:

- *Decision point V: "H3N2 patients high?"*
- *Decision point W: "SARS patients high?"*

This statement is correct.

2.21. Answer: C

Statement I: If decision point V was "SARS level low?" and we would answer "NO", then we would go to the next decision point, which is the X. This decision point should ask about the H3N2 level. If the H3N2 level is high, then we are talking about Belgium. If the H3N2 level is low, then we are taking about Malaysia. Statement I is correct.

Statement II: Since we have to answer both V and W with "YES" to get to Z, we have low SARS and low H3N2 levels, which matches with Algeria. Thus, statement II is also correct.

2.22. Answer: A

Statement I: If X = Y = 1, then the term has the following values when we proceed with the flow chart.

1) (6 × 1 + 4) × (2 – 1) = 10

2) x ≥ 4 No

3) x ≤ 1 Yes

4) (10 + 1)2 = 121

5) Term ≥ 100 Yes

6) TV show A

The statement is correct.

Statement II: Because Jens determines Y, he can choose the television series. If he determines that Y = 2, then the term is zero and one stops at series B. Or, if he chooses a number with several decimal positions such as 2.0000001, then they will also reach series B. This statement is not correct.

4. APPENDIX: ANSWER SHEETS

Exam 1				
	A	B	C	D
1				
2				
3				
4				
5				
6				
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9				
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12				
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22				

Exam 2				
	A	B	C	D
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