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**

Solving Quantitative Problems

The subtest “Solving Quantitative Problems” provides practical problems to be solved by using basic arithmetic operations. This test measures mathematical thought and the ability to solve basic mathematical problems. The level of the arithmetic operations to be performed is elementary.

22 questions in the test, working time 45 minutes

Instructions
Please read the instructions before you start with the examples.

Here you will find some problems which you have to solve.

Example:
A student works in a factory during the holidays. He earns 10 Euros an hour. He works 8 hours a day, 5 days a week. How much money has he earned at the end of 4 weeks of work?

(A) 800 Euros
(B) 1,200 Euros
(C) 1,600 Euros
(D) 2,000 Euros

Answer:
(C) 1,600 Euros

How to reach the solution:

Daily wage	= 10 Euros x 8 hours
Weekly wage	= Daily wage x 5 days
Wage after 4 weeks	= Weekly wage x 4 weeks

Sample question 1: degree of difficulty low

2,600 bottles contain 650 litres of a soft drink. How many litres do 5,000 bottles hold?

(A) 338 litres
(B) 1,000 litres
(C) 1,250 litres
(D) 1,300 litres

Sample question 2: degree of difficulty low

A working day is 8 hours long and a working week is five days long. A woman receives a wage of 25 Euros per hour. If she works for longer than 8 hours per day she receives 30 Euros for each extra hour she works. In 4 weeks, she earns 4,600 Euros.
How many hours did she work altogether in those four weeks?

(A) 195
(B) 180
(C) 175
(D) 160

Sample question 3: degree of difficulty medium

Corinna has a photo which is 9 cm wide and 6 cm high. She would like to enlarge it to a width of 15 cm. The ratio of width to height has to remain the same. How high will the photo be?

(A) 11 cm
(B) 10 cm
(C) 9 cm
(D) 8 cm

Sample question 4: degree of difficulty medium

Dora and her three siblings Anton, Berta and Carl are an average of 5 years old. Anton is 2, Berta 6 and Carl 7. Dora, her cousin Hanna, Hanna's brother Emil (18), Hanna's sister Franka (6) and Hanna's brother Gustav (1) are an average of 10 years old.
How old is Dora's cousin Hanna?

(A) 5
(B) 10
(C) 15
(D) 20

Sample question 5: degree of difficulty high

Together, two sports clubs (A and B) have x members; A has a members and B has b members. Some of the persons are members of both sports clubs. Which of the following expressions describes how many persons are members in only one of the two sports clubs?

(A) x + a - b
(B) 2(a + b) - 2x
(C) ab - 2x
(D) 2x - (a + b)

Sample question 6: degree of difficulty high

A bottle X is filled entirely with orange juice. It contains 1 l of orange juice. Maria pours orange juice from this bottle X into two empty bottles Y and Z. Bottle Y is half as big as bottle X (in terms of volume). After the filling operation, bottle X still contains 0.6 l of orange juice; bottle Y is 1/5 full of orange juice; and bottle Z is half-full of orange juice. Maria fills bottle Z with water until the bottle is full.
How much liquid does bottle Z contain?

(A) 0.1 l
(B) 0.3 l
(C) 0.4 l
(D) 0.6 l

Inferring Relationships

In the subtest “Inferring Relationships”, each question consists of two pairs of words. Two of the four words are missing, and you are to identify the matching words so that both pairs of words have an analogous (the same, similar) relationship. This requires that you find the rule governing the analogy and select the words accordingly.
This test measures logical linguistic thought. Test takers have to identify meaning, and generalise and abstract in order to find the rule. Eventually the rule has to be concretised in order to fill the gaps.

22 questions in the test, working time 10 minutes

Instructions
Please read the instructions before you start with the examples.

“Dark : light = hot : cold” – “dark” is the opposite of “light” and “hot” is the opposite of “cold”. Between the first and the second word, therefore, there is an analogous relationship, as there is between the third and the fourth word.
Each of the following problems contains two gaps. Your task is to work out which words fill the two gaps in such a way that an analogous relationship results on the left- and the right-hand side of the “=”. Please note: Whether a word comes before or after the colon “:” is of decisive importance for the correct solution of the analogy.

Example:
house : _____ = tree : _____

(A) window – apple tree
(B) villa – tree trunk
(C) roof – branch
(D) front door – furniture

Only if you choose “(C) roof – branch” is there an analogous relationship on the left- and on the right-hand side. A roof is part of a house. A branch is part of a tree.
The first word always goes in the first space and the second word always in the second space.

Please note:
All verbs are expressed as “to” plus the infinitive, e.g. “to drink”. If a word which can be either a noun or a verb appears without “to”, the noun form is intended. For example, “drink” is intended in the sense of “beverage”.

Sample question 1: degree of difficulty low

pear : fruit = _____ : _____

(A) motor – motorcycle
(B) hammer – tool
(C) grass – cow
(D) animal – elephant

Sample question 2: degree of difficulty low

to cut : _____ = _____ : ball

(A) sharp – round
(B) bread – football
(C) knife – to play
(D) blood – to throw

Sample question 3: degree of difficulty medium

warmth : _____ = wind : _____

(A) temperature – tornado
(B) cold – wind velocity
(C) flame – rain
(D) heat – storm

Sample question 4: degree of difficulty medium

thick : thin = _____ : _____

(A) tired – sleepy
(B) sad – happy
(C) warm – hot
(D) hungry – thirsty

Sample question 5: degree of difficulty high

diversity : _____ = _____ : action

(A) uniformity – success
(B) distance – passiveness
(C) variety – deed
(D) uniformity – measure

Sample question 6: degree of difficulty high

intentional : _____ = coincidental : _____

(A) purposeful – unplanned
(B) unintentional – unplanned
(C) planned – chaotic
(D) orderly – disorderly

Completing Patterns

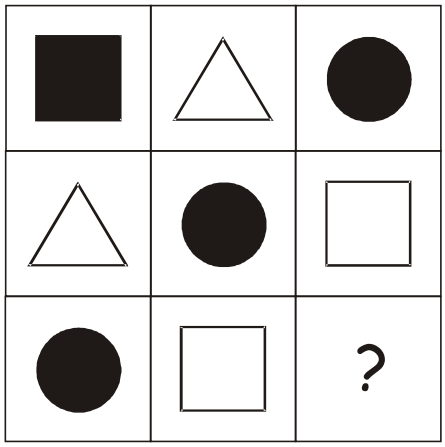
In the subtest “Completing Patterns”, lines, circles, quadrilateral and other geometrical shapes are arranged in the fields of a matrix according to a specific rule. You are to find the rule and apply it by identifying the missing shape in the last field. This test measures logical graphic thought. Language skills or educational background are irrelevant.

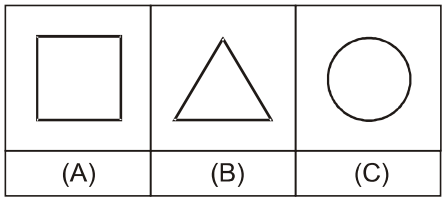
22 questions in the test, working time 20 minutes

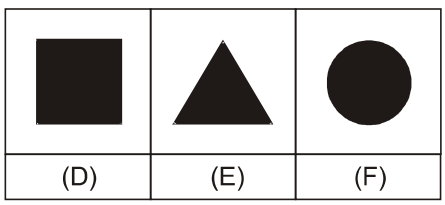
Instructions
Please read the instructions before you start with the examples.

For this group of items, you will read the instructions before the working time begins. The working time does not begin until after the instructions have been read. The test administrator will tell you when to begin.

Each of the following items consists of nine fields. Eight of the fields contain figures. In the ninth field (at the bottom right) is a question mark.







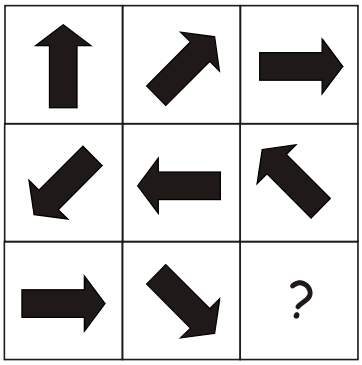
The arrangement of the figures has been carried out according to certain rules. Your task is to recognise these rules and apply them in order to find the ninth figure.

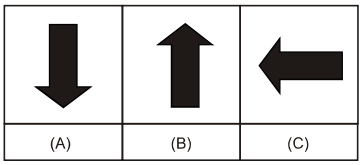
The rules apply
- from left to right,
- OR from top to bottom,
- OR from left to right **AND** from top to bottom.

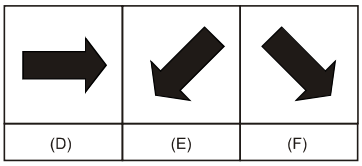
There are no other directions (e.g. diagonal) in which the rules can apply!

In order to solve an item, you need one, two or three rules. It is also possible that one rule applies horizontally and another rule vertically.
Below the nine fields, you will find six figures (A, B, C, D, E and F). Select the figure which should take the place of the question mark. How to reach the solution for the example will be described in sample question 3.

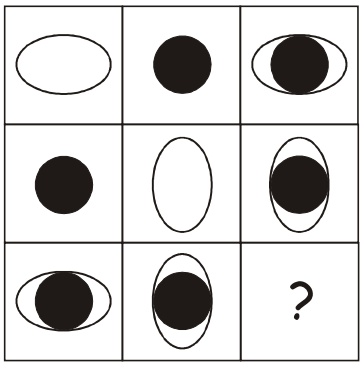
Sample question 1:
degree of difficulty low

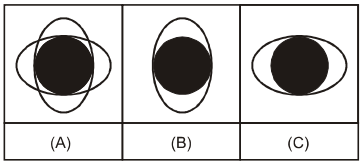


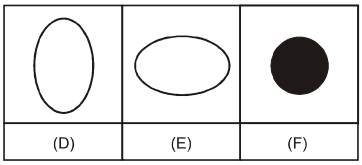




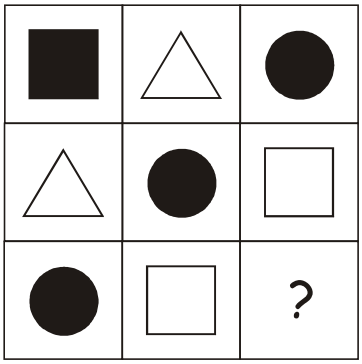
Sample question 2:
degree of difficulty low

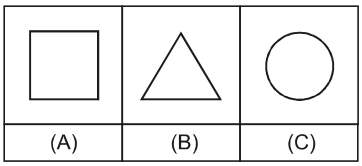


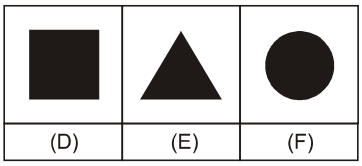




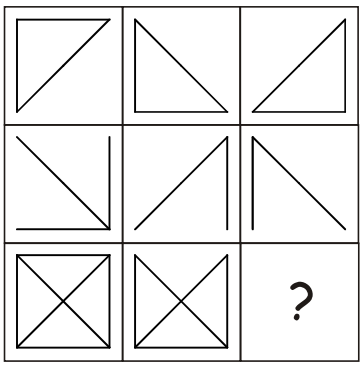
Sample question 3: degree of difficulty medium

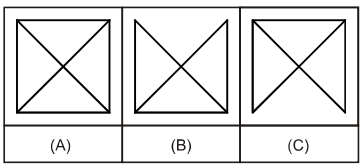


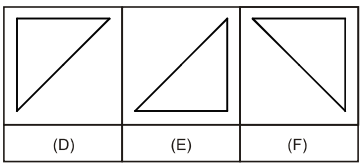




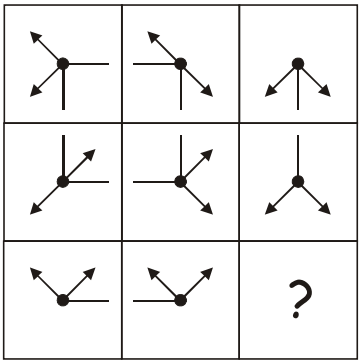
Sample question 4: degree of difficulty medium

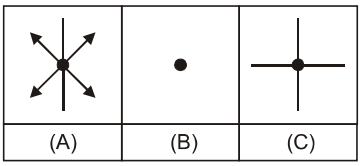


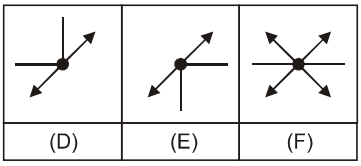




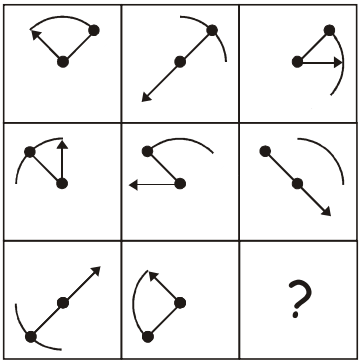
Sample question 5: degree of difficulty high

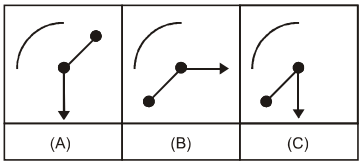


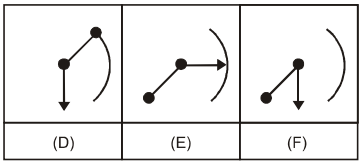




Sample question 6: degree of difficulty high







Continuing Numerical Series

The subtest “Continuing Numerical Series” provides a series of numbers structured according to a specific rule. You are to find the rule and apply it in order to identify the missing number. This test measures logical numerical thought. Knowledge of the four basic arithmetical operations addition, subtraction, multiplication and division is sufficient to answer the questions.

22 questions in the test, working time 25 minutes

Instructions
Please read the instructions before you start with the examples.

For this group of items, you will read the instructions before the working time begins. The working time does not begin until after the instructions have been read. The test administrator will tell you when to begin.

Each item consists of a numerical series, formed according to a particular rule. Your task is to find the next number in the series – its place is marked by the question mark (?).

Example 1:
5 15 13 23 21 31 29 ?

The numerical series is formed by the following arithmetical operation: +10 -2 +10 -2 +10 -2.
5+10=15 15-2=13 13+10=23 and so on.
The number that should be in the place of the question mark (?) is therefore **39** (29 + 10).

Example 2:
35 30 120 60 55 220 110 ?

The rule for this numerical series is as follows: -5 x4 ÷2 -5 x4 ÷2.

The number that should be in the place of the question mark (?) is therefore **105** (110 – 5).

Each rule can contain only the four basic arithmetical operations [addition (+), subtraction (-), multiplication (x) and division (÷)].

Proceed step by step:
1. First take a look at the numerical series.
2. Work out the rule on which the numerical series is based.
3. Then apply the rule in order to find the next number in the series. Carry out the necessary arithmetical operation and calculate the number that should be entered in the place of the question mark (?).

The solution number is always a whole number.

The solution number can be positive, negative or zero.

Any digit only ever occurs once in a solution number; in other words, solution numbers such as 11, 44 or 100 cannot occur.

On the answer sheet, mark the digits that appear in the solution number. If the number is negative, please mark the “-” on the answer sheet as well as the digits. The order of the digits does not matter.

Examples:
For the number “14”, mark the “1” and the “4”.

	–	0	1	2	3	4	5	6	7	8	9
01	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐

For the number “41”, also mark the “1” and the “4”.

	–	0	1	2	3	4	5	6	7	8	9
02	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐

For the number “-14”, mark the “-”, the “1” and the “4”.

	–	0	1	2	3	4	5	6	7	8	9
03	☒	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐

Sample question 1: degree of difficulty low

25 35 15 45 5 55 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
01	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sample question 2: degree of difficulty low

5 50 20 200 170 1700 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
02	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sample question 3: degree of difficulty medium

60 66 96 100 120 122 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
03	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sample question 4: degree of difficulty medium

2 6 16 64 640 644 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
04	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sample question 5: degree of difficulty high

2048 32 1 16 128 32 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
05	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sample question 6: degree of difficulty high

6 18 0 24 -6 30 ?
Solution:

	–	0	1	2	3	4	5	6	7	8	9
06	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐


KALBA ХОРАТА
LES HOMMES
LUDZI

Sample questions

Humanities, Cultural Studies and Social Sciences Module

The Humanities, Cultural Studies and Social Sciences Module is divided in three 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
Understanding and Interpreting Texts	22	45 minutes
Using Representation Systems Flexibly	22	55 minutes
Recognising Linguistic Structures	22	50 minutes
Total working time		**150 minutes**

Understanding and Interpreting Texts

In the subtest "Understanding and Interpreting Texts", short texts are presented on which questions have to be answered. This test measures the ability to read, understand, and correctly interpret different kinds of short texts with different content as well as to establish links between text elements and synthesise information from the text.

22 questions in the test, working time 45 minutes

Instructions
Please read the instructions before you start with the examples.

The following exercises are intended to test your ability to understand, interpret, and draw the right conclusions from the content of short texts. You will be asked to process several texts with different topics. Each text is followed by two or three questions relating to the preceding text. In each case please mark one of the four answering options on your answer sheet.

Text for sample questions 1 and 2

An Experiment
40 years ago, those who were friends with students of the sociology professor H. Garfinkel had to be prepared for surprises: His students would sometimes, without the least warning, behave very unusually. And so it was that one of his students, for example, involved her husband in the following dialogue while he sat watching TV in the evening, after he had casually remarked that he was tired:
"How do you mean you're tired? Physically, mentally, or are you merely bored?"
"I don't know, I think mostly physically."
"Do you mean your muscles and bones hurt?"
"I guess so, yes! Don't be so pedantic!" After a brief pause, he commented:
"In all these old films, the people are always well-dressed even when they're at home!"
"What are you saying? Do you mean all old films, or only some of them, or only those you've seen?"
"What's the matter with you? You know exactly what I mean!"

Sample question 1: degree of difficulty low

How did the husband probably feel at the end of this dialogue?

(A) He was curious.
(B) He was content.
(C) He was irritated.
(D) He was bored.

Sample question 2: degree of difficulty medium

What can be seen from the above-mentioned experiment?

I. If people choose their words exactly this helps towards a clear understanding.
II. The husband believes he has expressed himself clearly.

(A) Only I can be seen.
(B) Only II can be seen.
(C) I and II can be seen.
(D) Neither I nor II can be seen.

Text for sample questions 3 and 4

A Communication Model
A simple model of communication between two people consists of a "broadcaster", a "message", and a "receiver". The broadcaster sends the message to the receiver. A message may have spoken parts and/or non-spoken parts (e.g. intonation, facial expressions, gestures). Parts of the message may be "explicit" (expressly formulated) or "implicit" (indirectly communicated in the form of hints). Implicit messages are often communicated as non-spoken statements.
If the spoken parts and the non-spoken parts of a message match, one calls this a "congruent message". If the spoken parts and the non-spoken parts contradict each other, the message is "incongruent".

Sample question 3: degree of difficulty low

Which of the two following statements is or are correct according to the above text?

I. Messages sent by the broadcaster to the receiver may be communicated both implicitly and explicitly.
II. Messages about the relationship between the broadcaster and the receiver are mostly communicated implicitly.

(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.

Sample question 4: degree of difficulty medium

Which of the two following statements is or are correct according to the above text?

I. Someone who is silent is not communicating a message.
II. Someone who is speaking dialect is communicating an incongruent message.

(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 for sample questions 5 and 6

Lunch in the Courtyard, freely adapted from a tale by Johann Peter Hebel

The servant had a master whom he sometimes could not please whatever he did. And so it was that the master came home one day and sat down to lunch. The soup was either too hot or too cold or neither of the two. So he took the bowl and, together with its contents, threw it through the open window into the courtyard. And how did the servant react? With great presence of mind he threw the meat he was about to set down on the table after the soup down into the courtyard, followed by the bread, the wine, and finally the tablecloth with all that was remaining on it. "What on earth are you doing?" asked the master, rising angrily from his chair. The servant, however, responded: "Forgive me, master, if I did not guess your true intention. I was convinced you wanted to dine in the courtyard today. The air is so delightful, the sky so blue, and see, master, how sweetly the apple tree blooms and how cheerfully the bees are buzzing!" – The soup had been thrown down for the last time! The master realised the error of his ways and, cheered by the sight of the beautiful spring sky, smiled to himself about the quick-wittedness of his servant, thanking him in his heart for the well-taught lesson.

Sample question 5: degree of difficulty medium

Which of the following statements is or are correct according to the above text?

I. The master wanted to dine in the courtyard.
II. The servant threw the food out of the window because he thought his master wanted to dine in the courtyard.

(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.

Sample question 6: degree of difficulty high

Which of the following statements is or are correct according to the above text?

I. After this incident, the master never again threw soup out of the window.
II. The master thanked the servant for teaching him a lesson.

(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.

Using Representation Systems Flexibly

The subtest "Using Representation Systems Flexibly", shows the content of a text diagrammatically or, in the reverse case, a diagrammatic illustration has to be put into words.
This test measures inductive reasoning (the ability to draw generalised conclusions on the basis of individual instances) in the linguistic field as well as the ability to derive what is concrete from the abstract and vice versa. In addition, it measures the ability to capture the meaning of diagrammatic illustrations and to put their content into words.

22 questions in the test, working time 55 minutes

Instructions
Please read the instructions before you start with the examples.

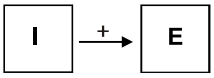
To help understand a text, a diagram is helpful to visualise the essential content.

When it comes to **effects**, one notes down the key variables from the text and uses arrows to show the effects occurring between the variables. "+" and "-" are used to indicate whether the effect is positive or negative.

Here is an example of a positive effect:

Text: The bigger the income **(I)** of a family, the bigger is also its expenditure **(E)**.
OR: The lesser the income **(I)** of a family, the lesser is also its expenditure **(E)**.

Diagram:

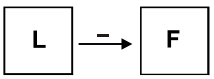


I.e. an increase in variable **I** leads to an increase in the target variable (in this case **E**) or, alternatively, a decrease in variable **I** leads to a decrease in the target variable **E**. Thus, both variables follow the same trend.

Here is an **example** of a negative effect between two variables:

Text: The more a student studies **(L)**, the lower is his fear **(F)** of the examination.
OR: The lesser a student studies **(L)**, the greater is his fear **(F)** of the examination.

Diagram:



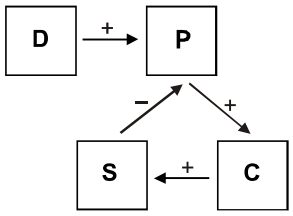
I.e. an increase in variable **L** leads to a decrease in the target variable **F** and vice versa. Thus, the two variables follow an opposite trend.

Since more than two variables are usually described in a text, diagrams generated from texts are frequently more complex.

Here is an **example** of various effects occurring between four variables:

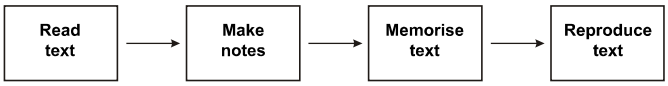
Text: Over the last few years, the demand **(D)** for PCs rose continuously. This led to an increase in prices **(P)**. The general increase in prices led to more and more companies **(C)** coming into the PC market and the supply **(S)** of PCs increased. This in turn affected prices **(P)**: they fell.

Diagram:



Chronological processes are shown using arrows (without the signs "+" and "-"). Here is an example:

Text: To help understand a text, it makes sense to first read the text and then make notes. One can then memorise the content of the text using the notes. Afterwards one tries to reproduce the essential content of the text from memory.



There are **relations** which are shown by other arrows or line connections. These are explained in the corresponding exercises.

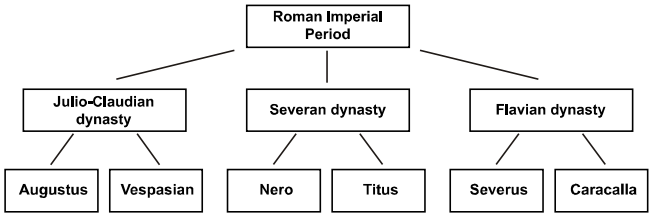
The following exercises in each case comprise up to three questions on a particular topic. In finding solutions to the exercises you will possibly also have to take previously given information into account, for example solving Exercise 3 may require information given in Exercises 1 and 2. If exercises are linked this way, you will always be informed of this.

Solve the exercises using only the corresponding information given. Specialist knowledge is not required for correctly solving the exercises.

Sample question 1: degree of difficulty low

The Roman Imperial Period
The Roman Imperial Period can be divided into the Julio-Claudian dynasty, the Severan dynasty, and the Flavian dynasty. Vespasian and his son Titus reigned in the Flavian dynasty. Severus and his son Caracalla belonged to the Severan dynasty. Augustus and Nero were emperors of the Julio-Claudian dynasty.

The following diagram is intended to show the described affiliations. Affiliations are shown by connecting lines.



Which of the following statements is or are correct?

I. The Julio-Claudian dynasty is shown correctly.
II. The Flavian dynasty is shown correctly.

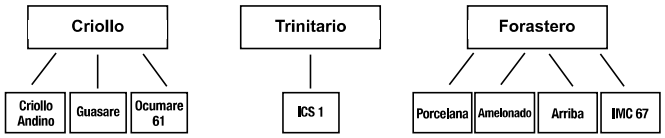
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 2: degree of difficulty low

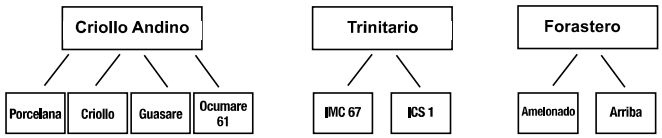
Types of Cocoa
A differentiation can be made between three groups of cocoa subspecies: Criollo, Trinitario, and Forastero. Forastero accounts for 80 % of worldwide cocoa cultivation. Due to its resilience to various diseases, this group of cocoa subspecies tends to be preferred to the fine cocoas Criollo and Trinitario, although it is inferior in taste to the latter. Several types are known under the name of Criollo: Porcelana has smooth, green to red fruits. Criollo Andino is the name given to a Criollo subspecies from the Venezuelan Andes provinces of Merida and Tachira. Guasare grows very quickly for a Criollo subspecies and bears its first fruits after only three years. It has a much stronger flavour than Porcelana. Ocumare 61 is quite widespread in Venezuela, thanks to its superior flavour and robustness. There are also several subspecies of Forastero: Amelonado is the most widespread cocoa variety. This is the type most often used to make sellable cocoas. Type IMC 67 (Iquitos Mixed Calabacillo 67) is widespread throughout the world, from Africa to Hawaii, and requires little shade. Arriba is one of the finest tasting Forastero varieties. It has a flowery flavour. Imperial College Selection 1 (ICS 1) is a high-yield Trinitario variety, producing around 100 medium-sized fruits per year. It has a mild and distinctly fruity flavour.

Which of the following diagrams shows the correct allocation of superordinate terms and subordinate terms? Superordinate and subordinate terms are linked together by lines.

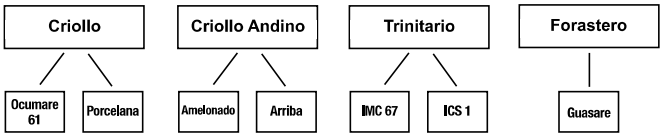
(A)



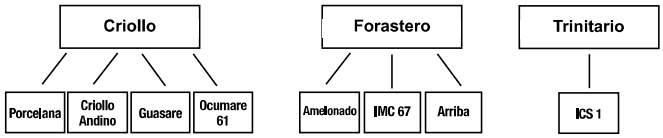
(B)



(C)



(D)

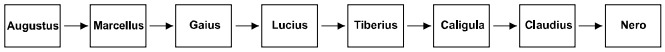


Sample question 3: degree of difficulty medium

The Roman Empire
Augustus ruled over the Roman Empire from 24 BC to 14 AD. Tiberius, Augustus' stepson, was initially excluded from succession to the throne by Augustus. Only after the death of Augustus' nephew Marcellus, and the deaths of the two grandsons Gaius and Lucius (neither of whom reigned), did Tiberius come to power in 14 AD. Claudius, initially passed over in Caligula's favour, was the only legitimate candidate after Caligula's murder and became emperor. Nero, who became Claudius' successor through the efforts of his ambitious mother Agrippina, is described by historians as a tyrant and passionate actor who, in fulfilling his role, killed his mother.

Which of the following diagrams correctly shows the imperial succession?

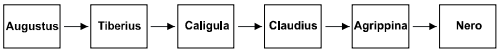
(A)



(B)

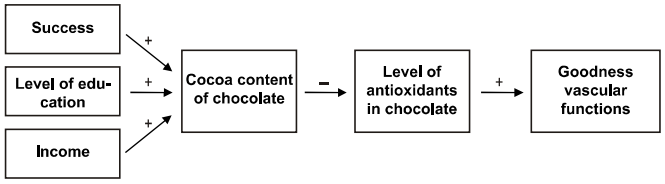
(C)

(D)



Sample question 4: degree of difficulty medium

Chocolate
A magazine makes the claim:
"Successful people eat dark chocolate to do something for their hearts. Dark chocolate contains more cocoa and hence more antioxidants than light-coloured chocolate. Antioxidants improve the body's vascular functions for a few hours. The higher the level of education and income, the darker the chocolate."
The following diagram is intended to show the described effects.



Which of the following two statements about this diagram is or are correct?

I. The diagram correctly shows the effects of education and income on cocoa content in the preferred type of chocolate.
II. The diagram correctly shows the effects of cocoa content in chocolate on the level of antioxidants in chocolate.

(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.

Sample question 5: degree of difficulty medium to high

Chocolate and its Effects
Research has shown that eating cocoa-containing chocolate may contribute slightly towards reducing blood pressure. Cocoa-containing chocolate also contains a substance which supports the healing of wounds and reduces the risk of stomach diseases.

How can one show these effects in a diagram?

I. Eating cocoa-containing chocolate is connected to a reduction of blood pressure using $\xrightarrow{+}$.
$\xrightarrow{+}$ points to reduction of blood pressure.
II. Eating cocoa-containing chocolate is connected to the healing of wounds using $\xrightarrow{+}$ and is connected to the risk of stomach diseases using $\xrightarrow{-}$.
$\xrightarrow{+}$ and $\xrightarrow{-}$ point to eating cocoa-containing chocolate.

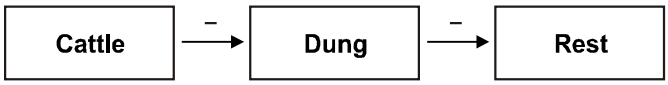
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 6: degree of difficulty high

Arable Farming in the Roman Empire
In the Roman Empire, there was not much fertiliser available in the form of dung for its fields since there were frequently no larger herds of cattle near the farms. The further away the cattle herds were from a farm, the less dung was available for the fields. The less dung there was for fertilising, the more frequently the farmers had to let the corn fields rest.

The following diagram shows the effects of the distance of the cattle herds from the farm, the availability of fertiliser in the form of dung, and the frequency of resting periods when growing corn crops.

Cattle = distance of the cattle herds from the farm
Dung = availability of fertiliser in the form of dung
Rest = frequency of resting periods when growing corn crops



If there was less fertiliser in the form of dung, nitrogen-rich plants were cultivated and used as fertiliser. However, due to the low rainfall frequency in the Roman Empire, this was not always possible: The fewer the rainfalls, the less nitrogen-rich plants could be grown. Nevertheless, intensive irrigation significantly increased the cultivation of nitrogen-rich plants and so shortened the resting periods for growing corn.
What additions have to be made to the diagram to show these effects correctly?

Cul = cultivation of nitrogen-rich plants
Dung = availability of fertiliser in the form of dung
Irrig = intensity of irrigation
Rain = rainfall frequency
Rest = frequency of resting periods when growing corn crops

Which of the following statements is or are correct?

I. Cul is positioned between Dung and Rest and is linked to both by $\xrightarrow{-}$. One $\xrightarrow{-}$ points from Dung to Cul, one $\xrightarrow{-}$ points from Cul to Rest.
II. Rain and Irrig are each linked to Cul with a $\xrightarrow{+}$. Both arrows point to Cul.

(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.

Recognising Linguistic Structures

The subtest "Recognising Linguistic Structures" comprises sentences in a ficticious language and their English counterparts. The information provided is to be used to derive the meaning of individual words, semantic relations between the terms, and several grammar rules. Subsequently the newly acquired knowledge is to be used to formulate new sentences in the ficticious language.
This test measures the ability to recognise structures and inherent laws in language patterns and use these laws in new contexts. In addition, it is a matter of recognising semantic relations expressed by word order or other linguistic characteristics.

22 questions in the test, working time 50 minutes

Instructions
Please read the instructions before you start with the examples.

In the following exercises, you will be shown several expressions in invented foreign languages and their English translation. This will allow you to derive the meaning of individual words and some grammatical rules in the respective foreign language. This information will help you answer the subsequent questions. In each case two exercises relate to a certain language. Therefore please only use the provided expressions to answer the questions.
You may proceed on the assumption that

- there are no exceptions to the rules (e.g. irregular verbs) and
- only those rules apply which may be derived from the provided expressions.

Example:
koloa = I lie
kolue = he lay
satoe = he stands

Question: What is "I stood" in the foreign language?
(A) satoa
(B) kolua
(C) satoe
(D) satua

Answer (D) is correct since:
I. The expressions for "I lie" and "he lay" differ only as regards the last two letters; hence "kol" must be the root of the verb "lie".
II. The final letter of the expressions "he lay" and "he stands" is in both cases "e"; hence an appended "e" means "he".
III. The two present tense forms ("I lie" and "he stands") both have an "o" as the penultimate letter; hence "u" as the penultimate letter must indicate the past tense and "a" as the last letter must mean "I".

Consequently: "I stood" in the foreign language must be "satua".

Sample question 1: degree of difficulty low

palo ko = I sit
palo tu = she sits
karo tu = she stands

"I stand" is expressed in the foreign language by:

(A) tu ko
(B) ko karo
(C) karo ko
(D) karo palo

Sample question 2: degree of difficulty medium

tundo ramodopo novot = The pupil called his uncle.
namidu kavino suvavot = The saleswoman greeted the teacher.
tundu kavinopu tetavosir = The schoolgirl is asking her teacher.
hidamo tundo nosir = The caretaker is scolding the pupil.

"The uncle greeted his caretaker" is expressed in the foreign language by:

(A) novot suvosir hidamo
(B) namidu hidamopu suvavot
(C) novot hidamopo suvasir
(D) ramodo hidamopo suvavot

Sample question 3: degree of difficulty medium

rumpulöpp = The child is sleeping.
renguming tschik löppzi = The person is protecting his child.
rumpilemp gum = The goat is sleeping deeply.
yanitzorr lempzi = The lion is killing the goat.

"The child is protecting his goat" is expressed in the foreign language by:

(A) rumpulemp tschik rengzi
(B) rengilöpp tschik lempzi
(C) rumpilemp tschik löppzi
(D) rengulöpp tschik lempzi

Sample question 4: degree of difficulty medium to high

puna selveui = The child is coming from the hut.
puna tipveu = The cat is going to the hut.
lom fanveui = The farmer is coming from the field.
borro selveu = The child is walking to the meadow.

"The child is walking to the field" is expressed in the foreign language by:

(A) lom selveui
(B) lom selveu
(C) lom fanveu
(D) puna selveu

Sample question 5: degree of difficulty medium to high

po namal	=	He learns everything.
su ?mal	=	You will learn.
ki ?malna	=	I will learn nothing.
lemal rah malle su	=	Are you learning a lot or a little?
?nafor ak	=	Will we ask everything?

"Will he learn a little?" is expressed in the foreign language by:

(A) po malle
(B) ?lemal po
(C) ?malle po
(D) po ?lema

Sample question 6: degree of difficulty high

ao tane lom sok bani jo sharuli	=	He spoke on the radio yesterday.
ao hai lom yal bani ao lanta	=	He will learn to program tomorrow.
ao simi kiso jo fesomo ao hai	=	You are sitting at university and learning.
ao rumi lom shili jo fesomo	=	I am listening at university today.

"I speak and listen" is expressed in the foreign language by:

(A) ao tane shili ao rumi
(B) shili tane ao rumi
(C) ao tane lom jo rumi
(D) tane ao rumi lom

Sample questions

Engineering Module

The Engineering Module is divided in three 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
Formalising Technical Interrelationships	22	60 minutes
Visualising Solids - Question type 1 - Question type 2	 13 13	30 minutes
Analysing Technical Interrelationships	22	60 minutes
Total working time		**150 minutes**

Formalising Technical Interrelationships

In the subtest "Formalising Technical Interrelationships", you are to transfer technical or scientific facts described verbally into a formulaic presentation and to interrelate the arising parameters to each other.
This test measures your ability to formalise, your deductive and combinatory powers and your ability to use basic mathematical tools of the trade. Deeper knowledge of mathematics and physics is not required to solve the problems – formulae and laws are given but must be used and interrelated correctly.

22 questions in the test, working time 60 minutes

Instructions
Please read the instructions before you start with the examples.

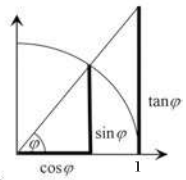
In the following items, the relationships between various technical quantities will be described in a text or a sketch. Your task is to determine the formal relationship between the given quantities.

Aids:
- Circumference of a circle: $U = 2\pi r = \pi D$
- Area of a circle: $A = \pi r^2 = \pi \frac{D^2}{4}$
- Circle: degrees: 360° or radians: 2π
- Sphere: the volume of a sphere is $\frac{4}{3}\pi r^3$.
- Average speed: distance divided by time
- Rotational frequency: number of revolutions per time unit (e.g. 10 revolutions per second or $n = 10\ s^{-1}$)
- Pressure: force divided by surface area
- Torque: force multiplied by lever arm (only applies to right angles)
- A lever is balanced when the magnitudes of the clockwise and counter-clockwise torques are equal.
- Proportionality:
  - The quantities x and y (e.g. weight and volume) of a body are **proportional** to one another $(x \sim y)$, when their ratio is a constant.
  - The quantities u and w (e.g. volume and pressure of an ideal gas at a constant temperature) are **inversely proportional** $(u \sim \frac{1}{w})$ to one another, when their product is a constant.

Trigonometry

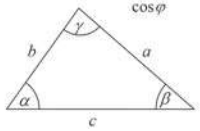
$\sin^2\varphi + \cos^2\varphi = 1, \quad \tan\varphi = \frac{\sin\varphi}{\cos\varphi}, \quad \cot\varphi = \frac{1}{\tan\varphi}$

φ	0°	30°	45°	60°	90°	120°	150°	180°
$\sin\varphi$ $= \cos(90° - \varphi)$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0



$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$ (Law of sines)

$c^2 = a^2 + b^2 - 2ab\cos\gamma$ (Law of cosines)



The illustrations are merely included as a visualisation aid and are not true to scale.

Sample question 1: degree of difficulty low

A gear mechanism consists of the gears A and B. Gear A has Z_A cogs; Gear B has Z_B cogs. In the time it takes Gear A to complete n_A number of rotations, Gear B completes n_B number of rotations.

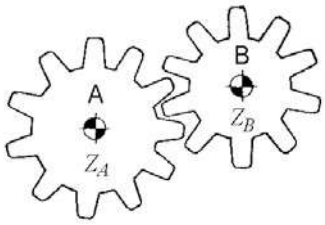
Which of the following equations is correct?

(A) $n_B = \frac{Z_B}{Z_A\ n_A}$

(B) $n_B = \frac{Z_A\ n_A}{Z_B}$

(C) $n_B = \frac{Z_A\ Z_B}{n_A}$

(D) $n_B = \frac{Z_B\ n_A}{Z_A}$

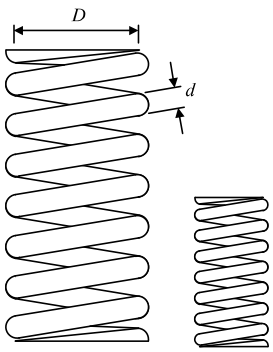


Sample question 2: degree of difficulty low

The stiffness c of a spring depends on the core diameter D, on the wire diameter d, on the number of turns n and the material parameter G – the insertion module. The following applies:

$$c = \frac{G d^4}{8 n D^3}$$

In the case of a second spring made from the same material and with the same number of turns, both the core diameter and the wire diameter are halved.



Which statement is correct?

(A) The stiffness halves.
(B) The stiffness remains unchanged.
(C) The stiffness doubles.
(D) The stiffness quadruples.

Sample question 3: degree of difficulty medium

In a steel mill, sheet steel is rolled onto cylinders at the end of the production process. When empty, the radius of one of these cylinders is r_0 and the cylinder turns at a constant rotation speed n during the rolling process. The thickness of the sheet steel is expressed as d.

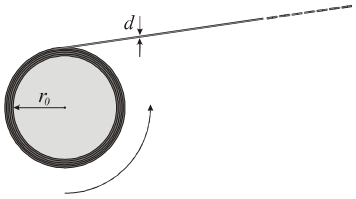
Which equation expresses the change in a cylinder's radius r in relation to the time t (in seconds)?

(A) $r = r_0 + dt$

(B) $r = (r_0 + nd)\, t$

(C) $r = r_0 + ndt$

(D) $r = r_0 + \frac{nd}{t}$



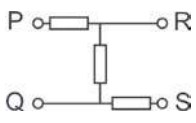
Sample question 4: degree of difficulty medium

A black box with the four terminals P, Q, R and S contains ohmic resistors in an unknown arrangement. It is known that their resistance values are equal. Resistance measurements on the terminals lead to the following results:

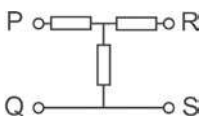
(1) Between Q and S, there is no measurable resistance.
(2) Between P and Q, 5 Ohms are measured.
(3) The resistance between P and R is twice as high as that between P and Q.

Which circuit does the black box contain?

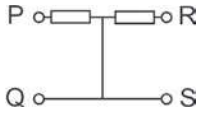
(A)



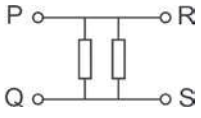
(B)



(C)



(D)



Sample question 5: degree of difficulty high

The initial weight of a rocket is W_I. After the engines are started (t = 0), fuel is expelled; the amount of fuel is proportional to time. When the fuel has been burned up, at the point in time T, the engines are turned off. The weight of the rocket has decreased to W_T .
Which of the following equations applies for the rocket weight W at the point in time t in the time interval
$0 \le t \le T$?

(A) $W = W_I - W_T \frac{t}{T}$

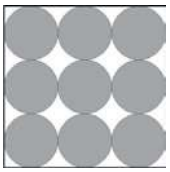
(B) $W = W_I - W_T\, t$

(C) $W = (W_I - W_T) \frac{t}{T}$

(D) $W = W_I - \frac{(W_I - W_T)}{T}\, t$

Sample question 6: degree of difficulty high

Inside a square with the surface area $A = 1m^2$, n^2 circles (n = 1, 2, 3, ...) are drawn (see diagram for $n = 3$). The surface area of all the circles drawn is A_n.



Which statement is correct?

(A) $A_1 < A_2 < A_4 < A_8$

(B) $A_1 > A_2 > A_4 > A_8$

(C) $A_1 > A_2 = A_4 > A_8$

(D) $A_1 = A_2 = A_4 = A_8$

Visualising Solids

In the subtest “Visualising Solids”, you have to infer perspectives of a solid from one given view of the solid.
The test measures your spatial sense.

26 questions in the test, 2 question types with 13 questions each, working time 30 minutes

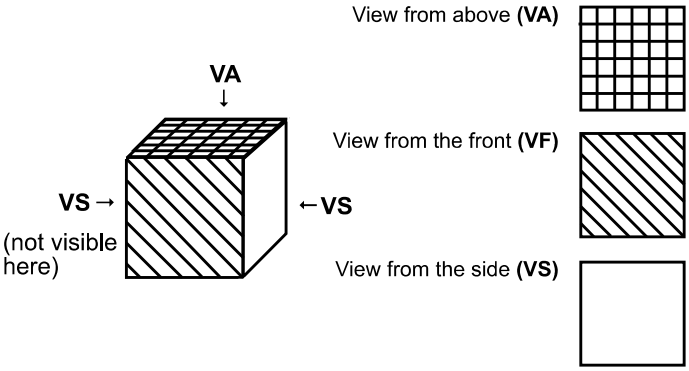
Instructions
Please read the instructions before you start with the examples.

Question type 1

To solve the following items, you are to visualise the bodies three-dimensionally. In each exercise, the body is shown from two perspectives. You are to identify the view of the same body from a third perspective. Please select the correct solution (A, B, C or D).

The views/perspectives are referred to as follows:

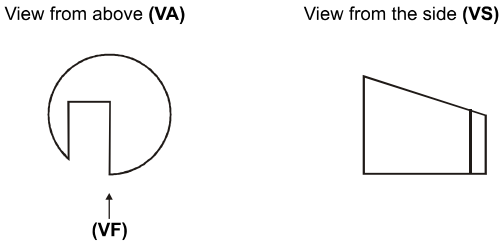
Parallel projection of a cube:



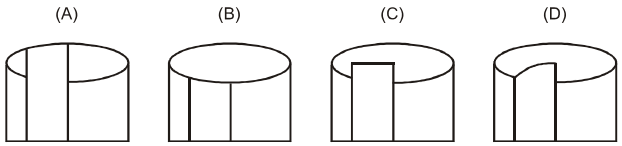
Further pointers:
- In the illustrations, all visible edges are depicted as continuous (uninterrupted) lines.
- If the illustration of a view from the side is not accompanied by an arrow → indicating which of the two side views is intended, part of the task is to find that out.
- If, for example, a side view is illustrated to the right of the view from the front or the view from above, it does not necessarily mean that it is a view from the right side.

Sample question 1: degree of difficulty low

Given: The view of a solid from above and one side view of the same solid

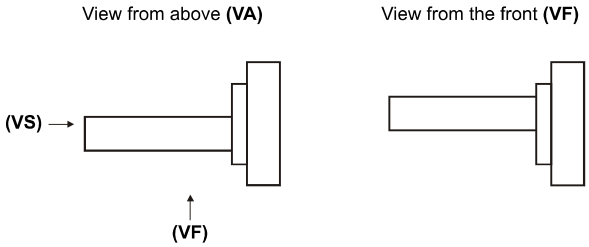


Wanted: View from the front **(VF)** of the solid

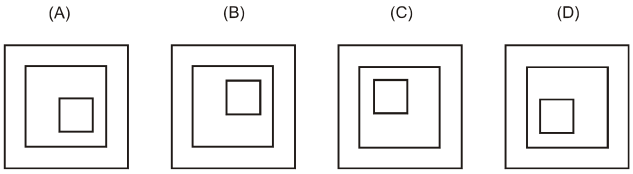


Sample question 2: degree of difficulty low

Given: View from above and view from the front of a solid

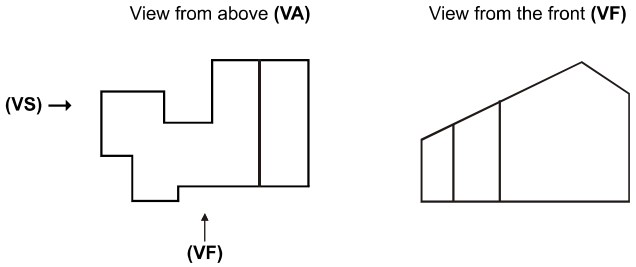


Wanted: View of the same solid from the side **(VS)** indicated by the arrow

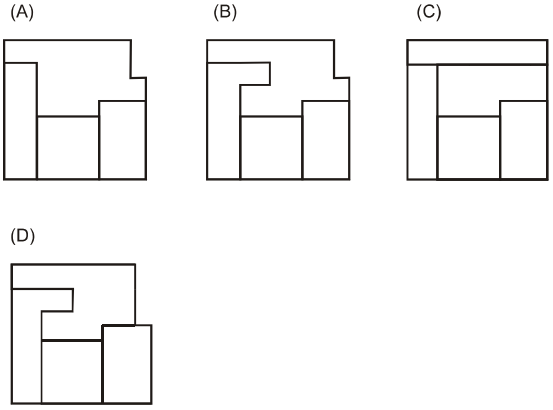


Sample question 3: degree of difficulty medium

Given: The view of a solid from above and the view from the front of the same solid

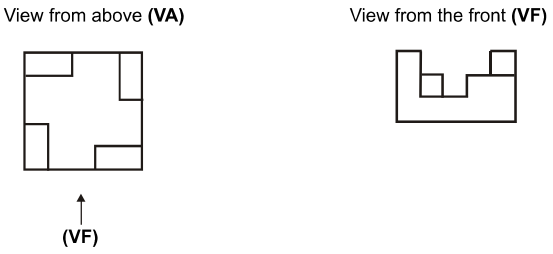


Wanted: View from the side **(VS)** of the solid indicated by the arrow

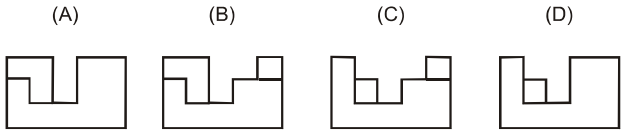


Sample question 4: degree of difficulty medium

Given: View from above and view from the front of a solid

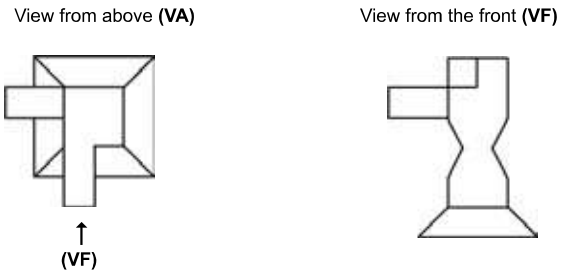


Wanted: View of the same solid from the side **(VS)**

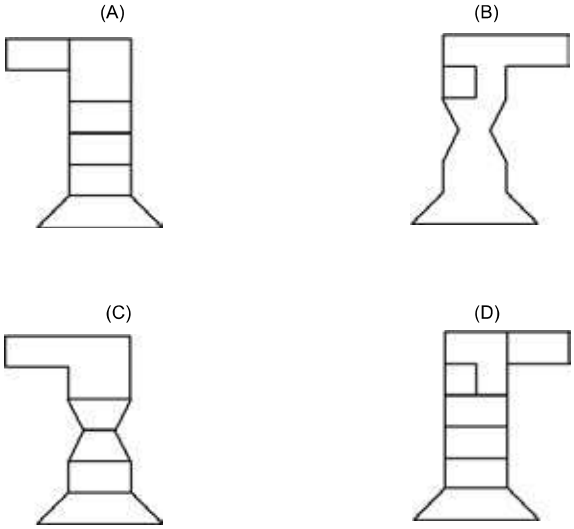


Sample question 5: degree of difficulty high

Given: The view of a solid from above and the view from the front of the same solid

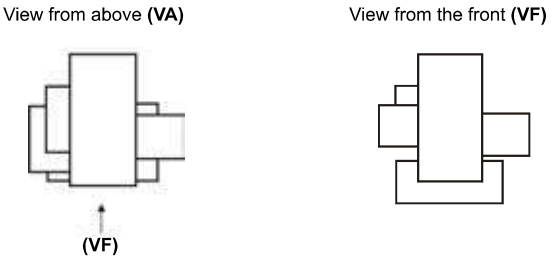


Wanted: View from the side **(VS)** of the solid

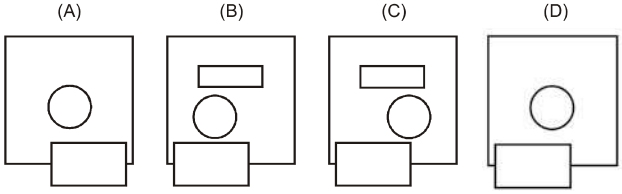


Sample question 6: degree of difficulty high

Given: View from above and view from the front of a solid



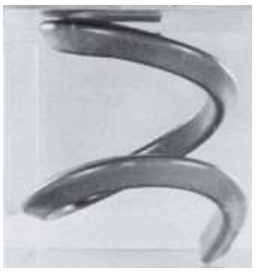
Wanted: View of the same solid from the side **(VS)**



Question type 2

The following items also test your ability to visualise three-dimensional figures. Each item consists of two illustrations showing a transparent cube with one or two cables in its interior. The first illustration (left) always shows the view from the front. In the picture on the right, the same cube is illustrated again. Your task is to determine whether the picture on the right shows that cube from the right (r), left (l), from below (w), above (a) or behind (d).

Example:



(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

In the picture on the right, you see the cube from above. On your answer sheet, you would mark the D.

These items can be solved in one of the following two ways:

- Imagine that the cube had been placed on a glass table and that you could walk all the way around it. Standing to the right or left of the table, you look at the cube from the right or from the left. If you go behind the table, you look at the cube from behind. If you come back to the front of the table and bend over it, to look at the cube from above, and if you imagine yourself lying down underneath the table, feet first, you see the view from below.
- Or you imagine that you could pick up the cube and turn it around in your hands. If you looked at the cube from the front, i.e. from the position shown in the left-hand illustration, and then tipped it towards you by 90 degrees, not changing your own position at all, then you would see the view from above. If you looked at the cube from the front and then turned it 90 degrees to the right you would see the view from the left. If you turned it from the starting position 90 degrees to the left, you would see it from the right. And if you turned it 180 degrees to the right or left from the starting position you would see it from behind. Finally, if you tipped it backward, you would see it from below.

Sample question 1: degree of difficulty low

(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

Sample question 2: degree of difficulty low

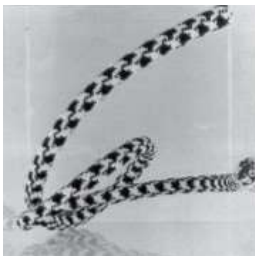
(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

Sample question 3: degree of difficulty medium

(A) : r
(B) : l
(C) : w
(D) : a
(E) : d



Here you see the cube from the front!

Here you see the cube from _____?

Sample question 4: degree of difficulty medium

(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

Sample question 5: degree of difficulty high

(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

Sample question 6: degree of difficulty high

(A) : r
(B) : l
(C) : w
(D) : a
(E) : d

Here you see the cube from the front!

Here you see the cube from _____?

In the subtest "Analysing Technical Interrelationships", you have to analyse and interpret diagrams, charts or tables depicting technical laws or formulae.
The test measures the ability to abstract from scientific and technical facts and to put abstract facts in concrete terms. Knowledge of mathematics, physics or technology is not needed, background information will be provided if necessary.

22 questions in the test, working time 60 minutes

Instructions
Please read the instructions before you start with the examples.

These items contain questions from various technical areas. Your task is to visualize simple technical procedures and recognise technical interrelationships.
Unless otherwise indicated, the axes (scales) of all diagrams are linearly subdivided.
In some of the items, you must identify the "qualitatively" correct diagram. In other words, your task is to decide which graph best represents the relationship between the variables shown. Even the correct diagram will not necessarily be drawn to scale.

Sample question 1: degree of difficulty low

A tank lorry is half full. The pictures show it in three different situations: travelling at a constant speed, braking and accelerating (gaining speed).

Picture 1 Picture 2 Picture 3

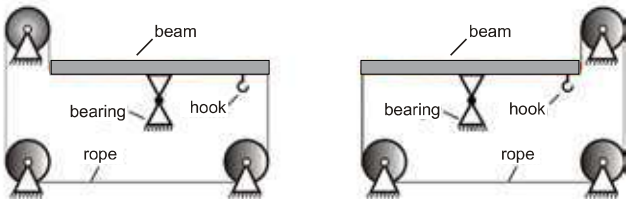
Which assignment of pictures to situations is correct?

	constant speed	braking	accelerating
(A)	Picture 3	Picture 2	Picture 1
(B)	Picture 2	Picture 1	Picture 3
(C)	Picture 1	Picture 2	Picture 3
(D)	Picture 3	Picture 1	Picture 2

Sample question 2: degree of difficulty low to medium

Arrangements I and II each include a beam which is pivot-mounted (like a swing or see-saw). A hook has been mounted on the right end of the beam. The ends of the beam are connected by a rope which is threaded through rolls.

I II



A weight is hung on the hook.

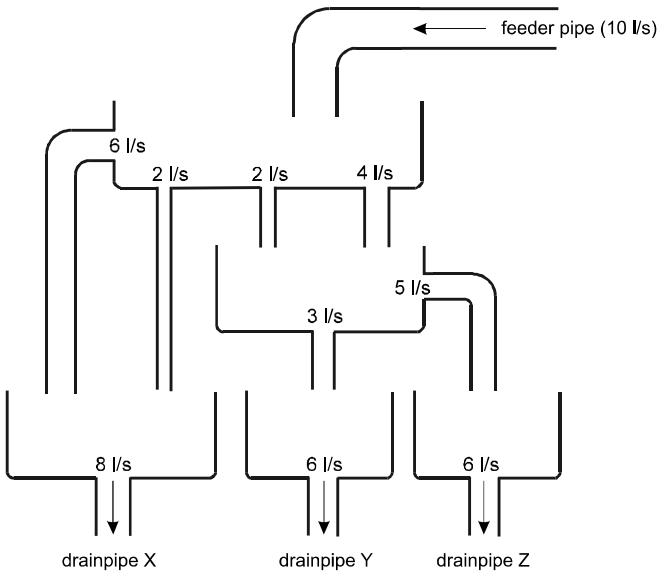
Which of the following statements is or are then correct? (The masses of the beam, rope and hook can be neglected.)

I. In the case of arrangement I, the right end of the beam moves downward.
II. In the case of arrangement II, the right end of the beam moves downward.

(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.

Sample question 3: degree of difficulty medium

In the system illustrated below, 10 litres of water per second (10 l/s) flow into the system by way of a feeder pipe. The water then flows through surge tanks and drainpipes of differing diameters into the final drainpipes X, Y and Z. For each drainpipe, the illustration shows the maximum amount of water that can flow through it per second.

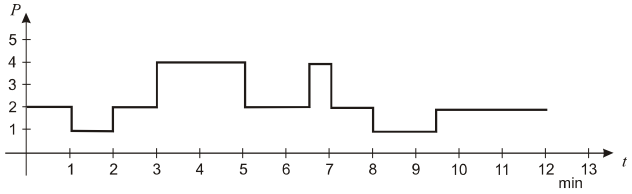


After one minute, how much water flows out through the three final drainpipes per second?

	Litres of water per second (l/s)		
	Drainpipe X	Drainpipe Y	Drainpipe Z
(A)	8	6	6
(B)	2	3	5
(C)	3	4	3
(D)	4	3	3

Sample question 4: degree of difficulty medium to high

This diagram shows the power P required by a lift motor in a period of 12 minutes (min).
When the lift travels upward, four times as much power (per minute) is required as when the lift travels downward.
When the lift stops at a floor, twice as much power is required as when the lift travels downward.
The travelling time between two consecutive floors is 30 seconds. At the point in time t = 0, the lift is on the third floor.



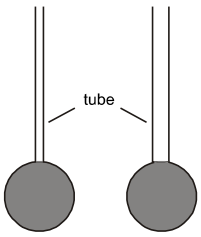
Which of the following statements is or are correct?

I. Within the 12 minutes shown, the lift travels up to the sixth floor.
II. At the point in time t = 10 min, the lift is on the third floor.

(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.

Sample question 5: degree of difficulty high

The diagram shows two thermometers on which no temperature scales have yet been indicated. They are both filled with the same liquid, and the amount of liquid is also the same. Their tubes are of the same length. However, the tube of the left-hand thermometer has a smaller diameter than that of the right-hand thermometer.



We will assume that the markings for the two temperature scales are added correctly. They begin at the same height on each tube and end at the same height. Both thermometers are used only at temperatures for which they are suitable.

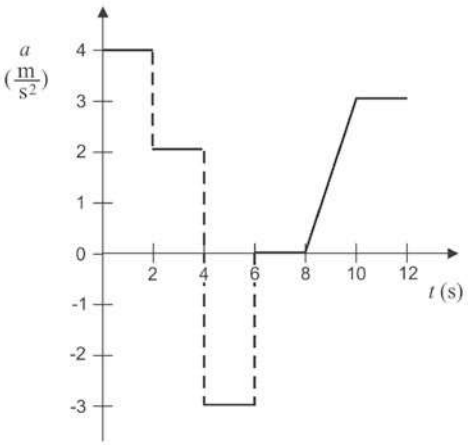
Which of the two statements is or are therefore correct?

I. Rises in temperature can be measured less accurately with the left-hand thermometer than with the right-hand one.
II. The right-hand thermometer covers a greater temperature range than the left-hand one.

(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.

Sample question 6: degree of difficulty high

In this diagram, the acceleration a (in m/s^2) of an object is shown as a function of the time t (in s). At t = 1, the speed of the object is positive.



Which of the following statements is or are correct?

I. At t = 3, the object is moving faster than at t = 1.
II. At t = 7, the object is not moving.

(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.

Sample questions

Mathematics, Computer Science and Natural Sciences Module

The Mathematics, Computer Science and Natural Sciences Module is divided in two different subtests. You have a total of 145 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 Scientific Interrelationships	22	60 minutes
Understanding Formal Depictions	22	85 minutes
Total working time		**145 minutes**

Analysing Scientific Interrelationships

The subtest "Analysing Scientific Interrelationships" presents texts and illustrations with natural sciences content on which questions are then posed.
This test measures how well people can grasp and analyse simple natural sciences topics. It is also a matter of recognising interrelationships, separating important data from unimportant data and drawing the right conclusions from the presented information. Relevant background information is provided.

22 questions in the test, working time 60 minutes

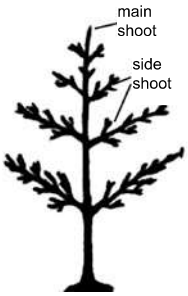
Instructions
Please read the instructions before you start with the examples.

These items contain questions from various fields of science. You are to picture various scientific processes and recognise scientific interrelationships.
Unless otherwise specified, the axes (scales) in the diagrams are linearly subdivided.
In several items, you are asked to identify the "qualitatively" correct diagram. In these cases, decide which diagram shows the curve that best expresses the circumstances described. Even the correct diagram may not be drawn in numerically precise manner.

Sample question 1: degree of difficulty low

An experiment is conducted on three plants of the same species:
- Plant 1 is not treated.
- The tip of the main shoot of plant 2 is cut off.
- The tip of the main shoot of plant 3 is cut off. Afterwards a phytohormone is applied to the cut surface on the plant.

The plants are now placed under observation:
- The main shoot and the side shoots on plant 1 grow.
- The main shoot on plant 2 does not grow. The side shoots grow.
- The main shoot on plant 3 grows. The side shoots do not grow.



These results are generally applicable to this species of plant.

Which of the following statements is or are correct?

I. The phytohormone promotes the growth of the main shoot of this plant species.
II. The phytohormone hinders the growth of the side shoots of this plant species.

(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.

Sample question 2: degree of difficulty low to medium

The peptide X consists of a chain of 10 amino acids. Each amino acid is designated by three letters (for example: "Trp"). The sequence of the amino acids is shown from left to right. One end of the peptide is formed by the amino acid Gly, the other end by the amino acid Leu.

With the enzyme Ch, the peptide X is split behind the amino acids Tyr and Trp. The following four parts come about as a result:

Lys – Gly
Leu – Ala – Tyr
Lys – Gly – Trp
Arg – Tyr

With the enzyme Tr, the peptide X is split behind the amino acids Arg and Lys. The following four parts come about as a result:

Gly – Trp – Arg
Tyr – Lys
Gly
Leu – Ala – Tyr – Lys

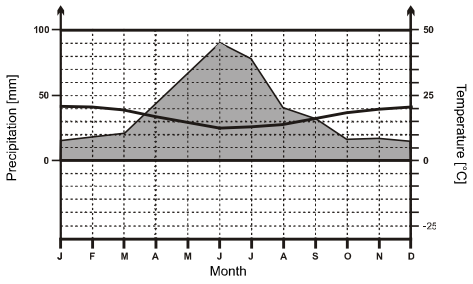
What is the structure of peptide X?

(A) Leu – Ala – Tyr – Arg – Tyr – Lys – Gly – Trp – Lys – Gly
(B) Gly – Trp – Arg – Leu – Ala – Tyr – Lys – Tyr – Lys – Gly
(C) Leu – Ala – Tyr – Lys – Arg – Tyr – Lys – Gly – Trp – Gly
(D) Leu – Ala – Tyr – Lys – Gly – Trp – Arg – Tyr – Lys – Gly

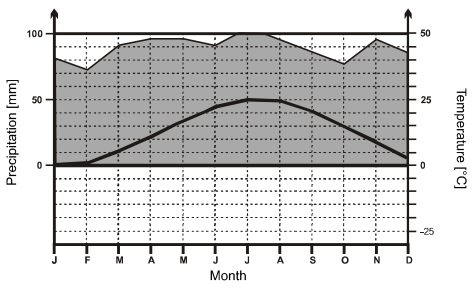
Sample question 3: degree of difficulty medium

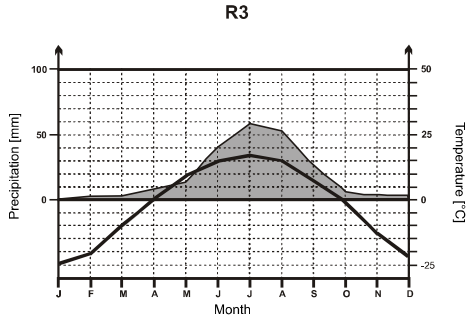
The climate of a certain region is described in terms of the average monthly temperatures (in °C) and the average monthly amount of precipitation (rain in mm).
The illustrations below show climate charts of four different regions (R1 to R4).

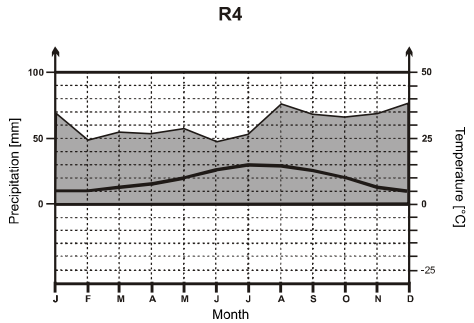
R1



R2







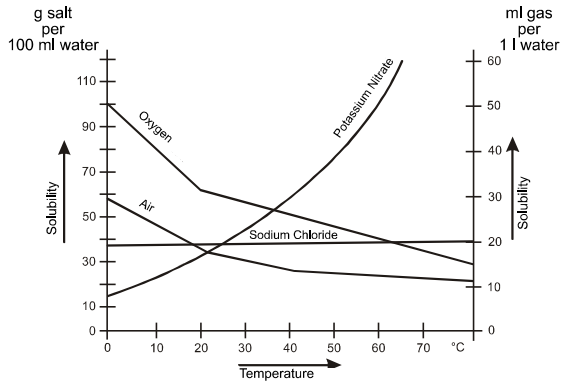
Which of the two statements is or are correct?

I. The annual precipitation is greater in region R1 than in region R4.
II. At least one of the four regions is located south of the equator.

(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.

Sample question 4: degree of difficulty medium

The diagram shows how the solubility of substances in water is dependent on temperature. Potassium nitrate and sodium chloride are salts (shown as grams of salt per 100 millilitres of water). Oxygen and air are gases (shown as millilitres of gas per 1 litre of water).



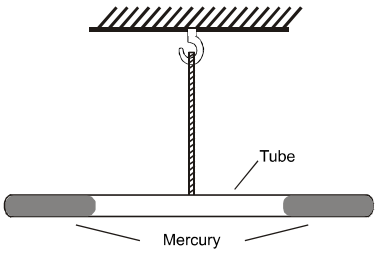
Which of the following two statements is or are correct?

I. 60 g of potassium nitrate does not fully dissolve in 100 ml of water at 50°C.
II. Within a temperature range of 0°C to 20°C, the solubility of oxygen is more dependent on temperature than in the temperature range from 20°C to 80°C.

(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.

Sample question 5: degree of difficulty high

A closed tube is hung up so that it is in a balanced state. Both ends are filled with mercury; the space between is filled with air.



The mercury on the right side of the tube is now heated.

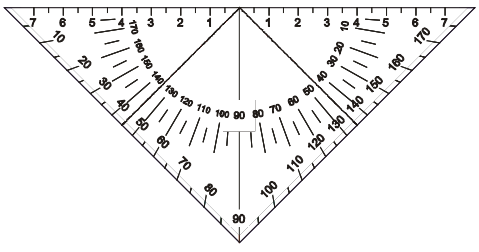
Which of the two statements on the impact of this heating action is or are correct? (Please note: the weight of the air in the tube is to be ignored.)

I. The left side will go down.
II. The right side will become lighter.

(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.

Sample question 6: degree of difficulty high

A set square comprises a ruler and an angle gauge (a scale for measuring angles). This particular set square consists of a material which has expanded homogeneously by 1 percent in all lengths since it (the set square) was manufactured.



Which of the two statements is or are correct?

I. When measuring length, the values shown by the ruler are too small.
II. The circumference of the set square has increased by 3 percent.

(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.

Understanding Formal Depictions

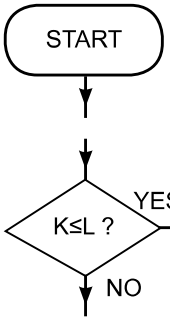
The subtest "Understanding Formal Depictions" involves transposing information from a text into a diagrammatic illustration ("flow chart") and vice versa.
This test, in one respect, measures the ability to transpose concrete natural sciences content into models and the ability to think in terms of formalised systems. In another respect, it measures critical thinking skills in the sense that the information provided has to be checked for correctness. What is more, this subtest seeks to verify the existence of a basic understanding of natural sciences.

22 questions in the test, working time 85 minutes

Instructions
Please read the instructions before you start with the examples.

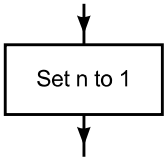
In this group of items, a process or a model has to be transferred to a flow chart or a given flow chart has to be analysed.

The flow charts can contain the following **elements**:



Beginning of the process

Decision point: The further process depends on the answer given to the question set here.
Example: If the question "K ≤ L?" is answered with "YES", then the "path" marked "YES" has to be followed.
If the question "K ≤ L?" is answered with "NO", then the "path" marked "NO" has to be followed.
(The answer to the question "K ≤ L?" is "YES" if quantity K is smaller than quantity L, or if both quantities are of equal size. The answer is "NO" if K is larger than L.)

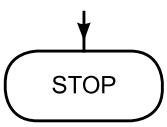


Operation that is carried out, or an alternative that is selected. In the example, "n" is set to 1.

Examples of notation:

M: = 2	M is allocated a value of 2.
M: = M + 1	The value of M is increased by 1.
M: = M – N	The value of M is decreased by the value of N.

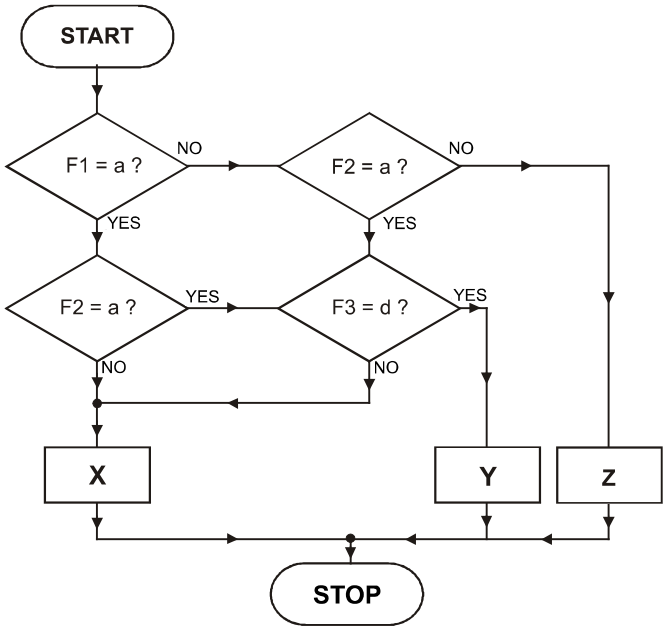
Joining together: Two "paths" are joined together to form a joint "path".



End of the process

Text and flow chart for sample questions 1 and 2

A decision between X, Y, and Z depends on the factors F1, F2, and F3.
F1 may take the value a or b, F2 may take the value a or b, and F3 may take the value c or d. The flow chart shows how the decision is taken.



Sample question 1: degree of difficulty low

Which of the following statements is or are correct?

I. If F1 = a, then X is always selected.
II. If F2 = b, then X is always selected.

(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.

Sample question 2: degree of difficulty medium

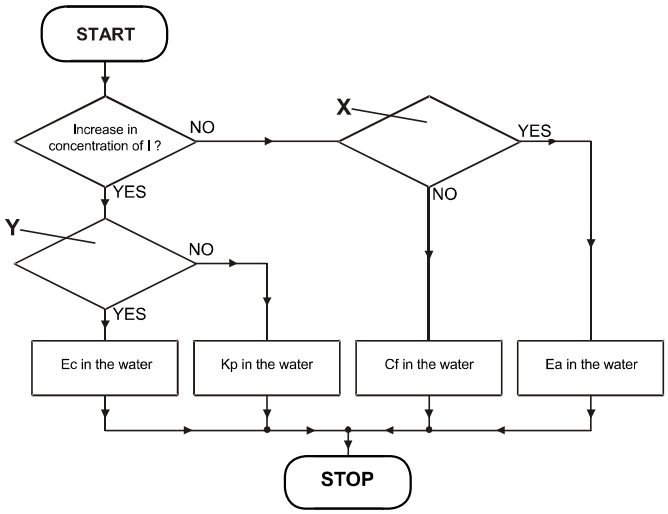
Which of the following statements is or are correct?

I. If F3 = c, then X is always selected.
II. If F2 = a, then Z is never selected.

(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 sample questions 3 and 4

Water may contain bacteria. Bacteria produce substances which can be traced in water. If the concentration of these substances is increased, one can draw the conclusion that the water contains bacteria.
The bacteria Ec and Kp produce indol (I). The bacteria Cf and Ec produce acid (S). The bacteria Ea and Kp produce acetoin (A).
If one has a water sample which contains exactly one type of bacteria, this bacteria type can be detected by conducting a test. The flow chart shows how the test is conducted.



Sample question 3: degree of difficulty low

Which of the following statements is or are correct?

I. If decision point Y is labelled “Increase in concentration of S?”, the flow chart may be correct.
II. If decision point X is labelled “Concentration of A normal?”, 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.

Sample question 4: degree of difficulty medium to high

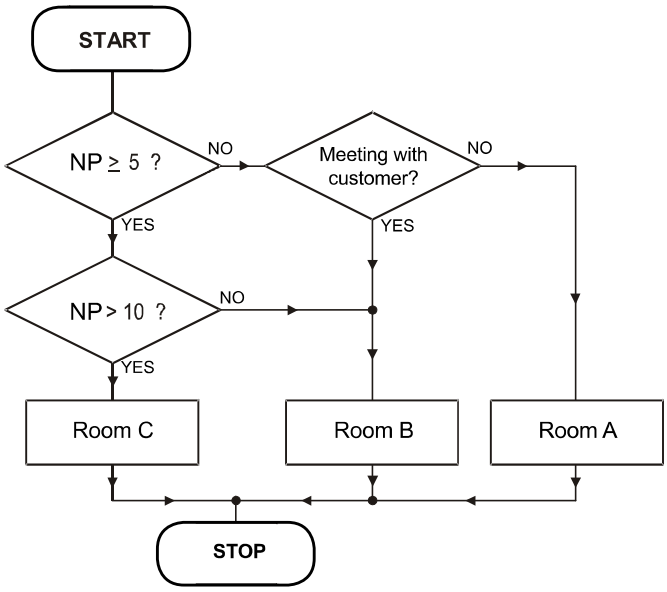
Which of the following statements is or are correct?

I. If decision point Y is labelled “Increase in concentration of A?”, the flow chart may be correct.
II. If decision point X is labelled “Concentration of S normal?”, 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.

Text and flow chart for sample questions 5 and 6

A business consulting company has three rooms, A, B, and C, available for meetings. Room A is the smallest and seats a maximum of 4 people. Room B seats 10 people. Room C is the largest and seats 30 people. The flow chart shows how a choice is made between the three rooms. “NP” = number of people.



Sample question 5: degree of difficulty medium to high

Which of the following two statements is or are correct?

I. If customers are taking part in the meeting, then Room B is always chosen.
II. If no customers are taking part in the meeting, then the smallest room with enough space for the participants 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.

Sample question 6: degree of difficulty high

Which of the following two statements is or are correct?

I. If there are 10 participants, Room B is always chosen.
II. Room B is only chosen if the number of people is between 5 and 10.

(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.

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**

Analysing Economic Interrelationships

In the subtest "Analysing Economic Interrelationships", you are to analyse and interpret economic diagrams, charts and tables. This test measures mainly your ability to differentiate between relevant and unimportant data and to draw the correct conclusion from the information given. Background information will be provided if necessary.

22 questions in the test, working time 65 minutes

Instructions
Please read the instructions before you start with the examples.

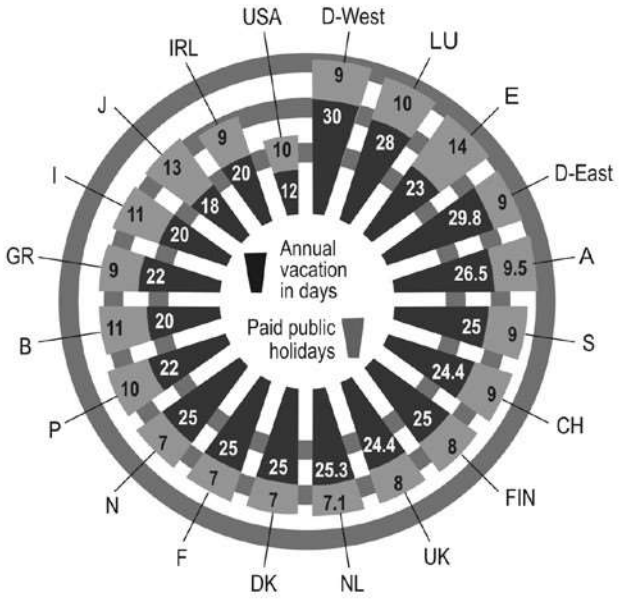
In the following items, economic interrelationships are depicted in a graph or table. Your task is to analyse these interrelationships and interpret them correctly.
For each item, choose the correct answer (A, B, C or D).

General recommendations on taking the "Analysing Economic Interrelationships" subtest:
In this test you will encounter various types of illustrations: curve graphs (cf. sample question 4), column or bar graphs (cf. sample question 5), pie graphs (cf. sample question 1) and tables.
In curve and column graphs, pay special attention to the units with which the axes are marked. In the simplest case, you will find absolute numbers (e.g. the number of residents or the price in Euros). But sometimes the axis will represent percentages (e.g. the percentage of the population of a country). In the latter case, it is difficult to keep track of the overall number to which the percentage refers. Ten percent of the U.S. population is naturally a greater number of persons than ten percent of the population of Germany.
Experience has shown that graphs depicting percentage changes (cf. Item 5) are particularly difficult.
As a little exercise, check Statements III and IV against the graph in sample question 5:

- Statement III: In the first quarter of 2001, the earnings were greater than in the second quarter of 2001.
  The statement may appear correct at first sight. But be careful: The statement cannot be evaluated on the basis of the graph, since it would be wrong to compare the bars with one another (cf. above). It is entirely possible that the earnings in 2/2001 were greater than in 1/2001; but it is also possible that they were smaller. Since we do not know the answer, the statement is incorrect.
- Statement IV: In the fourth quarter of 2003, the earnings were smaller than in the fourth quarter of 2000.
  This statement is incorrect. In 4/2001, the earnings were one percent greater than in 4/2000. In 4/2002, they were about 0.5 percent greater than in 4/2001, and in 4/2003, they were slightly lower than in 4/2002. Altogether, the earnings in 4/2003 were therefore more than one percent greater than in 4/2000.

Sample question 1: degree of difficulty low

Annual vacation (in days) and paid holidays of employees in various countries



Which of the following statements is or are correct?

I. There is no country with fewer annual vacation days than the USA.
II. Of all countries, Spain (E) has the greatest number of paid holidays.

(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.

Sample question 2: degree of difficulty medium

The diagram shows the number of employees and the turnover of big German companies in 1997.

Company	Employees		Turnover	
	worldwide	thereof abroad	worldwide (in million DM)	thereof abroad
Siemens	379,000	46 %	94,180	61 %
Volkswagen	260,811	47 %	100,123	64 %
Bosch	176,481	47 %	41,146	61 %
Hoechst	147,862	63 %	50,927	82 %
Bayer	142,200	60 %	48,608	82 %
BMW	116,112	45 %	52,265	72 %
BASF	103,406	41 %	48,776	73 %
VIAG	88,014	47 %	42,452	50 %

Which of the following statements is or are correct?

I. In 1997, VIAG in Germany had a higher turnover than BASF.
II. In 1997, Siemens had a higher worldwide turnover per employee than BMW.

(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.

Sample question 3: degree of difficulty medium

The illustration shows the development of the US Dollar/Euro exchange rate from the beginning of April 2004 to the beginning of April 2005. It shows how many US Dollars one Euro was worth. The value of the dollar in Euros can easily be calculated.

Development of the US Dollar/Euro Exchange Rate

Which of the following statements is or are correct?

I. The value of the Euro (in US Dollars) increased by ten percent from April to the end of October 2004.
II. Anyone who exchanged 1,000 Euros for dollars at the end of November 2004 received more than 1,000 Euros when re-exchanging the money at the end of March 2005.

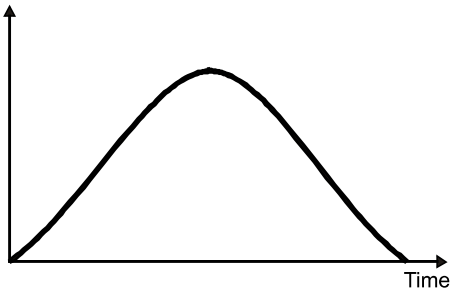
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 4: degree of difficulty high

The first diagram on the right shows the development in the number of people testing a new product for the first time.

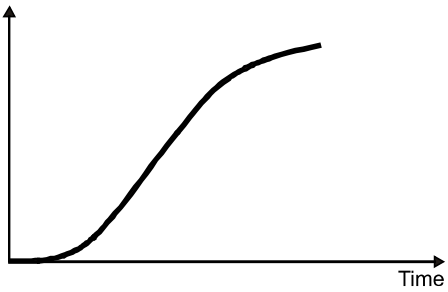
Which diagram shows the development in the number of people who have already tested the product at least once?

Number of people



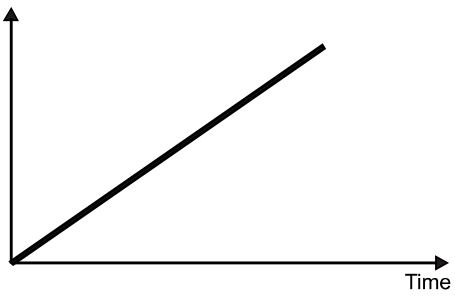
(A)

Number of people



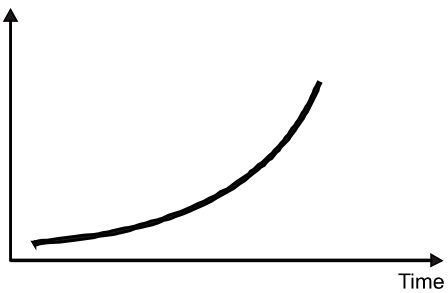
(B)

Number of people



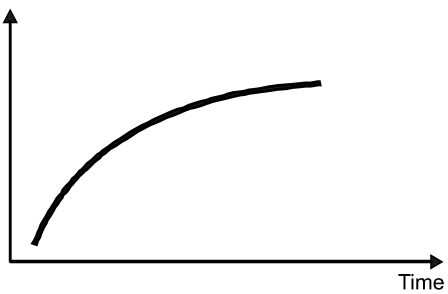
(C)

Number of people



(D)

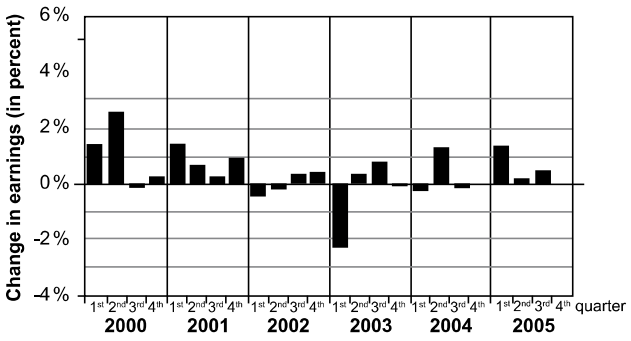
Number of people



Sample question 5: degree of difficulty high

The illustration shows the change in earnings in commerce from the beginning of 2000 to the end of 2005. For each year, the chart shows the percentage by which the earnings changed in the first, second, third and fourth quarters of the year in comparison to the same quarter of the previous year.

Change in Earnings in commerce (in each case: the change with regard to the same quarter of the previous year)



Which of the following statements is or are correct?

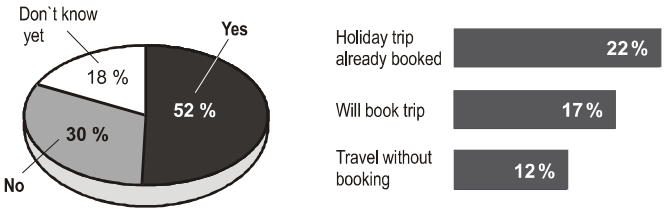
I. In the first quarter of 2003, the earnings were more than two percent lower than the earnings in the first quarter of 2002.
II. In the fourth quarter of 2004, the earnings were exactly as high as in the fourth quarter of 2003.

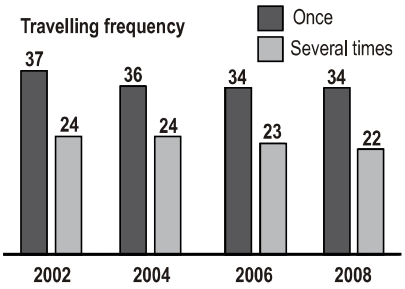
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 6: degree of difficulty high

The diagrams show the results of a survey conducted in Germany at the start of 2009. People were asked whether they had planned a holiday trip for 2009. The third diagram shows the percentage of Germans who took a holiday trip once or several times in the last few years.

Are you planning a holiday trip for 2009?





Which of the following statements is or are correct?

I. On average, more Germans took a holiday trip in 2002 than in 2008.
II. Of those Germans who had planned a trip for 2009, over 40% had already booked a holiday trip at the time the survey was conducted.

(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.

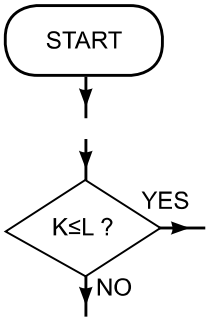
In the subtest “Analysing Processes”, you are to formalise sequences of events and analyse flow charts.
This test measures mainly the ability to convert concrete economic facts into models and to think within the context of formalised systems. It also measures critical thought in the sense that given facts are tested for correctness and not accepted as true a priori.

22 questions in the test, working time 85 minutes

Instructions
Please read the instructions before you start with the examples.

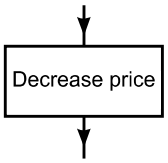
In this group of items, a process or a model has to be transferred to a flow chart or a given flow chart has to be analysed.

The flow charts can contain the following **elements**:



Beginning of the process

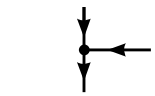
Decision point: The further process depends on the answer given to the question set here.
Example: If the question “K ≤ L?” is answered with “YES”, then the “path” marked “YES” has to be followed.
If the question “K ≤ L?” is answered with “NO”, then the “path” marked “NO” has to be followed.
(The answer to the question “K ≤ L?” is “YES” if quantity K is smaller than quantity L, or if both quantities are of equal size. The answer is “NO” if K is larger than L.)



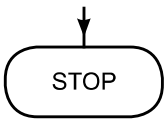
Operation that is carried out, or an alternative that is selected. In the example, the price is decreased.

Examples of notation:

M:	= 2	M is allocated a value of 2.
M:	= M + 1	The value of M is increased by 1.
M:	= M – N	The value of M is decreased by the value of N.



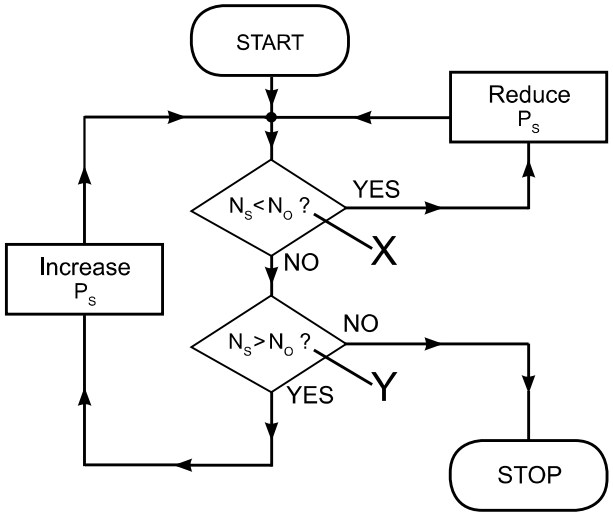
Joining together: Two “paths” are joined together to form a joint “path”.



End of the process

Text and flow chart for sample questions 1 and 2

In the case of a certain product, the number sold per day, N_S, increases, the lower the sales price P_S. Conversely, the higher the P_S, the lower the N_S.
A company employee has determined that it is optimal for the company when the number of pieces sold per day is N_O.
The flow chart shows a strategy which is to lead to the number sold per day amounting to N_O at the end (“STOP”).



Sample question 1: degree of difficulty low

Which of the two statements about the strategy is or are correct?

I. If not enough pieces are sold, the sales price is – correctly – reduced.
II. It can happen that a sales price which is already too low 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.

Sample question 2: degree of difficulty medium

Which of the two statements is or are correct, when the contents of decision points X and Y are exchanged?

I. A correct price is reduced.
II. A price which is too high is further increased.

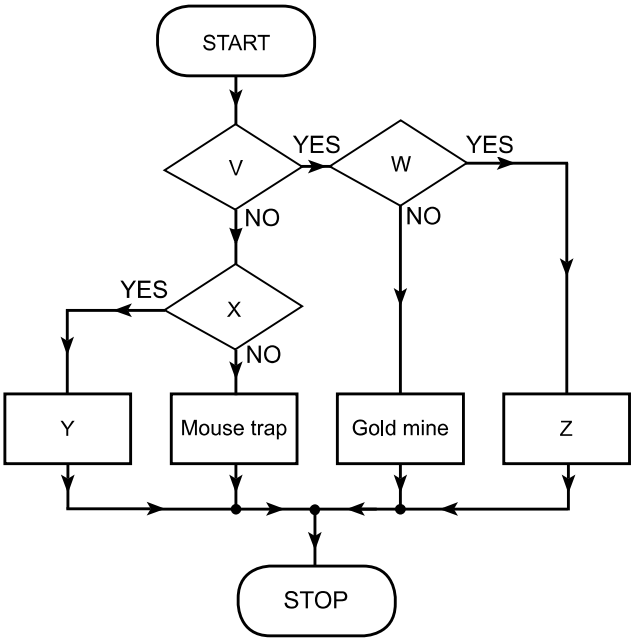
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Text and flow chart for sample questions 3 and 4

Markets (for example the automobile market in Germany) have an entry barrier and an exit barrier. The entry barrier supplies information as to how difficult it is for a new provider to enter the market – for example to sell cars in Germany. The exit barrier supplies information as to how difficult it is to exit (leave) the market again.

– "flea market": low entry barrier, low exit barrier
– "mouse trap": low entry barrier, high exit barrier
– "gold mine": high entry barrier, low exit barrier
– "gilded cage": high entry barrier, high exit barrier

Complete the flow chart in such a way that it assigns each market to the correct position.



Sample question 3: degree of difficulty medium

Which of the two statements is or are correct?

I. Decision point V could read: "Exit barrier high?"
II. Element Y could read: "Gilded cage"

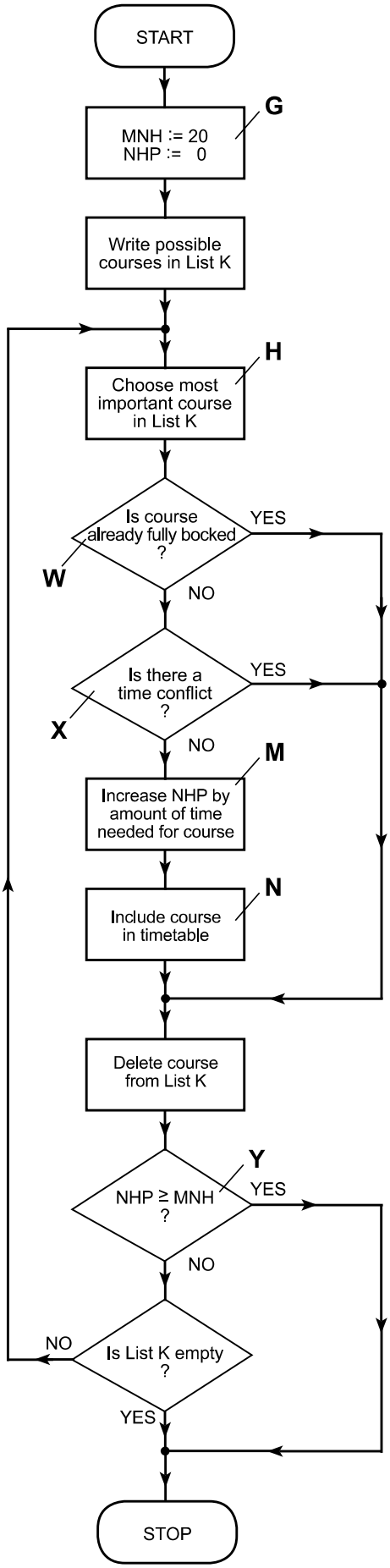
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 4: degree of difficulty medium to high

Which of the two statements is or are correct?

I. Decision point V could read: "Entry barrier low?"
II. Decision point X could read the same as decision point W.

(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 sample questions 5 and 6

University entrant Schmidt is writing his timetable for his first semester.

The flow chart shows how he proceeds.

MNH: Maximum number of hours that Schmidt has time for courses each week.
NHP: Number of hours that Schmidt has already planned in for courses each week.
"fully booked": a course is fully booked when no more places are free.
"time conflict": The course Schmidt has to decide about takes place at the same time as a course already in the timetable.

Sample question 5: degree of difficulty high

Which of the following statements is or are correct?

I. It is possible that Schmidt includes a course in the timetable for which he does not have enough time.
II. It is possible that Schmidt includes a course in the timetable that is less important than a course that has not been included.

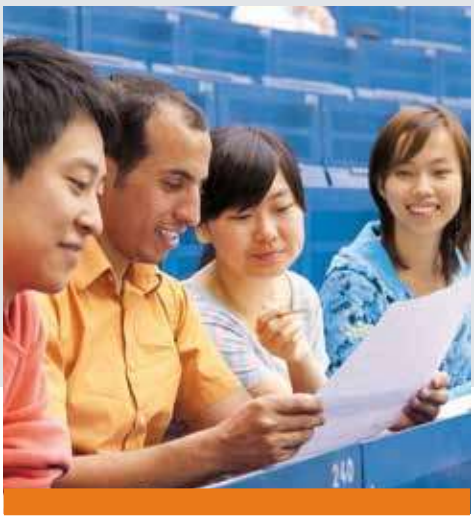
(A) Only statement I is correct.
(B) Only statement II is correct.
(C) Both statements are correct.
(D) Neither of the two statements is correct.

Sample question 6: degree of difficulty high

Which of the following statements is or are correct?

I. If there is a time conflict between two courses which both still have free places, then Schmidt always chooses the more important course.
II. If decision point Y is eliminated, then Schmidt always plans in more than twenty hours per week.

(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.



TestAS

Test für Ausländische Studierende
Test for Academic Studies

Sample questions

Solutions

Solving Quantitative Problems

Sample question 1
2,600 bottles contain 650 litres of a soft drink.
One bottle therefore contains 650 : 2,600 = 0.25 litres of soft drink.
5,000 bottles contain 5,000 times as much soft drink as one bottle, that is 5,000 bottles x 0.25 litres per bottle = 1,250 litres of soft drink.

C is therefore the correct solution.

Sample question 2
Step 1: In four weeks, how many hours has the woman worked at 25 Euros per hour? 8 hours per day x 5 days per week x 4 weeks = 160 hours.

Step 2: How much has she earned in 160 hours? 160 hours x 25 Euros = 4,000 Euros.

Step 3: How much money did she earn by working extra hours? She earned a total of 4,600 Euros. She earned 4,000 Euros from working normally. She thus earned extra: 4,600 Euros – 4,000 Euros = 600 Euros.

Step 4: How many hours did she work for that amount? For the extra hours she works, she receives 30 Euros per hour. She has received 600 Euros, which means her extra work amounts to: 600 Euros : 30 Euros per hour = 20 hours.

Step 5: How many hours has the woman worked in total? 160 hours at 25 Euros per hour + 20 hours at 30 Euros per hour = 180 hours.

B is therefore the correct solution.

Sample question 3
The width : height ratio has to remain the same.

Step 1: What is the ratio of width to height in the photo Corinna already has? It is 9 cm to 6 cm, or 3 : 2.

Step 2: Now the width is increased from 9 to 15 cm. The width : height ratio has to remain at 3 : 2. How high (x) must the photo be?

15 : x = 3 : 2
x = (15 : 3) • 2
x = 10
The new photo will be 10 cm high.

B is therefore the correct solution.

Sample question 4
Step 1: How old are Dora, Hanna, Emil, Franka and Gustav together? They are 10 years old on average. So together they are 10 years x 5 persons = 50 years old.

Step 2: How old is Hanna? Hanna is 50 minus the age of Dora minus the age of Emil minus the age of Franka minus the age of Gustav. We know the ages of Emil, Franka and Gustav. We can calculate the age of Dora as follows:

Step 3: How old is Dora? Dora, Anton, Berta and Carl are an average of 5 years old. So together they are 5 years x 4 children = 20 years old. Dora is 20 years old - the age of Anton - the age of Berta - the age of Carl, i.e. 20 - 2 - 6 - 7 = 5 years old.

Step 4: How old is Hanna? Hanna is 50 - 5 - 18 - 6 - 1 = 20 years old.

D is therefore the correct solution.

Sample question 5
The number of persons who are members in only one sports club can be calculated by subtracting the number of persons who are in both clubs from the total number of persons (x).

Let n be the number of persons who are in both sports clubs. Let m be the number of persons who are only in one sports club. x is the total number of persons.

Step 1: What is the number of persons who are members in only one sports club? m = x - n (the total number of persons minus the number of persons who are members in both sports clubs). In order to calculate m, we therefore have to know how large n is.

Step 2: How large is the number of persons who are members in both sports clubs, that is n? If none of the persons were members in both sports clubs, then n = 0 and x = a + b. Since n persons are in both clubs, it holds that x + n = a + b; if we solve for n, then n = a + b - x.

Step 3: How large is the number of persons who are members in only one sports club, that is m? m = x - n (see above). n is replaced with a + b - x. Therefore m = x - (a + b - x); transformed: m = x - (a + b) + x; m = 2x - (a + b).

D is therefore the correct solution.

Sample question 6
Step 1: How much orange juice does Maria pour into bottles Y and Z altogether? In bottle X there are still 0.6 l, so Maria pours a total of 1 l - 0.6 l = 0.4 l into bottles Y and Z.

Step 2: How much orange juice is in bottle Y? Bottle Y is half as big as bottle X, so its volume is 0.5 l. It is filled 1/5 with orange juice, so it contains 0.5 l : 5 = 0.1 l of orange juice.

Step 3: How much orange juice is in bottle Z? 0.4 l - 0.1 l in bottle Y = 0.3 l.

Step 4: What is the volume of bottle Z? It is half full of orange juice, that is 0.3 l. So its volume is 0.3 l x 2 = 0.6 l. Bottle Z is full, so it contains 0.6 l of liquid.

D is therefore the correct solution.

Inferring Relationships

Sample question 1
Here the solution is B.

The relationship between “hammer” and “tool” is analogous to (the same as, similar to) the relationship between “pear” and “fruit”. A hammer is a tool and a pear is a fruit. Here “tool” and “fruit” are broader terms; “hammer” and “pear” are narrower terms.
In (A) and (C), there are other relationships between the words (“... is a part of a ...” and “... is food for a ...”).
In (D): The terms “animal” and “elephant” are also a broader term and a narrower term. In the case of the given pair of words, however (pear : fruit), the broader term comes second. In (D), the broader term comes first. The relationship between the two words in the answer (D) is therefore not analogous to the relationship between the given words.

Sample question 2
Here the solution is C.

The relationship between “to cut” and “knife” is the same as that between “to play” and “ball”: “To cut” is something one can do with a knife and “to play” is something one can do with a ball. Both cases refer to the function of an object.
In (A), (B) and (D), no comparable relationships can be found between the pairs of words. With (D), for instance, “to throw” is an activity that can involve a ball; “blood”, however, is not an activity but something produced when one cuts oneself with a knife (= result).

Sample question 3
Here the solution is D.

Analogous relationships are created on both sides of the “=” only if you choose (D): Heat is an intensification of warmth and storm is an intensification of wind.
(A), (B) and (C) do not result in analogous relationships on the two sides of the “=”.

Sample question 4
Here the solution is B.

Only in solution (B) are the words to the left and right of the “=” analogous in their relationship: “thick” is the opposite of “thin”, and “sad” is the opposite of “happy”.
In (A), (C) and (D), there are no analogous relationships on the two sides of the “=”. Opposites are certainly not involved in any of these cases.

Sample question 5
Here the solution is C.

We arrive at pairs of words with an analogous relationship to one another only if we fill the blanks with “variety” and “deed”. In each case, the pairs of words are synonyms, that is, they have the same meaning. “Variety” means the same as “diversity” and “deed” means the same as “action”.
(A), (B) and (D) do not result in analogous relationships between the two pairs of words.

Sample question 6
Here the solution is A.

It is only when you fill the gaps with “purposeful” and “unplanned” that you produce two word-pairs that stand in an analogous relationship to one another. Both word-pairs respectively are synonyms, that is, they have the same meaning. “Purposeful” thus means the same as “intentional”, and “unplanned” means the same as “coincidental”.
In (B), (C) and (D), there are no analogous relationships between the word-pairs.

Completing Patterns

Sample question 1
The rule here applies from left to right. In every row, the arrow is turned clockwise by 45° from the first field to the second. The same is true from the second field to the third. The question mark must therefore be replaced with an arrow pointing straight downward.

A is therefore the correct solution.

Sample question 2
The rule here applies horizontally and vertically (from left to right and from top to bottom). The figures from Field 1 and Field 2 are added together in Field 3. Field 3 thus contains the sum of the figures from Field 1 and Field 2.

A is therefore the correct solution.

Sample question 3
Here the rule applies from left to right and from top to bottom. Every row and every column contains a square, a triangle and a circle. The colours alternate between black and white.

How to reach the solution:
1. The forms: In the bottom row, there are a circle and a square. Therefore, what is missing is a triangle.

2. The colours: The circle is black; the square is white. The colour of the triangle is accordingly black.

E is therefore the correct solution.

Sample question 4
The rule here applies vertically. First, examine all the lines individually. Row 3, Field 1 contains all the lines from Row 1, Field 1 and all the lines from Row 2, Field 1. So the lines are added.

B is therefore the correct solution.

Sample question 5
Here two different rules apply: from left to right and from top to bottom.

I The arrows: In Field 3, only arrows are shown which are **not** in the same position in Field 1 and Field 2. Please look at Row 1. The arrow pointing towards the upper left appears in Field 1 and Field 2. It does **not** appear in Field 3. The arrow pointing towards the bottom left appears only in Field 1, the one pointing towards the bottom right appears only in Field 2. Field 3 shows an arrow pointing towards the bottom left and an arrow pointing towards the bottom right. Arrows pointing in the same direction cancel one another!

II The lines: Only the lines which are in the **same** position in Fields 1 and 2 appear in Field 3. Please look at Row 1. In Field 1, there is a line pointing towards the right. In Field 2, there is a line pointing towards the left. In both fields, there is a line pointing downward. Only the downward-pointing line appears in Field 3. Lines pointing in different directions cancel one another!

How to reach the solution:
1. The arrows: In Row 3, both arrows in Fields 1 and 2 are pointing in the same direction. For that reason, they both disappear in Field 3. There is accordingly no arrow in Field 3.
2. The lines: The lines in Row 3, Fields 1 and 2 are **not** in the same position. Therefore, there is no addition. Accordingly, there are no lines in Field 3.

B is therefore the correct solution.

Sample question 6
Three different rules apply here:

I The quadrants: From left to right: the quadrant turns clockwise by 45° from Field 1 to Field 2. The same applies from Field 2 to Field 3. From top to bottom: the quadrant turns counter-clockwise by 45° from Row 1 to Row 2, and counter-clockwise by 90° from Row 2 to Row 3.

II The lines with dots: From left to right: the lines with dots are at the same location in all three fields. From top to bottom: the lines with the dots turn counter-clockwise by 90°.

III The arrows: From top to bottom: the arrow turns clockwise by 45° from Row 1 to Row 2. From left to right, no rule can be established.

What is the solution?
1. The quadrant has to be at the upper left.
2. The line with the dot has to point from the middle towards the bottom left.
3. The arrow has to point from the middle downwards.

C is therefore the correct solution.

Continuing Numerical Series

Sample question 1
Begin by looking at the entire series of numbers. What you notice is:
- that the last digit of every number is 5,
- that the numbers become greater and smaller alternately and
- that the differences between the numbers become greater and greater.

Your next step is to take a closer look at pairs of neighbouring numbers. Develop a hypothesis as to a possible arithmetical operation with which the one number could be derived from the other. In the process, you can begin at any random place within the numerical series; frequently (but not always!) it is easiest to begin with the first two numbers.
What arithmetical operation can be used to derive 35 from 25? Begin with a simple calculation, here, for example +10 (÷5 x7 would also be possible – but more complicated. Check this hypothesis only if you have determined that the simpler hypothesis doesn't work.)
Now check the next two numbers. What arithmetical operation can be used to derive 15 from 35? A simple possibility is -20.
Now check the third pair of numbers: What arithmetical operation can be used to derive 45 from 15? A simple possibility is +30.
In many cases you can develop an assumption about the rule governing the numerical series after checking three pairs of numbers.
In the case of this example problem, you now have hypotheses about the first three arithmetical operations: +10, -20, +30.
A possible assumption about the rule would be: Addition and subtraction are carried out alternately, using a number that increases by 10 each time.
The following arithmetical operations, therefore, would be -40, +50, -60, +70, etc.
Now test your assumption: 45 - 40 = 5; 5 + 50 = 55.
The numerical series is therefore based on the rule you discovered. Now you must apply that rule once more, to the last number: 55 - 60 = -5.

Therefore the number which must take the place of the question mark is -5.
On your answer sheet, you have to mark the "-" and the "5".

Sample question 2
The row of numbers is created by the following arithmetical operations: x10 -30 x10 -30 x10.
5 x 10 = 50 50 - 30 = 20 20 x 10 = 200 200 - 30 = 170
170 x 10 = 1,700.

The number that must be entered in the place of the question mark (?) is therefore 1,700 - 30 = 1,670.
On your answer sheet, you must therefore mark the "0", the "1", the "6" and the "7".

Sample question 3
The first things we notice about this numerical series are
- that the numbers get bigger and bigger,
- that the intervals between the numbers vary,
- and that none of the numbers is a multiple of the one preceding it.

On the basis of this initial assessment, you can already arrive at a few assumptions about the rule: A different number is added in each case. The next step is to find out which number is added in each case. You can begin wherever you like – here we will begin with the first pair of numbers:
We get from 60 to 66 by adding 6.
We get from 66 to 96 by adding 30.
We get from 96 to 100 by adding 4.
We get from 100 to 120 by adding 20.
We get from 120 to 122 by adding 2.
Now you can recognize a regularity: The first, third and fifth of the numbers added (6, 4 and 2) and the second and fourth of the numbers added (30 and 20) can be more easily associated with one another than any of these added numbers with the one immediately before or after it, namely by subtracting 2 or 10, respectively.
Moreover, you may have noticed that each of the larger added numbers is the result of the number preceding it multiplied by 5: 6 x 5 = 30 and 4 x 5 = 20.
Thus you have two means of arriving at the last number to be added:
20 - 10 = 10
2 x 5 = 10
You must now apply this rule to the last number shown in the series, that is you must add 10 to that number:
122 + 10 = 132.

Therefore the number which must take the place of the question mark (?) is 132.
On the answer sheet, you have to mark the "1", the "2" and the "3".

Sample question 4
The row of numbers is created by the following arithmetical operations: +4 +10 x4 x10 +4.
2 + 4 = 6 6 + 10 = 16 16 x 4 = 64 64 x 10 = 640
640 + 4 = 644.

The number that must be entered in the place of the question mark (?) is therefore 644 + 10 = 654.
On your answer sheet, you must therefore mark the "4", the "5" and the "6".

Sample question 5
At first sight, all you notice about this numerical series is:
- that the numbers get smaller, then larger, then smaller again.

In this case, it is probably easier not to begin with the first two numbers in the series, but with the 1, the third number in the series:
What arithmetical operation can be used to derive 1 from 32?
Two simple possibilities are: -31 and ÷32. It is best to make a note of both possibilities.
What arithmetical operation can be used to arrive at 16 from 1?
Here, two simple possibilities are +15 and x16.
Before you look at the third pair of numbers, you should decide which arithmetical operation is more likely to be part of the rule you are looking for. How can 31 / 32 be related to 15 / 16? The simplest relationship is between 32 and 16 (32 ÷ 2 = 16). The probability that "÷32" and "x16" are part of the rule is greater than the probability that "-31" and "+15" are part of it.
Check another pair of numbers against this assumption. Choose a pair of numbers with which you can recognize a probable arithmetical operation as quickly as possible. In this case, the pair could be 128 and 32. What arithmetical operation can be used to arrive at 32 from 128? A simple possibility is ÷4 (which is more likely to be related to your hypotheses ÷32 and x16 than the possibility -96).
Now it has undoubtedly become simpler to check the previous pair of numbers. What arithmetical operation can be used to derive 128 from 16? A simple possibility is x8 (and this possibility looks more closely related to your hypotheses than +112).
In the meantime, you have the following hypotheses:
___, ÷32, x16, x8, ÷4, ___
You see that each number is half of the previous number. The first arithmetical operation, which you don't know yet, could therefore contain a 64. Take a look at the first pair of numbers. You arrive at 32 from 2048 when you use the arithmetical operation "÷64". If you still have plenty of time, check this calculation. If you are running out of working time, a rough estimation will suffice.
Now you see that, in the rule, two divisions are followed by two multiplications and then another division. A systematic rule would result if the last arithmetical operation were also a division. The number used in the final arithmetical operation should be half the previous, that is: 2.
Now apply the rule to the last number in the series:
32 ÷ 2 = 16.

Therefore the number which must take the place of the question mark (?) is 16.
On your answer sheet, you have to mark the "1" and the "6".

Sample question 6
The row of numbers is created by the following arithmetical operations: +12 -18 +24 -30 +36. In other words, there are alternate additions (+) and subtractions (-). All the numbers that are added or subtracted are multiples of the number 6:
2 x 6 = 12 3 x 6 = 18 4 x 6 = 24 5 x 6 = 30 6 x 6 = 36.
The calculations provide the following results:
6 + 12 = 18 18 - 18 = 0 0 + 24 = 24 24 - 30 = (-6)
(-6) + 36 = 30.

The number that must be entered in the place of the question mark (?) is therefore 30 - 42 = (-12).
On your answer sheet, you must therefore mark the "-", the "1" and the "2".

Understanding and Interpreting Texts

Sample question 1
The solution is C.
The fact that the husband is irritated is shown particularly by the last sentence. But his irritation is already indicated earlier, when the husband says: "Don't be so pedantic!"

Sample question 2
The solution is B.
Comments made by the husband, such as "Don't be so pedantic!" or "What's the matter with you? You know exactly what I mean!" show that he does not understand his wife's behaviour since he is convinced that he has expressed himself clearly.
Statement I is not correct as the text does not comment on this.

Sample question 3
The solution is A.
Statement II cannot be understood from the text whereas the sentence "Parts of the message may be "explicit" (expressly formulated) or "implicit" (indirectly communicated in the form of hints)." is reflected in statement I.

Sample question 4
Here the correct solution is D.
Both statements are incorrect.
Statement I: according to the text, non-spoken messages can also be sent (e.g. using facial expressions or gestures).
Statement II: messages are – according to the text – incongruent if the spoken parts and the non-spoken parts contradict each other. Statements in a dialect are spoken statements. Whether there is a contradiction between the spoken and non-spoken message remains open to question.

Sample question 5
Here the solution is D.
Neither of the two statements is correct according to the text. The servant threw the food out of the window because he wanted to teach his master a lesson for his never being able to do things right for him.

Sample question 6
The solution is A.
Statement I: this is exactly stated by the sentence "The soup had been thrown down for the last time!", which is contained in the text.
Statement II: the text only says that the master thanked him "in his heart" for the well-taught lesson, not that he expressed his thanks openly.

Using Representation Systems Flexibly

Sample question 1
The solution is D.
Both statements are incorrect. The Julio-Claudian dynasty is not shown correctly, for though Augustus and Nero belonged to this dynasty, Vespasian did not. The Flavian dynasty is not shown correctly either, for though Vespasian and Titus belonged to this dynasty, Severus and Caracalla did not.

Sample question 2
The solution is D.
The text mentions three groups of cocoa subspecies, namely Criollo, Trinitario and Forastero. Then the respective subspecies are described:
- Porcelana, Criollo Andino, Guasare and Ocumare 61 belong to the Criollo group,
- Amelonado, IMC 67 and Arriba belong to the Forastero group,
- and ICS 1 belongs to the Trinitario group.

Sample question 3
B is the correct solution here.
Marcellus, Gaius, Lucius, and Agrippina never reigned, therefore (A) and (D) cannot be correct. (C) includes all the emperors, but the order of succession Claudius/Caligula is incorrect.

Sample question 4
The solution is A.
Statement I is correct, as the sentence "The higher the level of education and income, the darker the chocolate." points to a positive relationship between income and education and the cocoa content of chocolate. This is what the diagram shows.
Statement II is incorrect, as the text says that "Dark chocolate contains more antioxidants than light-coloured chocolate." (positive relationship). The diagram, however, shows a negative relationship.

Sample question 5
The solution is A.
Statement I is correct, as the sentence "Research has shown that eating cocoa-containing chocolate may contribute slightly towards reducing blood pressure." points to a positive relationship between eating cocoa-containing chocolate and reducing blood pressure. Eating cocoa-containing chocolate brings about a reduction in blood pressure, therefore $\xrightarrow{+}$ must point towards reduction in blood pressure.
Statement II is incorrect. The sentence "Cocoa-containing chocolate also contains a substance which supports the healing of wounds and reduces the risk of stomach diseases." points to a positive relationship between eating cocoa-containing chocolate and the healing of wounds and a negative relationship between eating cocoa-containing chocolate and a risk of stomach diseases. However, the arrows should point towards supporting the healing of wounds and towards the risk of stomach diseases and not towards eating cocoa-containing chocolate.

Sample question 6
The solution is C.
Statement I: the new information interrupts the link between Dung and Rest through the insertion of CuI. The lack of dung alone does not in itself lead to more frequent resting periods in growing corn. Only if, in addition, insufficient amounts of nitrogen-rich plants are grown, does the number of resting periods in corn cultivation increase.
Statement II: both rainfall frequency and intensive irrigation have a positive impact on the cultivation of nitrogen-rich plants.

Recognising Linguistic Structures

Sample question 1
Answer C is correct since:

1. The expressions for "I sit" and "she sits" only differ as regards the second word ("ko" and "tu" respectively), so the first word "palo" must have the meaning "sit".
2. Correspondingly, the word "ko" means "I" and "tu" has the meaning "she".
3. This is confirmed by the third expression: "tu" again means "she" and "karo" hence means "stand".

"I stand" can therefore only be expressed by "karo ko".

Sample question 2
Answer D is correct since:

1. If one looks for the word "greeted" in the foreign language, one comes across "suvavot", for the word "kavino" in the second sentence must mean "teacher" (cf. the similar word in the third sentence) and "namidu" must mean "saleswoman". The latter becomes clear from this word's position in the sentence, compare the first and the third sentences.
2. "The caretaker" must hence be "hidamo". From the transition from "kavino" ("the teacher") to "kavinopu" ("her teacher") and from the ending of "ramodopo" ("his uncle") it follows that "his caretaker" must be "hidamopo".
3. What remains is the task of transforming the already identified word "ramodopo", meaning "his uncle", into a corresponding word for "the uncle". This is done by leaving off the ending "po".

Hence the sentence sought in the foreign language must be "ramodo hidamopo suvavot".

Sample question 3
Answer D is correct since:

1. If one looks at the first and third example sentences it becomes clear that the ending of the verb in the foreign language shows the respective subject of the sentence. The root of the verb "sleep" is "rump", followed by the ending "ulöpp" for "the child" and "ilemp" for "the goat".
2. If one now looks for the root of the verb "protect", one finds "renguming" in the second sentence, where "uming", as the word ending for person, is attached to the root word "reng". "The child is protecting" must therefore be "rengulöpp".
3. The next task is to identify the word for "goat" as the object. A point of orientation here is given by sentence 4. Here it becomes clear that "lemp", the corresponding verb ending for "goat" without an "i", only needs the postfix "zi" if the goat is the object of the sentence (cf. also sentence 2: "löppzi" = "child" as the object).
4. Finally the word for "his" needs to be identified in the foreign language. The only clue is to be found in sentence 2. Since the meanings of the words "renguming" and "löppzi" are already clear, only "tschik" remains, which must hence be the possessive pronoun.

Sample question 4

1. In this exercise one must first recognise that in the foreign language it is only the end syllable of the second word which stands for "come" or "go" respectively. On closer inspection of the expressions, it becomes clear that only the letters "veu" can have the meaning of "going somewhere". By contrast, the verb form with an attached "i" describes "coming from somewhere".
2. A comparison between the first and fourth expressions shows that the extension of "veu" to "selveu" and from "veui" to "selveui" has the meaning of "the child is going to" and "the child is coming from" respectively.
3. From the second and third expressions one can now work out that "tip" must mean "cat" and "fan" must mean "farmer".
4. By comparing the first and second expressions, one finds that the word for "hut" in the foreign language is "puna". From expressions three and four it can then be seen that "lom" means "field" and "borro" is the word for "meadow".

"The child is walking to the field" can hence only be "lom selveu" in the foreign language.
This means B is the correct solution in this exercise.

Sample question 5
Answer C is correct since:

1. If one looks for the word "learn" in the example sentences, one comes across various words containing the root word "mal" (namal, ?mal, ?malna, lemal, malle), to which, depending on the meaning, syllables are added as a postfix or prefix. In the first sentence, for example, "na" must mean "everything" and "mal" must mean "learn". If one tries to identify the word form for "learn a little", one finds "malle" in sentence 4. An appended "le" hence means "little".
2. If one now looks at the other components of the example sentences, it becomes clear that the remaining words must be personal pronouns ("po" = "he", "su" = "you", "ki" = "I", "ak" = "we"), which determine the person and singular or plural form of the verb.
3. The next thing is to find out the future form of a verb. If one considers the sentences 2, 3, and 5, it becomes clear that the future form of "mal" is indicated by a preceding "?".
4. The final step is to find out how to formulate a question in the foreign language. One point of orientation here is given by sentence 5 ("?nafor ak" = "Will we ask everything?"). We can correspondingly derive that the word order is decisive in formulating a question. The verb in its specific form must stand at the beginning and must come before the personal pronoun.

"Will he learn a little?" can hence only be expressed by "? malle po".

Sample question 6
Answer A is correct since:

1. This exercise first involves recognising that verbs can always be identified by a preceding “ao” (“ao tane”, “ao hai”, “ao lanta”, “ao simi”, “ao rumi”). If one now looks among these verbs for the words for “speak” and “listen”, one must examine sentence 1 and sentence 4 and finds “ao tane” = “speak” and “ao rumi” = “listen”.
2. Now the word for “I” has to be filtered out. Help in this respect is given by sentence 4. If one compares sentences 3 and 4, “jo fesomo” can be identified as the common factor and hence be left aside as the term for “at university”.
   The word “lom” also occurs in sentences 1 and 2, whose only common factor shared with sentence 4 is a time reference. Hence “lom” can be identified as “today” and cannot stand for “I” either.
   The only hitherto meaningless word in sentence 4 is “shili”, which must consequently mean “I”.

“I speak and listen” can therefore only be expressed by “ao tane shili ao rumi”.

Formalising Technical Interrelationships

Sample question 1
To solve this problem, an equation is to be derived from the introductory text and then transformed. As described in the text, the time required by Gear A to rotate exactly n_A times is equal to the time it takes Gear B to rotate n_B number of times. The following products can therefore be equated:
$Z_A \, n_A = Z_B \, n_B$.
To solve this equation for n_B, both sides must be divided by Z_B.
Therefore the solution is the equation shown under (B).

Sample question 2
A spring with the stiffness c is given. This stiffness can be calculated with the formula provided. The task now is to calculate the stiffness c_2 of a different spring. This other spring (spring 2) is characterised in comparison to the initial spring as follows:

- It consists of the same material, that is $G_2 = G$
- It exhibits the same number of turns, that is $n_2 = n$
- Its core diameter is half the size, that is $D_2 = \frac{1}{2} D$
- Its wire diameter is also half the size, that is $d_2 = \frac{1}{2} d$

If this information is entered into the given formula, the stiffness of spring 2 is:

$$c_2 = \frac{G\left(\frac{d}{2}\right)^4}{8\,n\left(\frac{D}{2}\right)^3}$$

Through transformation, we arrive at:

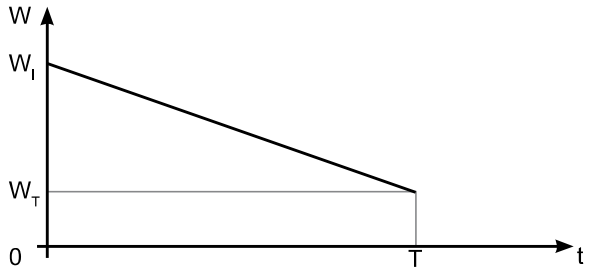
$$c_2 = \frac{G\left(\frac{1}{2}\right)^4 d^4}{8n\left(\frac{1}{2}\right)^3 D^3} = \frac{1}{2}\frac{Gd^4}{8nD^3} = \frac{1}{2}c$$

The stiffness of spring 2 thus amounts to half the stiffness of the initial spring.
Therefore the correct solution is A.

Sample question 3
To solve this problem, it is necessary to find a formula with which the value of a constantly changing variable (the radius of the cylinder) can be determined at any given point in time.
Since the cylinder moves at a constant rotation speed n – this speed being defined as number of rotations per unit of time – n has to be multiplied by the time t. The result (nt) indicates how often the cylinder has turned at this point in time.
With every rotation of the cylinder, one layer of sheet steel is added. Therefore, if the product nt is multiplied by the sheet thickness d, the increase of the cylinder's radius after t seconds can be determined.
In order to calculate the total radius, the radius r_0 of the empty cylinder at the beginning of the rolling process must be added to the result.
Alternative C is the only equation which reflects all of these aspects and is therefore the correct answer.

Sample question 4
This item is solved by means of logical argumentation:
Result (1): *There is no measurable resistance between Q and S.*
Circuit (A) exhibits resistance between Q and S. Result (1) does not apply to this circuit. It can therefore be ruled out. Circuits (B), (C) and (D) remain.
Result (3): *The resistance between P and R is twice as high as that between P and Q.*
Let us first consider circuit (B): Here we have two resistors between P and R and two resistors between P and Q. The resulting total resistance for both connections is thus equal. Circuit (B) can therefore be ruled out.
Now let us consider circuit (C): Here we have only one resistor between P and Q. Result (3) is therefore compatible with circuit (C).
Finally, let us consider circuit (D): Here we have no resistor between P and R. Between P and Q, on the other hand, there are two resistors. Circuit (D) can therefore be ruled out.
Result (3) thus applies only to circuit (C).
Result (2): *Between P and Q, 5 ohms are measured.*
Due to the fact that there is exactly one resistor between P and Q, this result leads to the additional requirement that every resistor in circuit (C) have a value of 5 ohms. Thus not only the resistors' positions, but also their size is determined.
The correct solution is therefore C.

Sample question 5
The task presented by this test item is to find an equation which describes the change in the rocket's weight over the course of time. To this end, let us consider the following figure (see below). At the time of take-off (t = 0), the weight is W_I. After take-off, fuel is expelled, and the rocket's weight decreases. It can be deduced from the text that the amount of fuel expelled is proportional to time. In other words, in the time interval between 0 and T, the weight decreases linearly (W_I - W_T). The slope of the resulting straight line is thus (W_I - W_T)/T, and is preceded by a minus sign because the weight is decreasing. This line intersects the vertical axis at the point W_I. The correct equation is therefore $W = W_I - W_T \frac{t}{T}$.



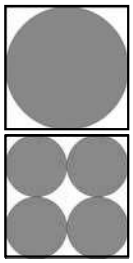
Inserting into the equation yields:

for t = 0 $\quad W = W_I - \frac{(W_I - W_T)}{T} \; 0 = W_I$
and
for t = T $\quad W = W_I - \frac{(W_I - W_T)}{T} \; T = W_I - W_I + W_T = W_T$

The correct solution is therefore D.

Sample question 6

The surface area of a circle is calculated with the following formula: $A = \pi r^2 = \pi \frac{D^2}{4}$. Due to the fact that the surface area of the square amounts to $A = 1m^2$, the diameter $D = 1m$. With this information, the area which has to be multiplied by the number of circles, that is by n^2, can be calculated.



For $n = 1$, the area A_1 is calculated as follows:

$$A_1 = 1^2 \times \pi \times \left(\frac{1}{2 \times 1}\right)^2 \mathrm{m}^2 = \frac{\pi}{4}\mathrm{m}^2$$

Therefore, for $n = 2$, the area A_2 is calculated as follows:

$$A_2 = 2^2 \times \pi \times \left(\frac{1}{2 \times 2}\right)^2 \mathrm{m}^2 = \frac{\pi}{4}\mathrm{m}^2$$

For $n = 4$, the area A_4 is calculated as follows:

$$A_4 = 4^2 \times \pi \times \left(\frac{1}{2 \times 4}\right)^2 \mathrm{m}^2 = \frac{\pi}{4}\mathrm{m}^2$$

For $n = 8$, the area A_8 is calculated as follows:

$$A_8 = 8^2 \times \pi \times \left(\frac{1}{2 \times 8}\right)^2 \mathrm{m}^2 = \frac{\pi}{4}\mathrm{m}^2$$

The comparison of the four areas shows that:

$A_1 = A_2 = A_4 = A_8$.

The correct solution is therefore D.

Visualising Solids

Question type 1
Sample question 1

Visualise this solid as a tree stump which has been cut off diagonally. When you look at it from above (view from above), you see that a fairly large piece has been cut out of its left half. Behind the cut-out section, however, a relatively large section of the stump has remained standing.

You can therefore rule out Option (A) immediately, because this option shows nothing remaining behind the cut-out section except for the outer bark. Option (B) can likewise not be the correct solution, since here only a section of bark has been removed from the front. The piece cut out of Option (D) has only one straight side. According to the view from above, however, the cut-out section has to have three straight sides. This is the case only with the section cut out of Option (C).

Therefore, (C) is the correct answer.

Sample question 2

The answer options for this task differ only with regard to the positioning of the inner square. In the view from above and the view from the front, it can be seen that this inner square must be the long square bar. When the figure is seen from above, this square bar is positioned on the lower section of the base plate. When you look at the view from above and, in your mind's eye, adopt the perspective of the view from the side, you will realize that from this angle the square bar must be located in the right-hand section of the base plate. You can thus already rule out options C and D. With the aid of the view from the front, you can now find out that the square bar must be positioned in the upper part of the base plate.

That means that (B) is the only possible solution.

Sample question 3

One way of solving this item is to begin by looking at a detail which does not occur in all four answer options. Look, for example, at the figure which looks like an upside-down "L" on the left edge of Option (B) and (D). Does this figure result from the view from above and the view from the front? Yes, it does, because the "upside-down L" is the unobstructed view of the high surface at the figure's centre. Accordingly, you can already rule out Options (A) and (C). Options (B) und (D) differ in that, in Figure (B), a step has been indicated over the rectangular figure to the right, whereas (D) shows a straight edge all the way to the top. In the view from above, however, you can see the protruding section which forms the step.

Therefore (B) is the correct answer here.

Sample question 4

The solid shown here is a square base with a rectangular cuboid at each of its four corners. Two of these cuboids are high, and two are low. With the aid of the view from above and the view from the front, it can be established that (seen from above) a high cuboid must be located at bottom left and upper right respectively. This means that, for both side views, a high cuboid must be visible at the front right and rear left respectively.

This is only the case in option (A).

Sample question 5

In the process of solving this item, it is at first unclear whether the side view we are looking for is a view from the left or one from the right. On the basis of the view from above, it can be deduced that in the view from the left side (VSL), one of the two beams sticking out at the upper end of the figure points towards the viewer, the other towards the right. In the view from the right side (VSR), only one of the two beams that is sticking out can be seen; it points towards the left.

The answers (B) and (D) are therefore options for the VSL, and the answers (A) and (C) are options for the VSR. Answer (B) is out of the question because there is no line indicating an edge at the transition from the figure's base to the vertical element, or "pillar", on top of it. – On the basis of the view from above it can be deduced that the base of the figure is square. Therefore any view from the side would have to indicate the upper edge of the base, just as the view from the front does.

In the case of answer (D) there is a vertical line at the transition between the upper end of the "pillar" and the beam that is sticking out. In the view from above, however, this line cannot be explained.

In the case of answer (A), on the other hand, there is likewise a vertical line at the transition between the upper end of the "pillar" and the beam. Here that line is correct, because this is one of the two options for a VSR. The left, vertical edge of the pillar must therefore be visible in front of the beam that is sticking out. The other elements of answer (A) also correspond with the view of the three-dimensional figure from above and the view of it from the side, **and (A) is accordingly the correct solution to this task**.

Answer (C) cannot be the correct solution because the transition between the upper end of the pillar and the upper beam is shown as a single plane. According to the view from above, however, the vertical edge of the uppermost end of the pillar would have to be visible here.

Sample question 6
This solid is composed of five elements. In addition to what the view from above and the view from the front tell us, the answer options also indicate that several elements are constant here. – For example, it is clear that the element extending to the right in the view from above and the view from the side must be a round rod and cannot be rectangular, for instance.
Since the view from above and the view from the front provide no evidence of any such round element for the left side, it is clear that the view from the right side is the one we are looking for. Answer option A cannot be the solution because the base, the bottom element of the solid, is positioned too far on the right. Option C can be ruled out because the arrangement of the round rod and the base does not match the view from above. Option D seems to be the best match: the configuration of the base is correct and the constellation of the base and the round rod matches the view from above. However, the view from the front shows that the distance between the round rod and the base is too big (it is equal to the distance between the base and the rectangular rod on the left side). Hence option B is the only solution left. – But does the narrow rectangle not seem out of place, since it appears neither in the view from above nor in the view from the front? Not at all, as the rectangle does not necessarily have to stick out of the solid but may jut into the solid as a recess (like a drawer compartment, for example). Since all other answer options can be ruled out, that must be the case here.
Hence B is the correct solution to this task.

Question type 2
Sample question 1
In the case of this simple example, you can immediately rule out the perspective from "below" and "above". From below as well as from above, you would be looking through a kind of "tube". Therefore the perspective illustrated on the right can only be the view from the "right", the "left" or "behind". Now look at the bottom end of the cable: In the left-hand picture it "faces" you. In the right-hand picture it faces away from you, that is it points in exactly the opposite direction. Therefore it is clear that the right-hand picture shows the view from "behind".
(E) is the correct answer.

Sample question 2
In this task, we immediately notice the metal wire used to bind together a few coils in the cable. In the view from the front, this wire can be made out as being roughly in the middle of the cube. Since a few coils of the cable are clearly lying in front of this wire, it must be positioned in the rear section of the cube. In the right-hand picture not much has changed in the position of the metal wire; in contrast to the front view, however, no coils of cable are positioned in front of the wire here. What we have here is therefore the view from behind **(solution letter E)**. This is confirmed by further details such as the end of the cable shifting from the bottom left to the bottom right, or by the route taken by the cable coils.

Sample question 3
Here the only view you can rule out immediately is the one from "behind" (Option E): If the view from the front shows one end of the cable leading toward the back of the cube at the top right, the view from behind would show this cable end "coming at you" at the top left. This is not the case in the right-hand picture. If you tip the cube forward in your imagination, you immediately see that the correct answer cannot be the view from "above"; and turning the cube 180 degrees or 90 degrees to the right also does not lead to the desired perspective. But if you imagine yourself standing on the right side of the cube, you see that the end of the cable which is hidden in the left-hand illustration comes toward you on the right side of the cube in the right-hand illustration.
Therefore "right" (A) is the correct answer.

Sample question 4
In this task, both ends of the white cable have been bent to form loops, through which in both cases the white cable itself is guided. The positioning and direction of these two loops in the view from the front and in the view we are looking for make it clear that the right cube shows the view from below **(solution letter C)**. The positions of the ends of the black cable confirm this, even though the end visible on the upper right in the view from the front almost disappears behind a coil of the black cable in the view from below (where it can be discerned on the bottom right).

Sample question 5
Here the figure on the right cannot be showing the view of the cable from the left (B): In the view from the left, the section of the cable running horizontally in the view from the front would have to be visible in the middle of the right-hand edge. Answer (E) is incorrect for the same reason: In the view from behind, the horizontal section of cable would have to be visible in the background, likewise running horizontally about halfway between bottom and top.
In the view from above (D), this same section of cable would have to be seen leading from one side to the other along the bottom surface of the cube which is not the case.
The figure on the right cannot be showing the view from the right (A), because the part of the cable touching the upper left-hand wall in that figure would have to be touching the upper right-hand wall in the view from the front, which is not the case.
The only remaining option is the view from below (C), but one must look closely to see that it is correct. We might easily find ourselves looking for the end of the cable clearly seen at the bottom left in the view from the front. – In the view from below it runs right into a curve in the cable and thus appears not to be an end at all. On the other hand, the end of the cable visible on the right-hand edge in the view from below is not visible in the view from the front because it is hidden behind a curving section of cable.

Example 6
Even in this difficult task we immediately notice the striking location where the two ends of the cable meet. Although this location can be quickly identified in the right-hand cube too, the task is still by no means solved. The view from behind can be ruled out – it would have to look like the view from the front, the difference being that the cable ends are in the right half. The views from the right and left can also be eliminated, because in both cases the cable ends would have to be located at the same height as they are in the view from the front. This leaves us with just the views from below and from above. The perspective from below can be ruled out because none of the cable coils running across the base lead directly to the location where the two cable ends meet up. This is the case, however, with the view from above: the cable coming from the bottom right of the cube and running along the top is then guided back downward into the cube's interior – to exactly the point where the two cable ends meet.
(D) is the correct answer.

Analysing Technical Interrelationships

Sample question 1
The fluid in the tank lorry is inert: When the lorry gains speed (accelerates), it stays somewhat behind (Picture 2), when the lorry travels at a constant speed, it lies inactively in the tank (Picture 3), and when the lorry brakes, it moves forward (Picture 1).
The solution to this item is therefore D.

Sample question 2
Without the rope, the right ends of both of the two beams move downward when a weight is hung from the hook. The question is therefore whether this movement of the beam is prevented by the rope.
When a weight is hung from the hook in arrangement I, the rope slackens on both the right and left ends. The right end of the beam moves downward, and statement I is therefore correct.
When a weight is hung from the hook in arrangement II, tension is applied to the right end of the rope. This tension is translated to the left end of the beam by way of the rope. Both ends of the beam are pulled downward with the same force, and the beam accordingly does not move. Statement II is therefore wrong.
The solution to this item is therefore A.

Sample question 3
10 l/s flow into the tank at the top. From this tank, 8 l/s flow through the three drainpipes in its floor (2 + 2 + 4 l/s). The remaining 2 l/s flow through the drainpipe on the left wall of the tank.
6 l/s (2 + 4 l/s) flow into the tank in the middle of the system. From this tank, 3 l/s flow out through the drainpipe in its floor. The remaining 3 l/s flow through the drainpipe on the right-hand wall of the tank.
4 l/s (2 + 2 l/s) flow into the tank at the bottom left and thus into drainpipe X. 3 l/s flow into the tank at the bottom centre and thus into drainpipe Y. 3 l/s flow into the tank at the bottom right and thus into drainpipe Z.
The solution to this item is therefore D.

Sample question 4
In the diagram, three different values for the power P occur: 1, 2 and 4. According to the text, P is the lowest when the lift travels downward. Therefore in this case P = 1. Accordingly, P = 2 when the elevator stops on a floor. It follows that, when the lift travels upward, P = 4.
With this information, the lift's activity can thus be reconstructed: At the point in time t = 0, the lift is on the third floor and it stops there for 1 minute. Then it travels downward for 1 minute. Since it travels at a speed of 30 seconds per floor, it is then on the first floor. After stopping there for 1 minute, it travels upward for 2 minutes (corresponding to four floors). Thus at the point in time t = 5, the lift is on the fifth floor. There it stops for 1.5 minutes and then travels to the sixth floor. Statement I is therefore correct. One minute later it travels 1.5 minutes (corresponding to three floors) downward and, from the point in time t = 9.5 onward it is on the third floor. Statement II is therefore also correct.
The solution to this item is therefore C.

Sample question 5
If the temperature is increased by x degrees, the liquid inside each thermometer expands by the same volume. However, this increase in liquid volume makes the liquid rise to a higher level in the tube of the thermometer on the left. Since the cross-section of the tube in the left-hand thermometer is smaller than that of the right-hand one, a defined temperature change generally leads here to a greater change in the liquid level than with the right-hand thermometer. Consequently, temperature changes can be measured more accurately with the left-hand thermometer than with the right-hand one. Statement I is therefore wrong.
Since a rise in temperature has a smaller effect on the liquid level in the tube of the right-hand thermometer than on that in the left-hand one, greater changes in temperature can be measured with the right-hand thermometer. The right-hand thermometer thus covers a larger temperature range. Statement II is therefore correct.
The solution to this item is therefore B.

Sample question 6
Between the point in time t = 1 and the point in time t = 3, the acceleration is reduced, but it remains greater than 0. Therefore the object continues to gain speed during this period of time. Statement I is therefore correct.
By the point in time t = 7 , the object has accelerated 4 m/s^2 for 2 s, then 2 m/s^2 for 2 s, then -3 m/s^2 (i.e. slowed down) for 2 s. Between the point in time t = 6 and the point in time t = 7, the object is no longer accelerated, but it continues to move. Statement II is therefore wrong.
The solution to this item is therefore A.

Analysing Scientific Interrelationships

Sample question 1
The observation results show that the main shoot and the side shoots of the untreated plant grow. If the tip of the main shoot is cut off, the main shoot stops growing. However, the phytohormone can be used to make a main shoot continue to grow after its tip has been cut off. The phytohormone hence promotes the growth of the main shoot. Statement I is therefore correct.
The side shoots grow on the untreated plant and they also grow on the plant where the main shoot was cut off at the tip. If the phytohormone is applied, however, the side shoots stopped growing. The phytohormone hence hinders the growth of the side shoots. Statement II is hence also correct.
The correct solution is therefore C.

Sample question 2
Sequence A can be composed of the four parts which come about through division with the enzyme Ch. However, sequence A cannot be composed of the four parts which come about through division with the enzyme Tr. Sequence A is therefore wrong.
Sequence B is already wrong simply because it starts with the amino acid Gly and ends with Gly. The amino acid Leu has to form one end of the peptide X.
Sequence C cannot be composed of the four parts which come about through division with the enzyme Ch. Sequence C is therefore wrong.
Sequence D can be composed of the four parts which come about through division with the enzyme Ch. Sequence D can also be composed of the four parts which come about through division with the enzyme Tr.
Sequence D is therefore correct.

Sample question 3
The first step in solving this item is to determine which curve shows the temperature and which curve shows the amount of precipitation. Since only the thickly drawn curve also has negative values (see region R3), it must be the temperature curve.
In statement I, the annual precipitation amounts in the regions R1 and R4 are compared with one another. In region R1 the precipitation is greater than in region R4 in May, June and July. If we look at the year as a whole, however, the precipitation in region R4 is clearly greater than in region R1. Statement I is therefore wrong.
Statement II can be checked by looking at the temperature curve. In region R1, the temperatures are the lowest in June and July and the highest in December and January. Region R1 must therefore be located south of the equator. Statement II is therefore correct.
The correct solution is therefore B.

Sample question 4
Potassium nitrate is a salt. The solubility of potassium nitrate must therefore be read from the left scale. One starts off from 50°C (on the horizontal temperature scale) and goes up vertically to the potassium nitrate curve, and from there horizontally to the left solubility scale. The solubility value for potassium nitrate readable here is greater than 70 g per 100 ml of water. Statement I is therefore incorrect.
The oxygen curve is steeper from 0°C to 20°C than from 20°C to 80°C. Hence a temperature change of x°C between 0°C and 20°C leads to a stronger change in solubility than between 20°C and 80°C. Statement II is hence correct.
The correct solution is therefore B.

Sample question 5
If one heats the right side of the tube, the mercury on this side expands to the left (pressing the air in the tube together). Since the mercury expands on the right side, its centre of gravity shifts, along with the centre of gravity of the entire tube, to the left. The left side of the tube goes down. Statement I is therefore correct.
However, the expansion of the mercury on the right side and the shift in the centre of gravity does not make the right side lighter. Statement II is hence incorrect.
The correct solution is therefore A.

Sample question 6
Let us assume the numbers on the upper edge (base edge) of the set square give the length in centimetres (cm). Then the distance between the “5” on the left side and the “5” on the right side – if measured with a normal set square or ruler – would measure 10.0 cm (5.0 + 5.0). When the set square has expanded by 1 percent, this distance measures 10.1 cm. If one uses this set square to measure an object which is exactly 10.0 cm long, this object will not reach all the way from the one “5” to the other “5”. The set square will accordingly show a value which is somewhat smaller than 10.0. Statement I is therefore correct. (This train of thought is somewhat easier to follow if one imagines an expansion of – for example – 50 percent.)
If each of the three sides of the set square increases by 1 percent, then the overall circumference also increases by 1 percent. Statement II is therefore wrong.
The correct solution is therefore A.

Understanding Formal Depictions

Sample question 1
Statement I is incorrect:
If F1 = a, then the first question is answered "YES". Then you come to the decision point below that. If F2 = a, then the second question is also answered "YES" and you go right to the next decision point. If F3 = d, this question is also answered "YES" and you come to decision Y. Hence it is possible that F1 = a and Y is selected, not X.
Statement II is also incorrect:
If F1 = b, you go right from the first decision point. The question in this decision point is "F2 = a?". If F2 = b and you hence answer the question "NO", you come directly to decision Z. Hence it is possible that F2 = b and Z is selected, not X.
D is the correct solution.

Sample question 2
Statement I is incorrect:
If F1 = b, the answer to the first question is "NO". Then you get to the decision point on the right. If F2 = b, the answer to the second question is "NO". Then you get to Z – even if F3 = c.
Statement II is correct:
The only way to decision Z is via the decision point at the top right (F2 = a?). If F2 = a, then the question is answered "YES" and you move to the decision point below, from where you can only go to X or Y.
B is the correct solution.

Sample question 3

Bacteria in water:	I	S	A
Ec	Increased	Increased	Normal
Kp	Increased	Normal	Increased
Cf	Normal	Increased	Normal
Ea	Normal	Normal	Increased

Statement I is correct:
If I is increased, then you come to decision point Y, since you answer the first question "YES". If decision point Y is labelled "Increase in concentration of S?", an increase in S leads to the decision in the flow chart that the water sample contains Ec. This is correct, for if the water contains Ec, I and S are increased. However, if S is normal, then the question in decision point Y is answered "NO" and you come to the decision "Kp in water". This is correct, for if the water contains Kp, I is increased and S is normal.
If I is not increased, then you come to decision point X and the question posed there decides whether the flow chart is correct. Hence the flow chart may be correct.
Statement II is incorrect:
If decision point X is labelled "Concentration of A normal?", the flow chart leads to the wrong decision in two cases: if Ea are in the water or if Cf are in the water.
If Ea are in the water, then I is normal and A is increased. The question in the first decision point must therefore be answered "NO" and you come to decision point X. If decision point X is labelled "Concentration of A normal?", then the question in decision point X must be answered "NO" and you come to the wrong decision "Cf in the water".
If Cf are in the water, then I is normal and A is normal. If decision point X is labelled "Concentration of A normal?", then the question in decision point X must be answered "YES" and you come to the wrong decision "Ea in water".
A is the correct solution.

Sample question 4

Bacteria in water:	I	S	A
Ec	Increased	Increased	Normal
Kp	Increased	Normal	Increased
Cf	Normal	Increased	Normal
Ea	Normal	Normal	Increased

Statement I is incorrect:
If the concentration of I is increased, then you come to decision point Y, since you answer the first question "YES". If decision point Y is labelled "Increase in concentration of A?", an increase in A leads to the decision in the flow chart that the water sample contains Ec. This is incorrect, for if I and A are increased, the water contains Kp.
Statement II is correct:
If I is not increased, you come to decision point X. If decision point X is labelled "Concentration of S normal?", an increase in S leads to the decision Cf in the flow chart, because the question is answered "NO". This is correct because the combination of "I normal and S increased" means that the water contains Cf. If S had a normal concentration level, the flow chart would lead to the decision Ea. This is correct because the combination of "I normal and S normal" means that the water contains Ea.
B is the correct solution.

Sample question 5
Statement I is incorrect:
If there are more than 10 participants, Room C is always chosen, even if customers are taking part in the meeting.
Statement II is correct:
If no customers are taking part, then, according to the flow chart, Room A is chosen if there are 4 or fewer participants, Room B is chosen for 5 to 10 participants, and Room C is chosen for more than 10 participants.
B is the correct solution.

Sample question 6
Statement I is correct:
In the case of 10 participants, the question "NP ≥ 5?" is answered "YES" and the question "NP > 10?" is answered "NO", meaning that Room B is always chosen.
Statement II is incorrect:
Even if there are fewer than 5 people, Room B can still be chosen. For example, in the case of 4 participants, the question "NP ≥ 5?" is answered "NO". If customers are taking part in the meeting, the next question is answered "YES" and the meeting with 4 participants is held in Room B.
A is the correct solution.

Analysing Economic Interrelationships

Sample question 1
This item is very simple. You only need to read the individual values in the diagram.
Statement I is correct, since the employees in the USA have an average of only 12 days of annual vacation. In all other countries, the employees have more annual vacation days.
Statement II is also correct, since the employees in Spain have an average of 14 paid holidays. In all other countries, the number of paid holidays is smaller.
Therefore C is the right answer and is to be marked on the answer sheet.

Sample question 2
Statement I is correct: In 1997, VIAG had a worldwide turnover of some 42 billion (42,000 million) DM, half of which (21 billion) was made in Germany. BASF had a worldwide turnover of some 48 billion DM. 73% thereof was made abroad, in other words a little more than a quarter (around 13 billion) was achieved in Germany. Hence VIAG's turnover in Germany was distinctly higher than that of BASF.
Statement II is incorrect: Siemens' turnover is almost double that of BMW but it has three times more employees. Hence the turnover per employee at Siemens is lower than that at BMW.
Therefore A is the right answer and is to be marked on the answer sheet.

Sample question 3
This diagram shows how many dollars were received for one Euro over a course of twelve months. The value of the dollar in Euros can be calculated easily:
1 Euro corresponds to 1.2 dollars; 1 dollar accordingly corresponds to 0.83 Euro (1 : 1.2 = 0.83).
Statement I is incorrect, since an increase from 1.2 dollars per Euro to 1.3 dollars per Euro is less than ten (approximately eight) percent.
Statement II is correct, since - as the curve shows - one Euro was worth 1.35 dollars (and 1,000 Euros were accordingly worth 1,350 dollars) at the end of November 2004. At the end of March 2005, one Euro was worth 1.3 dollars, so 1,350 dollars were worth more than 1,000 Euros in any case.
B is therefore the correct answer to this item.

Sample question 4
Initially only a few people test the new product. Hence the number of people who have already tested the product shows only a slight increase. Then many people try the product. Hence the number of people who have already tested the product shows a strong increase. In the end, there are again only a few people trying the product for the first time. Hence the number of people who have already tested the product shows only a slight increase. Curve A is the only one to correctly show this development, qualitatively speaking: starting off with a slight increase, then showing a big increase, and ending with a slight increase.
Therefore A is the correct answer.

Sample question 5
To decide whether the statements are correct or not, it is necessary to read the caption of the vertical axis carefully and interpret it correctly. The bar chart does not show absolute numbers, but rather changes in comparison to the same quarter of the previous year (in percent). The first bar (1/2000) thus shows that the profits in the first quarter of 2000 were 1.5 percent greater than in the first quarter of 1999. We do not know how high the profits in 1/2000 were; that information cannot be derived from the chart. What that means is that the bars cannot be compared with one another.
Statement I is correct: We can determine this immediately on the basis of the length of the bar: In 1/2003, the profits were more than two percent less than in 1/2002.
Statement II is likewise correct: There is no bar visible for 4/2004. That means there was neither a positive nor a negative change. The profits in 4/2004 were therefore exactly as high as in 4/2003.
Therefore C is the right answer.

Sample question 6
Statement I is incorrect: a higher percentage of Germans took a holiday trip in 2002 than in 2008. However, among those who took several holiday trips, we have no knowledge of how many trips they took. If, for example, these people went on 3 trips on average in 2002 but went on 5 trips on average in 2008, then the average number of trips per person could be higher in 2008 (1.44 trips per person in 2008 and 1.09 trips per person in 2002).
Statement II is correct: 52% planned to take a holiday trip and 22% had already booked a holiday trip. 22 of 52 is over 40%. For 22 of 52 is more than 20 of 50, and 20 of 50 would be exactly 40%.
B is therefore the correct answer.

Analysing Processes

Sample question 1
Statement I refers to a situation in which too few pieces are sold. In such a situation, N_S is smaller than N_O. In this case, the answer to the question at decision point X ("$N_S < N_O$?") is "YES", and the operation "Reduce P_S" follows correctly. Statement I is therefore correct.
Statement II refers to a situation in which the sales price is too low. As a result, too many pieces are sold: N_S is greater than N_O. In this case, the answer to the question at decision point X ("$N_S < N_O$?") is "NO", and the answer to the question at decision point Y ("$N_S > N_O$?") is "YES". The operation "Increase P_S" thus follows correctly. Statement II is therefore false.
The correct solution to this item is therefore A.

Sample question 2
Statement I is not correct: When a price is correct, the number of pieces sold N_S corresponds to the optimal number N_O. The questions "$N_S < N_O$?" and "$N_S > N_O$?" would be answered "NO" and the "STOP" sign would be reached without any change in price. It is therefore not possible that a correct price is changed (in this case reduced) in this flow chart.
Statement II is correct: It says that a price which is too high is increased further as soon as the contents of the two decision points are exchanged. When the price is too high, N_S is smaller than N_O. The question posed at decision point X is then answered "NO"; the question at decision point Y is answered "YES" and the price is raised.
The solution is therefore B, since only statement II is correct.

Sample question 3
In the case of statement I, it suffices to consider the following: Decision point V must contain a question which, if its answer is "YES", corresponds to the market form "Gold Mine". If the answer to the question in statement I ("Exit barrier high?") is "YES", it does not correspond to "Gold Mine", since, in the case of the "Gold Mine", the exit barrier is low. Therefore statement I is false.
In the case of statement II it is necessary to recognize that there are two possible ways of completing the flow chart:
If the question at decision point V is "Entrance barrier high?", then the question at decision point X must read "Exit barrier low?" in order to correspond to the element "Mouse Trap", which is a given. In this case, "Flea Market" would be entered in element Y.
It is also possible, however, that decision point V reads "Exit barrier low?". In this case, the question at decision point X would have to read "Entry barrier high?" in order to correspond to the element "Mouse Trap". Element Y would then be "Gilded Cage". Statement II is accordingly correct.
The solution to this item is therefore B.

Sample question 4
Statement I is not correct: If decision point V says "Entry barrier low?", in the case of "Mouse trap" this question should to be answered "YES", because the entry barriers for a "Mouse trap" are low. If the question at decision point V is answered "YES", it is no longer possible to reach the "Mouse trap". If element Z also says "Mouse trap" then only one assignment possibility remains (element Y), but two forms, the "Gilded cage" and "Flea market" still have to be assigned.
Statement II is not correct: If the question in X and W is the same, then "Mouse trap" and "Gold mine" should be reached by the way of a "NO" answer. Therefore, one of the barriers (entry barrier or exit barrier) should be the same for both forms. However, both the entry barrier (gold mine: high; mouse trap: low) and the exit barrier (gold mine: low; mouse trap: high) are different.
The correct solution is therefore D, since neither of the two statements is correct.

Sample question 5
Statement I is correct: Schmidt has a maximum of 20 hours time for courses per week (Element G: "MNH := 20"). Let us assume that 19 hours per week have already been planned for courses (NHP = 19). Now a course which lasts two hours per week is selected from the List K. The course isn't full yet and there is no time conflict (see decision points W and X). Under these conditions, NHP increases by two hours and the course is added to the weekly schedule (see elements M and N). The weekly schedule now comprises 21 hours (NHP = 21), even though Schmidt only has 20 hours at his disposal. This circumstance is reflected in decision point Y, but no correction is made.
Statement II is also correct: Let us assume that a course selected from List K (see element H) cannot be added to the weekly schedule because it is already full (see decision point W). The next step is the selection of a less important course, which is not full yet and with which there is no time conflict, in element H. This course is then added to the weekly schedule in element N.
Therefore C is the solution to this item.

Sample question 6
Statement I is correct: Schmidt always chooses the most important course from the List K and checks whether he can sign up for it. A time conflict means that the course Schmidt has to make a decision about takes place at the same time as a course which is already in his timetable. The more important course has always been chosen first and included in the timetable. Every course Schmidt considers later – and thus every less important course – is crossed off the list because of the time clash.
Statement II is not correct: If Schmidt includes only few courses with less than 20 hours altogether in List K from the start, then even without decision point Y he does not exceed his 20-hour limit during his planning process; in other words he does not necessarily plan in more course time than he has at his disposal.
Therefore the correct solution is A, since only statement I is correct.