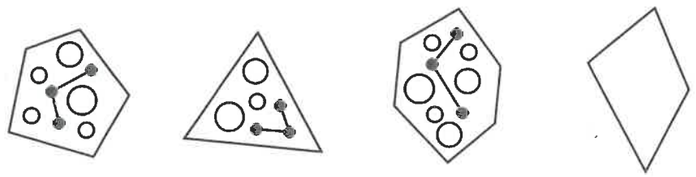
Most unlike

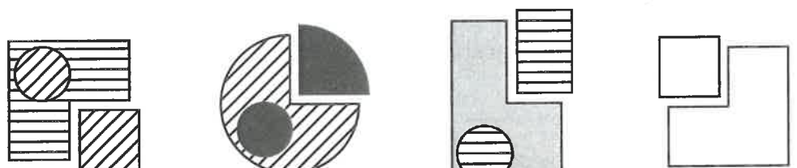
Have a go

Identify the features in common in the first three pictures. Complete the fourth picture so that it has the same features in common and will belong to the set.

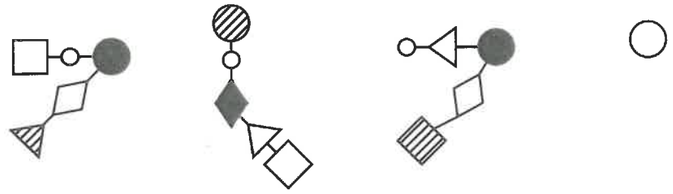
1



2

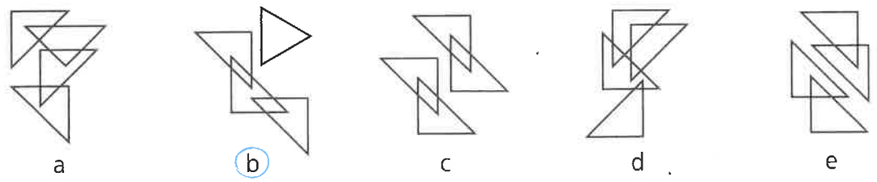


3



In the next two questions, look at the picture above the circled letter. Write the reason why this picture does not belong to the group.

4

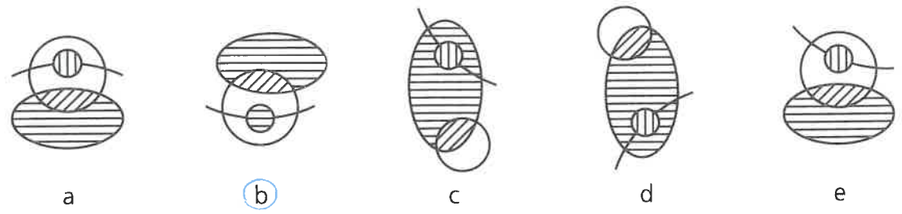


a (b) c d e

b does not belong because:

_____

5



a (b) c d e

b does not belong because:

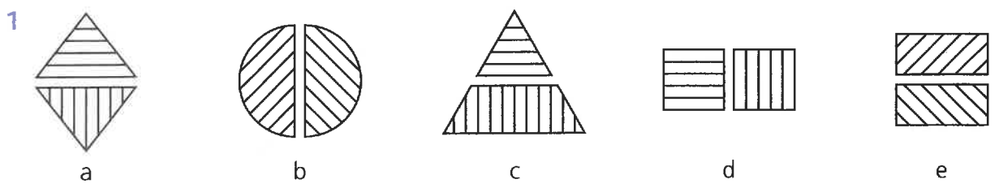
_____

Test yourself

Look at these sets of pictures and identify the one that is most unlike the others. Circle the letter beneath the correct answer. For example:

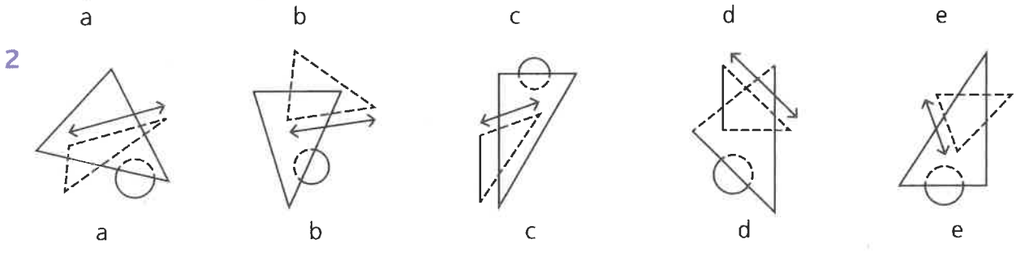
a b (c) d e

1



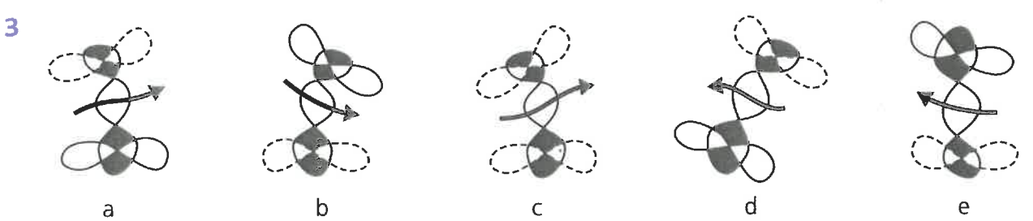
a b c d e

2



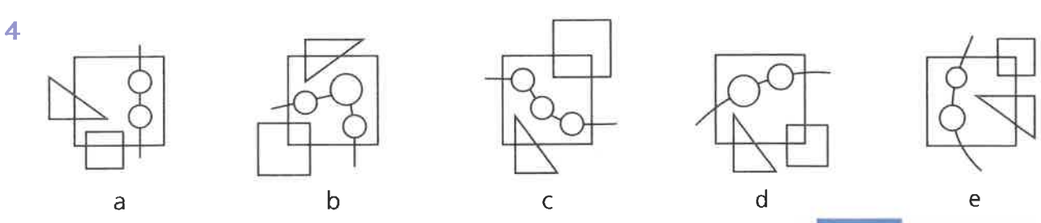
a b c d e

3



a b c d e

4

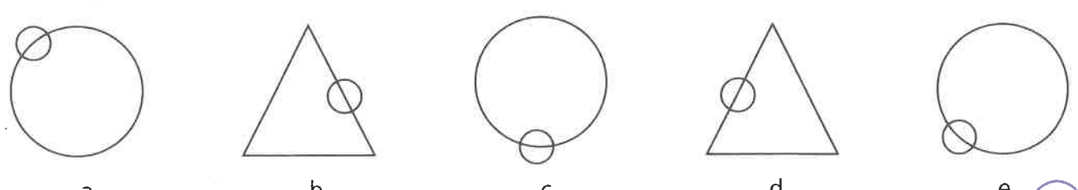


a b c d e

Score ☐ / 4

Try it out

Complete the following pictures in such a way that they are all different and option **c** is most unlike the other four options.



a b c d e

Matching features 1

Have a go

For each set of pictures below, list four things in common within each set.

1 

The features in common are:

(a) _____

(b) _____

(c) _____

(d) _____

2 

The features in common are:

(a) _____

(b) _____

(c) _____

(d) _____

3 

The features in common are:

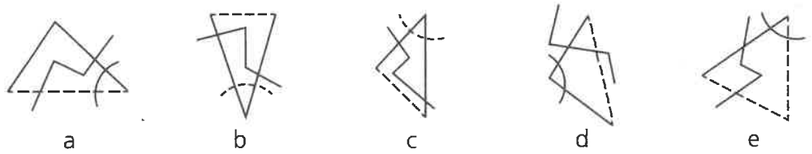
(a) _____

(b) _____

(c) _____

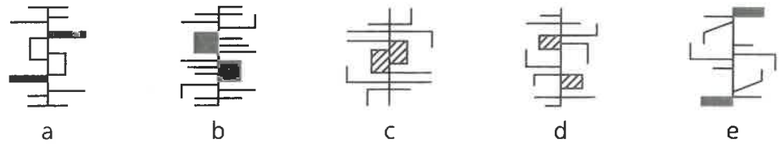
(d) _____

In the pictures below, options **a**, **b** and **c** form a set. Options **d** and **e** do not belong to the set. Write the feature that means **d** does not belong to the set and the feature that means **e** does not belong to the set.

4 

_____

_____

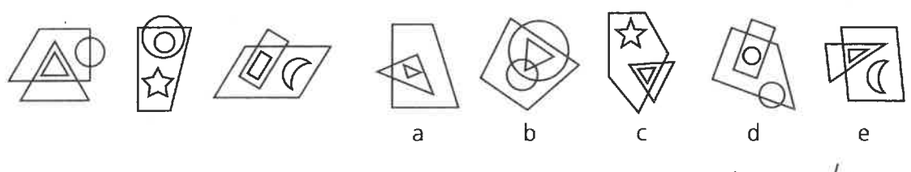
5 

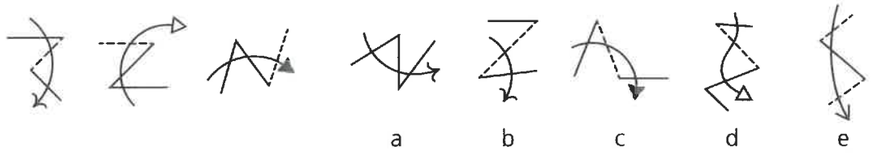
_____

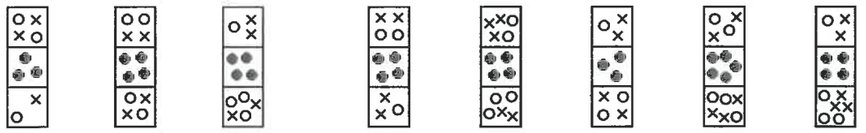
_____

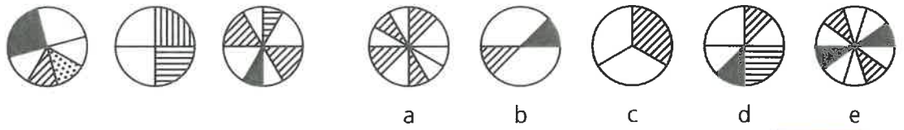
Test yourself

Look at the first three pictures and decide what they have in common. Then select the option from the five on the right that belongs to the same set. Circle the letter beneath the correct answer. For example:

1 

2 

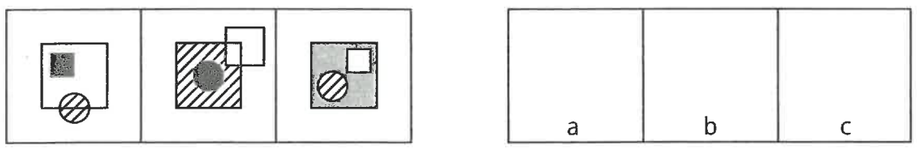
3 

4 

Score ☐ / 4

Try it out

Draw your own shapes in boxes **a**, **b** and **c** so that two of your figures belong to the set on the left and one does not. Ask a friend or parent to identify the odd one out.



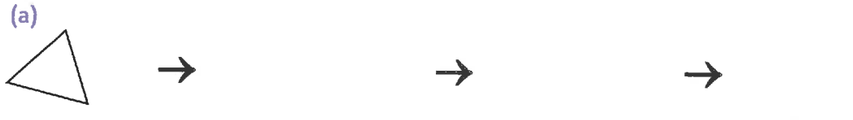
Applying changes 1

Have a go

For each question, apply the changes shown in the first chain of shapes to complete chains **(a)** and **(b)** in the same way.

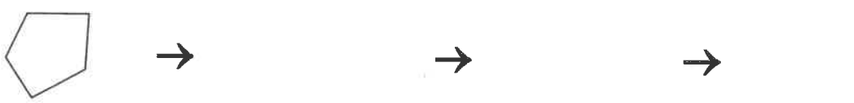
1

(a)



i ii iii

(b)



i ii iii

2

(a)

i ii iii

(b)

i ii iii

3

(a)

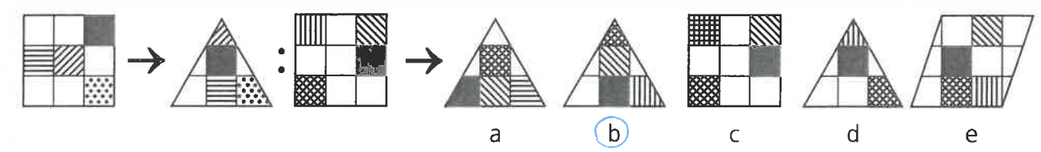
i ii iii

(b)

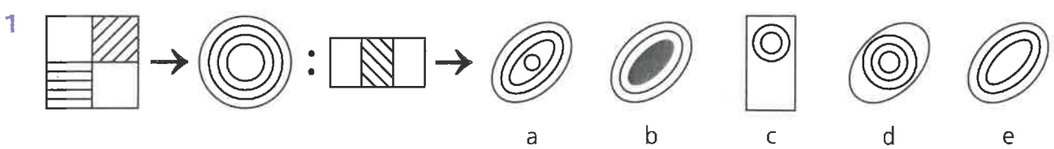
i ii iii

Test yourself

Look at the two pictures on the left connected by an arrow. Decide how the first picture has been changed to create the second. Now apply the same rule to the third picture and circle the letter beneath the correct answer. For example:

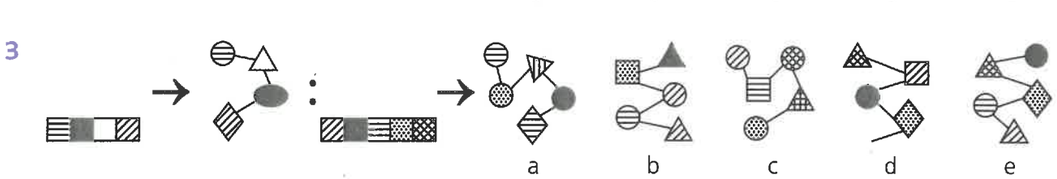


1

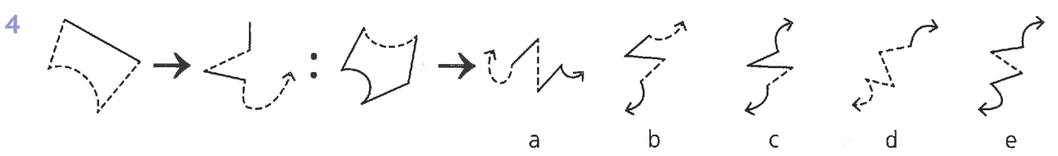


2

3



4



Score ☐ / 4

Try it out

Complete these questions by creating five possible answer options for each one. Then ask a friend or parent to try them. You can add more detail to the shapes provided if you wish.

1

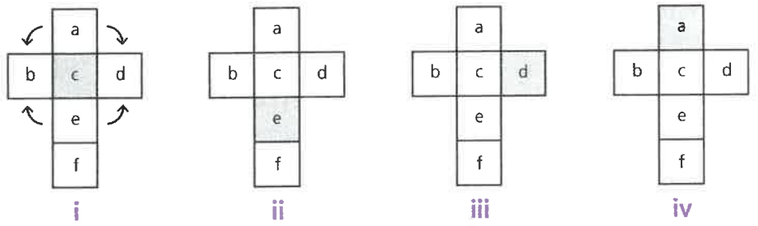
2

Matching 2D and 3D shapes 1

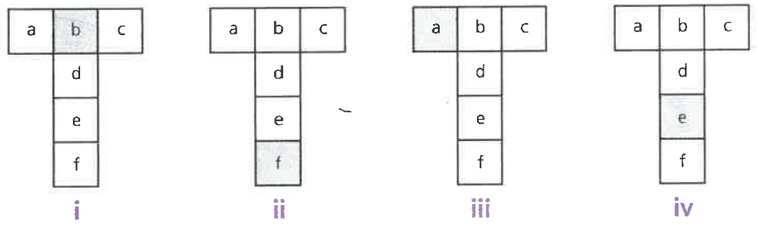
Have a go

These diagrams are called nets. They can be folded up to form cubes. Which four sides of the cube, when folded, will share an edge with the shaded face?

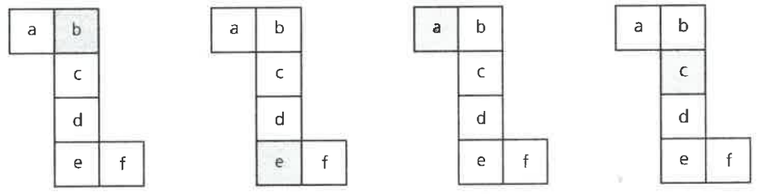
1



2

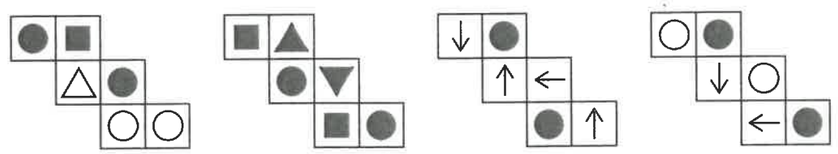


3

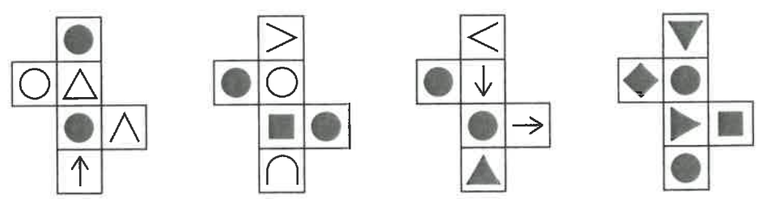


When these nets are folded to give cubes, the faces with black spots are opposite each other in three of the four cubes. Circle the one where the black spots will **not** be opposite each other.

4

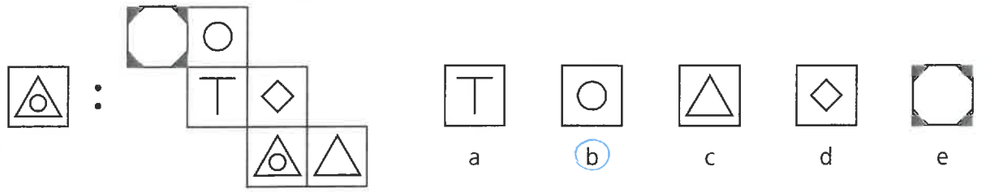


5

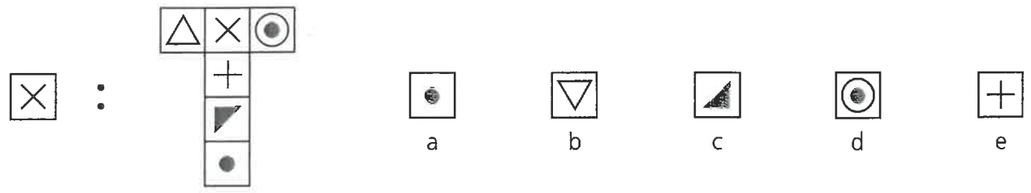


Test yourself

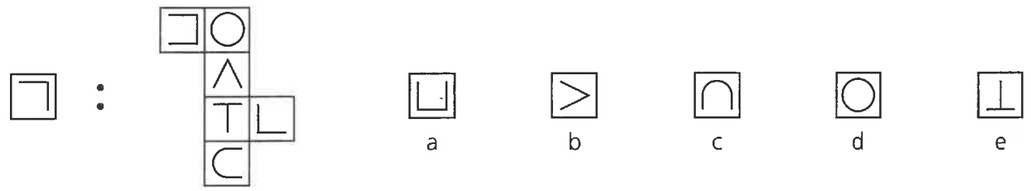
Find the face that would appear **opposite** the face given on the left when the net is folded into a cube. Circle the letter beneath the correct answer. For example:



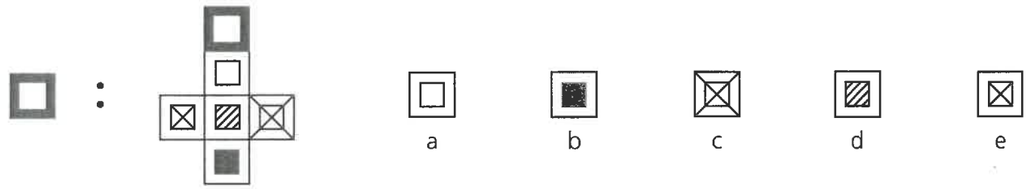
1



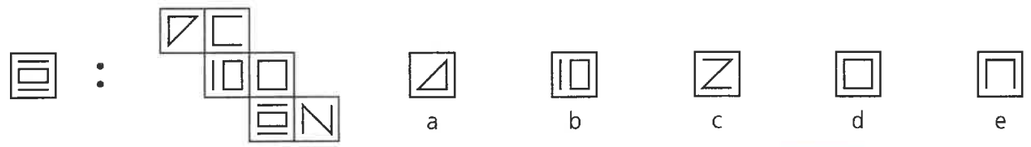
2



3



4



Score ☐ / 4

Try it out

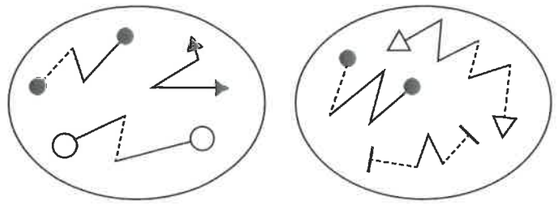
Draw a cube net of your own on squared paper. How many different ways can you arrange three circles and three crosses on the net? Identify the nets that will have a circle on opposite faces.

Matching features 2

Have a go

What **three** elements do these sets of shapes have in common?

1

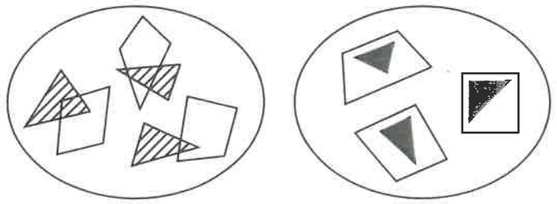


(a) _____

(b) _____

(c) _____

2

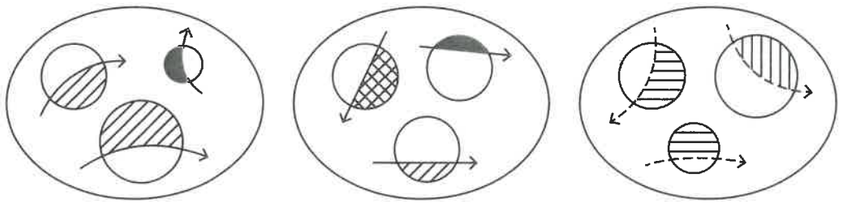


(a) _____

(b) _____

(c) _____

3



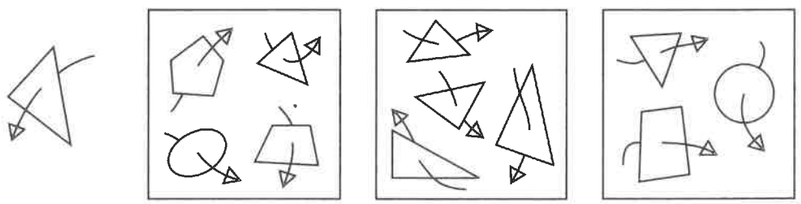
(a) _____

(b) _____

(c) _____

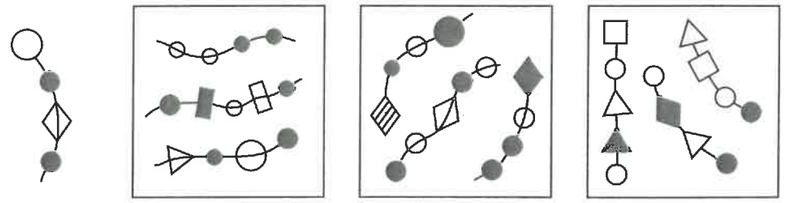
The picture on the left belongs to two of the three groups on the right. Circle the letter of the group to which it does **not** belong.

4



a b c

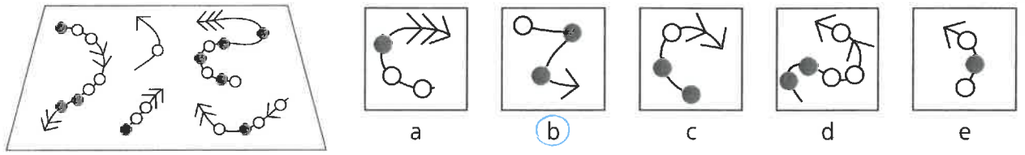
5



a b c

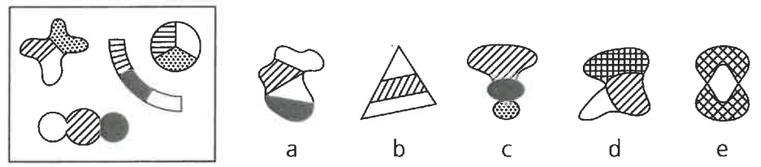
Test yourself

Look at the shapes in the box on the left and decide what they have in common. Then select the option that is part of the same set. Circle the letter beneath the correct answer. For example:



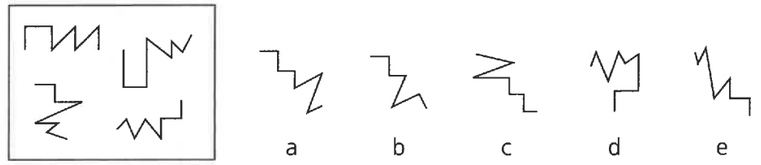
a (b) c d e

1



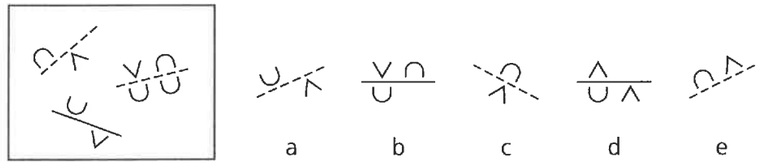
a b c d e

2



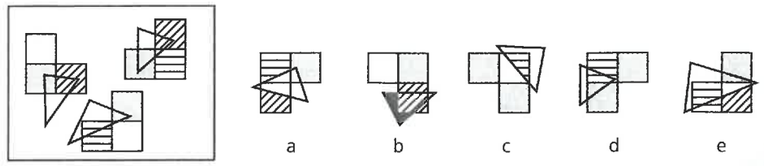
a b c d e

3



a b c d e

4

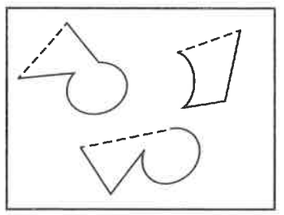


a b c d e

Score ☐ / 4

Try it out

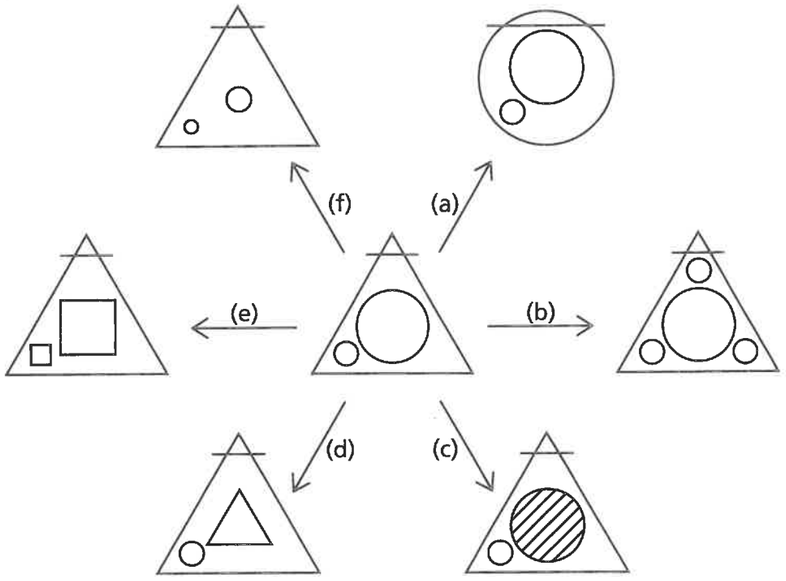
On a separate piece of paper, draw five more shapes. They should all look very similar to the shapes in the set but only one of them should actually belong to the set. Ask a friend or parent to identify the one that belongs.



Applying changes 2

Have a go

1 Identify what changes have been made to the central picture that has resulted in each of the pictures around it. Write what has changed.

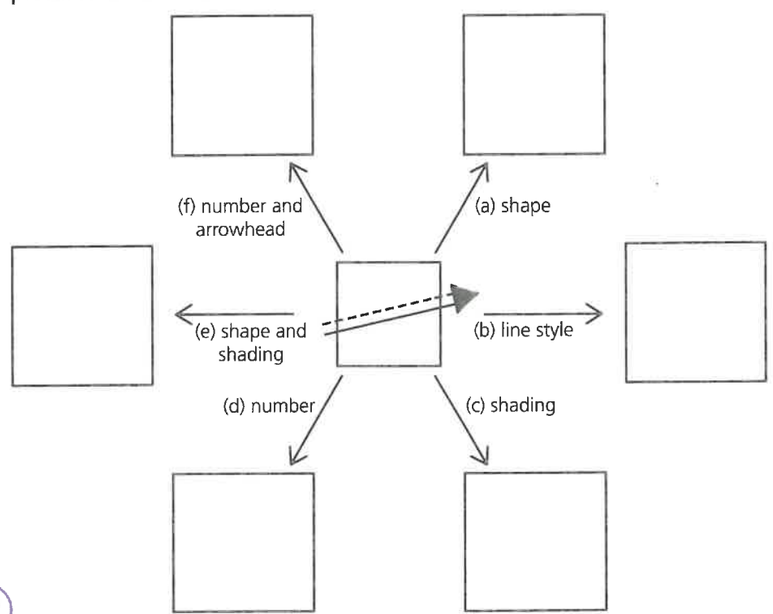


(a) _____ (d) _____

(b) _____ (e) _____

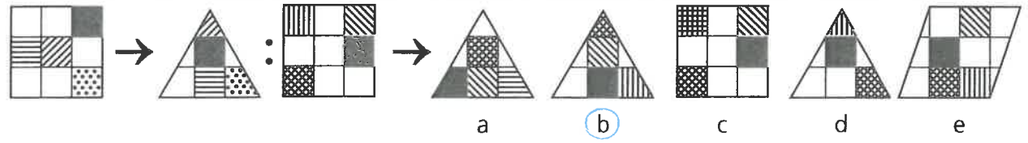
(c) _____ (f) _____

2 Using the instructions written next to the arrows, change the central picture to give six new pictures around it.

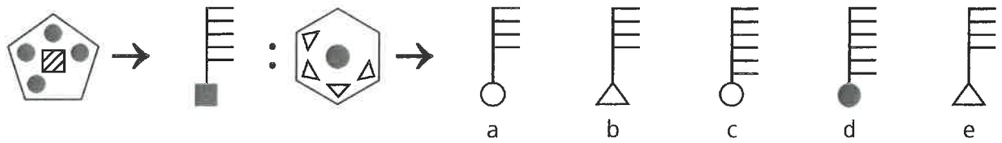


Test yourself

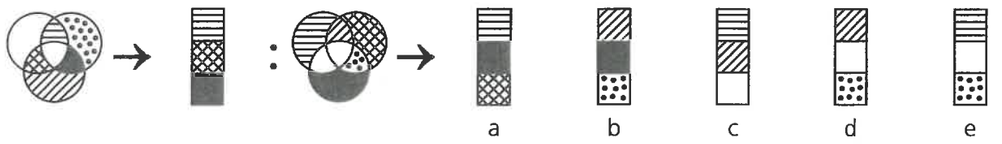
Look at the two pictures on the left connected by an arrow. Decide how the first picture has been changed to create the second. Now apply the same rule to the third picture and circle the letter beneath the correct answer. For example:



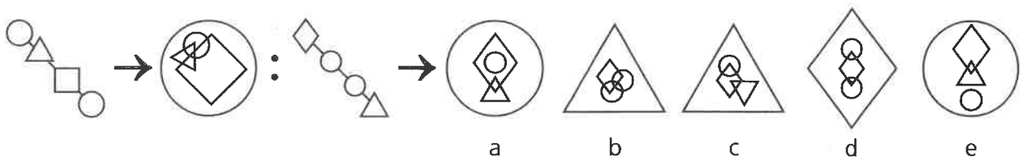
1



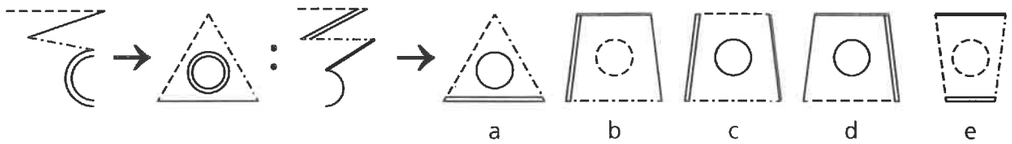
2



3



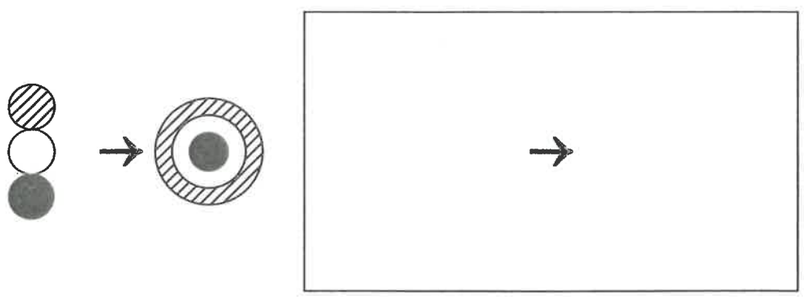
4



Score ☐ / 4

Try it out

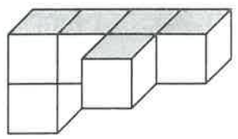
Draw a second pair of patterns to go with the first pair, where the first part of the second pair is changed in the same way as the first part of the first pair.

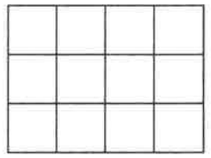


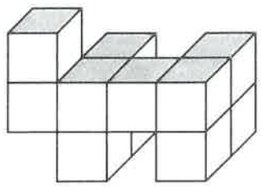
Matching 2D and 3D shapes 2

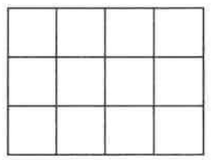
Have a go

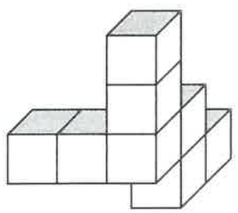
Draw the 2D plan of these sets of cubes on the squared grid next to them.

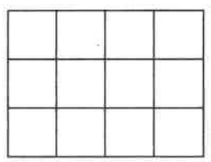
1 



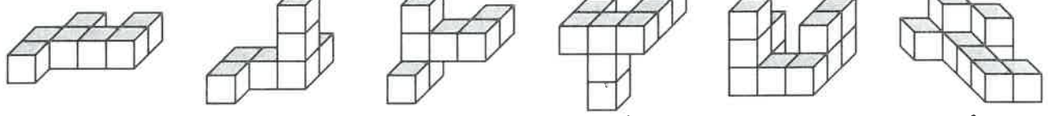
2 



3 

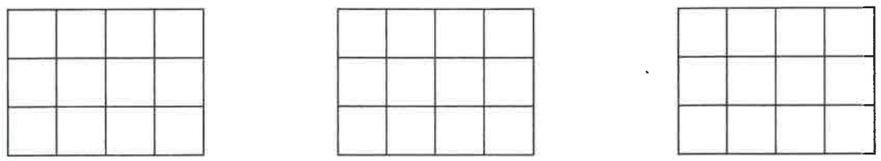


4 Identify the sets of cubes that have the same 2D plan. Write the letters of the pairs and then draw their 2D plan in the grid provided.



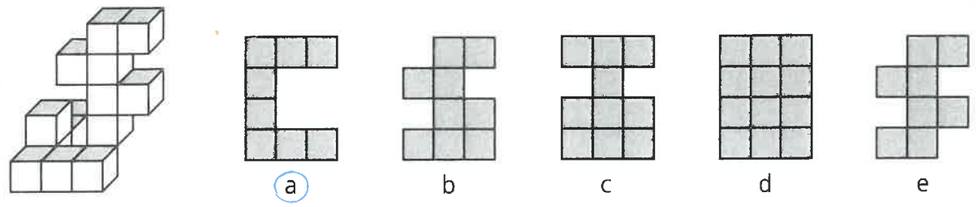
a b c d e f

1st pair: _____ 2nd pair: _____ 3rd pair: _____

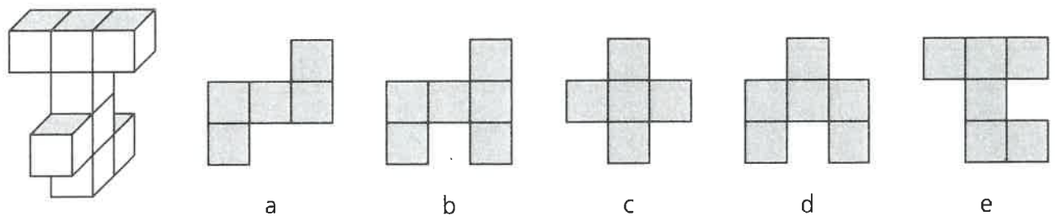


Test yourself

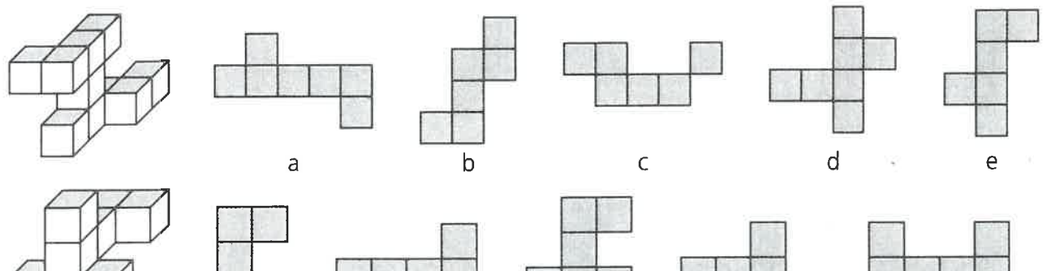
Which of the answer options is a 2D plan of the 3D picture on the left, when viewed from above? Circle the letter beneath the correct 2D plan. For example:



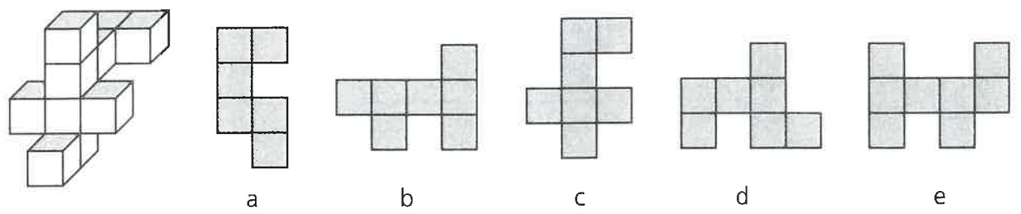
a b c d e

1 

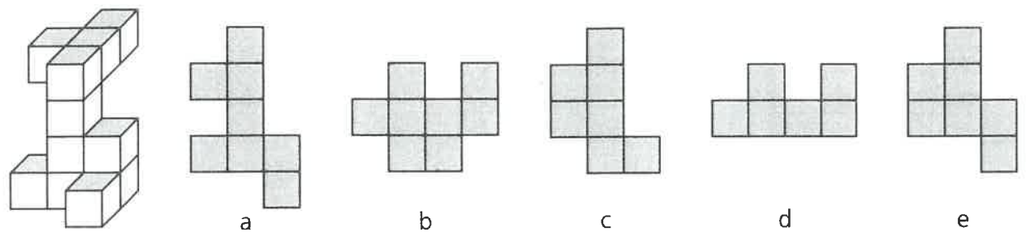
a b c d e

2 

a b c d e

3 

a b c d e

4 

a b c d e

Score ☐ / 4

Try it out

How many different 2D plans can be made using four cubes, if each cube has at least one full face touching another cube? Draw them out on a piece of squared paper.

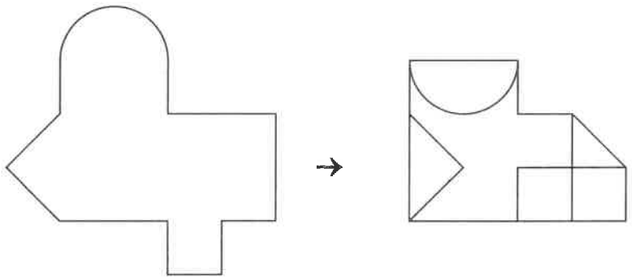
Following the folds 1

Have a go

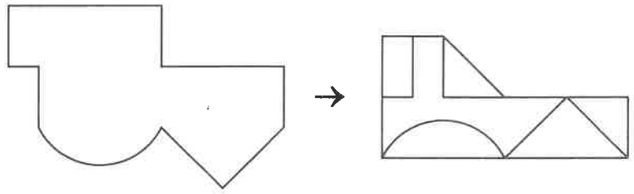
If the plan on the left is folded along certain lines it will appear like the diagram on the right. Identify where the folds have been made and draw them in with dashed lines.

1

2

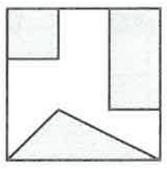


3

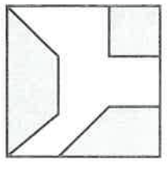


In the next two questions, the diagrams on the left can be made from different plans depending on where the folds are made. Draw two possible plans for each diagram showing the folds with dashed lines.

4 (a) (b)

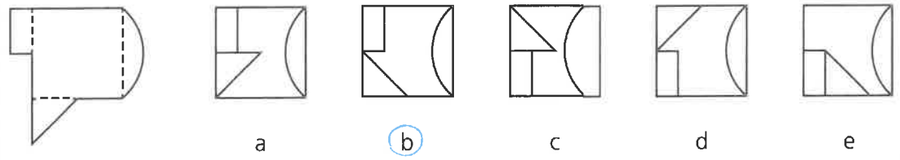


5 (a) (b)

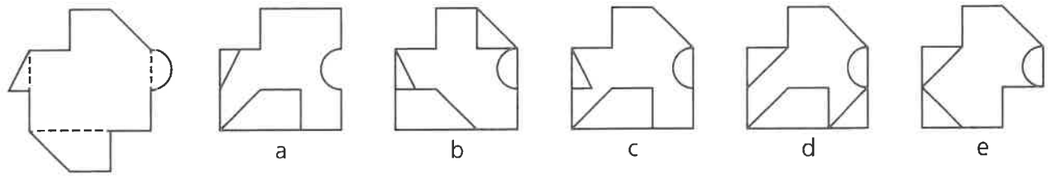


Test yourself

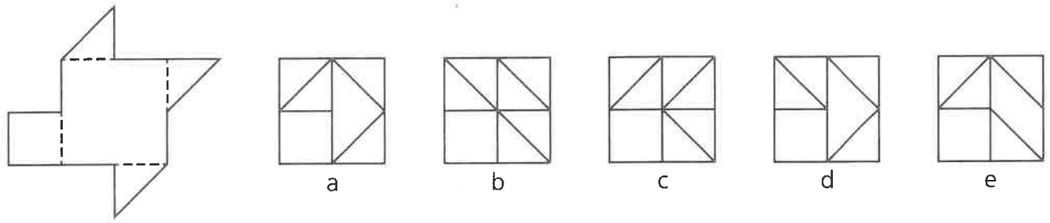
Identify the diagram that shows how the plan on the left will appear when it is folded in along the dashed lines. Circle the letter beneath the correct answer. For example:



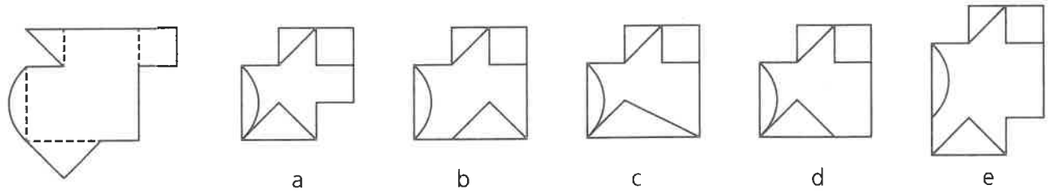
1



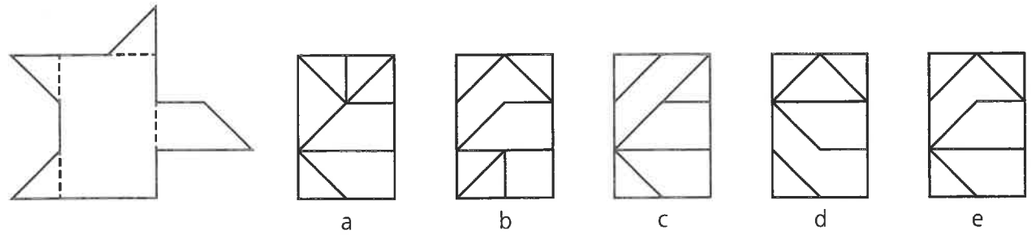
2



3



4



Score ☐ / 4

Try it out

On a separate piece of paper, draw your own plan using squares and triangles and dashed fold lines. Ask a friend or parent to draw what it will look like when folded. Cut it out and fold it up to check the answer!

Matching a single image 1

Have a go

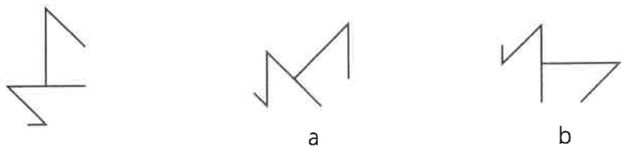
In the next two questions, the picture on the left has been rotated to give the pictures on the right. The rotations are in 45° steps.

i By how many degrees has the picture been rotated clockwise to give each of the pictures on the right?

ii By how many degrees has the picture been rotated anticlockwise to give each of the pictures on the right?

Write the number of degrees in the spaces provided.

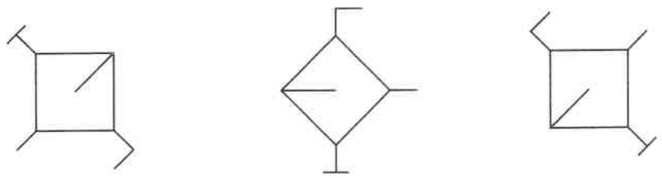
1



i clockwise _____ _____

ii anticlockwise _____ _____

2

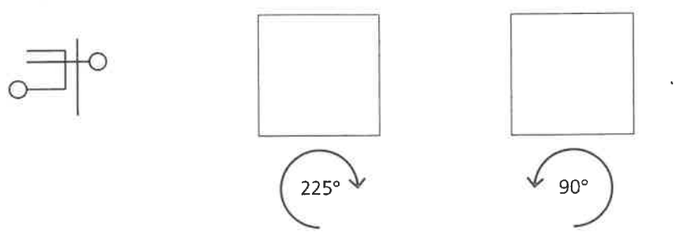


i clockwise _____ _____

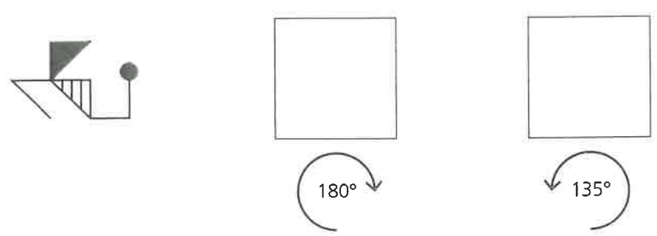
ii anticlockwise _____ _____

In the next two questions, work out how the picture on the left would appear if it was rotated by the number of degrees indicated and in the direction shown. Draw how it would look in the box provided.

3

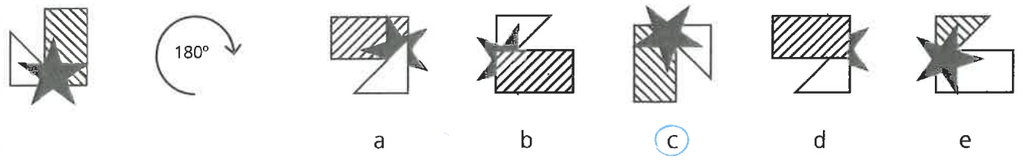


4

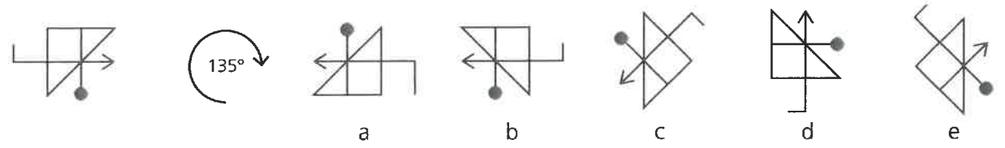


Test yourself

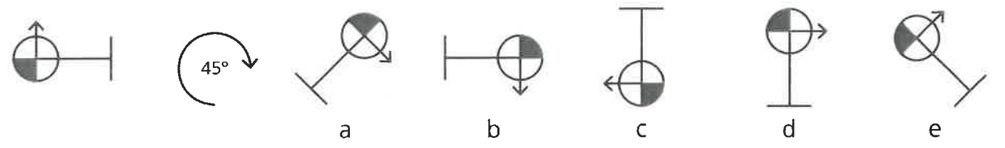
The picture on the left is rotated as shown by the arrow. Which answer option shows the picture after the rotation? Circle the letter beneath the correct answer. For example:



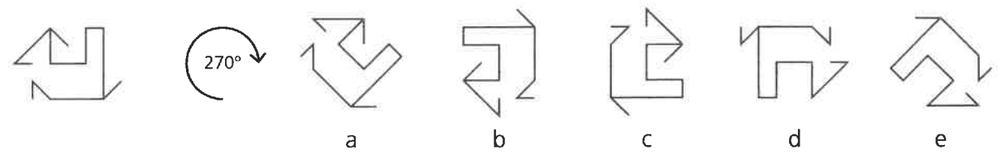
1



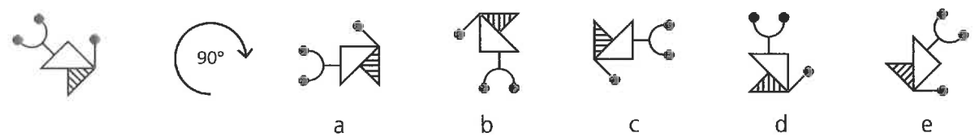
2



3



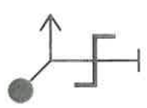
4



Score ☐ / 4

Try it out

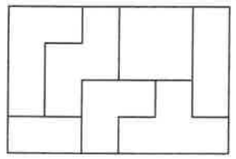
Draw five answer options for the picture below. Only one of the options should show a 135° clockwise rotation of the picture given. Ask a friend or parent to identify the correct answer.

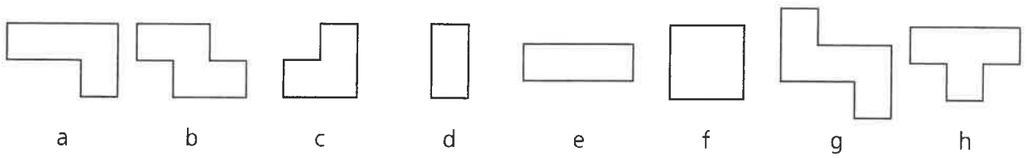


Translating and combining images 1

Have a go

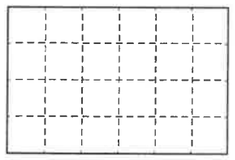
1 Which one of the pieces is **not** needed to complete the puzzle?

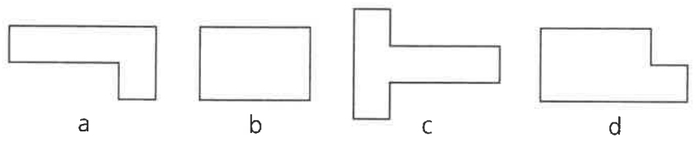




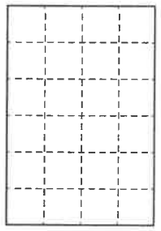
Fit the shapes into the grid in the next two questions. The shapes may be rotated but not flipped over (that is, not reflected).

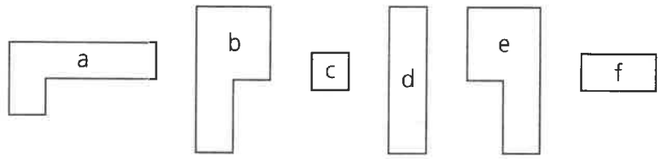
2





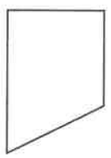
3

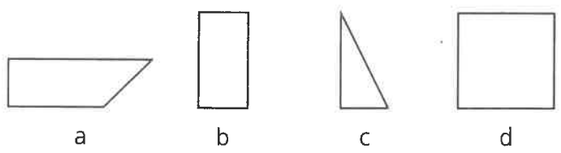




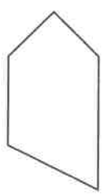
Which two shapes on the right are **not** needed to complete the shape on the left?

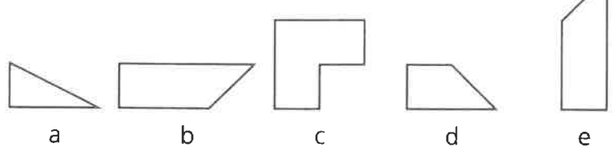
4





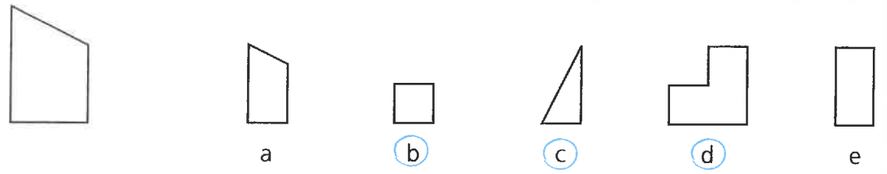
5



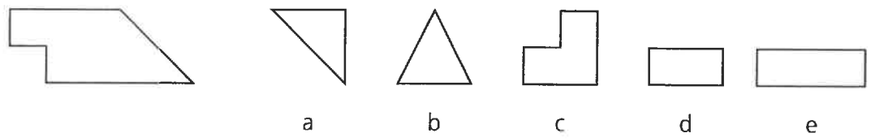


Test yourself

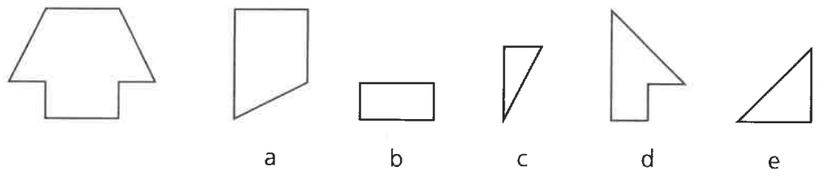
The shape on the left can be made using three of the five smaller shapes on the right. Identify the **three** shapes needed and circle the letters beneath them. For example:



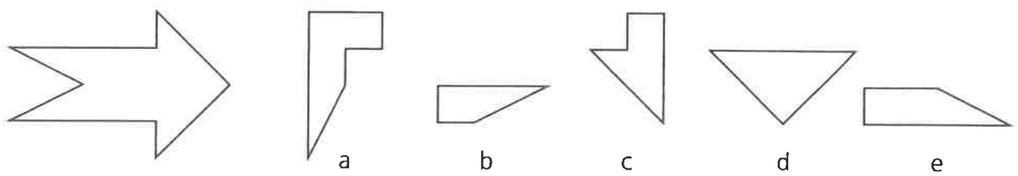
1



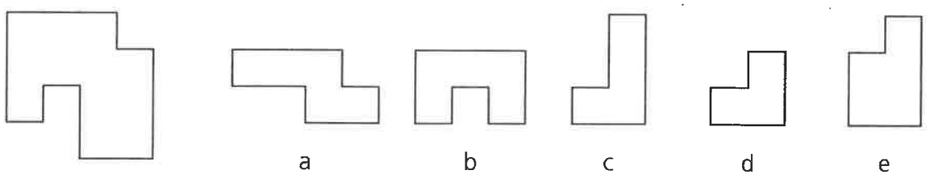
2



3



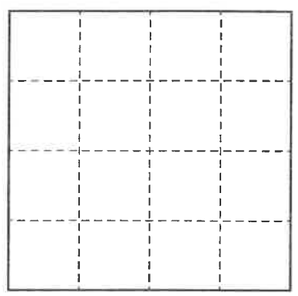
4



Score ☐ / 4

Try it out

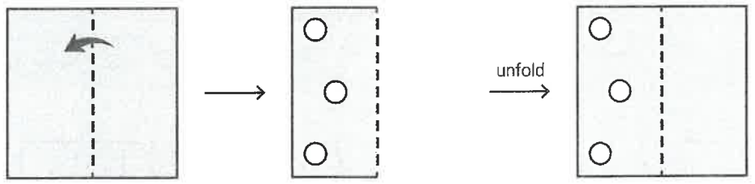
Draw five shapes, four of which can be put together to make the grid below. Ask a friend or parent to identify the one piece that is not needed.

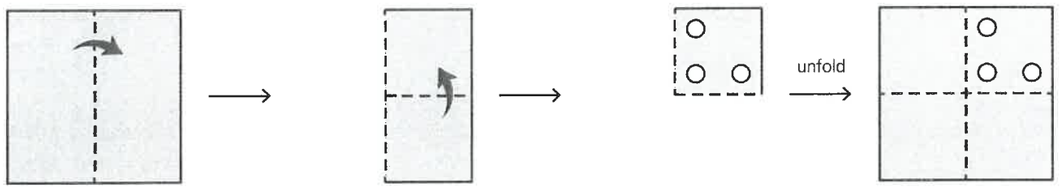


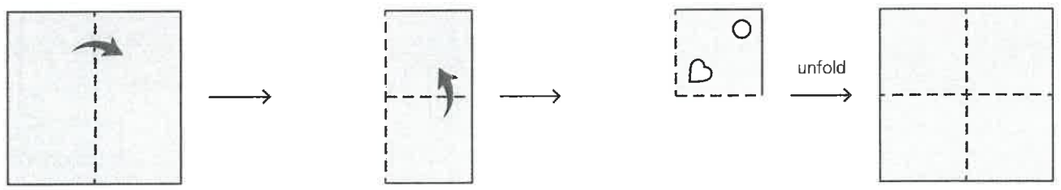
Following the folds 2

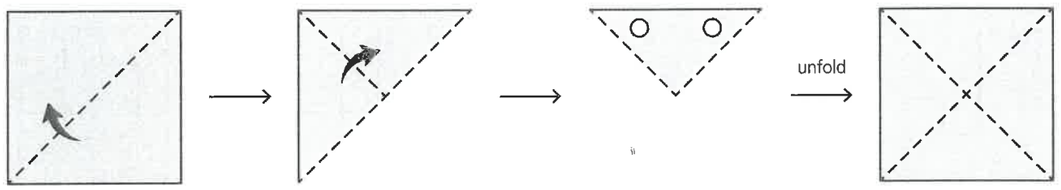
Have a go

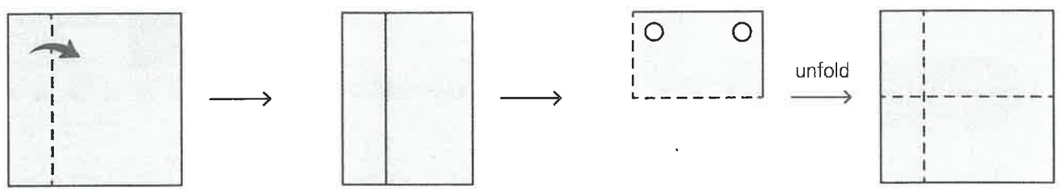
Draw the pattern of holes that will be seen when these folded sheets of paper are unfolded.
The fold lines are shown as dashed lines to help you.

1 

2 

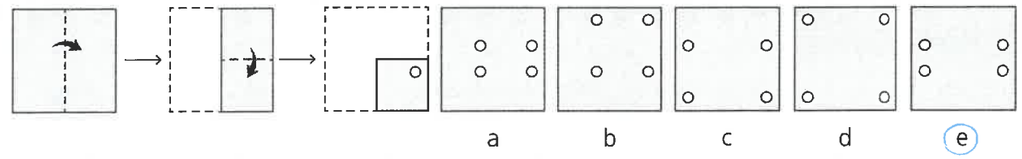
3 

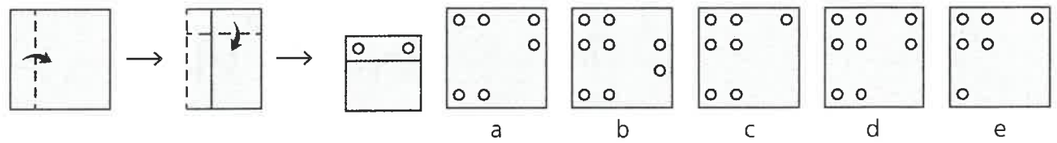
4 

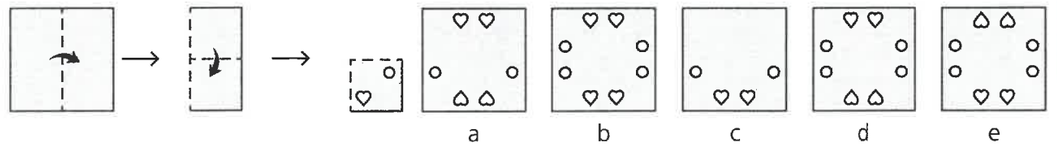
5 

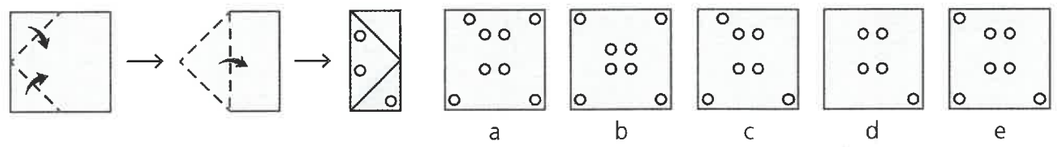
Test yourself

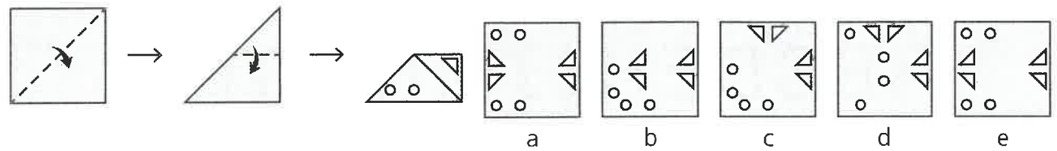
The square on the left is folded in the way indicated by the arrows, and then holes are punched where shown on the third diagram. Identify the answer option that shows what the square would look like when it is unfolded. Circle the letter beneath the correct answer. For example:



1 

2 

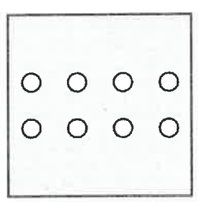
3 

4 

Score ☐ / 4

Try it out

Use dashed lines to show how to fold this sheet of paper so that punching just one circular hole will give this pattern when the paper is opened out.

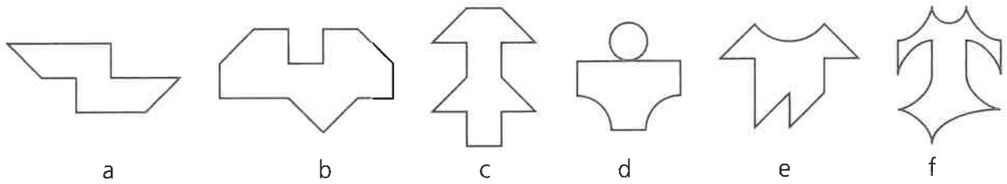


B Position and direction

Matching a single image 2

Have a go

1 Which of these pictures has a vertical line of symmetry, with one half a reflection of the other half? Circle the letter and draw in the line of symmetry.



a b c d e f

2 Complete these pictures so that the dashed line is a line of reflection.

3 (a) Which of these letters have a vertical line of symmetry, where one half is a reflection of the other half? Write your answer on the line provided.

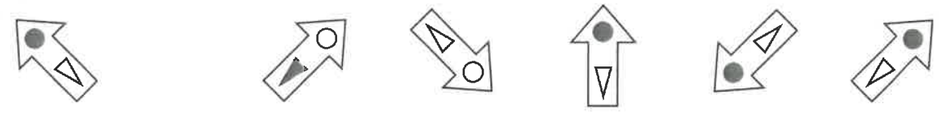
A B C D E H I J M N O S T

(b) Now draw each of the 13 capital letters rotated 90° clockwise.

Which ones now have a vertical line of reflection?

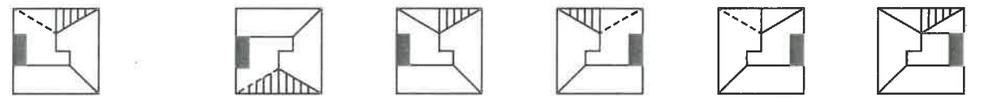
Test yourself

The picture on the left is reflected in a vertical mirror line and is represented by one of the pictures on the right. Circle the letter beneath the correct answer. For example:



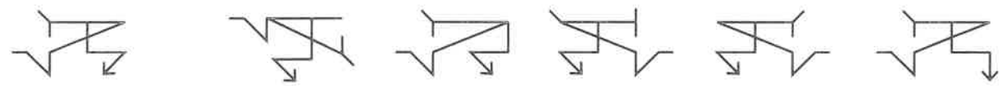
a b c d (e)

1



a b c d e

2

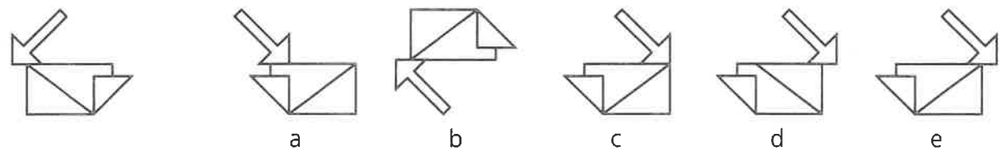


a b c d e

3

a b c d e

4

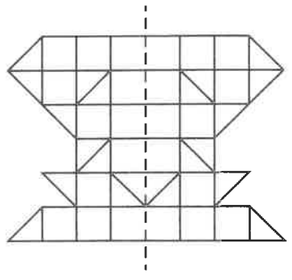


a b c d e

Score ☐ / 4

Try it out

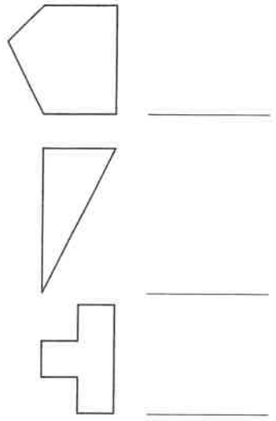
Using at least four different colours, accurately fill in the squares and triangles in the picture below so that the dashed vertical line is a line of reflection.

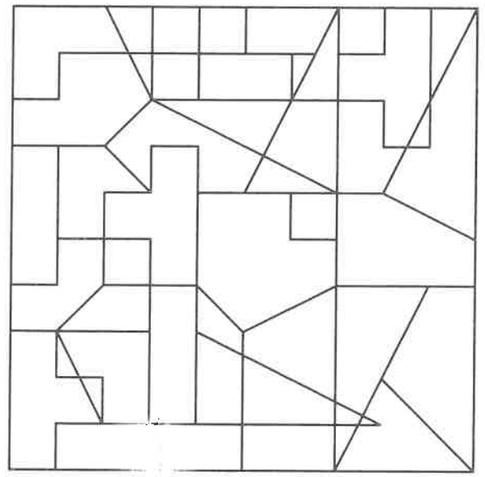


Translating and combining images 2

Have a go

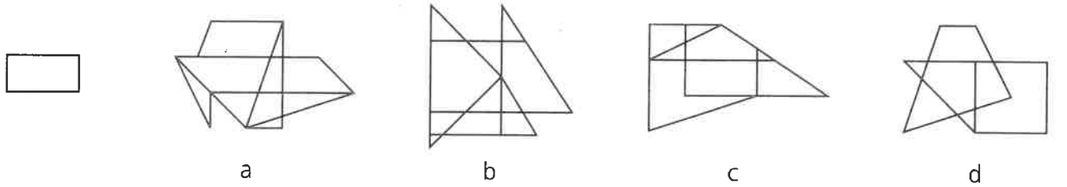
1 How many of each of these shapes are hidden in the picture on the right? Write the number next to each shape. Only count the shapes that are **not** rotated.



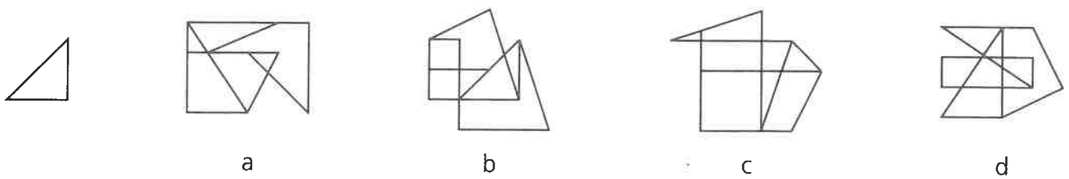


In the next two questions, the shape on the left is hidden in one of the pictures on the right. Find it and colour it in. The shapes are **not** rotated.

2



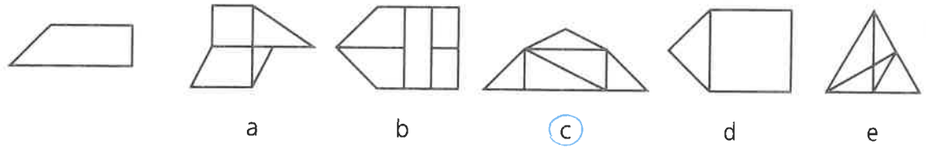
3



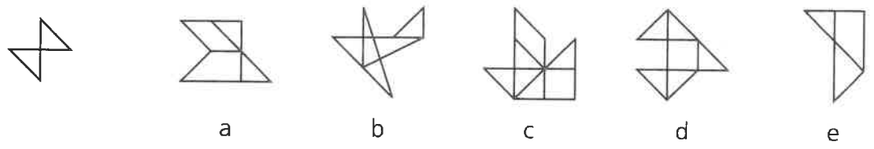
Marking or shading the shapes as you find them can be helpful.

Test yourself

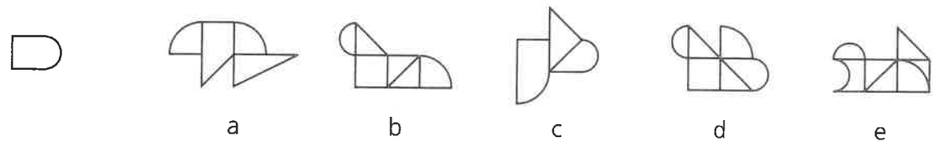
The small shape on the left can be found in one of the pictures on the right. It might be made up of one or more pieces. Circle the letter beneath the correct answer. For example:



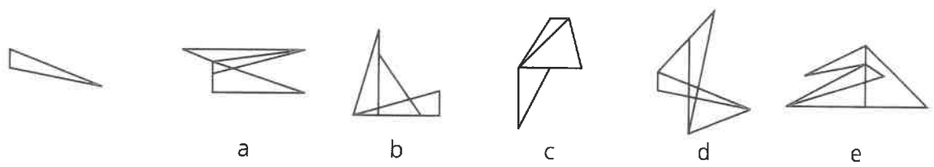
1



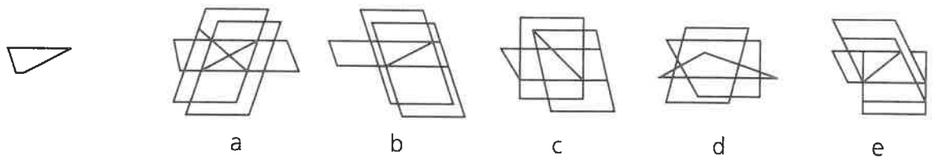
2



3



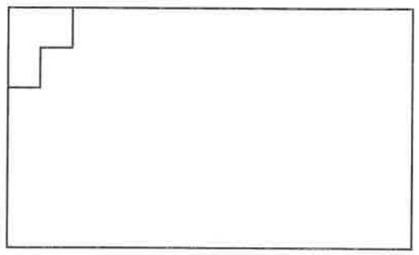
4



Score ☐ / 4

Try it out

Use a ruler to draw **eight** straight lines inside this rectangle so that the L-shape on the left is hidden within it. Ask a friend or parent to try to find the hidden L-shape.

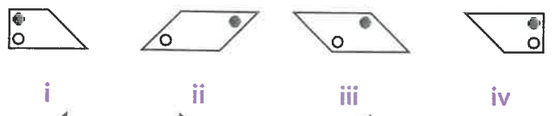


Matching a single image 3

Have a go

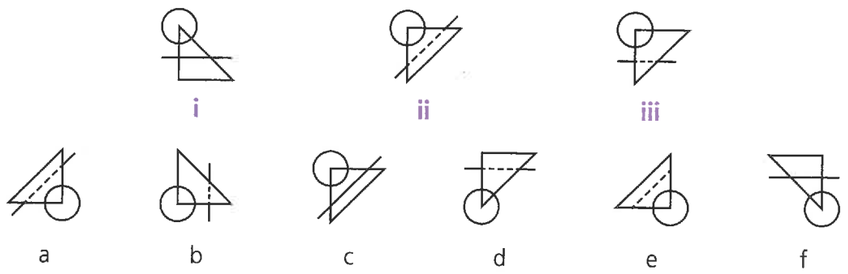
Match the pictures in the first row to their identical copy in the second row. Write the letter of the matching picture in the space provided.

1



i ____ ii ____ iii ____ iv ____

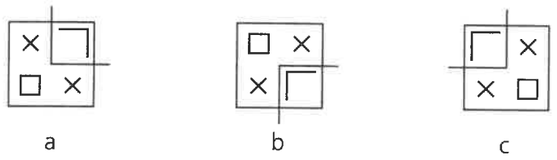
2



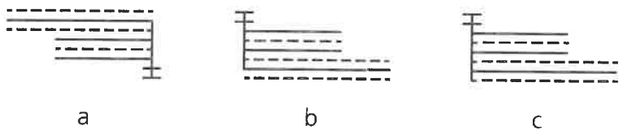
i ____ ii ____ iii ____

In the next three questions, two of the three pictures in each are identical. Circle the letter of the **odd one out**.

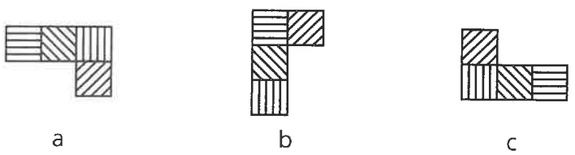
3



4



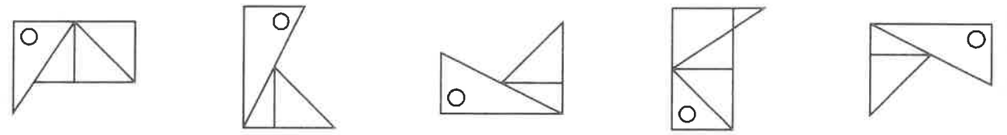
5



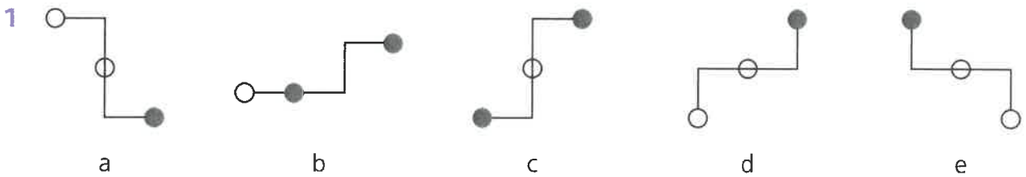
B Position and direction

Test yourself

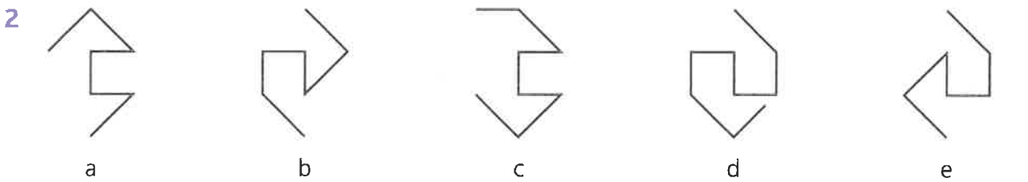
Look carefully at these pictures to identify the two that are identical. Circle the letters beneath the **two** identical pictures. For example:



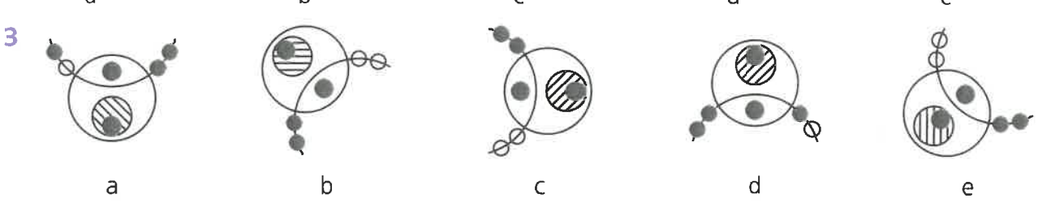
1



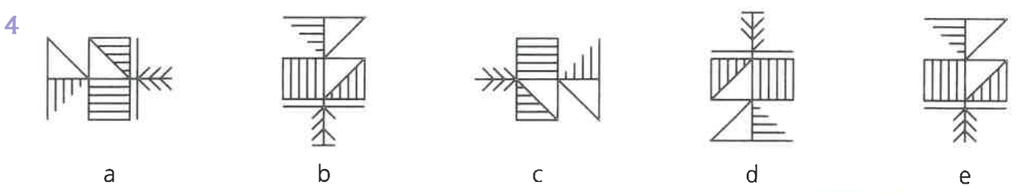
2



3



4



Score ☐ / 4

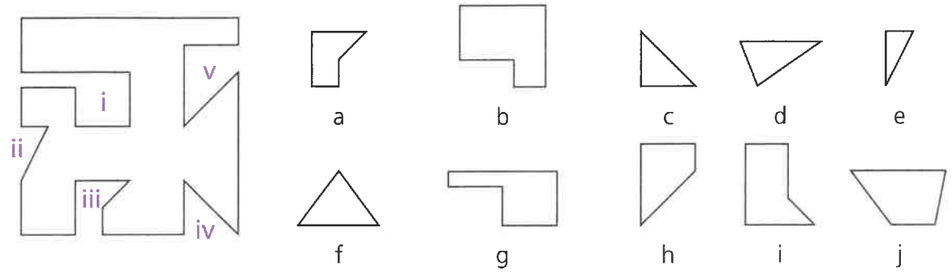
Try it out

Add patterns to these squares so that they are all quite similar but only **two** are identical. Try to include different **shapes**, different **shading styles** and a different **number** of elements. Ask a friend or parent to spot the identical patterns.

Translating and combining images 3

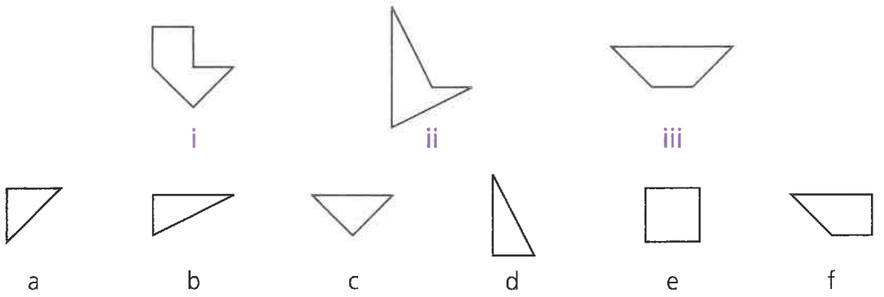
Have a go

1 The square below has five shapes cut out of it. These shapes have been moved to the right of the square and have not been rotated. Find the five missing shapes and write their letters next to the correct number in the spaces provided.



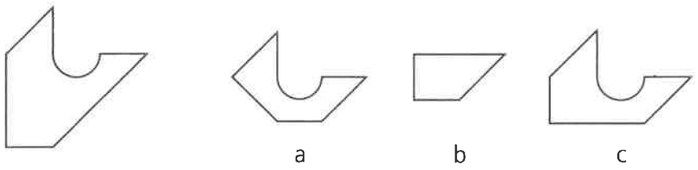
i ____ ii ____ iii ____ iv ____ v ____

2 Which two of the shapes in the second row can be put together to make each of the three shapes in the first row? Do not rotate them. Write the two letters of the shapes you select next to the correct numbers.

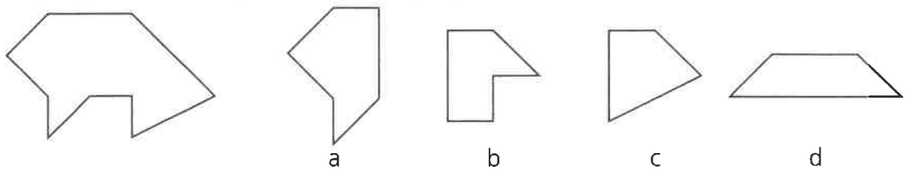


i _____ ii _____ iii _____

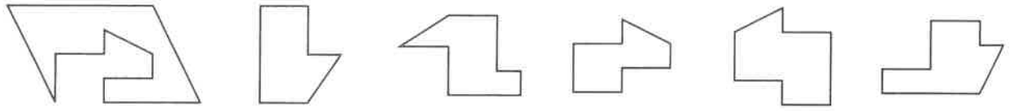
3 Which one of the three shapes on the right is **not** needed to make the shape on the left? Circle the letter beneath the correct answer.



4 Which one of the four shapes on the right is **not** needed to make the shape on the left? Circle the letter beneath the correct answer.

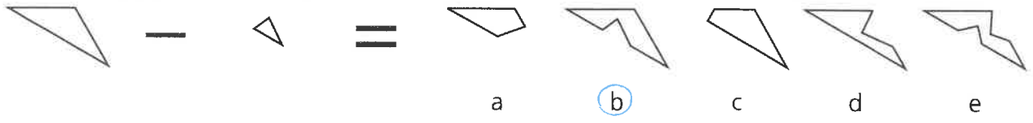


5 Which shape on the right has been cut out of the parallelogram on the left? The cut-out shape is **not** rotated. Circle the letter beneath the correct answer.

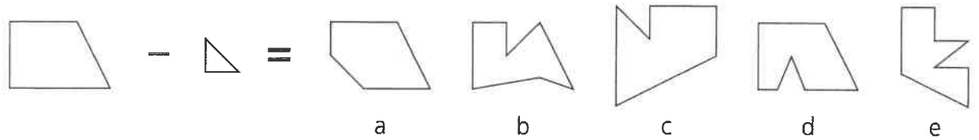


Test yourself

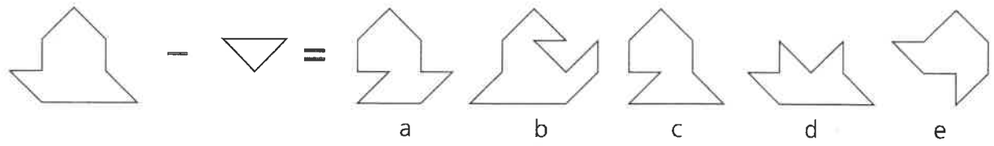
When the smaller shape is removed from the larger shape a new shape is made. This new shape is represented by one of the options on the right. Circle the letter beneath the correct answer. For example:



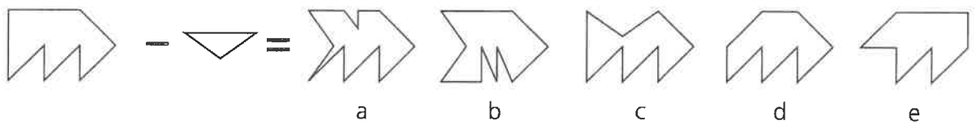
1



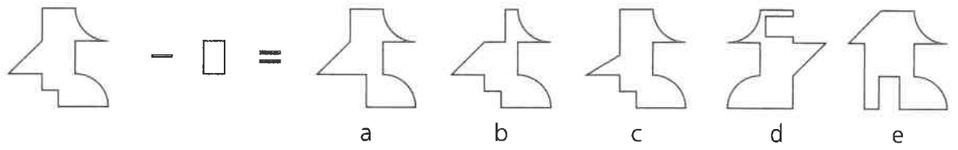
2



3



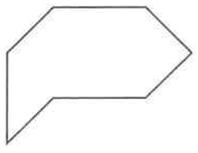
4



Score ☐ / 4

Try it out

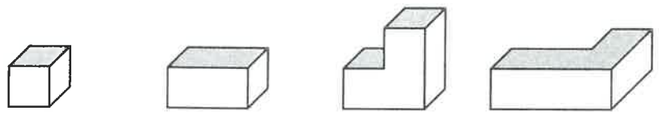
Try drawing your own question. Draw a small shape to be cut out of the large shape below. Then provide five possible answer options. Only one of the answer options should match the cut out.

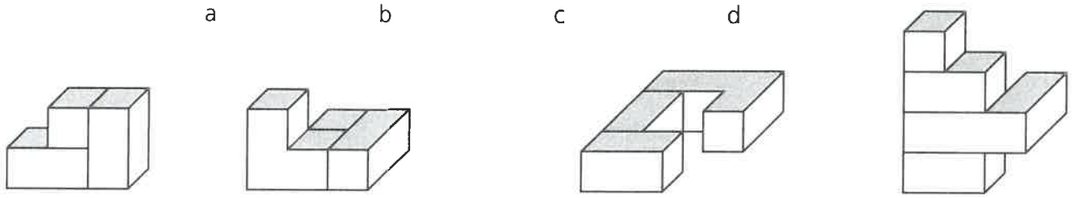


Translating and combining images 4

Have a go

1 The pictures can be made using the individual blocks above them. Sometimes one block has been used more than once. Complete the table showing how many of each type of block will be needed to build the picture.

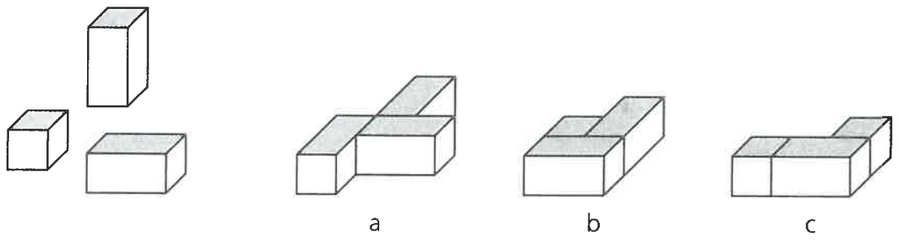




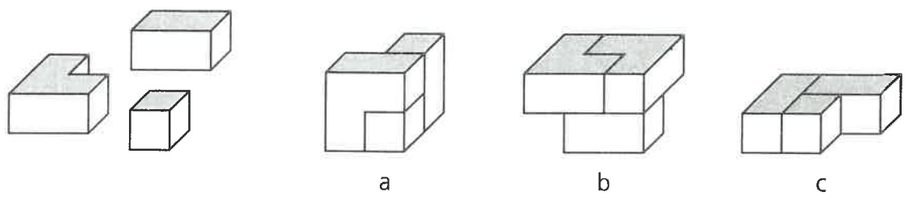
Picture	Block a	Block b	Block c	Block d
i				
ii				
iii				
iv				

Which pictures can be built with the blocks given? Circle the letter of your answer choice.

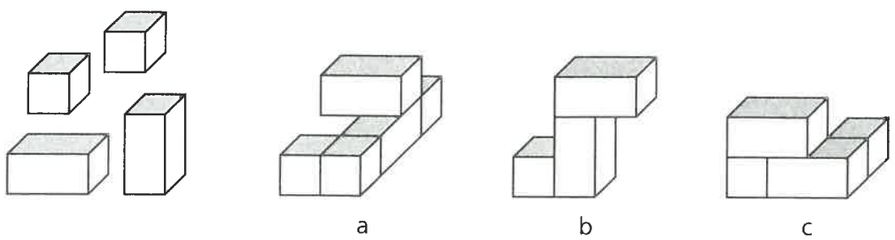
2



3

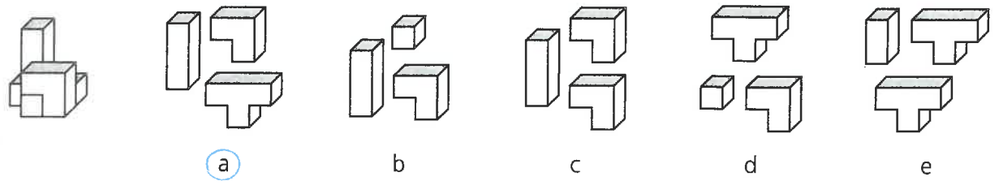


4

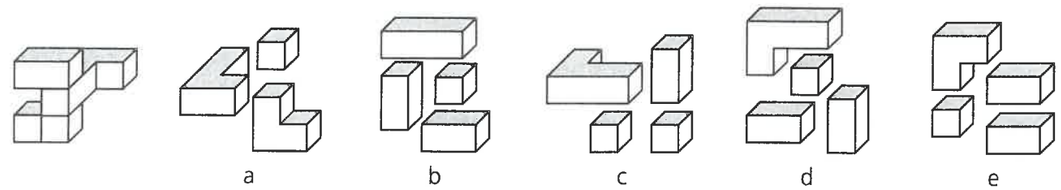


Test yourself

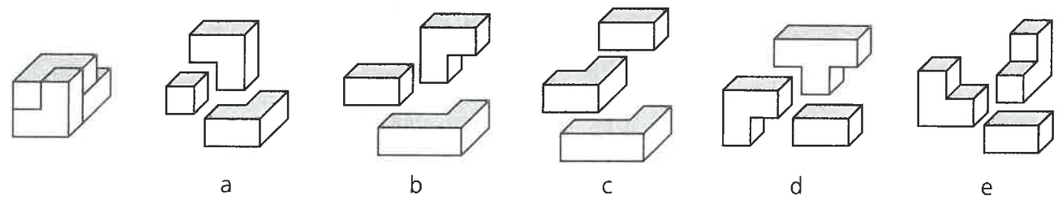
One group of separate blocks has been joined together to make the picture of blocks shown on the left of them. Some of the blocks may have been rotated. Circle the letter beneath the blocks that make up the picture. For example:



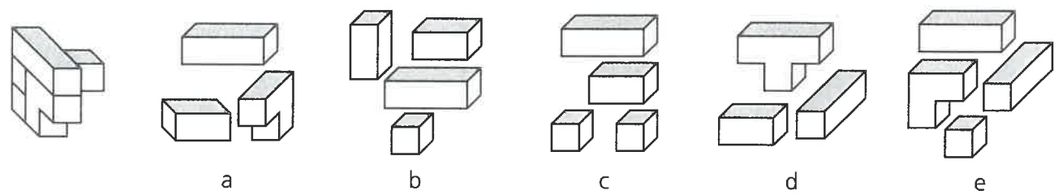
1



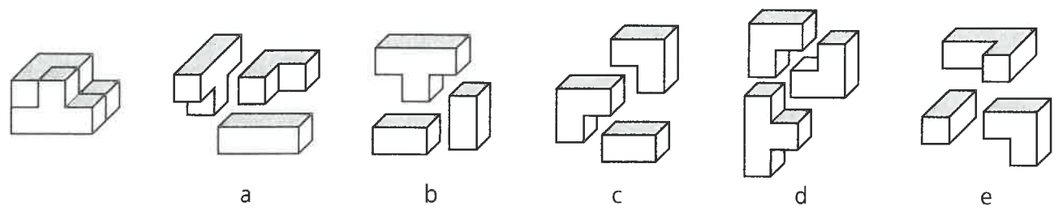
2



3



4



Score ☐ / 4

Try it out

How many different ways can you arrange these two blocks? At least one whole face must be touching the other block.

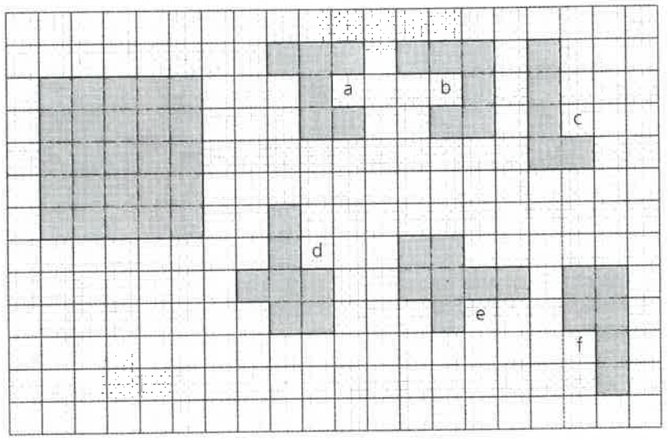
Maths workout 1

Many Non-Verbal Reasoning problems make use of mathematical skills and knowledge, so these pages contain some questions and puzzles to consolidate your mathematical skills, vocabulary and ideas. Keeping your maths skills sharp will help you to solve Non-Verbal Reasoning questions more quickly!

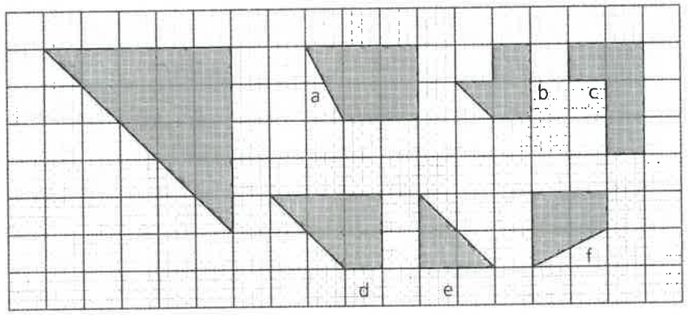
Working with 2D shapes

In the first two questions, which **four** pieces on the right can be put together to complete the 2D shape on the left? Circle the letters of your answer choices.

1

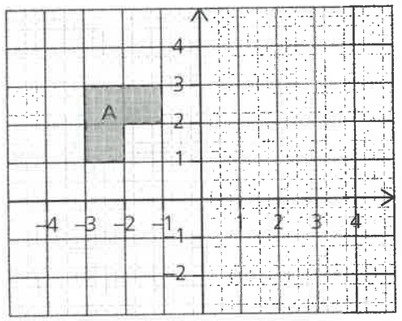


2



In the next two questions, move the 2D shapes by the number of squares instructed. Draw their new position and give the co-ordinates for the new position of point A.

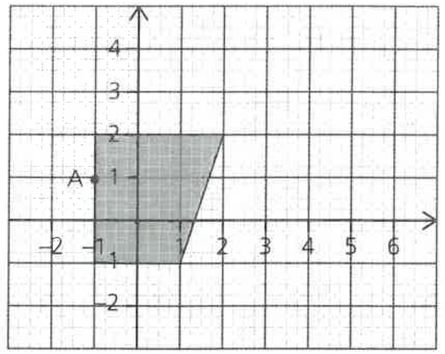
3



i right 4, down 2 new co-ordinates for point A (____, ____)

ii down 1, right 5 new co-ordinates for point A (____, ____)

4



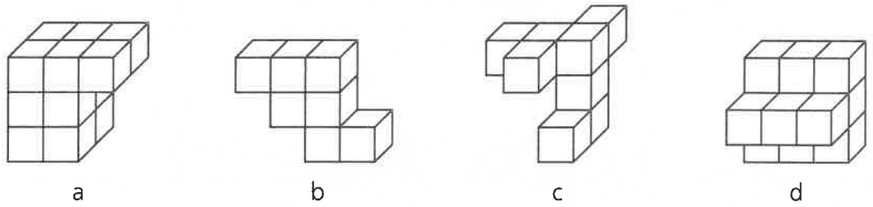
i up 2, right 4 new co-ordinates for point A (____, ____)

ii right 3, down 1 new co-ordinates for point A (____, ____)

Score ___ / 6

Working with 3D shapes

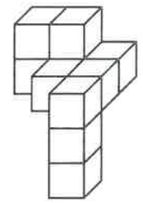
1 If each of these piles is made up of 1 cm cubes, what is the total surface area of each pile?



Pile a: _____ Pile c: _____

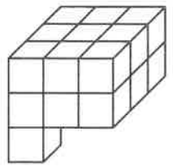
Pile b: _____ Pile d: _____

2 If the outer surface of these piles of cubes were painted red, how many cubes would have:



(a) i three painted faces? _____

ii five painted faces? _____



(b) i three painted faces? _____

ii five painted faces? _____

Score ___ / 8

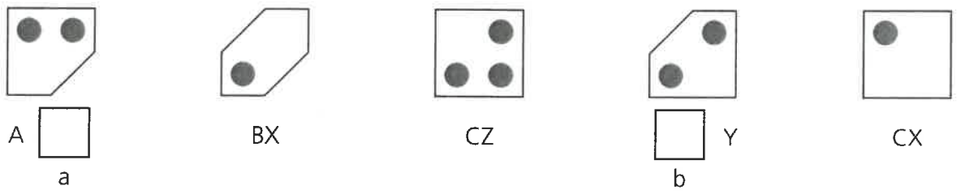
C Codes, sequences and matrices

Connections with codes 1

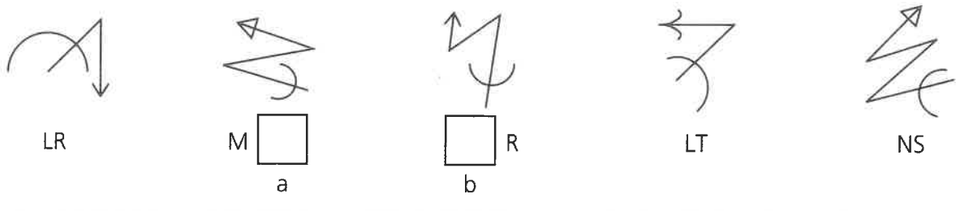
Have a go

In the next two questions, work out the missing code letters and write them in the answer spaces provided beneath the pictures.

1

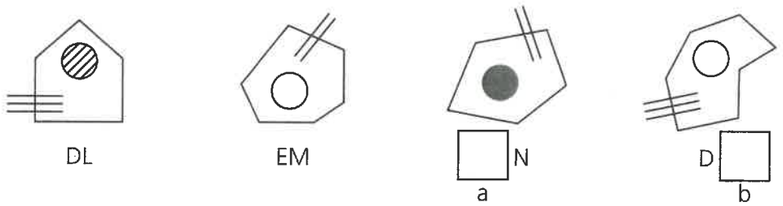


2



In the next two questions, write in the missing code letters. Then identify the features in each set of pictures that are not relevant to the answer and are included as distractors. Write these on the answer lines provided.

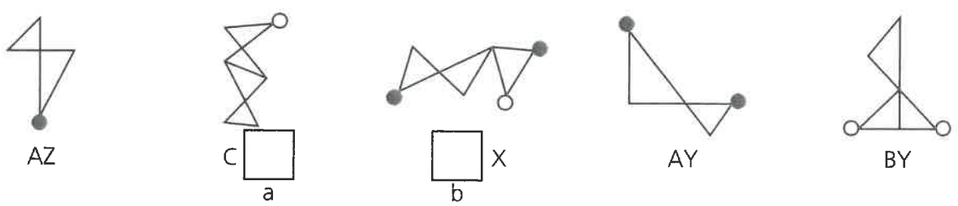
3



Distractor 1: _____

Distractor 2: _____

4



Distractor 1: _____

Distractor 2: _____

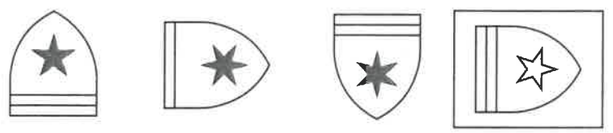
Distractor 3: _____

5 Here there are three codes to work out.

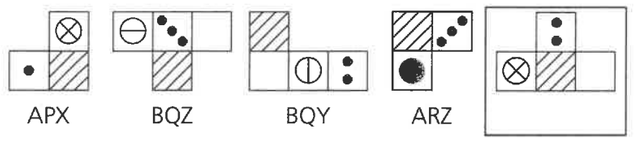
Test yourself

Each letter represents an individual feature in the picture next to it. Work out which feature is represented by each letter. Apply the code to the picture in the box and circle the letter beneath the correct answer code. For example:

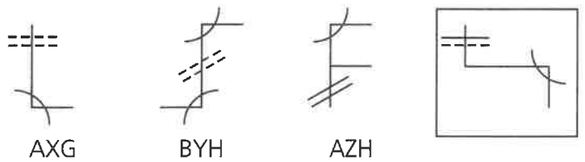
1



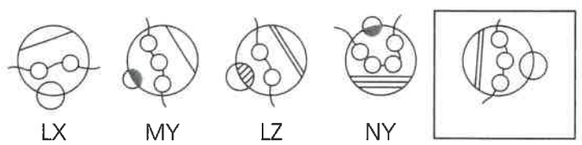
2



3



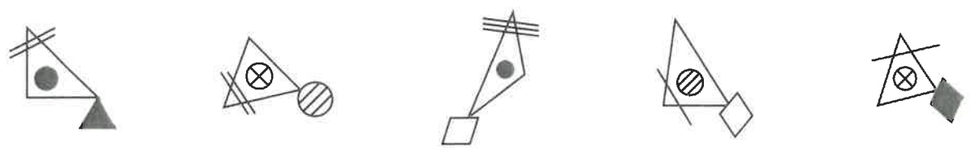
4



Score ☐ / 4

Try it out

Assign codes to the first four pictures so that the fifth picture has the code **BLT**.

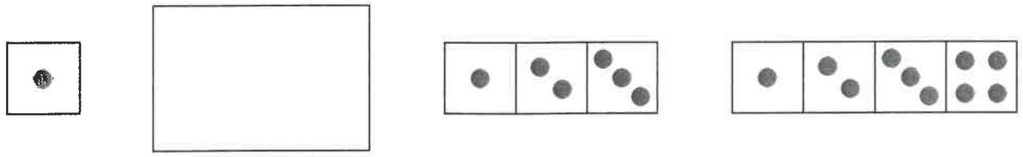


Sequences 1

Have a go

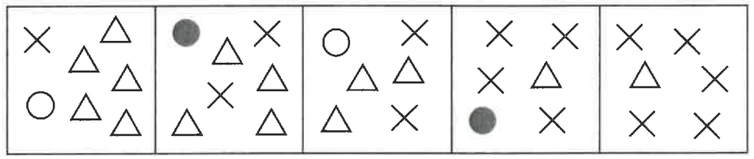
The first two questions contain a sequence of patterns with one pattern missing. Draw the missing pattern in the box provided.

1



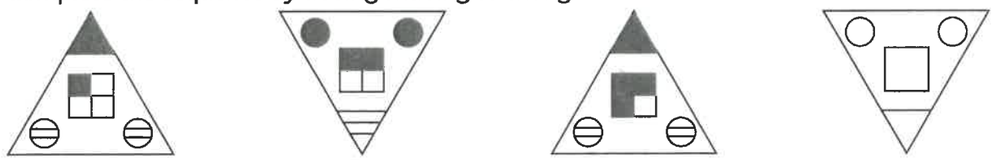
2

3 In the next sequence, one cross, one small circle and one small triangle are missing, each from a different box in the sequence. Work out the pattern and draw in the missing items.



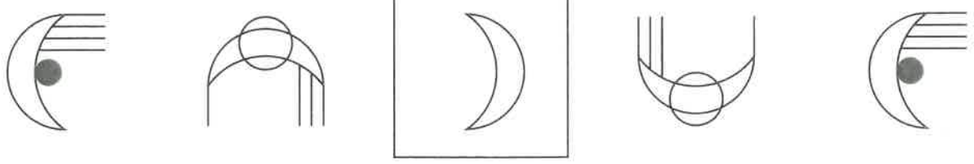
a b c d e

4 Complete the sequence by adding shading to triangle **d**.



a b c d

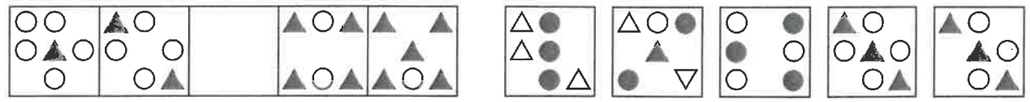
5 The third picture in this sequence is incomplete. Work out what is missing and draw it in.



a b c d e

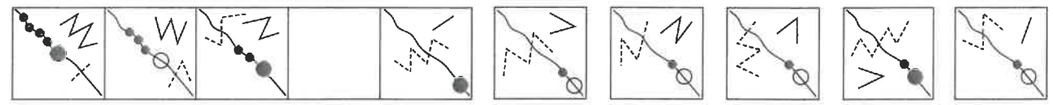
Test yourself

The five boxes on the left show a pattern that is arranged in a sequence. Choose the answer option that completes the sequence when inserted in the blank box. Circle the letter beneath the correct answer. For example:



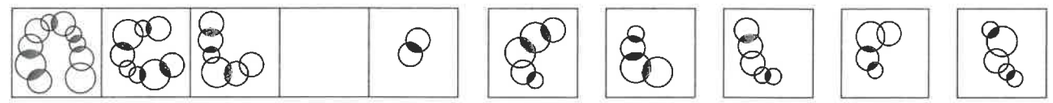
a b c d (e)

1



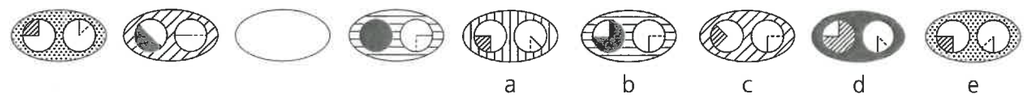
a b c d e

2



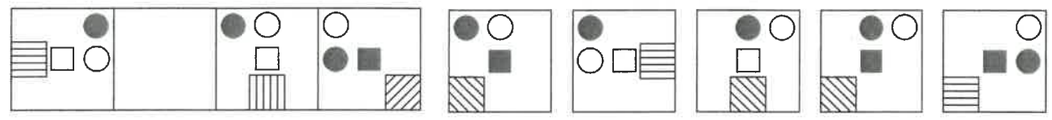
a b c d e

3



a b c d e

4

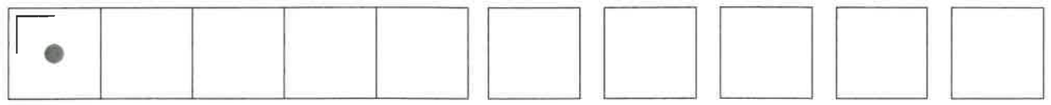


a b c d e

Score ☐ / 4

Try it out

Now create your own question. Use the pattern in the first box to make up a sequence of your own, leaving the fourth box empty. Then draw five answer options, with just one of them being the missing fourth pattern. Ask a friend or parent to identify the missing pattern.

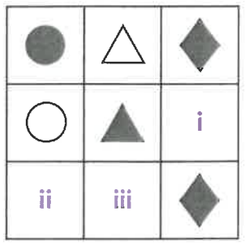


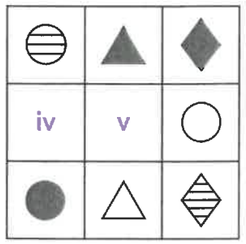
a b c d e

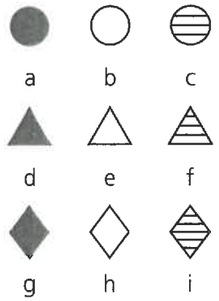
Matrices 1

Have a go

1 These two grids use the same shapes but they follow different patterns. Select the correct shape for each empty square from the options given.



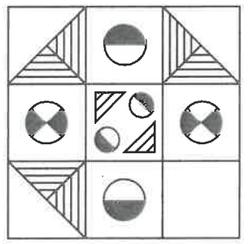




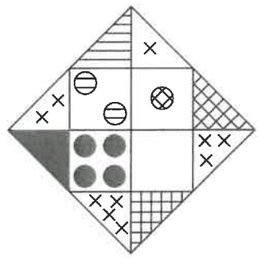
i ____ ii ____ iii ____ iv ____ v ____

Draw the missing pattern in the box provided to answer the next two questions.

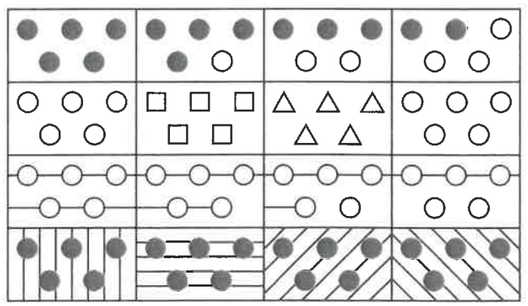
2



3



4 Identify the features that are changing along each row. Write them in the spaces provided.



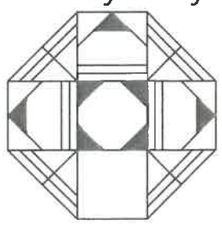
(a) _____

(b) _____

(c) _____

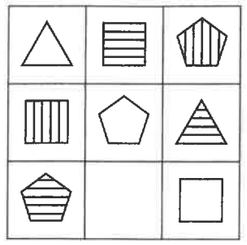
(d) _____

5 The pattern in this shape is symmetrical. Draw dashed lines across the shape to show the lines of symmetry. Then draw the missing pattern in the box provided.

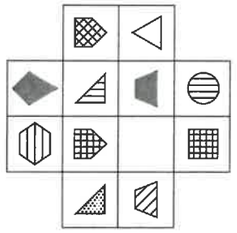


Test yourself

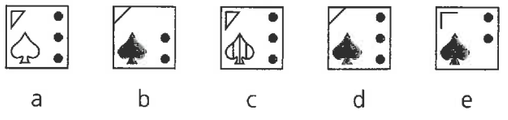
One of the options on the right completes the pattern in the grid on the left. Circle the letter beneath the correct answer. For example:



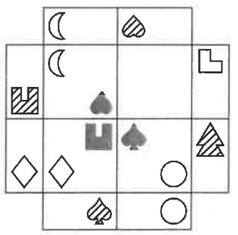
1



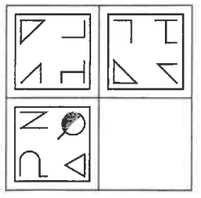
2



3



4



Score ____ / 4

Try it out

Draw a 3 × 3 grid and create your own pattern using black circles and white circles with different shadings. Leave one square in the grid blank and give five possible answer options. Ask a friend or parent to identify the missing pattern.

Connections with codes 2

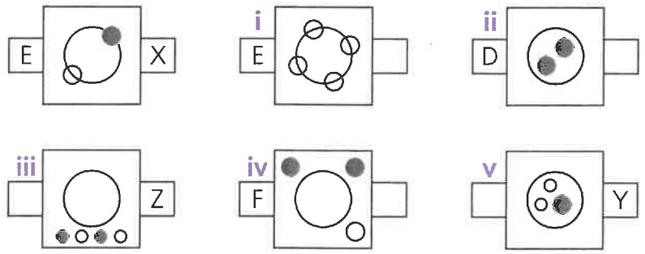
Have a go

1 If the codes A, B and C represent a square, a circle and a triangle respectively, and L, M and N represent black, white and horizontal stripes, draw and shade the correct pattern in each box to match the codes given.

i A N ii B L iii C M

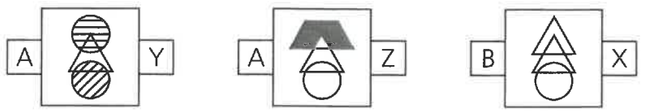
iv B M v C N vi A L

2 In these codes, the letter on the left relates to position and the letter on the right to number. Work out the code and fill in the missing letters.



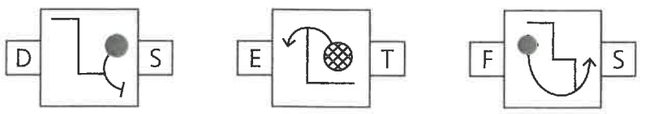
Codes have been assigned to the three pictures in each question. Work out the code and identify the feature represented by each letter. Write the features on the answer lines provided.

3



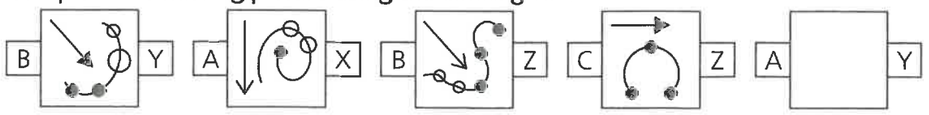
A _____
B _____
X _____
Y _____
Z _____

4



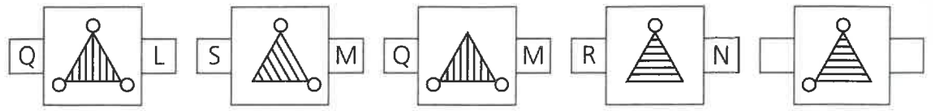
D _____
E _____
F _____
S _____
T _____

5 Complete the missing picture using the codes given.



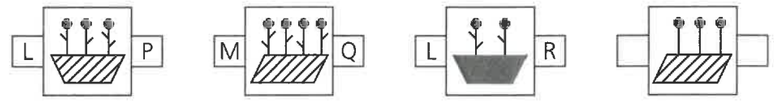
Test yourself

The letters in the boxes on the either side of these pictures each represent a feature of the pictures. Work out which feature is represented by each letter and apply the codes to the picture without any code. Circle the letter beneath the correct answer code. For example:



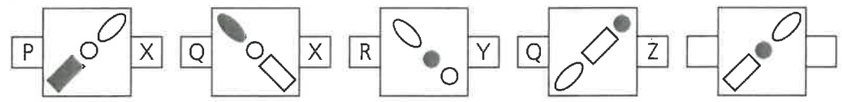
SN RM RL QM SL
a (b) c d e

1



LQ MP MR MQ LP
a b c d e

2

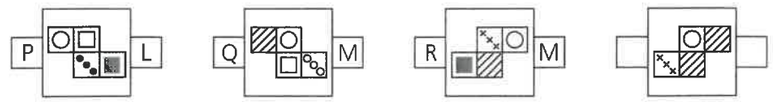


PZ QY RZ PY RX
a b c d e

3

AX BY AY BX AZ
a b c d e

4

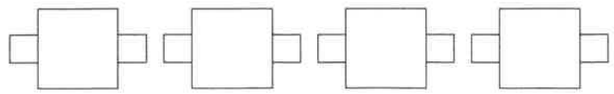


PM QL QN RL RN
a b c d e

Score ☐ / 4

Try it out

Make up your own codes question using the squares provided, giving five possible answer options.



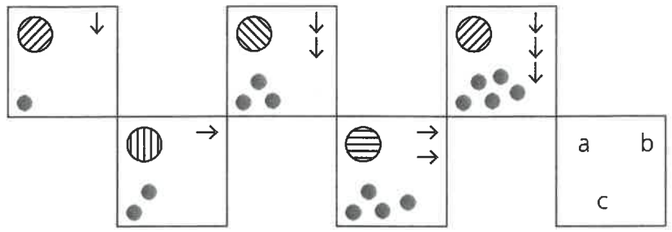
a _____ b _____ c _____ d _____ e _____

Sequences 2

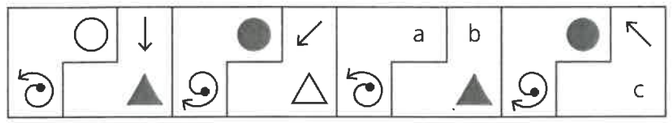
Have a go

Questions 1 and 2 contain sequences with three elements missing. Work out the pattern and then draw the missing elements.

1

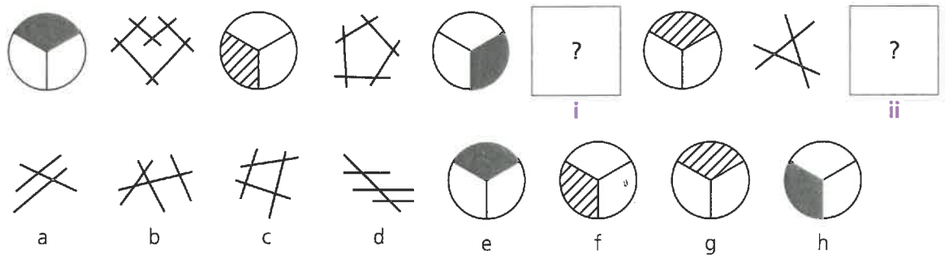


2

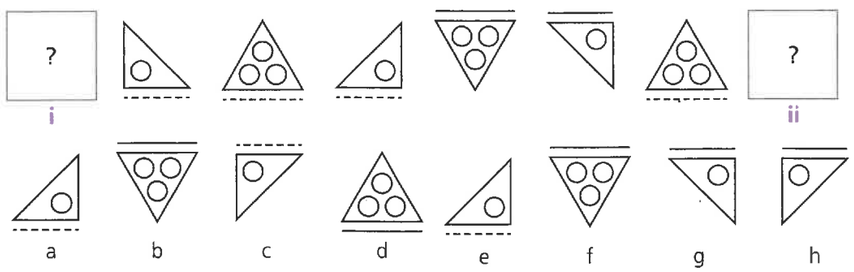


The next two questions contain a sequence with two alternating patterns. One pattern is missing from each sequence. Identify the missing pattern from the four options provided and circle the letter beneath it.

3



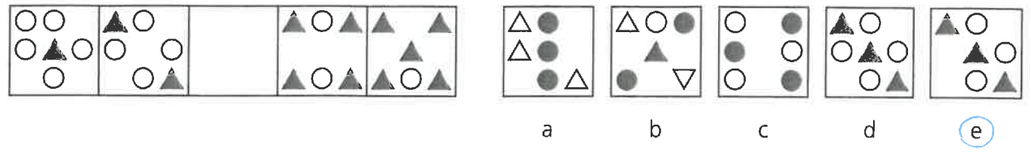
4



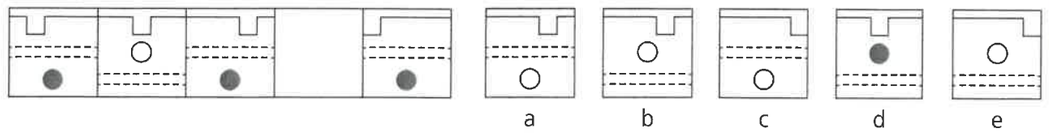
5 Continue the sequence by drawing the next three patterns in the sequence in the boxes provided.

Test yourself

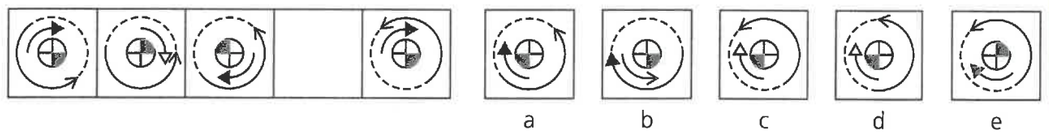
The five boxes on the left show a pattern that is arranged in a sequence. Choose the answer option that completes the sequence when inserted in the blank box. Circle the letter beneath the correct answer. For example:



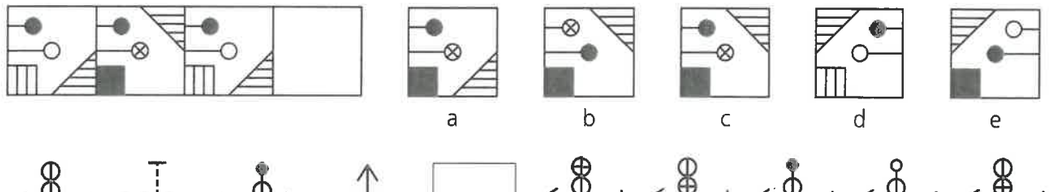
1



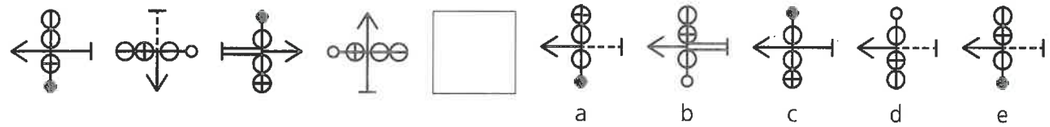
2



3



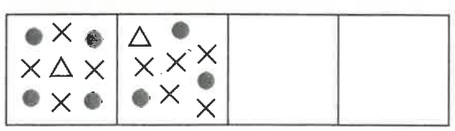
4

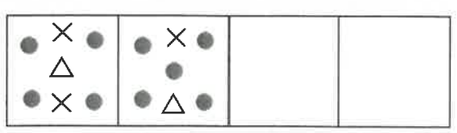


Score ☐ / 4

Try it out

Continue these two identical sequences in different ways. Draw the next two shapes in each sequence in the boxes provided.



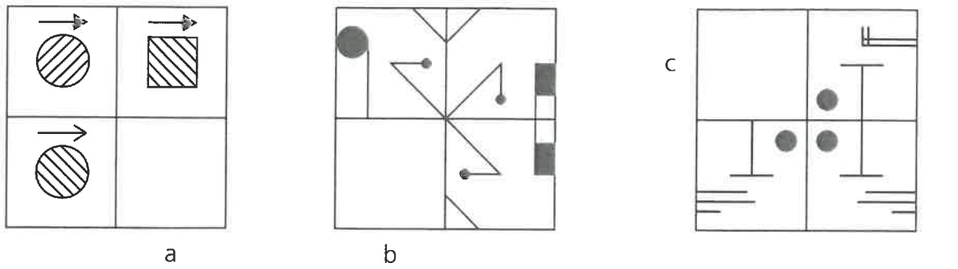


Matrices 2

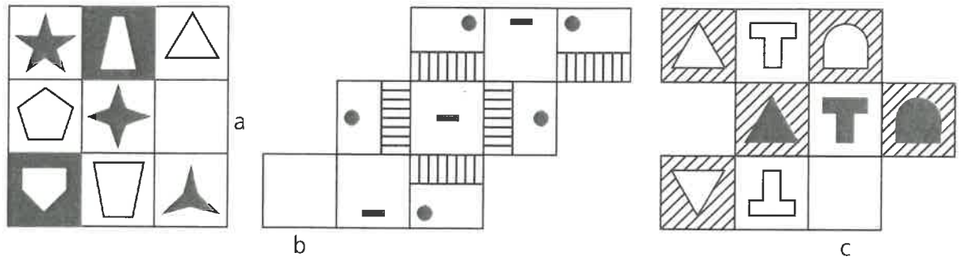
Have a go

Look at the patterns in the grids in the first two questions. Draw the missing patterns in the empty boxes.

1

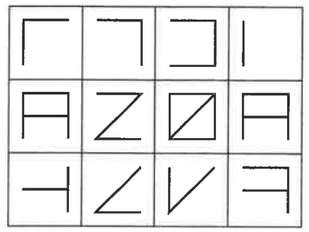


2

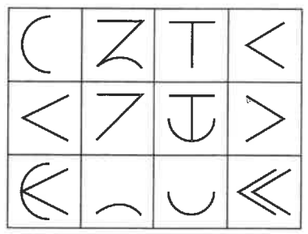


3 In the following grids, one column does not follow the pattern set out in the other columns. Which is the **odd** column?

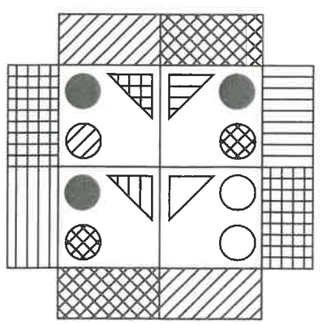
i



ii

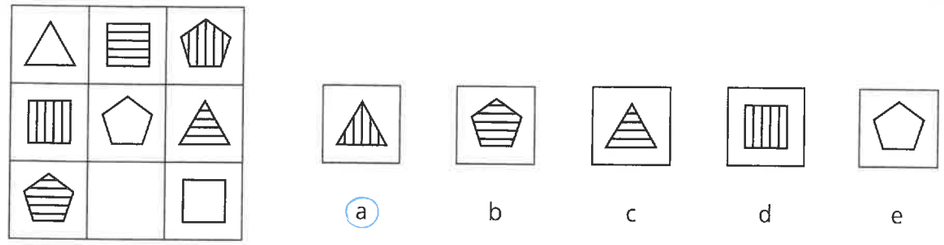


4 Complete the next grid by adding the correct style of shading to the three shapes in the bottom right-hand square.

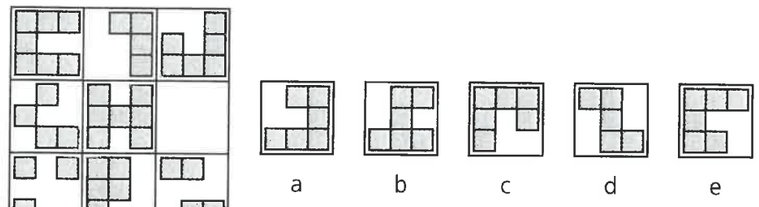


Test yourself

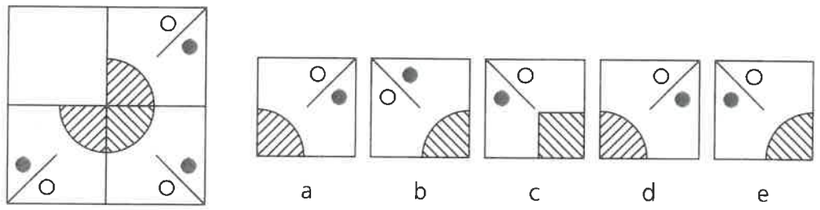
One of the options on the right completes the pattern in the grid on the left. Circle the letter beneath the correct answer. For example:



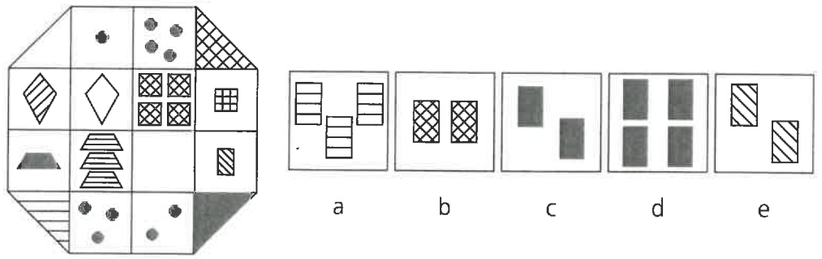
1



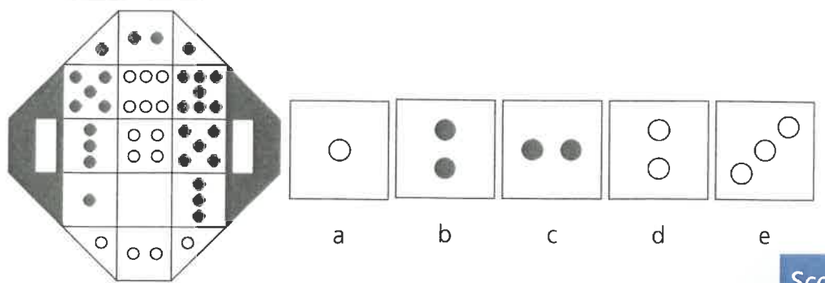
2



3



4



Score ☐ / 4

Try it out

On a separate piece of paper, draw a 4 × 4 grid and complete it with a shading pattern of your own. Leave one square empty and ask a friend or parent to identify the missing shading pattern.

Maths workout 2

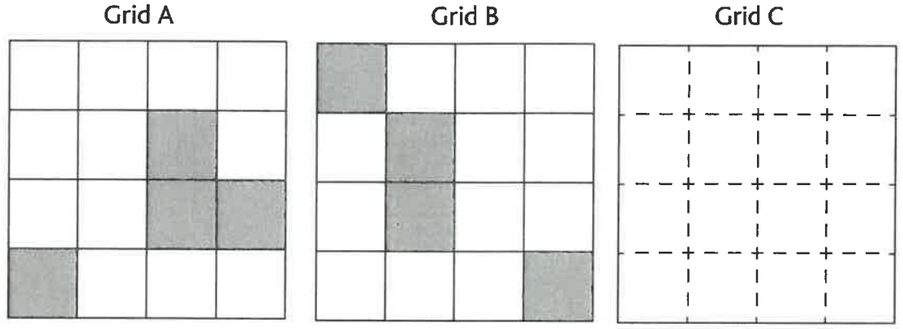
Many Non-Verbal Reasoning problems make use of mathematical skills and knowledge, so these pages contain some questions and puzzles to consolidate your mathematical skills, vocabulary and ideas. Keeping your maths skills sharp will help you to solve Non-Verbal Reasoning questions more quickly!

Rotating and translating images

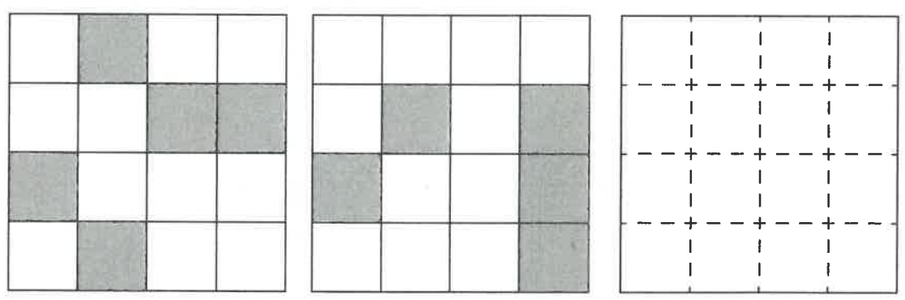
In the first two questions, the white squares in the grids are transparent. Rotate the grid as instructed. Imagine grid A is then placed over grid B. Draw the pattern you would see on grid C.

1 90° clockwise

(a)

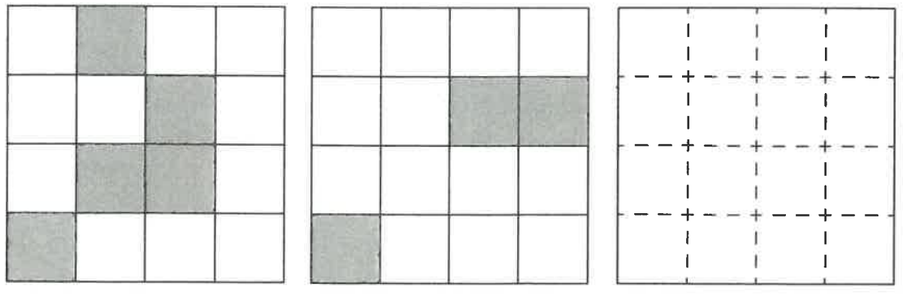


(b)

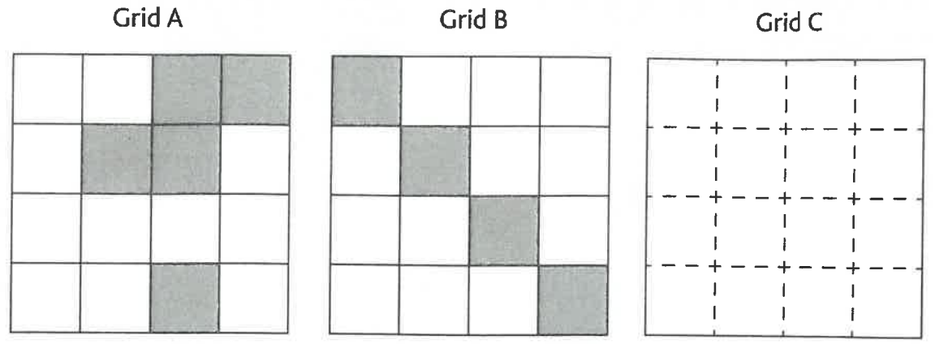


2 180° clockwise

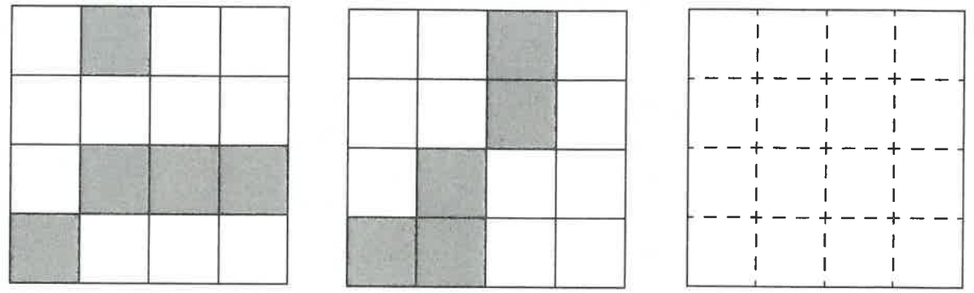
(a)



(b)



3 The white squares in these grids are transparent. Rotate grid A 90° clockwise and grid B 90° anticlockwise. Draw the pattern you would see when they are placed over each other on grid C.



Score ☐ / 5

Working with numbers

In the following number patterns, work out how the numbers in each row have been calculated and complete the missing numbers.

1

1		3		5		6		5		3		1
	4		(a)____		(b)____		(c)____		8		4	
		12		19		(d)____		(e)____		(f)____		
			(g)____		(h)____		(i)____		31			
				72		82		(j)____				
					(k)____		(l)____					
						308						

2

5		15		45		15		5
	10		(a)____		30		(b)____	
		(c)____		30		(d)____		
			(e)____		25			
				(f)____				

3 What is the next number in each of these sequences? Write your answers on the lines provided.

(a) 4 5 7 10 ____ (b) 4 6 10 16 ____ (c) 4 9 19 34 ____

Score ☐ / 12

Properties of 2D shapes

1 What shape am I?

(a) I have five equal sides. _____

(b) I have four sides, but only one pair of opposite sides is parallel. I have no right-angles.

_____

(c) I have three sides and my three angles are all 60°. _____

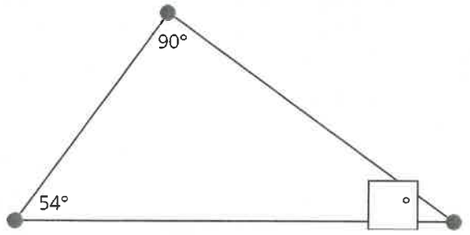
The angles in a triangle all add up to 180°.

The angles around a point add up to 360°.

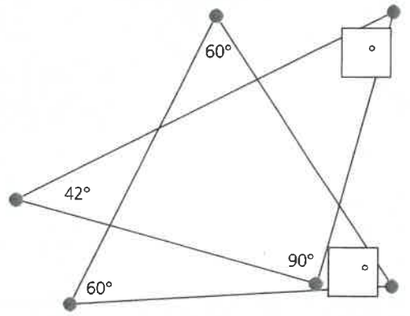
Vertically opposite angles at a point are equal.

Calculate the value of the missing angles and write them in these questions.

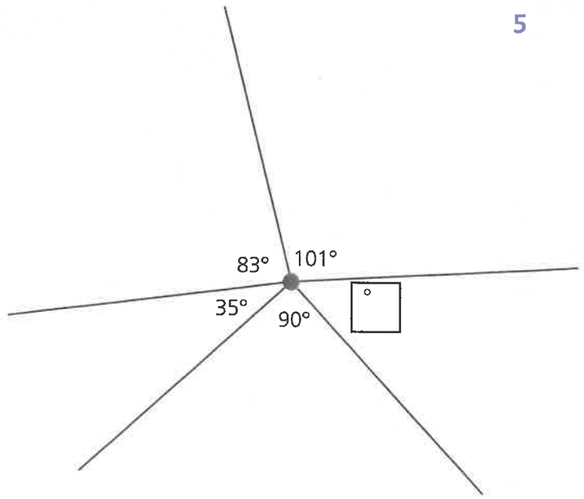
2



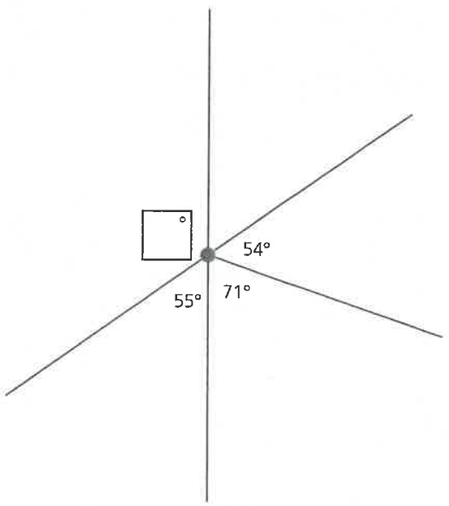
3



4



5



Score ☐ / 7