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sigma Σ
in mathematics & statistics support

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Non-Verbal Reasoning Practice Test 2 - Answers

Mark Scheme (1 mark for every correct answer)

Completing a Sequence

Question Number	Correct Answer
1	C
2	D
3	A
4	A
5	B
6	D
7	C

Identifying the 'odd one out'

Question Number	Correct Answer
8	B
9	C
10	B
11	A
12	E
13	C
14	D

Identifying Common Feature

Question Number	Correct Answer
15	A
16	B
17	B
18	C
19	B
20	A
21	A

Applying Operations

Question Number	Correct Answer
22	D
23	B
24	A
25	C
26	D
27	B
28	C

Guidance for Answering the Questions

Completing a Sequence

Question 1

The number of sides of the outer shape increases by one.

The inner shape has one fewer sides than the outer and is the same shape as the previous outer shape.

Shading alternates along the series.

The answer is C.

Question 2

The number of stems increases by one.

A circle appears on the empty stem in the following image.

White circles change shading in the image following their appearance.

The answer is D.

Question 3

The shaded circle moves downwards, swapping places with the symbol in the position it moves to. When it reaches the bottom, it goes back to the top.

The answer is A.

Question 4

The white circle moves anticlockwise by one sector (or clockwise by four sectors).

The black circle moves clockwise by two sectors (or anticlockwise by three sectors).

The answer is A.

Question 5

First, all elements are reflected in the vertical axis through the centre of the square.

Then, all elements are reflected in the horizontal axis through the centre of the square.

The 2 rules above are repeated.

The answer is B.

Question 6

All lines rotate anticlockwise by 90° .

The grey lines alternate in thickness.

The black lines change from thick to thin in three stages.

The answer is D.

Question 7

The black circle moves by one square diagonally downwards from left to right.

The grey circle moves by one square diagonally upwards from left to right.

The white circle moves by one square horizontally from right to left.

The answer is C.

Identifying the 'odd one out'**Question 8**

The answer is B.

For all other mazes it is possible to get from S to F without crossing any lines.

Question 9

The answer is C.

For all other images:

- the number of circles above the line is the same as the number of stars below the line.
- the number of stars above the line is the same as the number of circles below the line.

Question 10

The answer is B.

In all other images the shapes follow the same clockwise sequence.

Question 11

The answer is A.

In all other images the number of the individual shapes is the same as the number of sides of that shape.

Question 12

The answer is E.

In all other images, each white shape has an equivalent shaded shape.

Question 13

The answer is C.

A and D are the same and B and E are the same (after rotation).

Question 14

The answer is D.

All other images are made up of identical shapes.

Identifying Common Feature

Question 15

Set A: shapes are composed of straight lines only.

Set B: shapes are composed of straight lines and curved lines.

Figure 1: shapes are composed of straight lines only.

The answer is A.

Question 16

Set A: the position of the outer shapes corresponds to the position of the grey squares in the inner shape.

Set B: the position of the outer shapes corresponds to the position of the white squares in the inner shape.

Figure 1: the position of the outer shapes corresponds to the position of the white squares in the inner shape.

The answer is B.

Question 17

Set A: each cube can be formed by folding the net in the first image.

Set B: each cube can be formed by folding the net in the first image.

Figure 1: the cube is formed by folding the net in the first image of Set B.

The answer is B.

Question 18

Set A: the right side of the grid is a reflection of the left side.

Set B: the bottom half of the grid reflects the shapes in the top half but changes the shading.

Figure 1: the bottom half of the grid reflects the shapes in the top half but keeps the shading.

The answer is C.

Question 19

Set A: in each image, there are exactly two matching shapes, one large, one small with different shading.

Set B: in each image, there are exactly two matching shapes, one large, one small with the same shading.

Figure 1: in each image, there are exactly two matching shapes, one large, one small with the same shading.

The answer is B.

Question 20

Set A: all shapes have an even number of sides.

Set B: all shapes have an odd number of sides.

Figure 1: all shapes have an even number of sides.

The answer is A.

Question 21

Set A: in each image, the right side of the shape is a 180° rotation of the left.

Set B: in each image, the right side of the shape is a reflection of the left in the vertical axis.

Figure 1: in each image, the right side of the shape is a 180° rotation of the left.

The answer is A.

Applying Operations

Question 22

The input and operation are known, whereas the output is unknown.

The operation that is applied is: all symbols rotate 90° clockwise.

Rotation by 90° clockwise has to be performed on each of the three shapes:

- The black square in the L shape moves from the bottom left position to the top left position, with one white square being to the right from it and the second white square being under it. This results in possible answers being B or D.
- The diagonal line in the round shape moves from a bottom-left to top-right direction to a top-left to bottom-right direction. This results in possible answers being A, C or D.
- The black triangle that is at the top rotates and moves to the right side, while the white triangle that is at the bottom rotates and moves to the left. This results in possible answers being B or D.
- There is only one answer (D) in common for each shape.

The answer is D.

Question 23

The input and output are known, whereas the operator is unknown.

We compare input and output:

- ALL shapes have moved position, so A (1st and 3rd symbols change places) and D (1st and 2nd symbols change places) are not correct.
- Note that the diamond has moved from the 2nd position to the 1st (ie one place to the left) so the answer must be B. A quick final check confirms that applying the operator to the other symbols gives the correct results.

The answer is B.

Question 24

The operator and output are known, whereas the input is unknown.

The operation performed on the input is 'All symbols reflect in the vertical axis'. We work backwards from the output using the **inverse** of this operation. The operation is a 'self-inverse', that is, the inverse of a reflection in the vertical axis is reflecting back again in the vertical axis.

So, applying this inverse to the **output**:

- All symbols remain in the same position so neither C nor D are correct;
- The left side of the circle becomes black and the right side becomes white so the answer must be A.
- A quick final check of the other symbols would verify that:
 - as the arrow in position 2 is symmetrical about the vertical axis, the shape remains unchanged;
 - the vertical bar on the T shape moves to the right side.

The answer is A.

Question 25

The input and a combination of two operators are known, whereas the output is unknown.

After the first operator (2nd and 3rd symbols change places) is applied to the **input**:

- The 1st symbol (black triangle with white centre) remains unchanged;
- The square moves to the 2nd position;
- The white triangle with black centre moves to the 3rd position.

After the second operator (all triangles change shading) is applied to this **revised order**:

- As all the sections of the 1st symbol are triangular, the 1st symbol becomes a white triangle with a black centre so the correct answer must be C.
- A quick final check would confirm that, as the 2nd shape contains no triangles, it remains unchanged whereas the final shape becomes a black triangle with a white centre.

The answer is C.

Question 26

The input and a combination of two operators are known, whereas the output is unknown.

After the first operator (1st and 3rd symbols change size):

- The 1st symbol becomes a small triangle;
- The 2nd symbol remains as a small pentagon;
- The 3rd symbol becomes a large crescent.

As second operator (1st and 2nd symbols change places) does not alter the size of any shape, the answer must be D as it is the only alternative containing a small triangle.

A quick final check would confirm that, after swapping the first two symbols, the new order would become: small pentagon, small triangle, large crescent.

The answer is D.

Question 27

The output and a combination of two operators are known, whereas, the input is unknown.

The operations performed on the input are 'All symbols move one place to the right' followed by 'All symbols reflect in the horizontal axis'.

We work backwards from the output using the inverse of these operations:

- The inverse of 'all symbols move one place to the right' is 'all symbols move one place to the left'.
- The second operator is a 'self-inverse', that is, the inverse of a reflection in the horizontal axis is reflecting back again in the horizontal axis.

So, we work backwards from the **output**:

- First apply the inverse of the reflection.

- The 1st symbol becomes a circle with top left and bottom right sectors black.
 - The 2nd symbol becomes a diamond with an upper black section.
 - The 3rd symbol becomes an L shape' with a vertical bar on the left and a horizontal bar along the base.
- Secondly, apply the inverse of the position move to the **revised output**:
- The diamond moves one place to the left into the 1st position. The answer is therefore B as it is the only option with a diamond (black uppermost) in this position.
 - A final check will verify that the L shape moves to 2nd position and the circle, having been displaced from the 1st position, moves to the 3rd.

The answer is B.

Question 28

The input and output are known, whereas, the first of two operators is unknown.

We start by working backwards from the output as in Question 27.

First apply the inverse of the second operator to the output.

The second operator is 'All squares change shading' which is a self-inverse as the inverse of 'changing black to white' is 'changing white to black'. Applying this to the **output**:

- The 1st symbol could be assumed to remain the same as it appears to contain no squares; however, taking into account that in the original input the triangle contains a white square, we must assume that, in the final output, the black triangle contained a back square which would then change to white after the operator is applied. In summary, the 1st symbol becomes a black triangle, with a vertical left side, containing a white square.
- The 2nd symbol becomes a white square with top right and bottom left sections being black;
- The 3rd symbol remains the same (a circle with stripes sloping downwards) as it contains no squares.

Using these revised symbols as our output, we can now compare the given input with this revised output using a similar technique as for Question 23:

- The 1st symbol changes from a black triangle with a horizontal base to a black triangle with a vertical base. This can only result from a rotation through 90°, so the answer must be C.
- A final check of remaining symbols verifies that, if we rotate the input square by 90° clockwise, the top left black square would move to the top right and the bottom right black square would move to the bottom right. In addition, rotating the input circle by 90° would result in the stripes changing from a downwards to an upwards slope.

The answer is C.

This resource was produced by the **sigma** Network Employability Special Interest Group whose members are:

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