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

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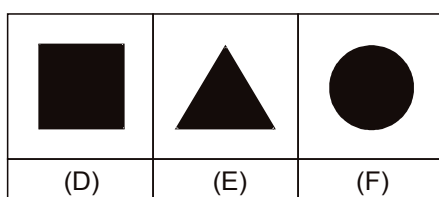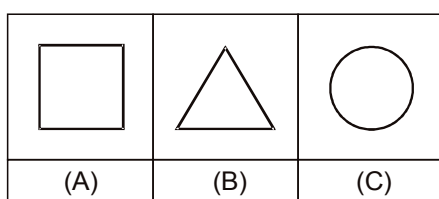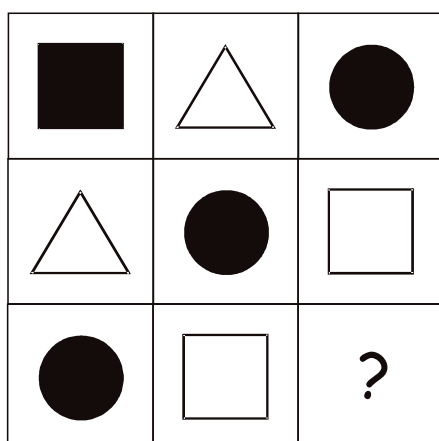
The arrangement of the figures has been carried out according to certain rules. Your task is to recognise these rules and apply them in order to find the ninth figure.

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.
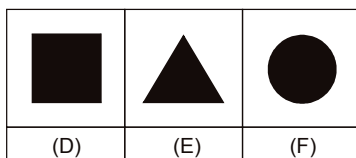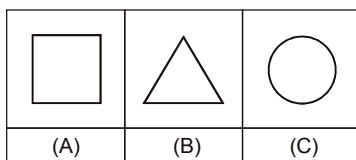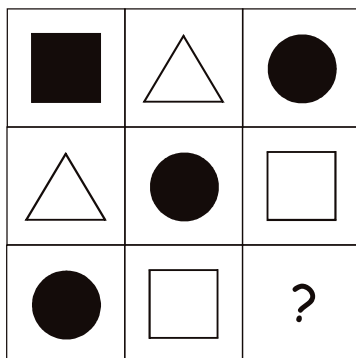
**Sample question 1:
degree of difficulty low**
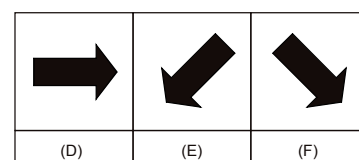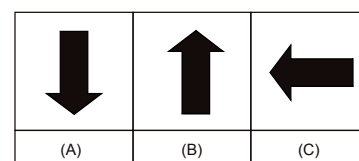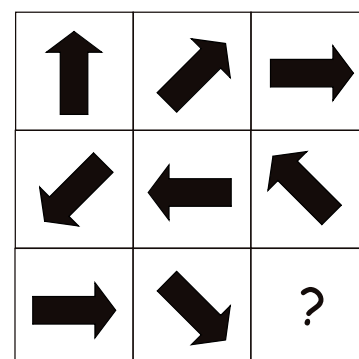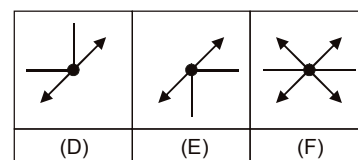

**Sample question 2:
degree of difficulty low**
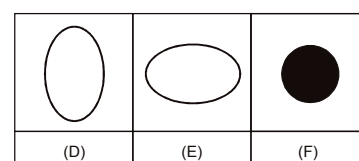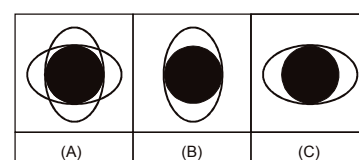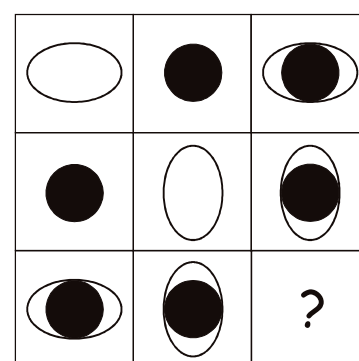
**Sample question 3:
degree of
difficulty medium**

**Sample question 5:
degree of
difficulty high**
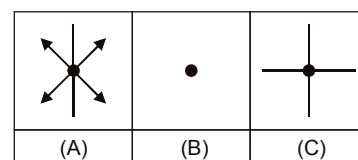
**Sample question 4:
degree of
difficulty medium**

**Sample question 6:
degree of
difficulty high**

Continuing Numerical Series

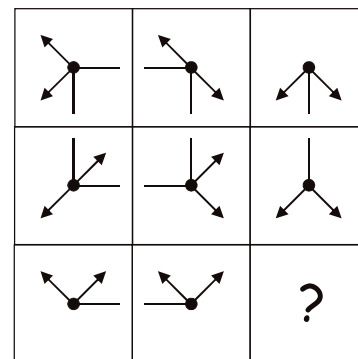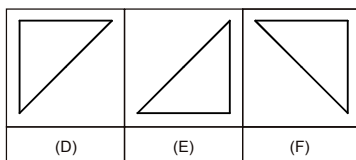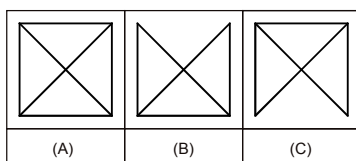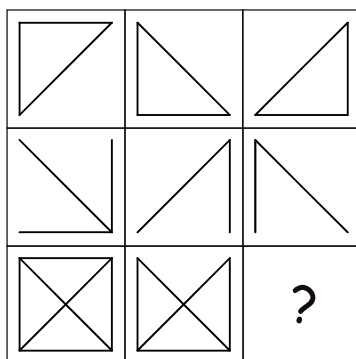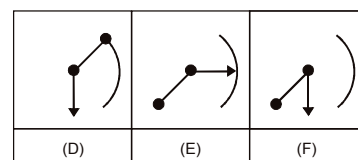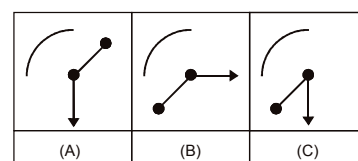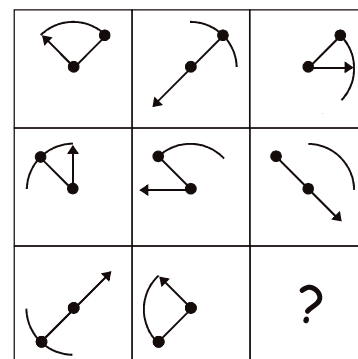The subtest "Continuing Numerical Series" provides a series of numbers structured according to a specific rule. You are to find the rule and apply it in order to identify the missing number. This test measures logical numerical thought. Knowledge of the four basic arithmetical operations addition, subtraction,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

Sample questions
Solutions

Solutions Core Test

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?

$15 : x = 3 : 2$
$x = (15 : 3) \cdot 2$
$x = 10$
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.

Solutions Core Test

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".

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