

Unit 3

Shape and space

Five daily lessons

National
Numeracy Strategy

Year 6
Summer term

Unit Objectives Year 6

- **Read and plot co-ordinates in all four quadrants.**
- **Use a protractor to measure and draw angles to nearest degree.**
- **Calculate perimeter and area of simple compound shapes that can be split into rectangles.**
- Classify quadrilaterals.
- Calculate angles in a triangle or around a point.
- Visualise 3-D shapes from 2-D drawing and identify different nets for a closed cube.
- Recognise where a shape will be after reflection.
- Recognise where a shape will be after two translations.

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This Unit Plan is designed to guide your teaching.

You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Resource sheet 3.1
- Activity sheet 3.1
- Activity sheet 3.2
- Activity sheet 3.3
- OHT 3.1
- OHT 3.2
- OHT 3.3
- OHT 3.4
- OHT 3.5
- OHT 3.6
- OHT 3.7
- Large sheets of paper
- Protractors
- OHP protractor
- Whiteboards
- Paper polygons
- Interlocking cubes
- Tracing paper
- Irregular shapes
- Related Key Stage 2 National test questions

Year 5

Link Objectives

Year 7

- Recognise positions and directions: read and plot co-ordinates in the first quadrant; **recognise perpendicular and parallel lines.**
- Understand and use angle measure in degrees. Identify, estimate and order acute and obtuse angles. Use a protractor to measure and draw acute and obtuse angles to the nearest 5°.
- **Understand area measured in cm². Understand and use the formula in words 'length times breadth' for the area of a rectangle.**
- Recognise properties of rectangles.
- Classify triangles (isosceles, equilateral, scalene), using criteria such as equal sides, equal angles, lines of symmetry.
- Calculate angles in a straight line.
- Visualise 3-D shapes from 2-D drawings and identify different nets of an open cube.
- Recognise reflective symmetry in regular polygons.
- Recognise where a shape will be after reflection in a mirror line parallel to one side.
- Recognise where a shape will be after a translation.

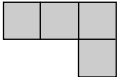
- Use conventions and notation for 2-D co-ordinates in all four quadrants; find co-ordinates of points determined by geometric information.
- Use angle measure; distinguish between and estimate the size of acute, obtuse and reflex angles.
- Know and use the formula for the area of a rectangle; calculate the perimeter and area of shapes made from rectangles.
- **Identify parallel and perpendicular lines; know the sum of angles at a point, on a straight line and in a triangle, and recognise vertically opposite angles.**
- Use 2-D representations to visualise 3-D shapes and deduce some of their properties.
- Recognise and visualise the transformation and symmetry of a 2-D shape.

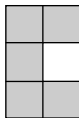
(Key objectives in bold)

department for
education and skills

Planning sheet	Day One	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Recognise and estimate angles.</p> <p>Know that there are 180° in a triangle.</p> <p>VOCABULARY right angle acute angle obtuse angle reflex angle equilateral isosceles</p> <p>Resources: OHP protractor OHT 3.1 Whiteboards</p>	<ul style="list-style-type: none"> Show triangle 1 on OHT 3.1. <div>Q What can you say about the angles in this triangle?</div> <p>Collect responses and draw out two angles are acute, C is a right angle and the angles sum to 180°.</p> <div>Q What size is angle B? Angle C?</div> <p>Collect estimates and check B using an OHP protractor.</p> <div>Q If we know C and B, how can we calculate A?</div> <p>Establish, as C is 90°, $A = 90^\circ - B$.</p> <p>Give children different values for A or B and get children to calculate the other angle, giving answers on whiteboards.</p> Show triangle 2. Collect names of angles and estimates of the size of angles. <div>Q If this triangle was equilateral, what size would the angles be?</div> <p>Establish each angle would be 60°. Give different values to two angles for children to calculate the third angle.</p> Show triangle 3. Ensure children can name angle N, and estimate the angles. <div>Q If the triangle was isosceles, what properties would it have?</div> <p>Establish two sides and two angles would be equal.</p> <div>Q If $N = 100^\circ$, what would the other angles be?</div> <p>Collect answers and confirm they would be 40° each if the triangle was isosceles, otherwise $L + M = 80^\circ$.</p> <p>Give pairs of angles, children calculate the third angle. Use similar questions to help sort the other sets of classes.</p> 	<p>Use a protractor to measure and draw angles to the nearest degree.</p> <p>Calculate angles in a triangle or around a point.</p> <p>VOCABULARY angle degrees protractor</p> <p>RESOURCES Protractors Activity sheet 3.1 Large sheets of paper</p>	<ul style="list-style-type: none"> Remind children of facts: angles on a straight line add up to 180° and around a point they add up to 360°. Set children some 'missing angle' questions involving angles round a point and angles on a straight line. Collect answers and discuss methods and strategies. <div>Q If I turn through one-third of a complete turn, how many degrees should I turn?</div> <p>Repeat using other fractions.</p> Give out Activity sheet 3.1. Discuss the angles in the shape of question 1. Ask children to measure the angles with a protractor and the lengths of the sides in millimetres. Collect answers and discuss the accuracy. Say you want them to be able to measure angles to the nearest degree. <div>Q When measuring an angle how can we improve our accuracy?</div> <p>Collect responses. Note down key points on a large sheet of paper for display. Repeat for measuring lengths.</p> Explain that, for question 2, they are to complete the triangle. The base is to be 88 mm, the angle at A is to be 65°, and the other side enclosing angle A is to be 65 mm. Get the children to draw the triangle and measure the third side and the two other angles. 	<ul style="list-style-type: none"> Look at some more demanding questions on finding angles. Go through these questions with the children. <p>For example: Mental paper 2000, Q19 Resource sheets 3.1 to 3.6 – SATs questions</p> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Use a protractor to draw and measure angles accurately; Know that the angles of a triangle sum to 180°; Know that angles on a straight line sum to 180° and angles around a point sum to 360°. <p>(Refer to supplement of examples, section 6, page 111.)</p> </div>

Planning sheet	Day Two	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Name and classify quadrilaterals using side and angle properties.</p> <p>VOCABULARY quadrilateral parallelogram rectangle square rhombus kite trapezium inverted or concave kite regular irregular parallel perpendicular opposite adjacent</p> <p>RESOURCES OHT 3.2 Whiteboards Large sheet of paper</p>	<ul style="list-style-type: none"> Show shape 1 on OHT 3.2. <div>Q What is the name of this shape?</div> <p>Children to write this down on their whiteboards. Establish it is a parallelogram, and ensure children can spell the word.</p> <div>Q What are the properties of a parallelogram?</div> <p>Children to discuss in pairs. Collect responses, record on a large sheet of paper under the name parallelogram.</p> <ul style="list-style-type: none"> Show shape 2. <div>Q What are the similarities and differences between shapes 1 and 2?</div> <p>Identify that shape 2 has only one pair of parallel sides.</p> <div>Q What is the name of this shape?</div> <p>Establish that it is a trapezium and collect and record its properties on the sheet of paper.</p> <ul style="list-style-type: none"> Repeat with the other pairs of shapes, naming the shapes, identifying similarities and differences, and record properties on paper for display. Identify other pairs of shapes, e.g. shapes 1 and 7, <div>Q What are the similarities and differences between shapes 1 and 7?</div> <p>Highlight the similarities, (opposite sides and angles are equal) and the differences (angles in 7 are all right angles but not in 1). Repeat using other pairs of shapes.</p>	<p>Recognise reflective symmetry in polygons.</p> <p>Recognise where a shape will be after reflection.</p> <p>VOCABULARY vertex vertices symmetry reflection mirror line polygon regular</p> <p>RESOURCES Paper polygons OHT 3.3 Mirrors Tracing paper Related Key Stage 2 National test questions</p>	<ul style="list-style-type: none"> Show children a shape with reflective symmetry and a shape with no reflective symmetry. <div>Q What is the difference between these shapes?</div> <p>Encourage children to use the correct vocabulary to describe the symmetry.</p> <div>Q How can we confirm the shape has reflective symmetry?</div> <p>Establish that a shape can be folded along its line of symmetry and a mirror or tracing paper is useful to identify symmetry.</p> <ul style="list-style-type: none"> Show the top half of OHT 3.3. Explain that the first two shapes are incomplete. The first shape has one line of symmetry, the second shape has two lines of symmetry. You want to complete the shapes. <div>Q What are the key features we can use to complete these shapes?</div> <p>Establish that the key features are the vertices of each shape and that these have to be the same distance either side of a line of symmetry. Ask the class to describe to you how to complete the two shapes.</p> <ul style="list-style-type: none"> Remind children that shapes are reflected in mirror lines. Show the second half of OHT 3.3. Say that you want to reflect the shapes in the mirror lines. Remind children that a reflected shape is the same distance from the mirror line as the original shape. <div>Q What are the key features we can use to reflect the shapes in the given mirror lines?</div> <p>Confirm that the vertices of the shapes are again the key features. With the class complete the first two shapes. Remind children how they can use mirrors and tracing paper and that they can turn the page around if it helps. Demonstrate how this might help with the second pair of shapes.</p> <ul style="list-style-type: none"> Hold up some regular polygons. <div>Q What are these polygons called?</div> <p>Collect responses and record the names on a large sheet for display.</p> <div>Q What is a regular polygon?</div> <p>Remind children that regular polygons have all their sides equal and all their angles equal. Using the OHP identify the lines of symmetry (on the regular polygons you have shown the class). Record these on the board. Establish that, if a polygon is regular, it will have the same number of lines of symmetry as the number of sides.</p>	<ul style="list-style-type: none"> Review key points about symmetry and reflections. Select related past test questions for children to discuss and answer. Draw out what children should focus on when answering these questions. <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none"> Recognise reflective and rotational symmetry; Classify 2-D shapes and discuss their properties; Sketch the reflection of a simple shape in a mirror line touching it at one point, when the edges are not necessarily parallel or perpendicular to the mirror line. <p>(Refer to supplement of examples, section 6, pages 79-81, 107.)</p>

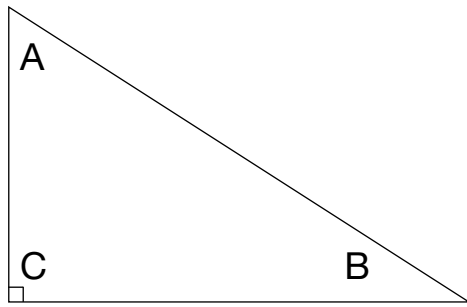
Planning sheet	Day Three	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Visualise 3-D shapes from 2-D drawings.</p> <p>VOCABULARY opposite net</p> <p>RESOURCES OHT 3.4 Interlocking cubes Whiteboards</p>	<ul style="list-style-type: none"> Show solid 1 on OHT 3.4. <div>Q How many cubes are in this solid?</div> <p>Establish that there are six (though it could be seven with one cube hidden). Show the class a model of the solid made from six cubes.</p> Ask children to draw on their whiteboards the view they would see looking down on the shape. Move the cubes to confirm it is an L shape, as shown below: <div>  </div> Show solid 2. <div>Q Is this a picture of the same solid?</div> <p>Encourage children to explain their reasons. Agree the solids are the same and confirm this using the cubes.</p> Repeat, showing solids 3 and 4. Establish solids 3 and 4 are not the same solids as solids 1 and 2 but that solids 3 and 4 are the same solids. Use the cubes to confirm this. Ask children to compare solids 1 and 3, and to think of them as tunnels. Moving along two cubes and up three cubes, solid 1 turns one way and solid 2 turns the other way. Point to the face of a cube on solid 3. <div>Q Where is this face on solid 4?</div> <p>Get children to show the face on the OHT. Repeat for solids 1 and 2.</p> <p>Discuss the strategies that the children used to identify where the faces are on the other solids.</p> 	<p>Calculate perimeter and area of complete compound shapes that can be split into rectangles.</p> <p>VOCABULARY area perimeter sequence</p> <p>RESOURCES Activity sheet 3.2 Related Key Stage 2 national test questions on area and perimeter</p>	<ul style="list-style-type: none"> Give out Activity sheet 3.2. <div>Q Which is larger, Shape A or Shape B?</div> <p>Collect children's initial responses.</p> <div>Q What were you comparing when you decided which shape was larger?</div> <p>Establish that the area is the measure of space in a shape; the perimeter is the measure of length around the shape.</p> <div>Q What units do we use to measure area and perimeter?</div> <p>Agree that in this case we are using cm^2 and cm.</p> Get children to find the area and perimeter for shapes A and B. Encourage the children to draw on the shapes if it helps them. Agree shape A has the larger area but the smaller perimeter. Ask children to find the area of shape C. Collect answers and discuss the methods the children used. <div>Q Can you draw a rectangle next to C with the same area as C?</div> <p>Establish the different rectangles that can be drawn that have the area 12 cm^2.</p> <div>Q Can you draw a triangle and a parallelogram with the same area as C?</div> <p>Collect children's methods for drawing these shapes.</p> Explain that the three shapes below are the first three shapes in a sequence. <div>Q How is the sequence formed?</div> <p>Discuss children's explanations. Ask children to find the areas of these shapes.</p> <div>Q What shape is the tenth shape in the sequence?</div> <p>Agree it will be a rectangle made from 10 of the L shapes. Remind children that the area of a rectangle can be found using the formula: $\text{area} = \text{length} \times \text{breadth}$.</p> <div>Q What will be the length and breadth of the tenth shape?</div> <p>Ask children to write a short explanation of how they knew what the length and breadth were and share their explanations with a partner. With the class, agree a short explanation and write this on the board. Remind children that, in some test questions, they are asked to write brief explanations like this. Set children a selection of related test questions that involve finding areas and perimeters.</p> 	<ul style="list-style-type: none"> Discuss the test questions the children have been working on. Emphasise how annotating the question paper might help them. Remind them of the key points arising from the lesson and set them past test questions to do at home. Ask children to look at the L shape on Activity sheet 3.2. <div>Q If we doubled the length of each side, what would the perimeter and area of the new L shape be?</div> <p>Discuss their answers and methods.</p> <p>Ensure they can recognise that while the perimeter doubles, the area is 4 times bigger.</p> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Calculate the perimeter and area of simple and compound shapes. <p>(Refer to supplement of examples, section 6, page 96, 97.)</p> </div>

Planning sheet	Day Four (page 1 of 2)	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Read and plot co-ordinates in all four quadrants.</p> <p>VOCABULARY axis axes x y co-ordinates quadrant origin</p> <p>RESOURCES OHP Whiteboards OHT 3.5 OHT 3.6</p>	<ul style="list-style-type: none"> Show OHT 3.5. Identify a point on the grid. <div>Q What are the co-ordinates of this point?</div> <p>Children record their answers on whiteboards. Ensure the children can identify co-ordinates correctly. Repeat with a point in each quadrant.</p> Identify the points with co-ordinates $(-2, -2)$ and $(4, -2)$. <div>Q How long is this line?</div> <p>Agree it is 6 units long, and this length of the line is the difference in the x co-ordinates. Say you want to identify the points on a rectangle that is 6 by 5, and the points, $(-2, -2)$ and $(4, -2)$ are two of the corners.</p> <div>Q What are the co-ordinates of the other two corners of this rectangle?</div> <p>Establish they are $(-2, 3)$ and $(4, 3)$ and the length of the other side, 5, fixes the y co-ordinate of these points.</p> Identify the points at $(1, -3)$ and $(5, 1)$. Say these points fix the side of a rectangle. <div>Q What could the co-ordinates of the other two points be?</div> <p>Establish that they could be $(4, 2)$ and $(0, -2)$, or $(3, 3)$ and $(-1, -1)$, or ... etc.</p> Identify the point $(5, -6)$. Say that a rectangle with area 12 square units is in the same quadrant as this point. <div>Q What could the co-ordinates of the other three points be?</div> <p>Establish that the rectangle can be 2 by 6 or 3 by 4 and, with the children, identify the possible co-ordinates for each rectangle.</p> Show OHT 3.6 revealing the top diagram. Say the co-ordinates of A are $(2, 1)$. <div>Q What could the co-ordinates of B, D and C be?</div> <p>Collect a set of sensible suggestions and write them on the board. Explain that M is the mid-point of AB and N the mid-point of BC. (Continued)</p> 	<ul style="list-style-type: none"> Recognise where a shape will be after two translations. <p>VOCABULARY transformation translation image clockwise anticlockwise</p> <p>RESOURCES Large sheet of paper Activity sheet 3.3 Tracing paper OHT 3.7 Selection from Related Key Stage 2 national test questions on area and perimeter</p>	<ul style="list-style-type: none"> Give children a shape from a selection of irregular shapes. Children work in pairs, one giving instructions for the other to move the shape (as with arrow keys on the computer), first with one translation, e.g. up 2; then with two translations – a combination of up or down, plus left or right. <div>Q How would you record the translation?</div> <div>Q What information do we need to describe a translation?</div> <p>Ensure that children understand that with translations the shape does not change in size or orientation.</p> <div>Q What information do we need to describe a reflection?</div> <p>Establish that children understand that with a reflection: the shape will always change in orientation (this is not always clear when using regular shapes); distance between the shape and the mirror line is the same both for the shape and the reflected image; size does not change.</p> Using grids in four quadrants with co-ordinates marked, children work in pairs transforming their irregular shapes with either two reflections or two translations. Each pair writes a brief explanation of what they have done. Use OHT 3.7. Ask children to record on whiteboards instructions to move shape 1 to shape 4; shape 2 to shape 3 etc. <div>Q How do we know these are translations, not reflections?</div> <p>Activity sheet 3.3. (one per pupil). Give instructions for children to translate the  shape, e.g. 3 right, 2 down, and mark the squares in the new position with crosses.</p> <div>Q How did you decide where the new shape would be?</div> <div>Q Are there other ways to do this?</div> <p>(Continued)</p> 	<ul style="list-style-type: none"> Discuss the test questions the children have been working on. Remind children of the key points that they should remember for the different transformations. <div>Q What properties of shapes do not change when they are reflected or translated?</div> Establish that angles, sides, areas and perimeters do not change. <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Sketch the position of a simple shape after it has been translated. Sketch the position of a simple shape after two translations or two reflections. <p>(Refer to supplement of examples, section 6, page 107–109.)</p>

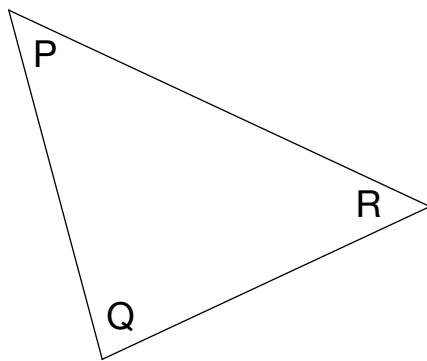
Planning sheet	Day Four (page 2 of 2)	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6	
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions	
	<div>Q What are the co-ordinates of M and N?</div> <p>Ensure children recognise that the mid-points are half-way between the pairs of points A and B, and B and C, and they can use this information to find the co-ordinates of M and N.</p> <p>Say that the co-ordinates of A are (3, 2) and the rectangle is 6 by 10. Repeat the above.</p> <ul style="list-style-type: none"> Reveal the bottom diagram on OHT 3.6. <div>Q What are possible co-ordinates for A, B and C?</div> <p>Collect responses and record a set of possibilities on the board. Say that M, P and Q are mid points.</p> <div>Q What are possible co-ordinates for M, P and Q?</div> <p>Ensure children can find these co-ordinates. Repeat using other co-ordinate values for A, B and C.</p>		<p>Discuss with children their strategies. (Some children may have focused on moving the whole shape, whilst others may have moved one square and placed the other squares in relation to this.) Continue with one or two more translations, ensuring that the final translation takes the shape back to the original position as a means of checking.</p> <ul style="list-style-type: none"> Children could then work in pairs on related questions from Key Stage 2 National test papers and discuss how they might solve them. 		

Planning sheet	Day Five	Unit 3 <i>Shape and space</i>	Term: <i>Summer</i>	Year Group: 6
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Rehearsal of mental mathematics, knowledge and skills.</p> <p>RESOURCES Timer Mental Mathematics Test Questions (Unit 1) Sheets of plain paper</p>	<ul style="list-style-type: none"> Give children 10 five second questions for them to answer on plain paper. Encourage them to use jottings if it helps. Collect answers and discuss any errors and misunderstandings. Repeat giving 10 ten second questions. Explain to children that in the test, even though they will have sheets with boxes for their answers to questions, they should still annotate questions and use jottings. 	<p>Review week's work and address objectives set out on front page.</p> <p>RESOURCES Resource sheet 3.1</p>	<ul style="list-style-type: none"> Give out Resource sheet 3.1. <div>Q Which of these diagrams are nets of cubes?</div> <p>Establish that diagrams 3, 5 and 6 are nets of cubes.</p> <div>Q If the shaded square is the base of the cube, which square is the top face of the cube?</div> <p>Collect answers and discuss children's methods.</p> Draw on the past test questions to create a short written timed test paper. Include questions that involve interpretation of 2-D drawings, of 3-D shapes, properties of shape and measuring angles. <p>Give children a set time to answer the questions.</p> <p>Collect children's answer papers for marking.</p>	<ul style="list-style-type: none"> Discuss the questions the children have been working on. Get them to reflect on what they can do and what they still need to work on. Identify those aspects of mathematics you will need to return to later.

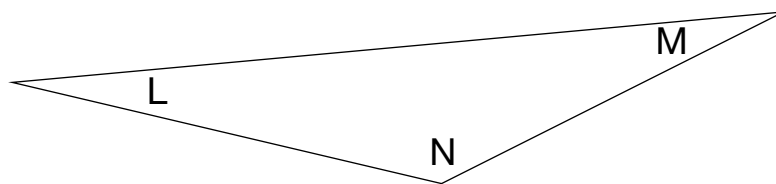
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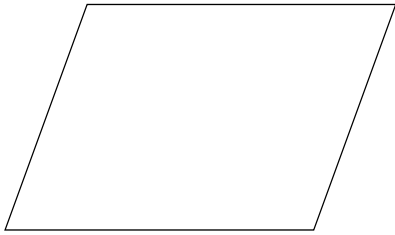
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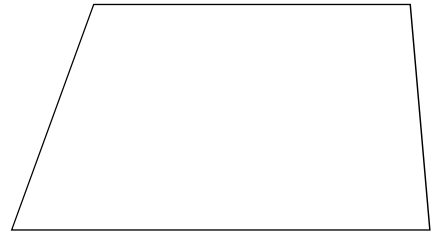
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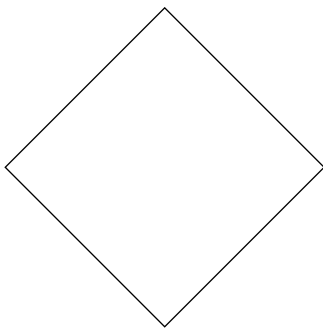
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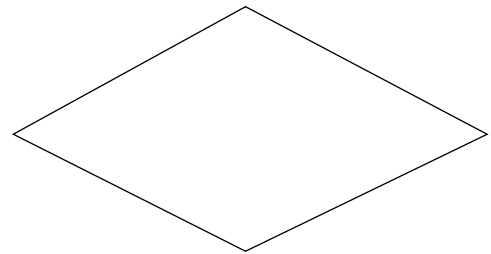
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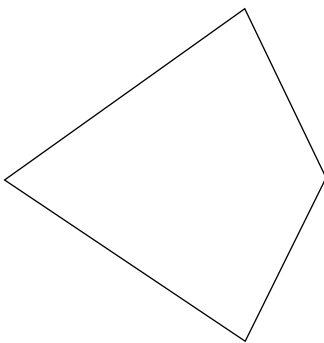
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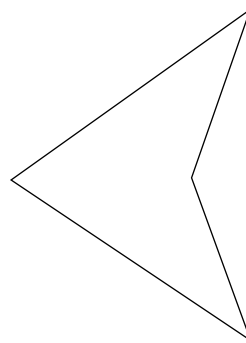
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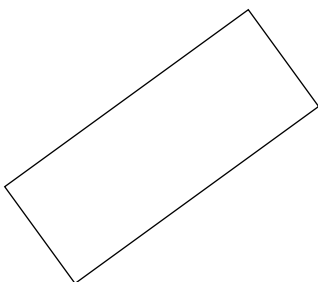
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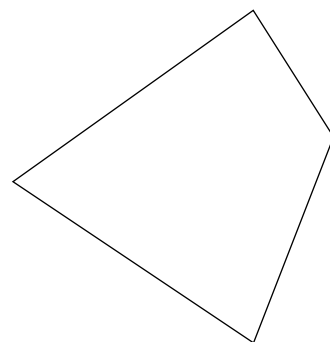
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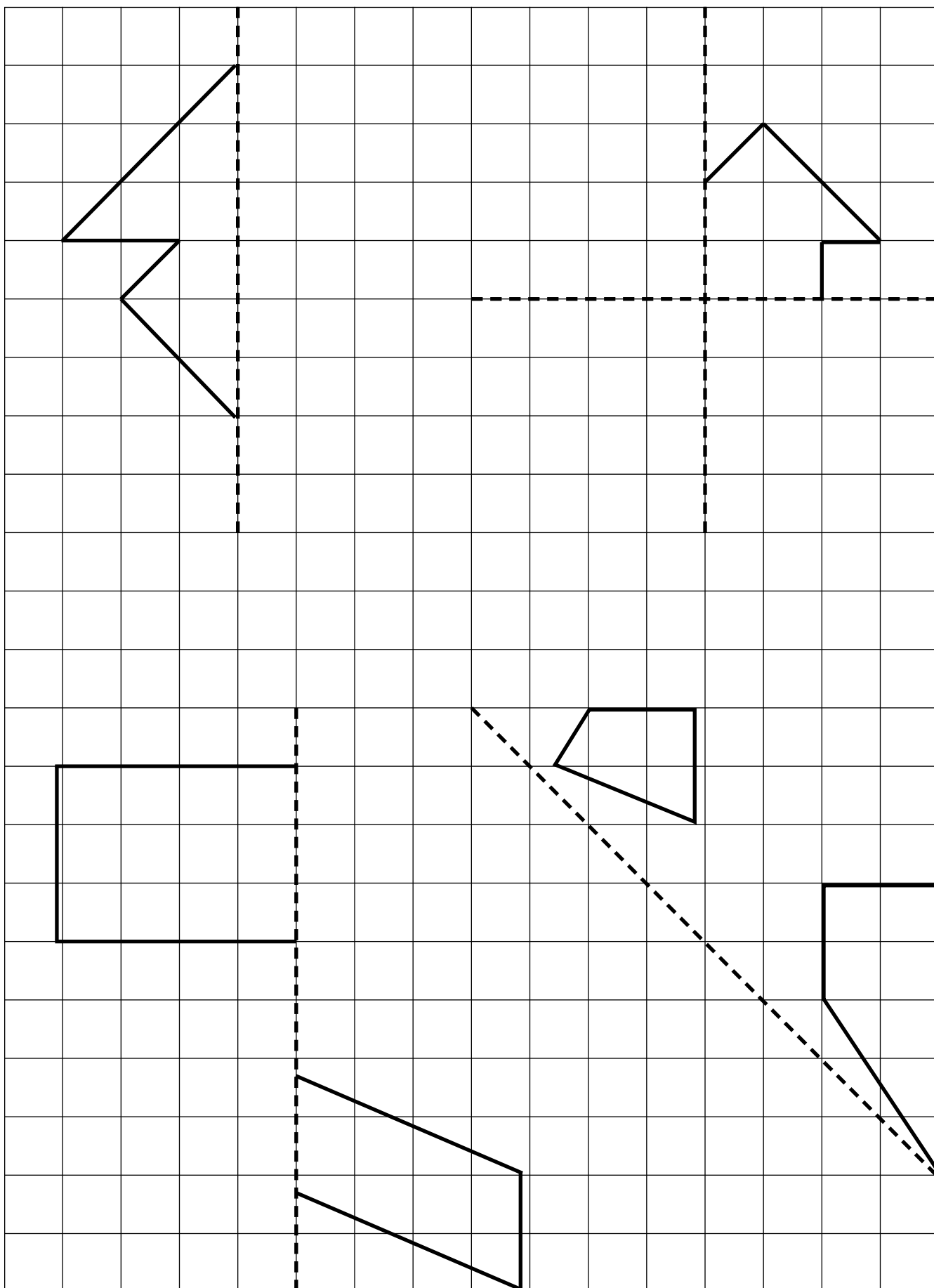


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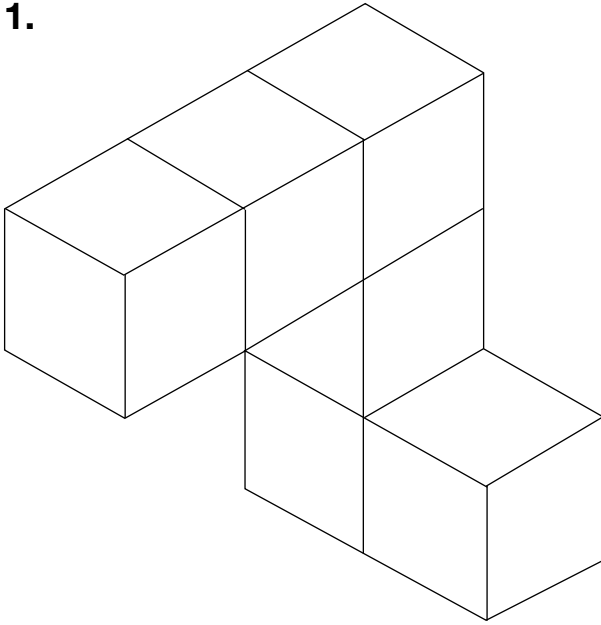


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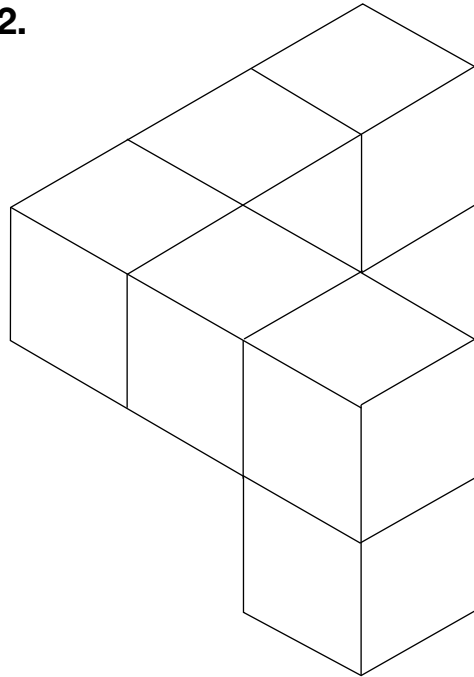




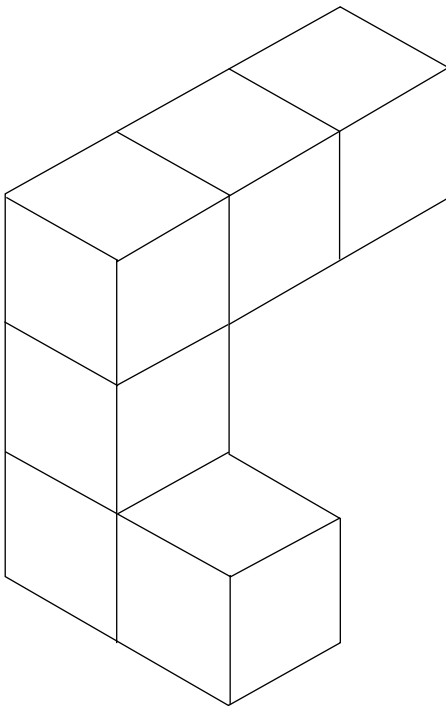
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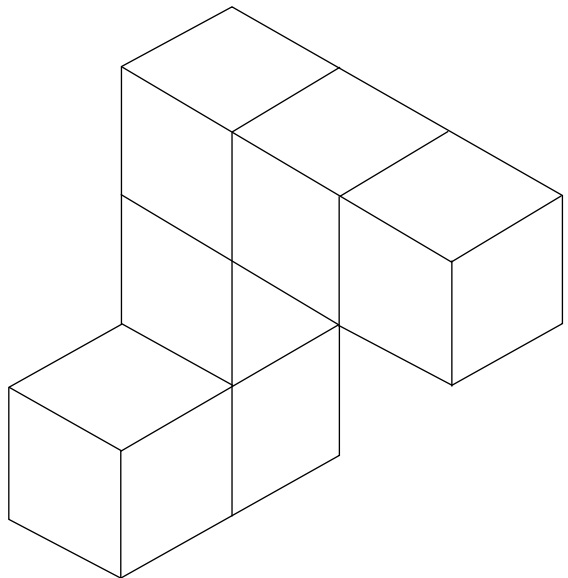
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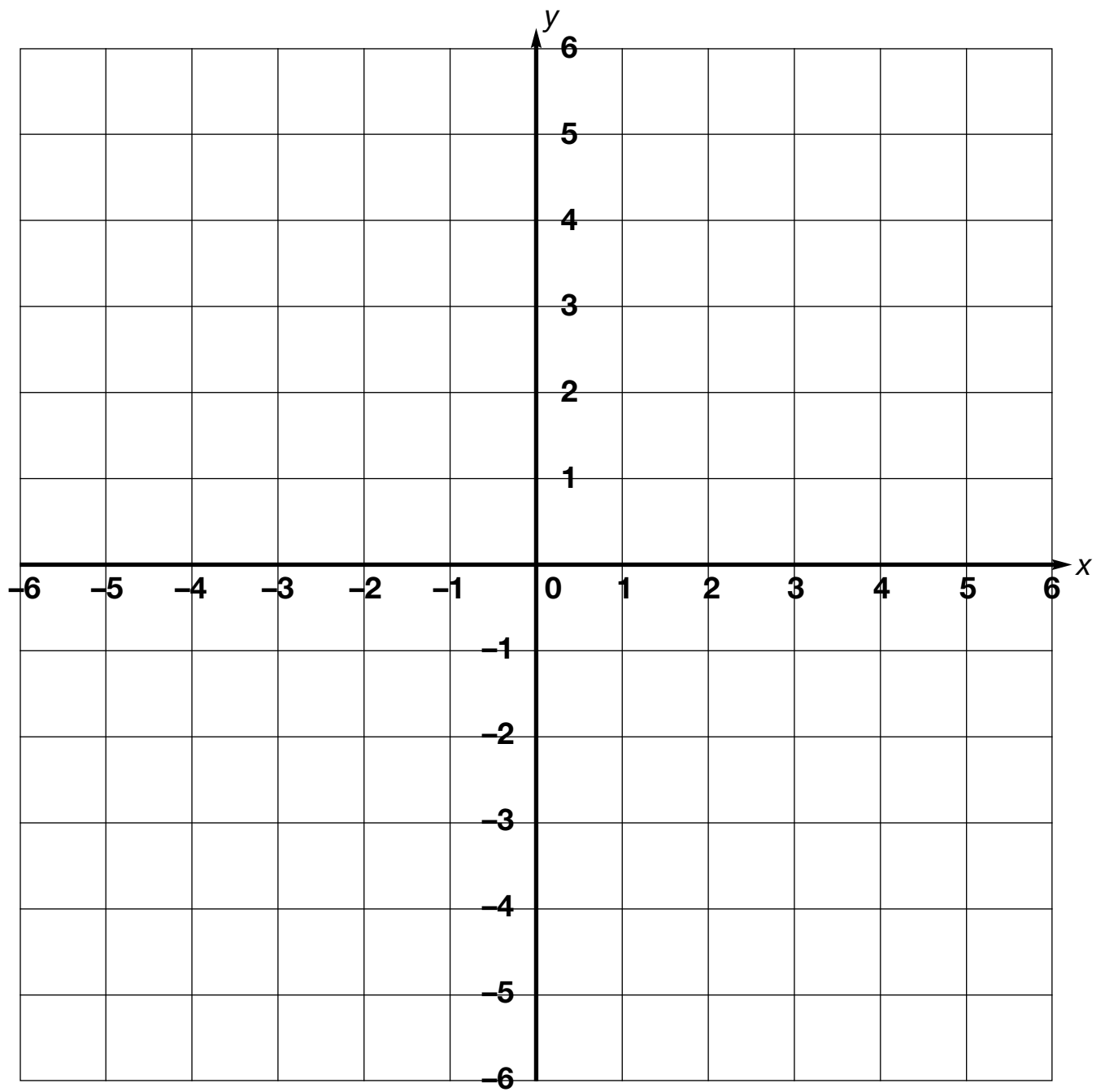


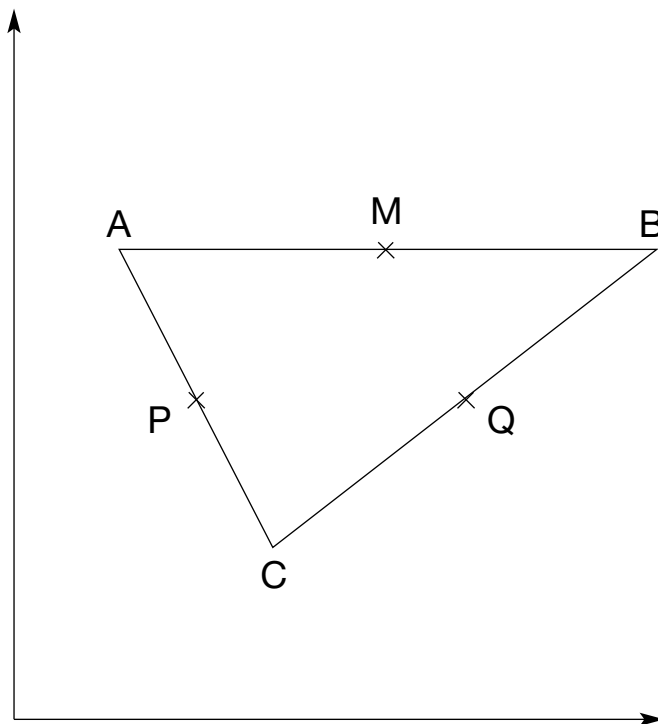
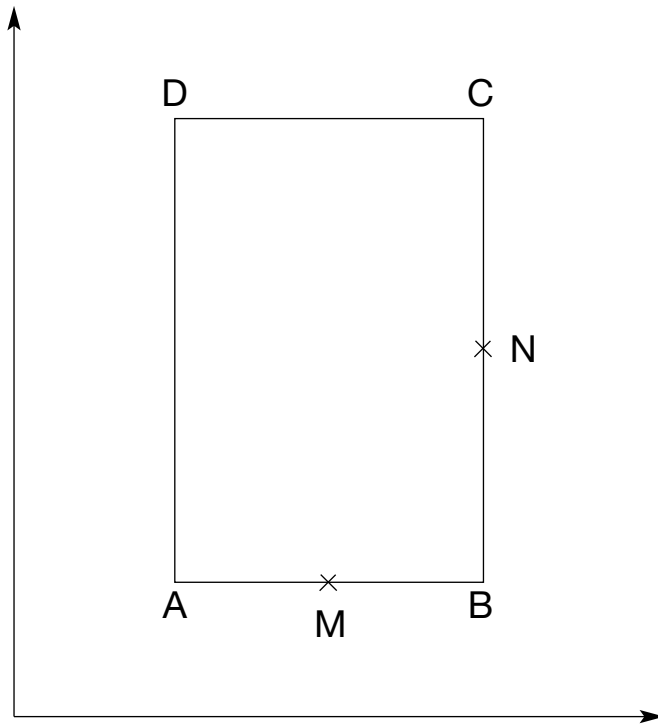
3.

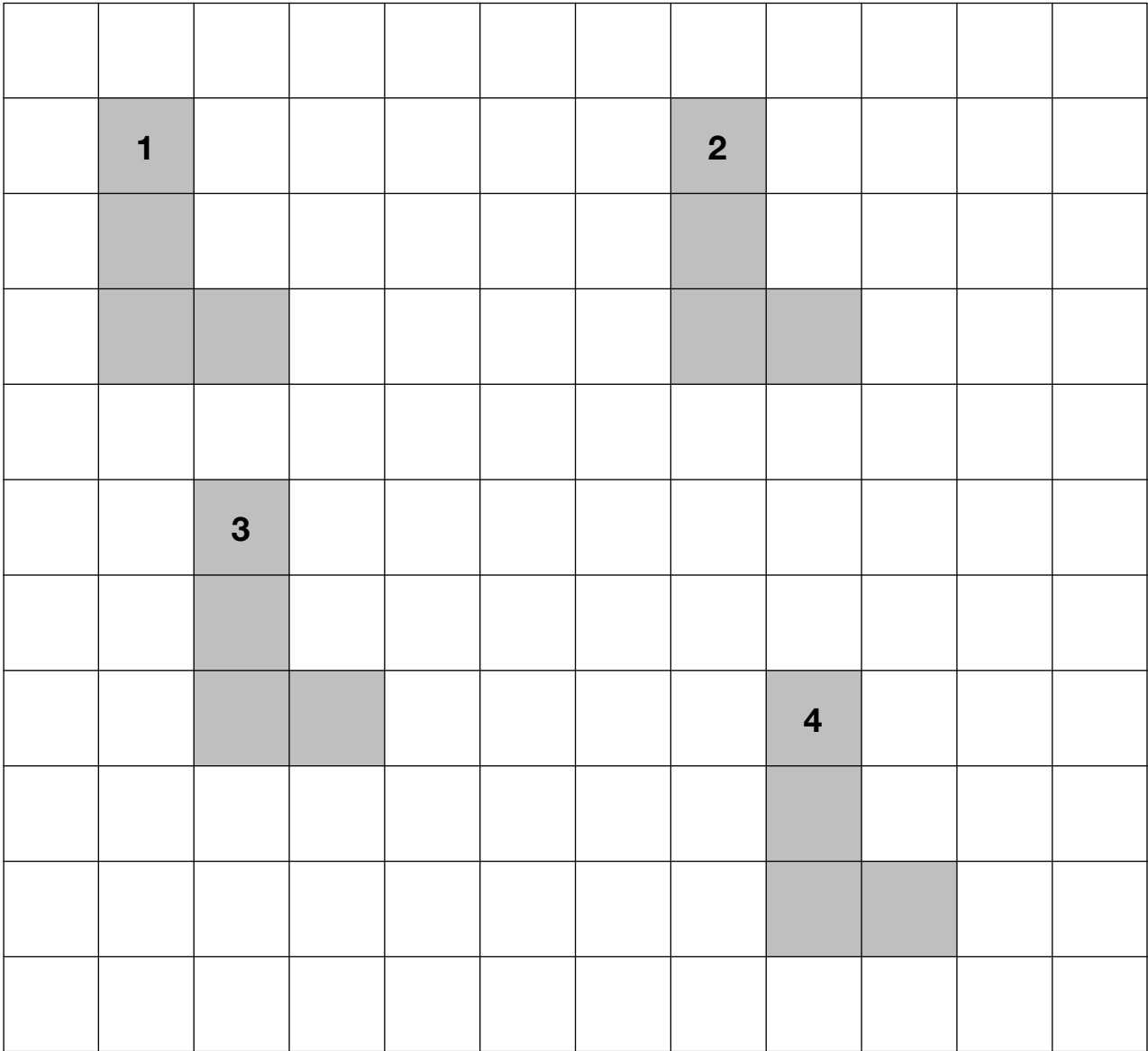


4.

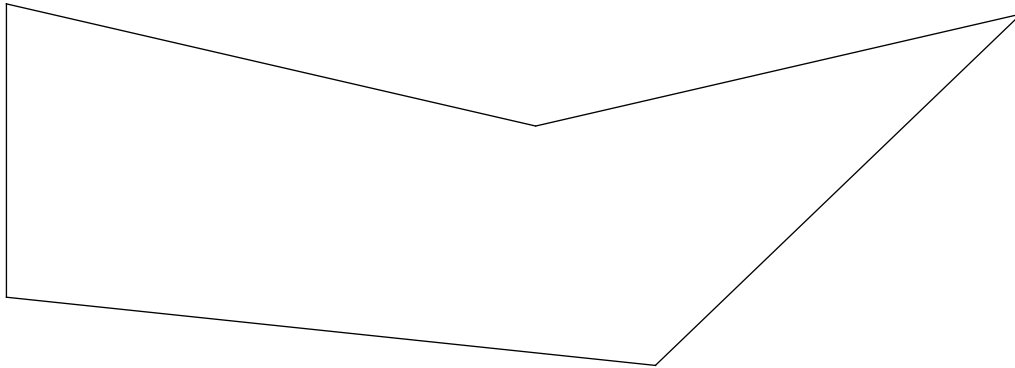








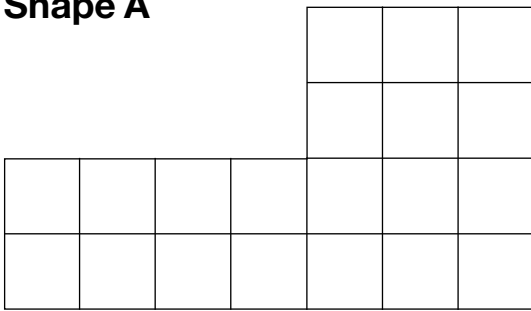
1.



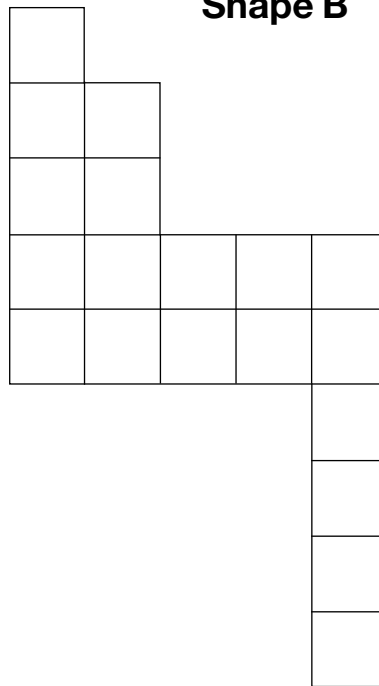
2.



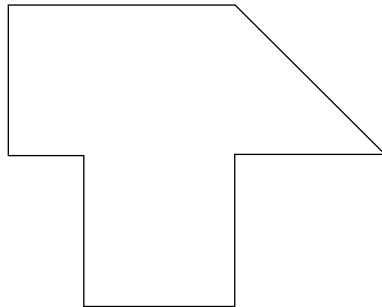
Shape A



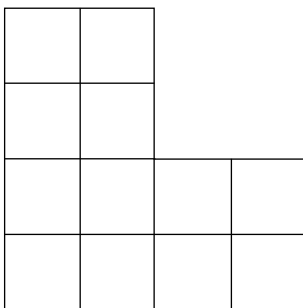
Shape B



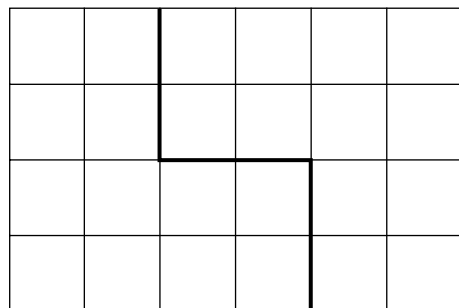
Shape C



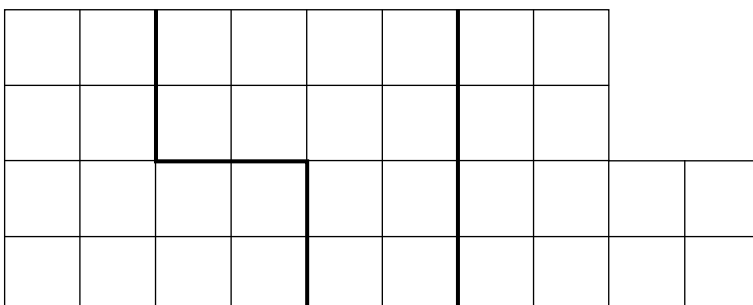
1.

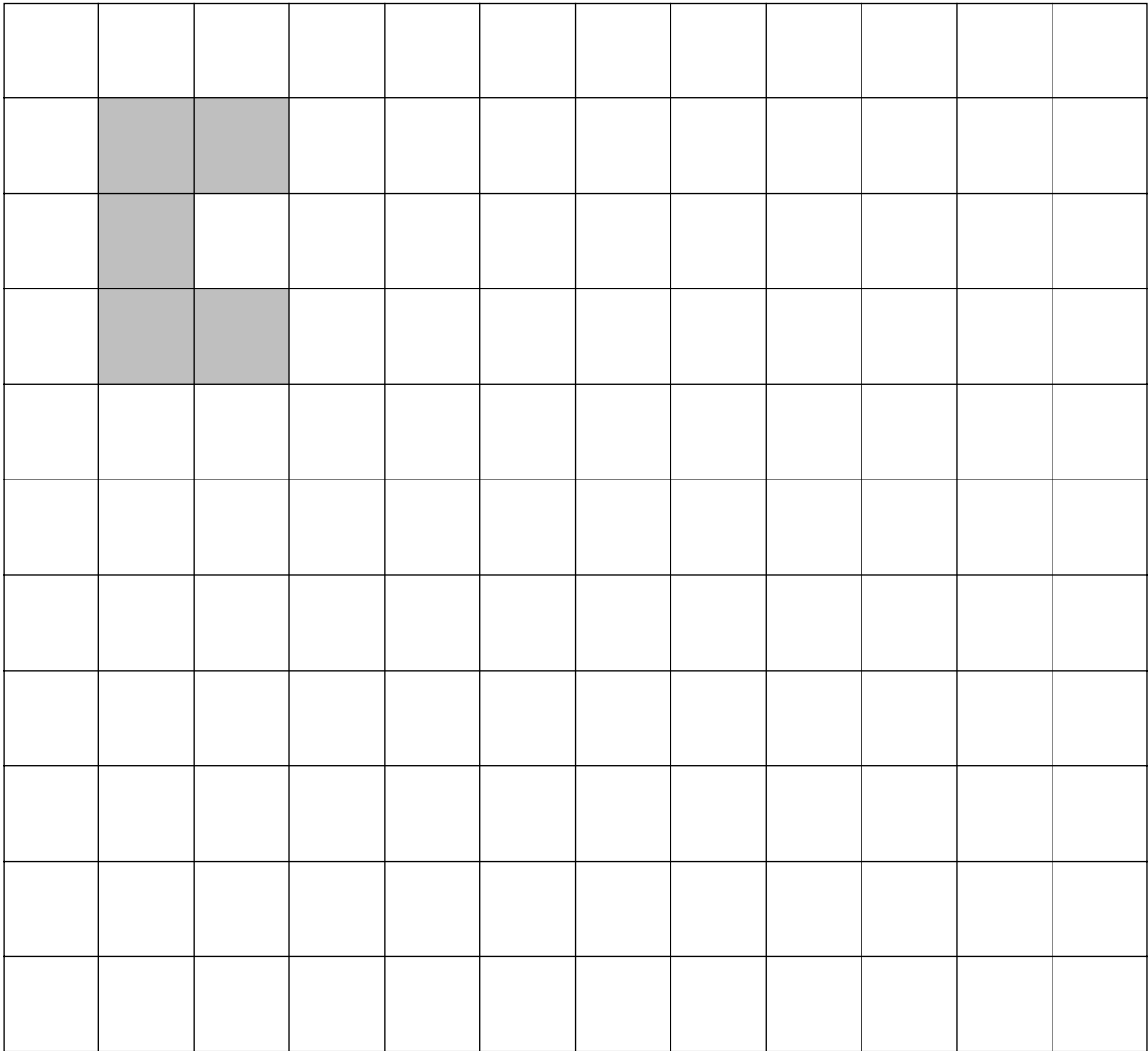


2.

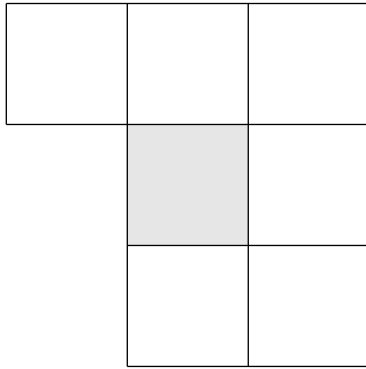


3.

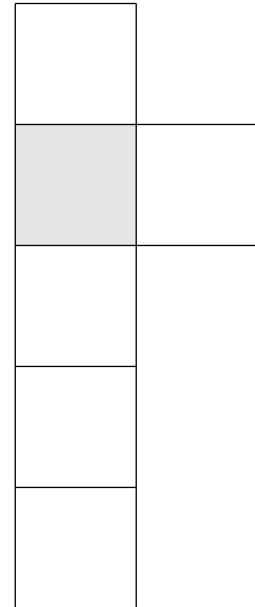




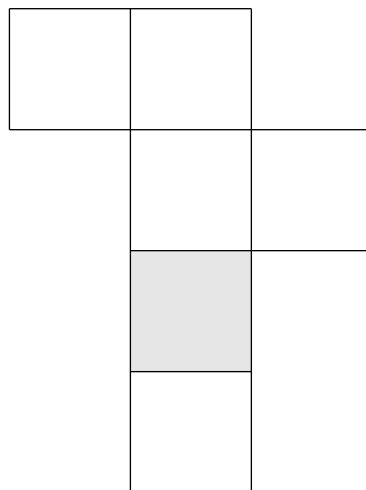
1.



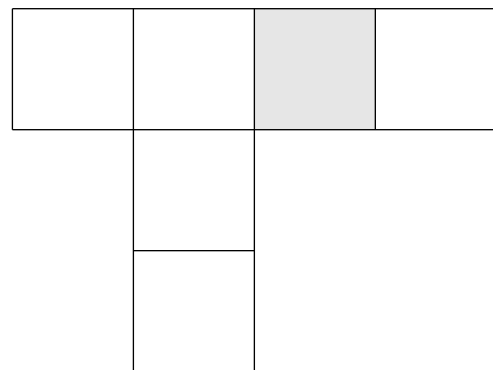
2.



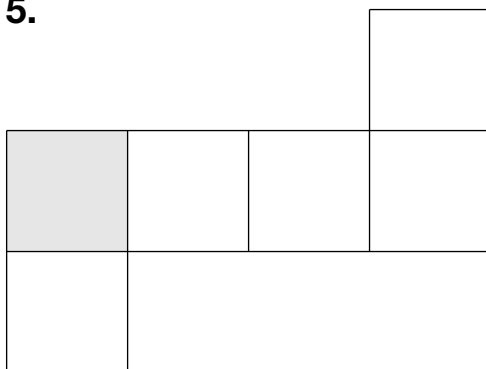
3.



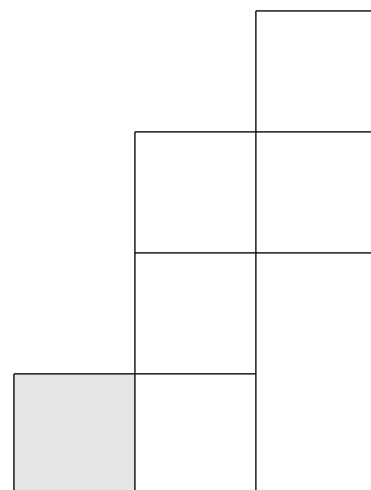
4.



5.



6.



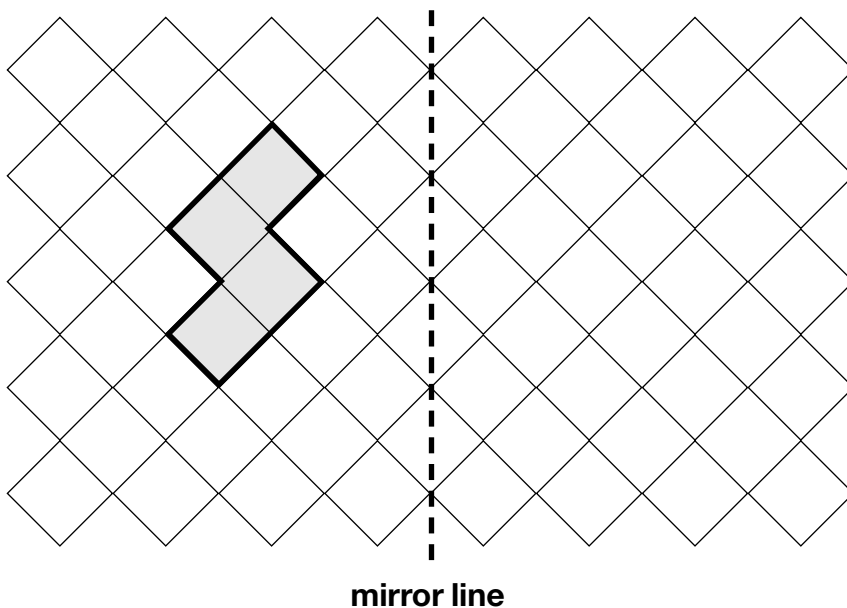
Related Key Stage 2 National test questions:

2001 Test A

4

Draw the **reflection** of the shaded shape in the mirror line.

You may use a mirror or tracing paper.



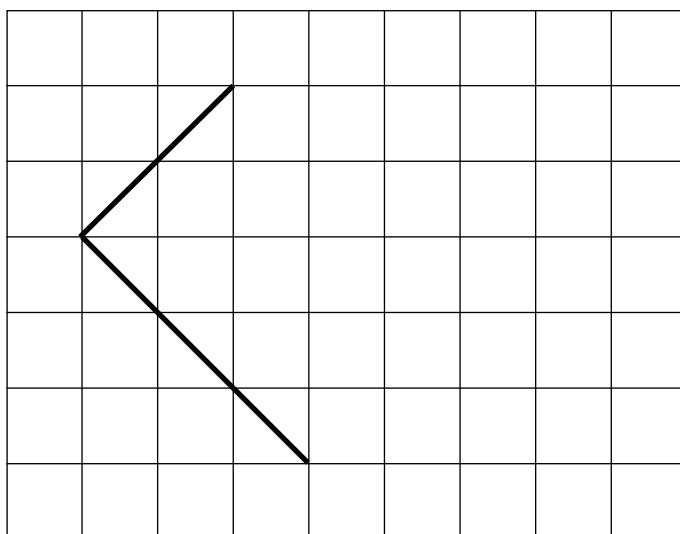
4

1 mark

6

Draw **two more straight lines** to make a rectangle.

Use a ruler.



6

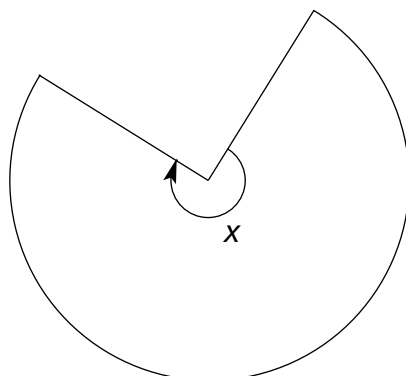
1 mark

Total

2001 Test A cont.

13

This shape is **three-quarters of a circle**.



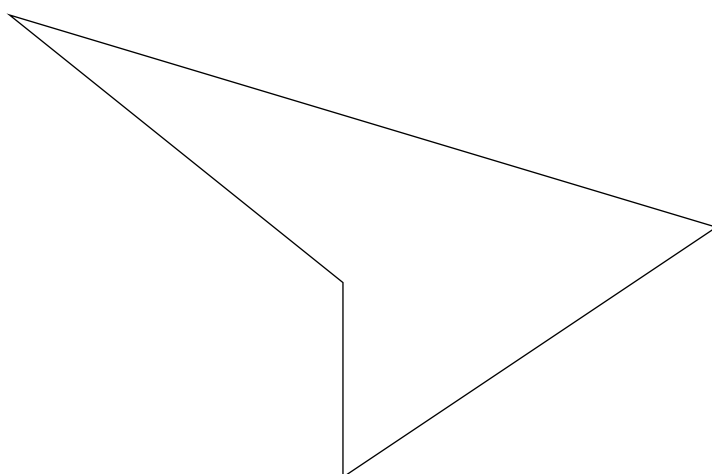
How many degrees is **angle x**?



13

1 mark

17



Measure accurately the **longest side** of this shape.

Give your answer in millimetres.


 mm

17

1 mark

Total

2001 Test A cont.

Measure accurately the **smallest angle** in the shape.

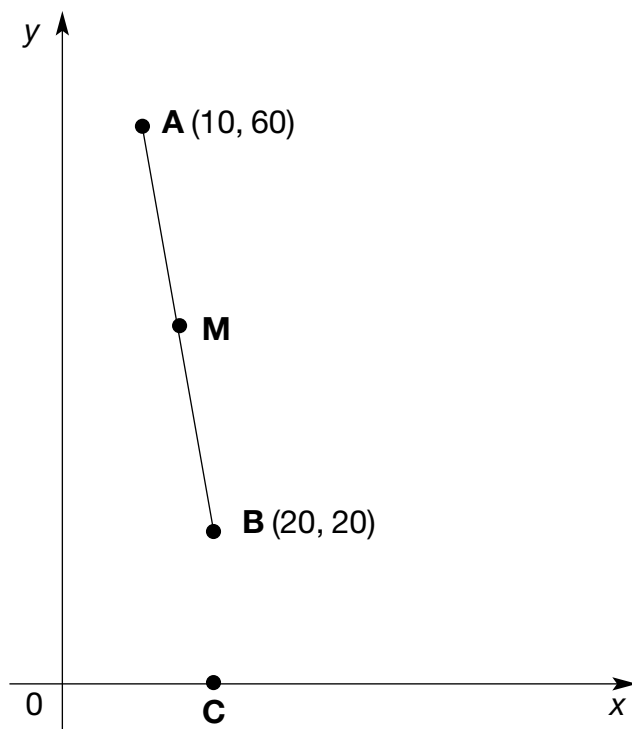
Use a protractor (angle measurer).



17

1 mark

20



A is the point **(10, 60)**.

B is the point **(20, 20)**.

M is the mid point of line AB.

Write the co-ordinates of **M**.



20

1 mark

Total

2001 Test A cont.

C is on the x-axis, directly **below B**.

Write the co-ordinates of **C**.



(,)

20

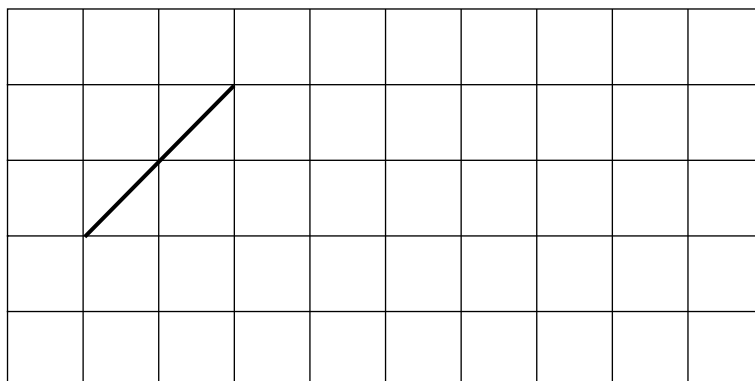
1 mark

25

This is a centimetre grid.

Draw **3 more lines** to make a **parallelogram** with an **area of 10 cm²**

Use a ruler.



25

1 mark

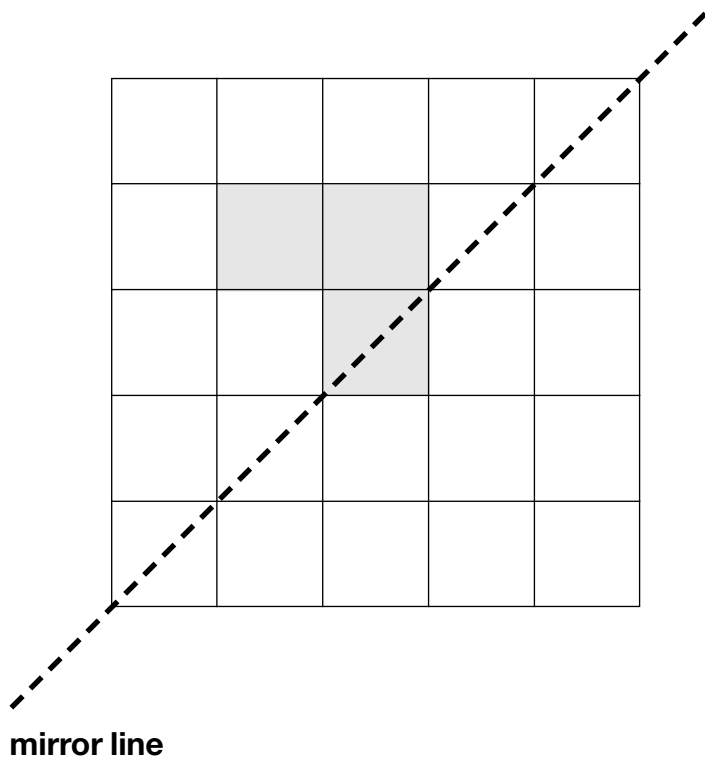
Total

2001 Test B

3

Shade in **two more squares** to make this design symmetrical about the mirror line.

You may use a mirror or tracing paper.



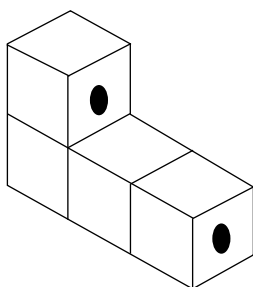
3

1 mark

8

Tom makes this shape from four cubes stuck together.

Two circles are drawn on the shape.

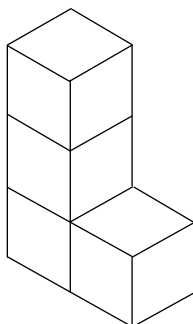


Tom moves the shape.

Total

2001 Test B cont.

Draw the **circles** on the shape in its new position.

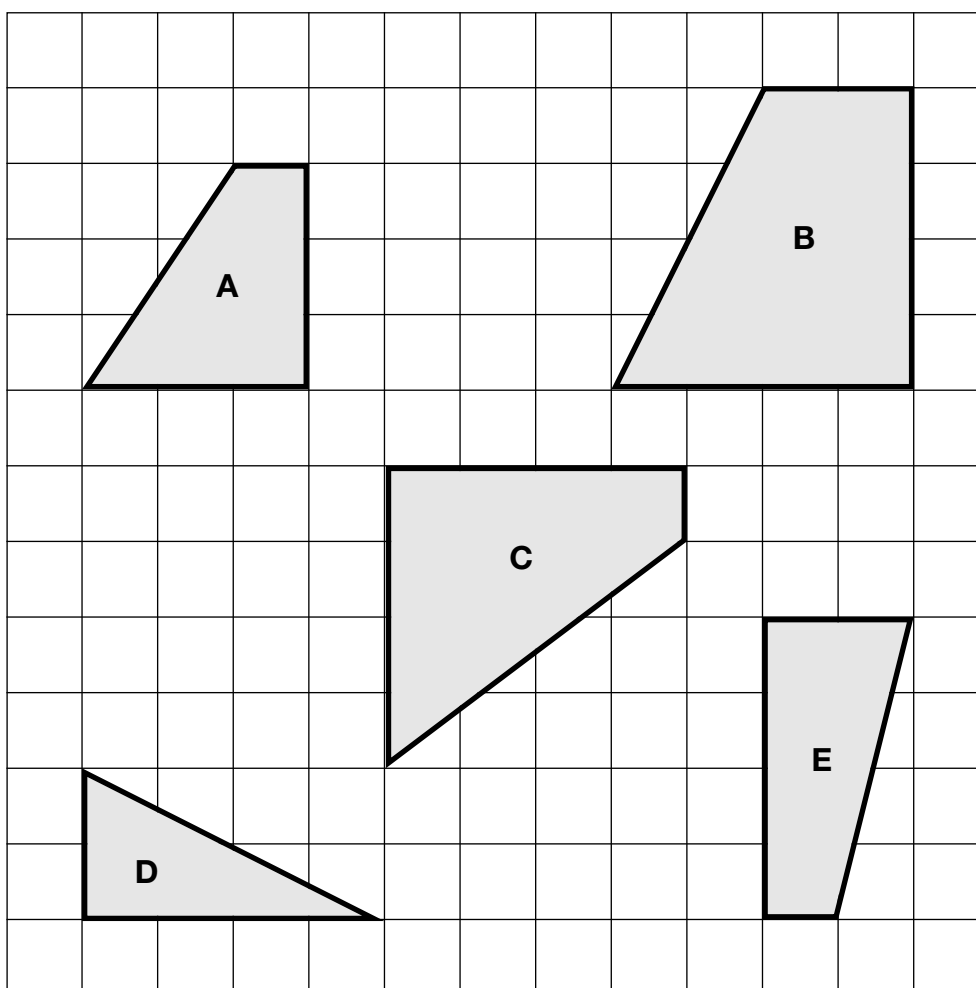


8

1 mark

15

Here are five shapes on a square grid.



Which **two** shapes fit together to make a **square**?



..... and

15

1 mark

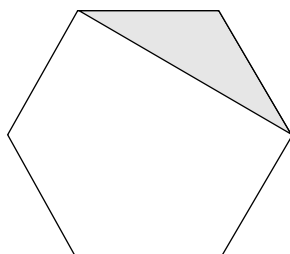
Total

2001 Test B cont.

18

These two shaded triangles are each inside a regular hexagon.

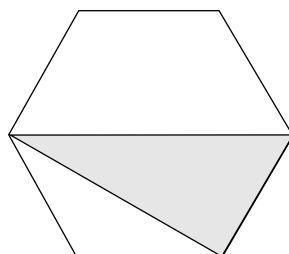
Under each hexagon, put a ring around the correct name of the shaded triangle.



equilateral

isosceles

scalene



equilateral

isosceles

scalene

18

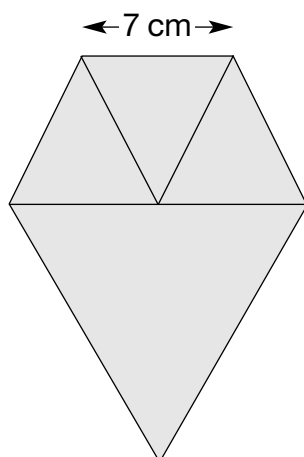
1 mark

20

Lauren has **three small equilateral triangles** and **one large equilateral triangle**.

The small triangles have sides of **7 centimetres**.

Lauren makes this shape.



Not actual size

Calculate the **perimeter** of the shape.

Do **not** use a ruler.



cm

20

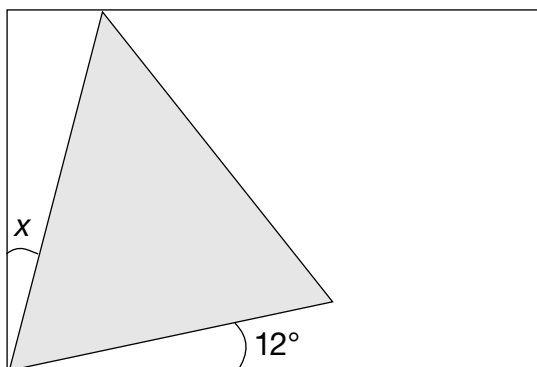
1 mark

Total

2001 Test B cont.

26

Here is an **equilateral triangle** inside a **rectangle**.



Not to scale

Calculate the value of angle x .

Do **not** use a protractor (angle measurer).



Show
your **method**.
You may get
a mark.

°

26

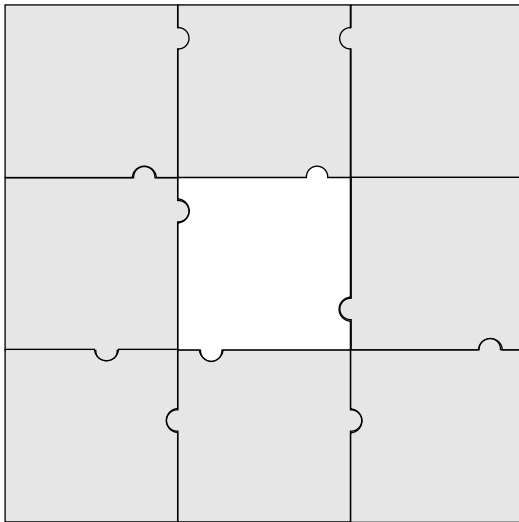
2 marks

Total

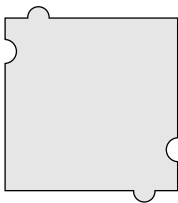
2000 Test A

3

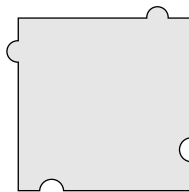
Here is a jigsaw with one piece **missing**.



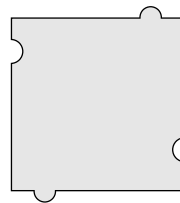
Which **one** of the pieces below fits the hole in the middle?



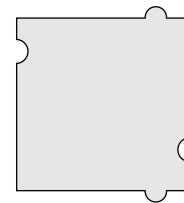
A



B



C



D



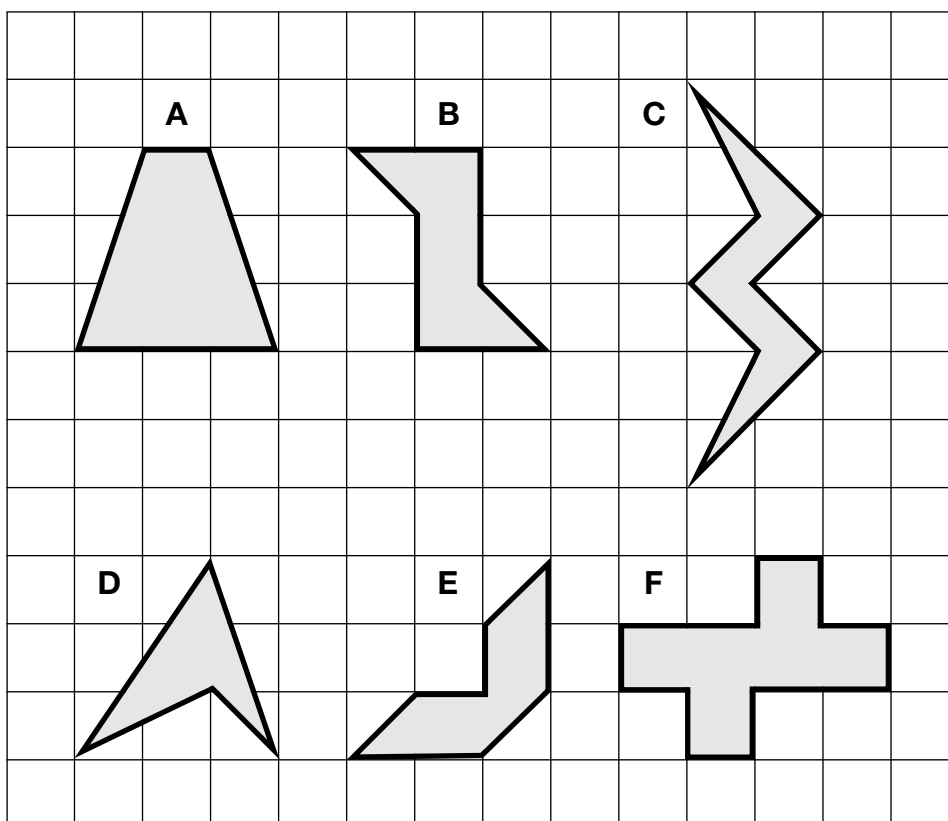
3

1 mark

Total

9

Here are some shaded shapes on a grid.



Which **three** shapes have **reflective symmetry**?

You may use a mirror or tracing paper.



.....

9

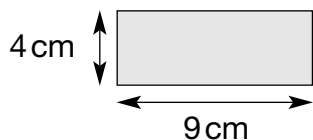
2 marks

Total

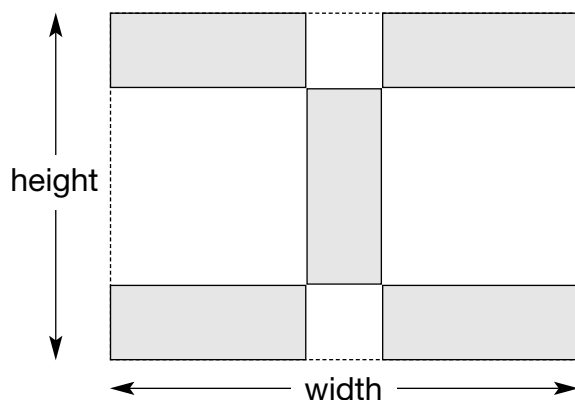
2000 Test A cont.

16

Kim has some rectangular tiles.

Each one is **4 centimetres** by **9 centimetres**.

She makes a design with them.

Calculate the **width** and **height** of her design.

width =

 cm

height =

 cm

2 marks

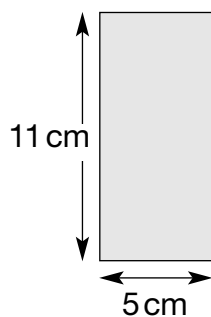
16

Total

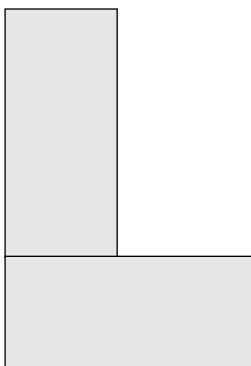
2000 Test A cont.

19

Liam has two rectangular tiles like this.



He makes this L shape.



What is the **perimeter** of Liam's L shape?



cm

1 mark

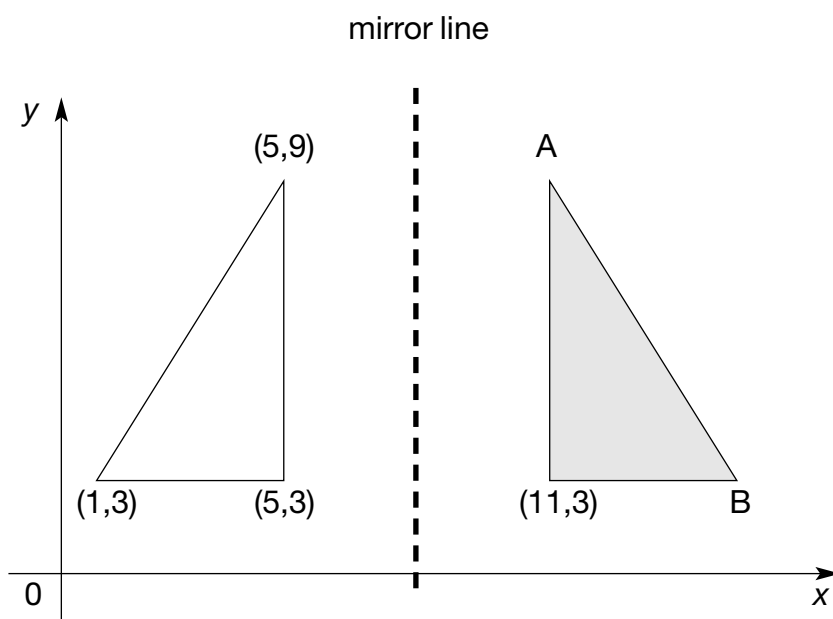
19

Total

2000 Test A cont.

22

The shaded triangle is a reflection of the white triangle in the mirror line.



Write the **co-ordinates** of point **A** and point **B**.



A is

B is

2 marks

22

Total

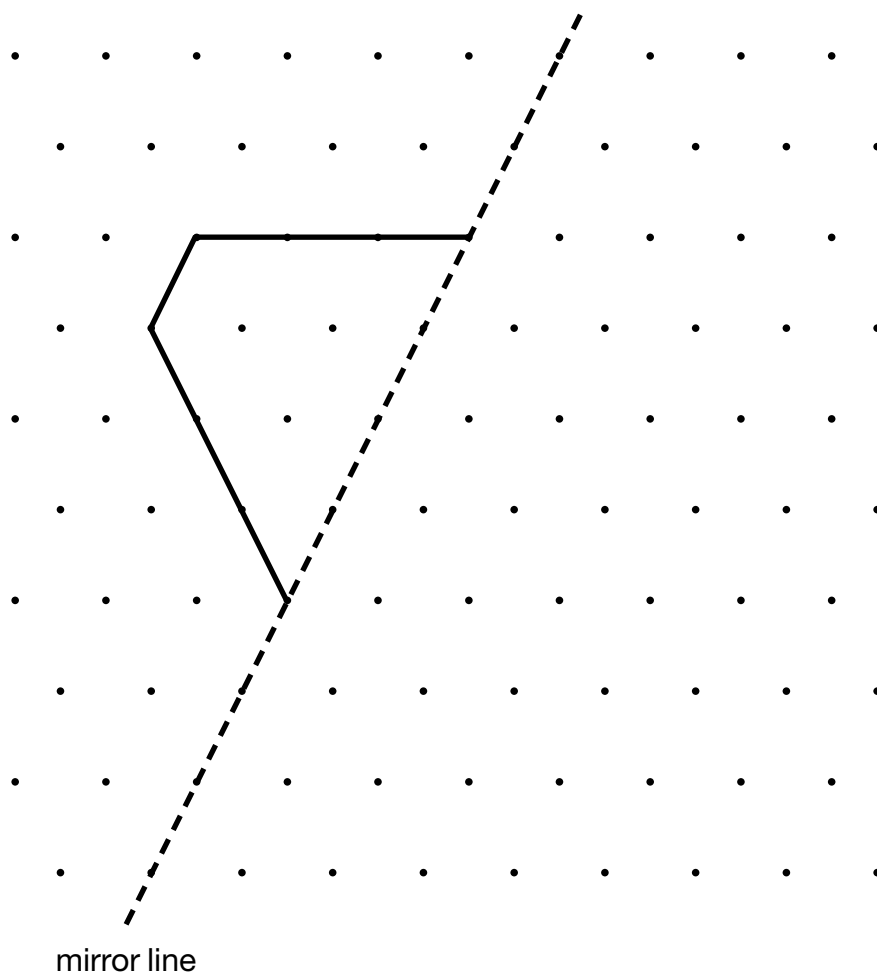
2000 Test B

6

Draw the **reflection** of the shape in the **mirror line**.

Use a ruler.

You may use a mirror or tracing paper.



6

1 mark

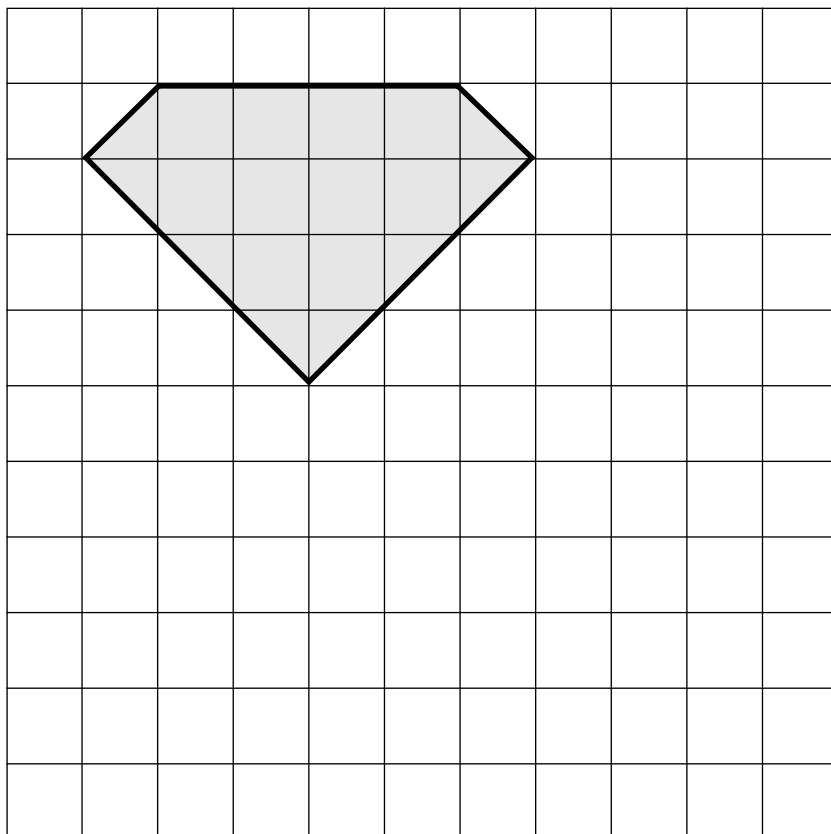
Total

2000 Test B cont.

11

On the grid, draw a **rectangle** which has the **same area** as this shaded pentagon.

Use a ruler.



11

1 mark

Total

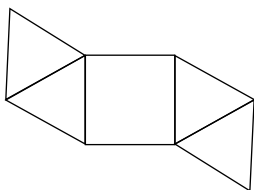
2000 Test B cont.

13

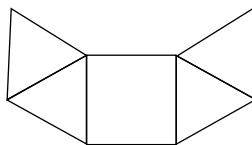
Look at each of these diagrams.

Put a tick (✓) if it is the **net of a square-based pyramid**.

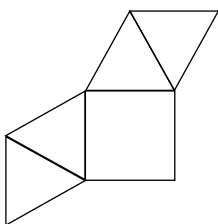
Put a cross (✗) if it is **not**.



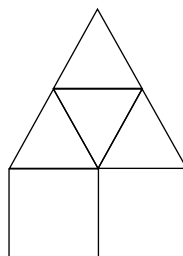
.....



.....



.....



.....

2 marks

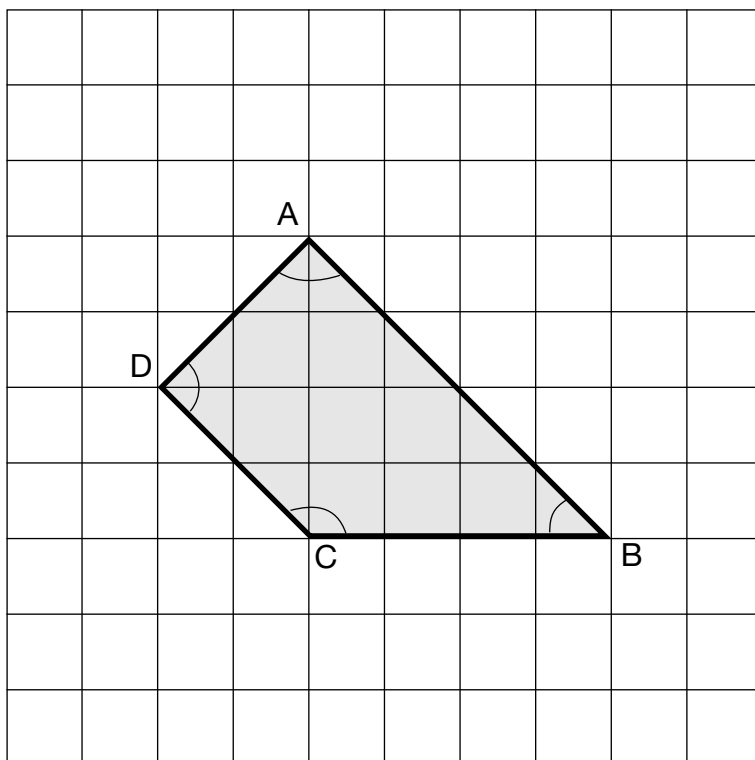
13

Total

2000 Test B cont.

20

Here is a shape on a square grid.



For each sentence, put a tick (✓) if it is true.

Put a cross (X) if it is not true.

Angle **C** is an **obtuse** angle.
☐
Angle **D** is an **acute** angle.
☐
Line **AD** is **parallel** to line **BC**.
☐
Line **AB** is **perpendicular** to line **AD**.
☐

20

2 marks

Total

1999 Test A

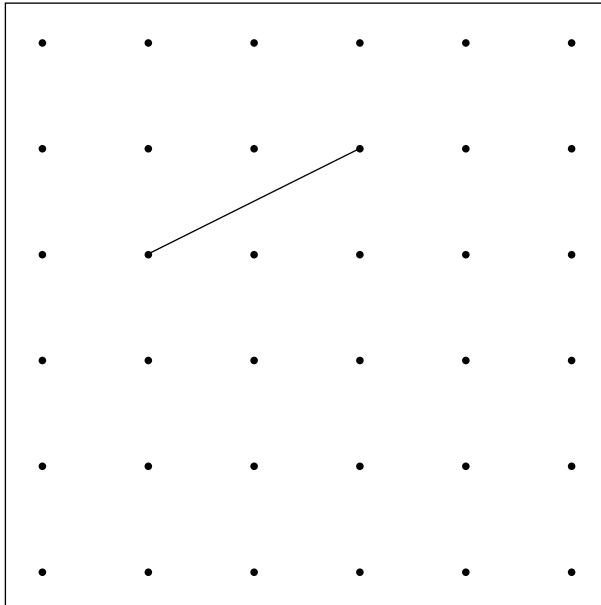
2

The line on the grid is one side of a **square**.

On the grid, draw the **other three sides** of the square.



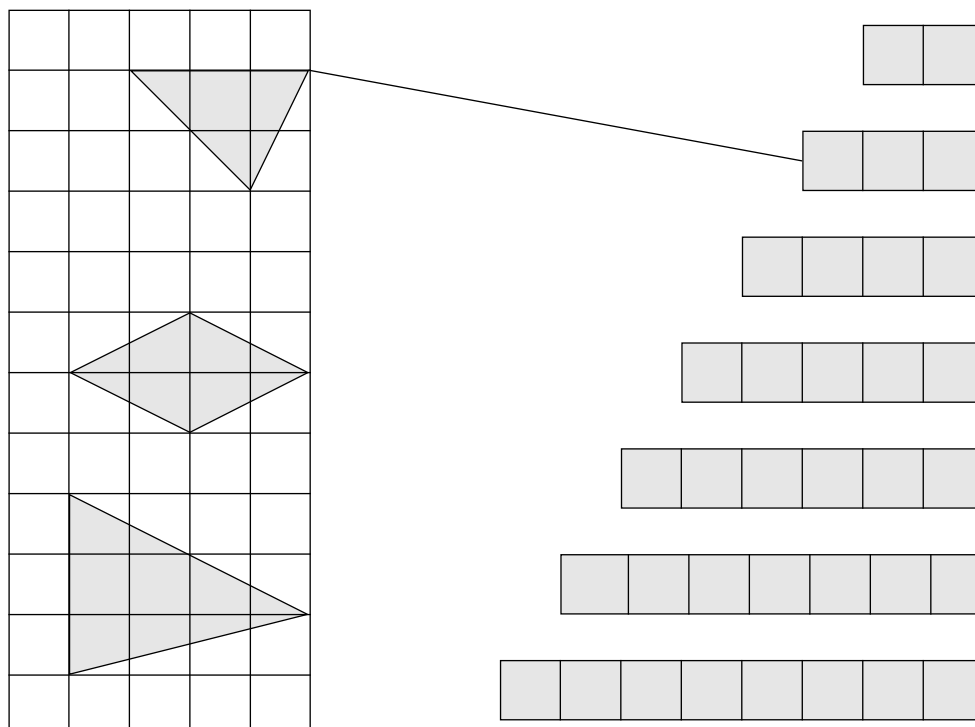
Use a ruler.



5

Draw **one line** from each shape to the rectangle which has the **same area**.

One is done for you.



2

1 mark

5

2 marks

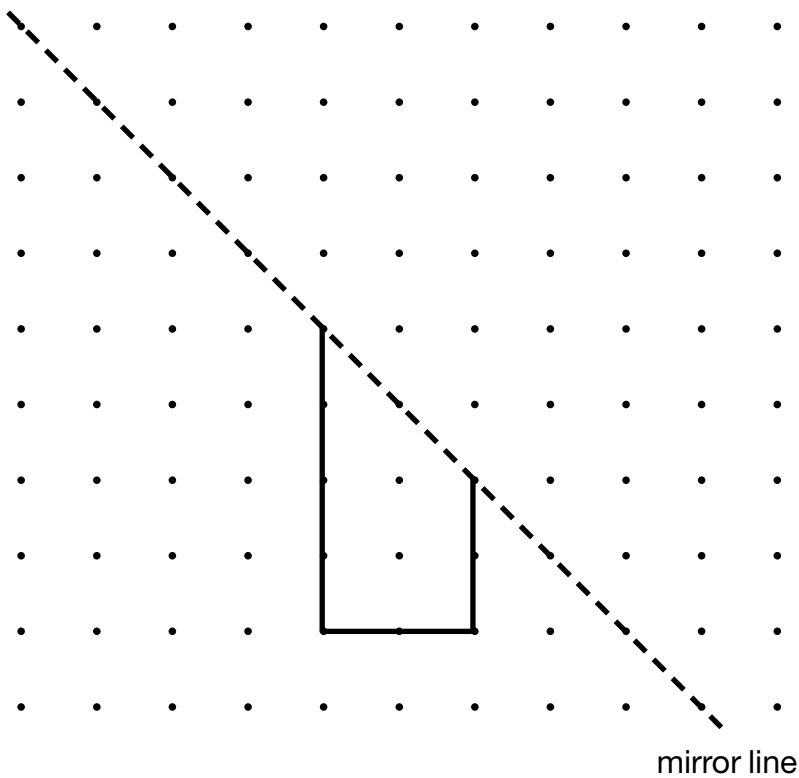
Total

1999 Test A cont.

8

Use a ruler to draw the **reflection** of this shape in the mirror line.

You may use a mirror or tracing paper.



8

1 mark

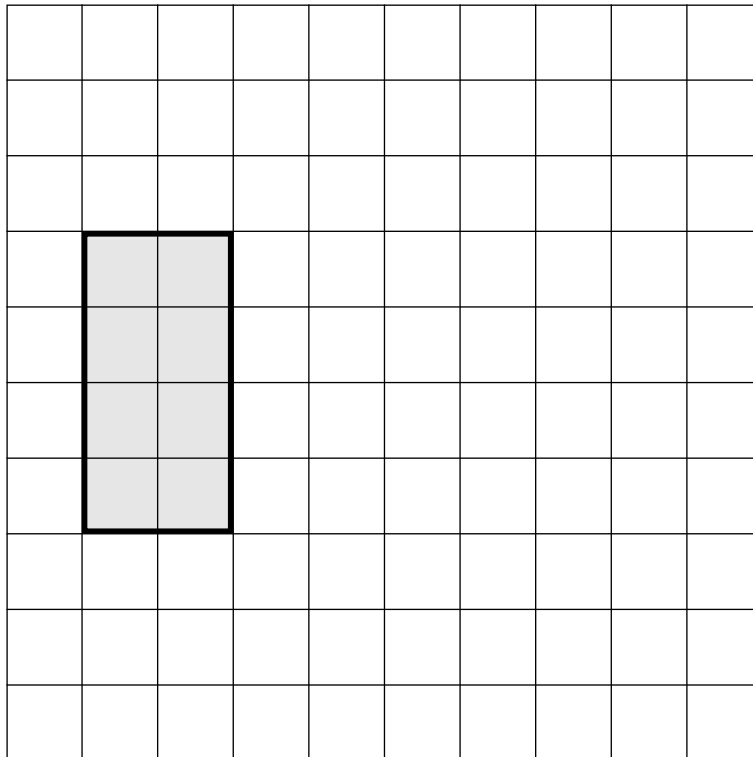
Total

1997 Test A cont.

19

On the grid draw a **triangle** with the **same area** as the shaded rectangle.

Use a ruler.



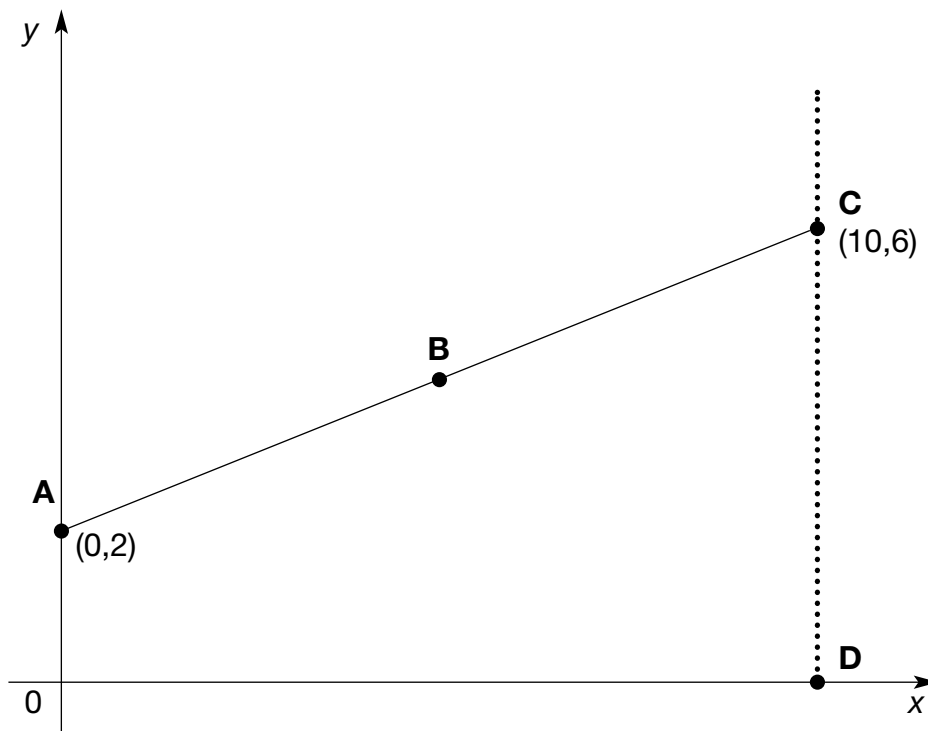
19

1 mark

Total

20

Here is a graph



The points **A**, **B** and **C** are **equally spaced**.

What are the **co-ordinates** of the **point B**?



Point **D** is directly below point **C**.

What are the **co-ordinates** of the **point D**?



20

1 mark

20

1 mark

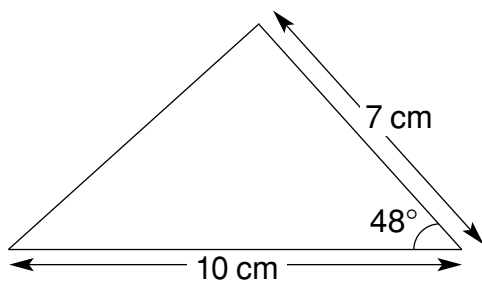
Total

1999 Test A cont.

22

Here is a sketch of a triangle.

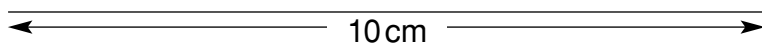
It is not drawn to scale.



Draw the full size triangle **accurately**, below.

Use an angle measurer (protractor) and a ruler.

One line has been done for you.



22

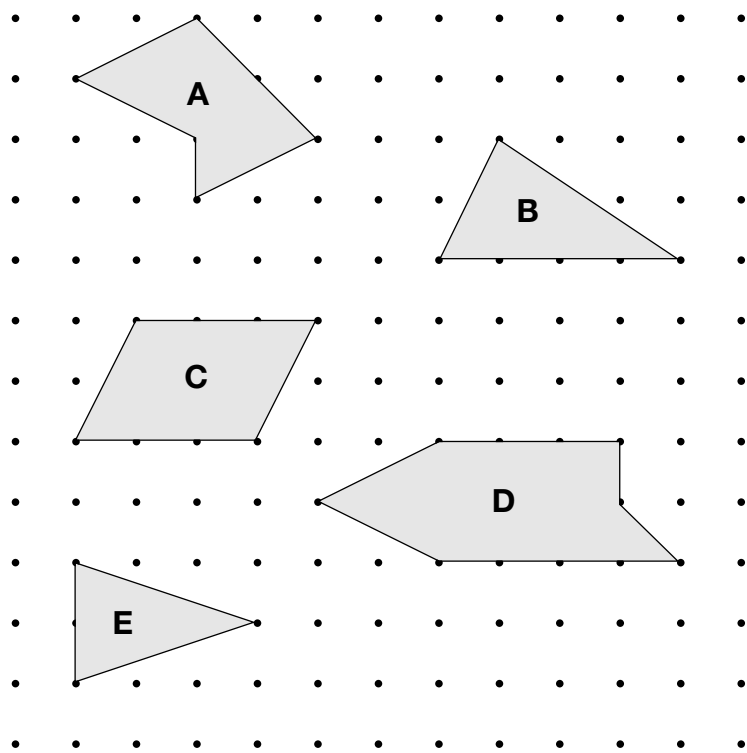
2 marks

Total

1999 Test B

6

Here are five shapes on a square grid.



Write in the missing letters.



Shape has two pairs of parallel sides.



Shape is a pentagon.



Shape has reflective symmetry.

6

1 mark

6

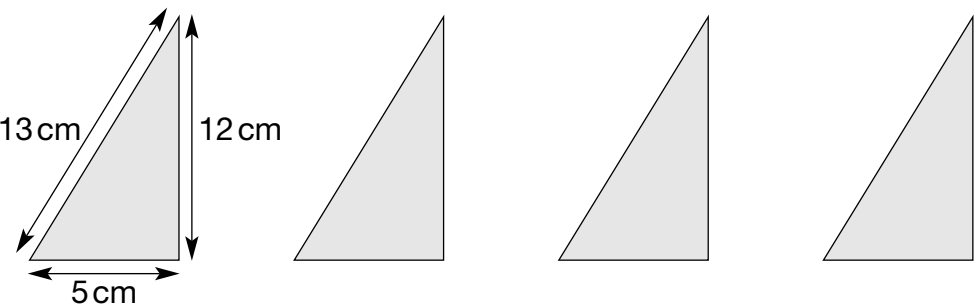
1 mark

6

1 mark

20

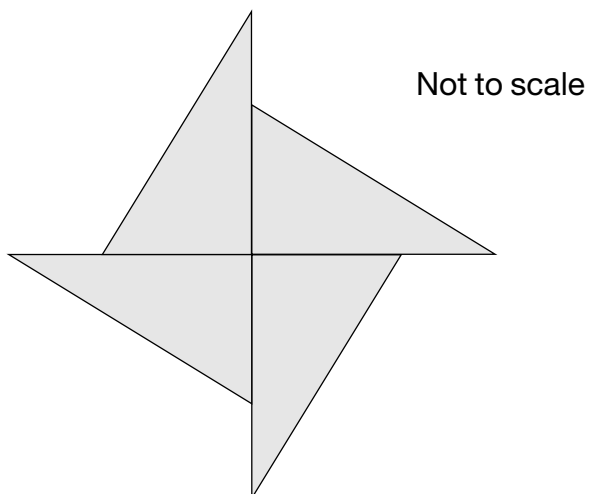
Lindy has 4 triangles, all the same size.



Total

1999 Test B cont.

She uses them to make a star.



Calculate the **perimeter** of the star.



Show
your **method**.
You may get
a mark.

cm

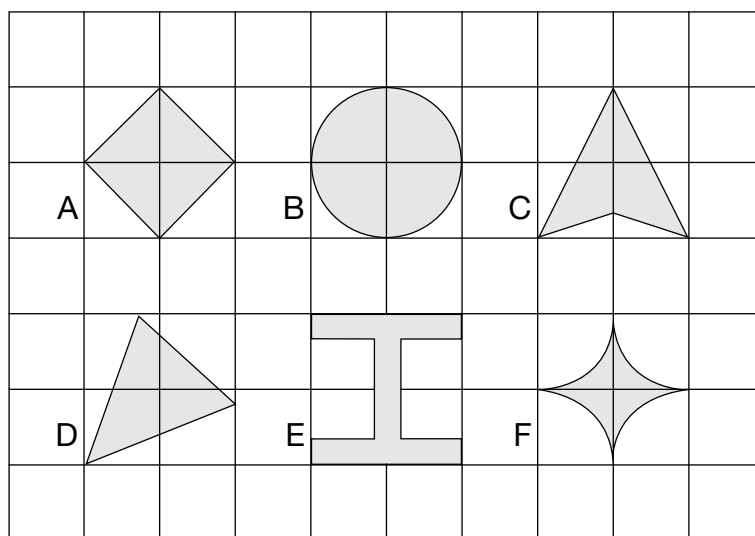
20
2 marks

Total

1998 Test A

8

Here are some shapes on a grid.



Which shape has the **longest perimeter**?



Which shape has the **largest area**?



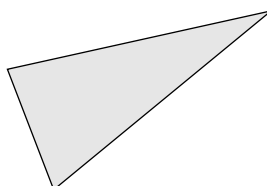
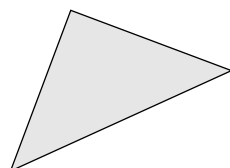
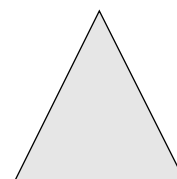
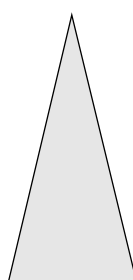
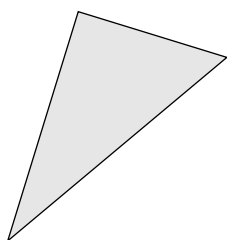
8
1 mark

8
1 mark

10

Here are six triangles. One of them is an **equilateral** triangle.

Put a tick (✓) in the equilateral triangle.



10
1 mark

Total

1998 Test A cont.

Write **one property** which makes **equilateral** triangles **different** from **all** other triangles.

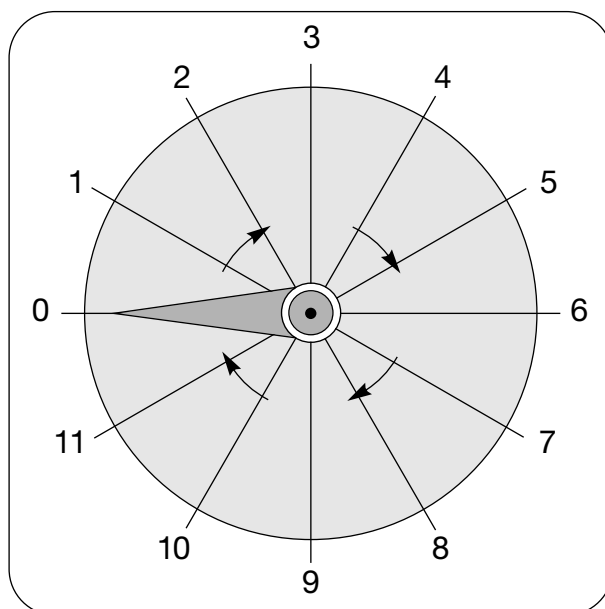


10

1 mark

12

Here is a dial.



The pointer on this dial turns in a **clockwise** direction.
The pointer is at **0**.

Which **number** does it point to after a turn of **270°**?



The pointer moves from **10** to **11**.
How many **degrees** does it turn through?



12

1 mark

12

1 mark

Total

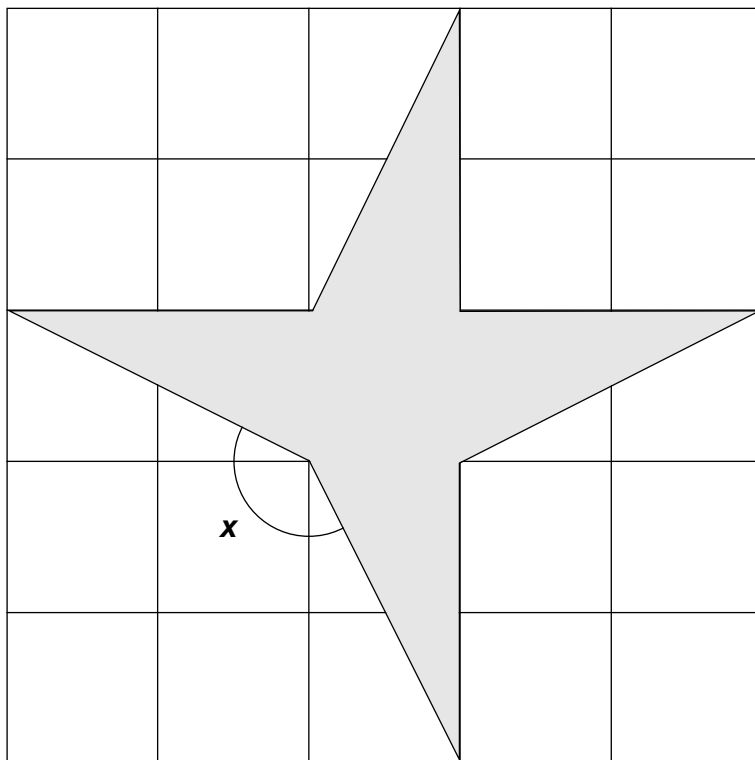
1998 Test A cont.

16

Here is a shaded shape on a grid made of squares.

Draw the line of symmetry of the shaded shape.

You may use a mirror or tracing paper.



What **fraction** of the area of the grid is shaded?



Measure **angle x** in degrees.

Use an angle measurer (protractor).



16

1 mark

16

1 mark

16

1 mark

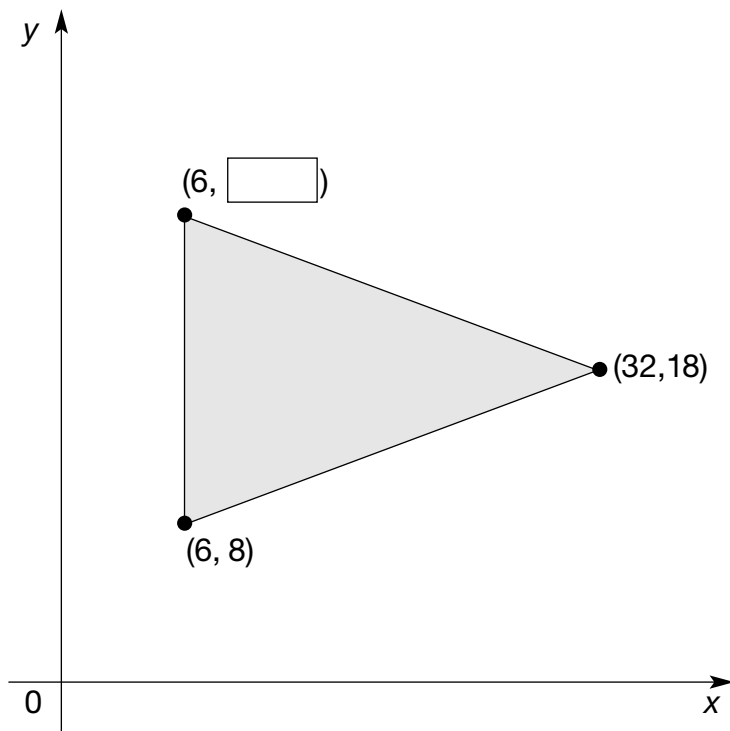
Total

1998 Test A cont.

21

The shaded shape is an **isosceles** triangle.

Write in the missing co-ordinate.



21

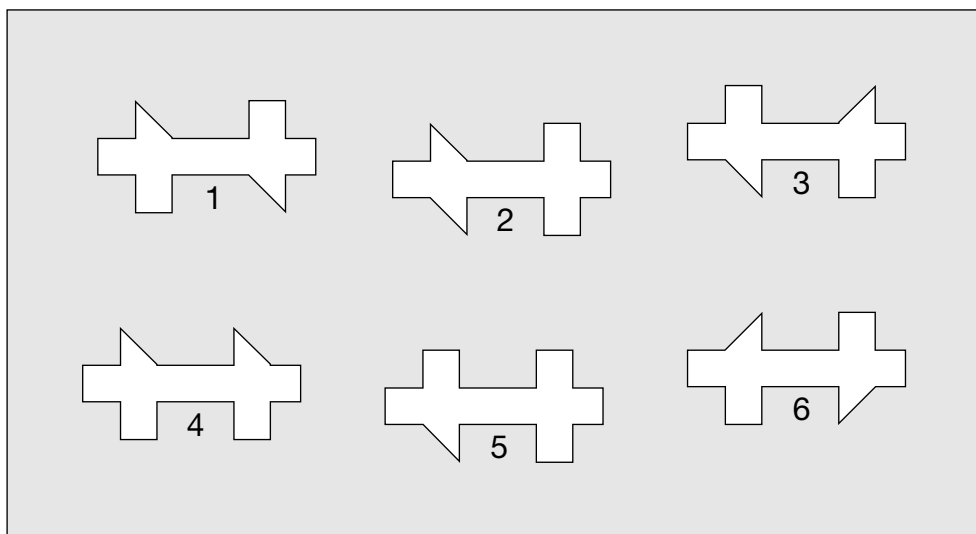
1 mark

Total

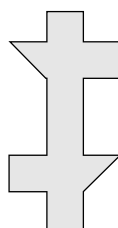
1998 Test B

2

This board has six holes cut in it.



Here is a shape cut out of card.



Which hole will the shape fit exactly into?

You may use tracing paper.



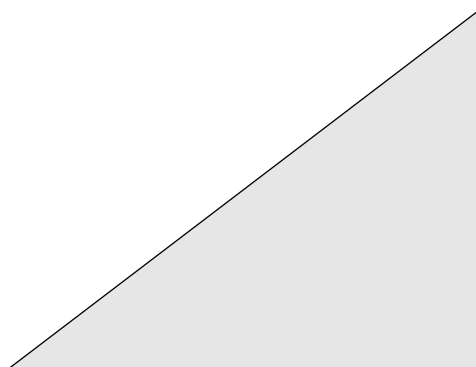
2

1 mark

6

Measure **accurately** the **longest side** of this triangle.

Give your answer in **millimetres**.


 mm

6

1 mark

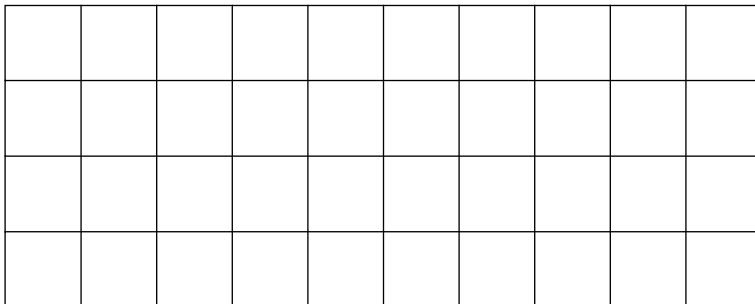
Total

1998 Test B cont.

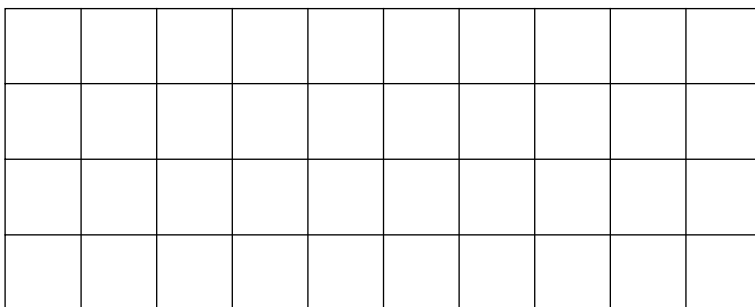
10

Here is a centimetre square grid.

On the grid draw a **shape** which has an **area** of **10** square centimetres.



On the grid below draw a **rectangle** which has a **perimeter** of **10** centimetres.



10

1 mark



10

1 mark

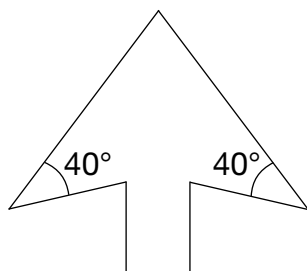
Total



1998 Test B cont.

15

This is a design for an arrowhead.

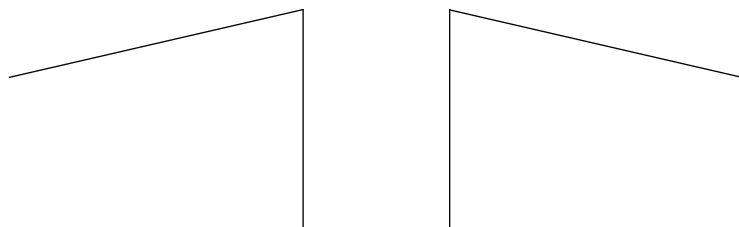


Below is part of a larger scale drawing of the arrowhead.

The drawing has the same size angles as the design.

Draw two more lines to complete the arrowhead **accurately**.

Use an angle measurer (protractor).



15

1 mark

Total

1998 Test B cont.

18

On the grid below, use a ruler to draw a **pentagon** that has **three right angles**.



18
1 mark

1997 Test A

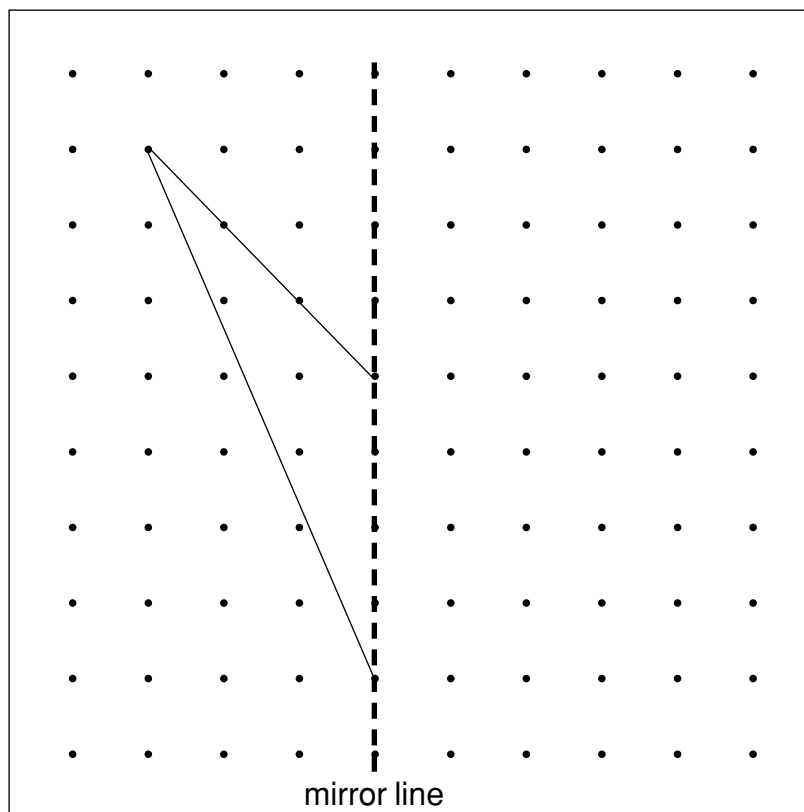
5

Draw the **reflection** of this triangle in the mirror line.

You may use a ruler.

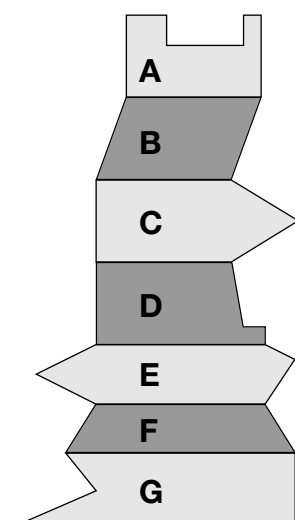


You may use tracing paper.



9

Here are 7 shapes.



How many of the shapes are **octagons**?



5

1 mark

9

1 mark

Total

1997 Test A cont.

Which **two** shapes are **hexagons**?



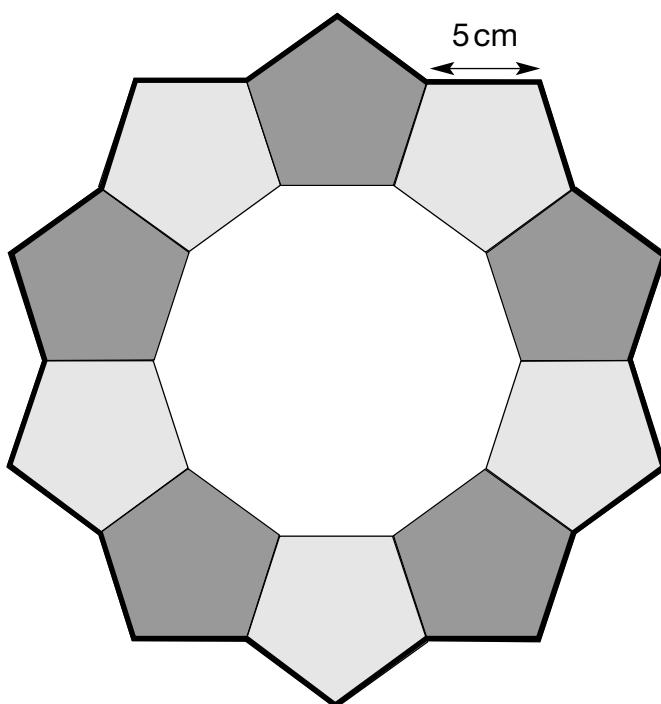
and

9

1 mark

12

This ring is made of regular pentagons, with sides of 5 centimetres.



What is the **length** of the **outer edge** of the ring?


 cm

12

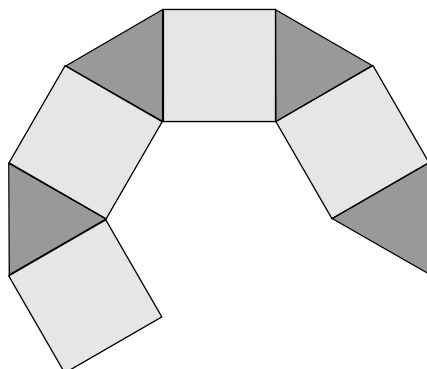
1 mark

Total

1997 Test A cont.

Here is part of a new ring.

It is made of **squares** and **triangles**.



The pattern is continued to complete the ring.

What is the **total** number of **squares** used in the complete ring?



12

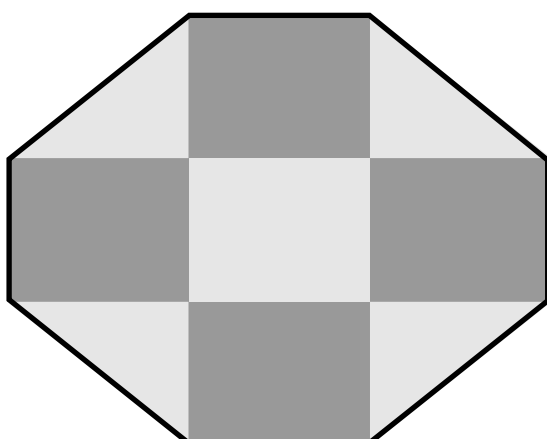
1 mark

17

This plan of a garden is made of rectangles and triangles.

The area of each **rectangle** is **12 square metres**.

What is the **area** of the **whole garden**?


 m²

17

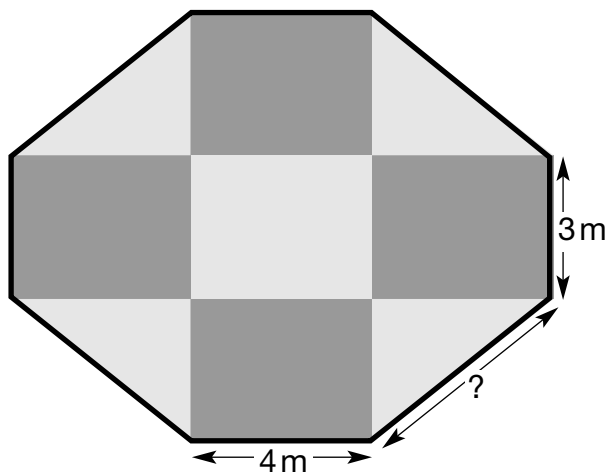
1 mark

Total

1997 Test A cont.

The **perimeter** of the garden is **34 metres**.

What is the length of the **longest side** of each triangle?



Show
your **working**.
You may get
a mark.

m

2 marks

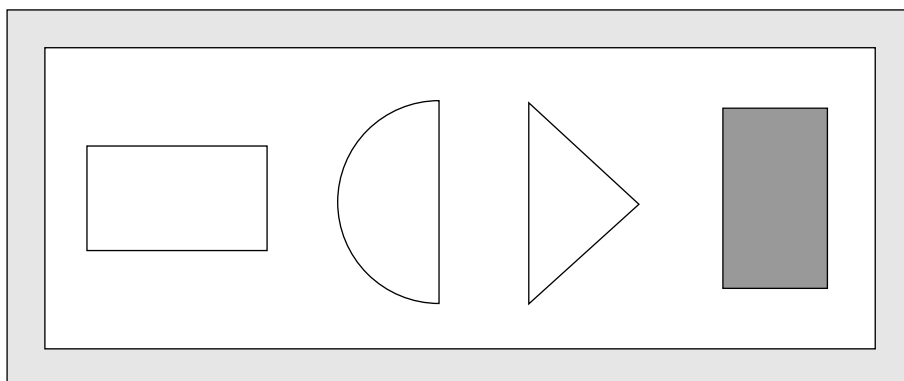
17

Total

1997 Test B

4

Here is a pattern on a window.



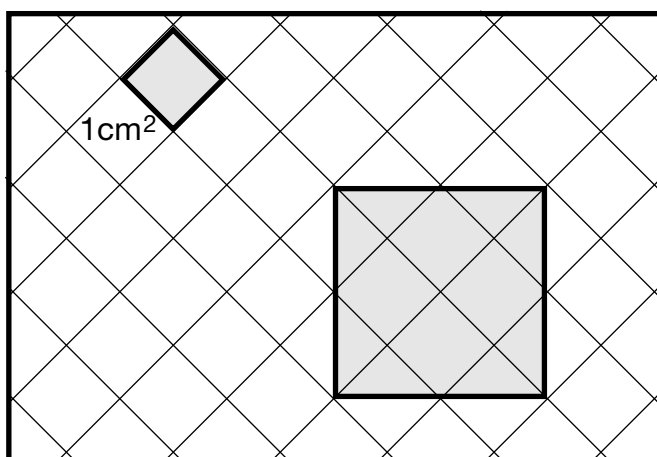
Draw how the pattern would look from the **other side** of the window.



10

The **area** of the **small** shaded square is **1 square centimetre**.

What is the **area** of the **larger** shaded square?



2 marks

1 mark

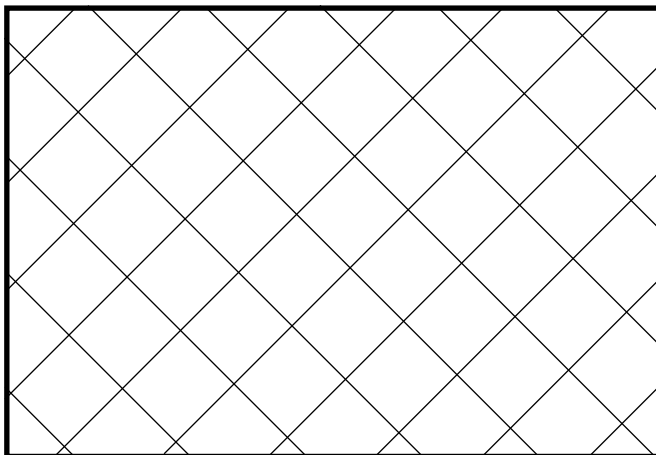
4

10

Total

1997 Test B

On the grid below, draw a **square** with an **area** of **2 cm²**.

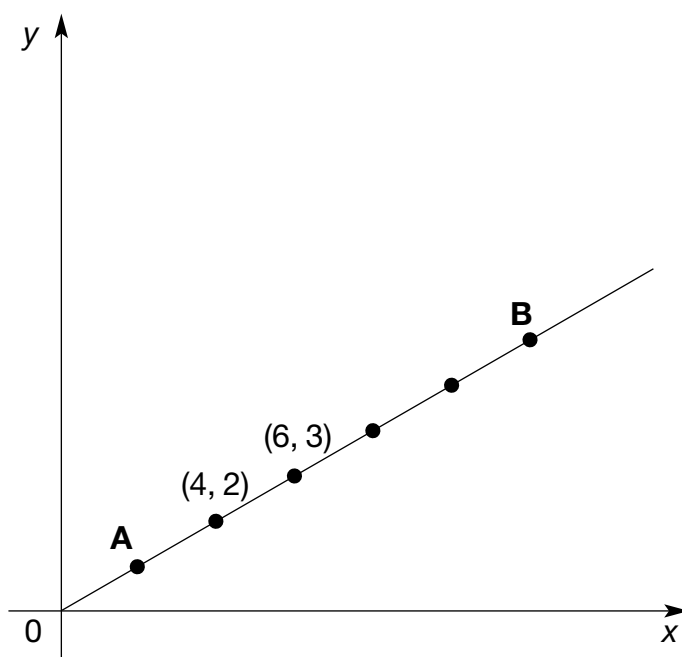


10

1 mark

11

Here is a graph.



The dots (•) on the line are **equally spaced**.

What are the **co-ordinates** of the point **A**?



(,)



11

1 mark

Total

1997 Test B cont.

Megan says,

'The point B has co-ordinates (11, 5).'

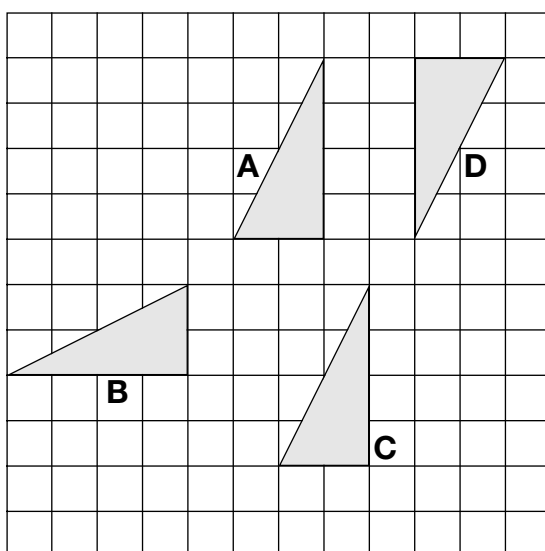
Use the graph to explain why she **cannot** be correct.



11

1 mark

19



Write the correct **letter** in this sentence.



Shape _____ is a **reflection** of shape A.

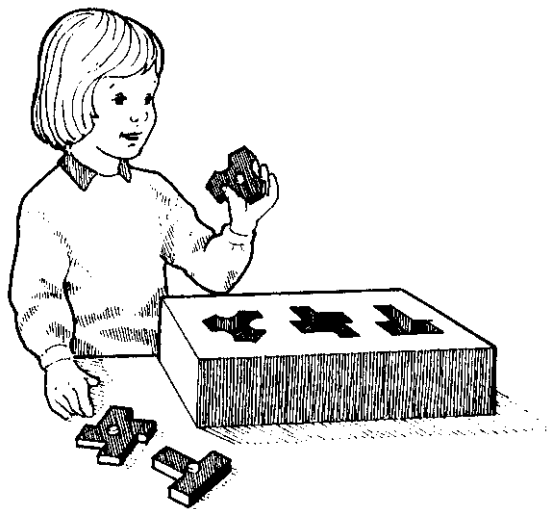
19

1 mark

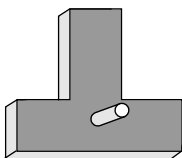
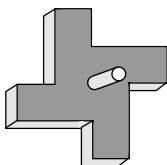
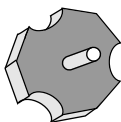
Total

2

Kim has a shape sorter toy.



How many different ways does each piece fit into its hole?



2

2 marks

5

Complete the table.



shape	property of shape		
	4 sides only	one or more right angles	two pairs of parallel sides
	<div>X</div>	<div>✓</div>	<div>X</div>
	<div></div>	<div></div>	<div></div>
	<div></div>	<div></div>	<div></div>

5

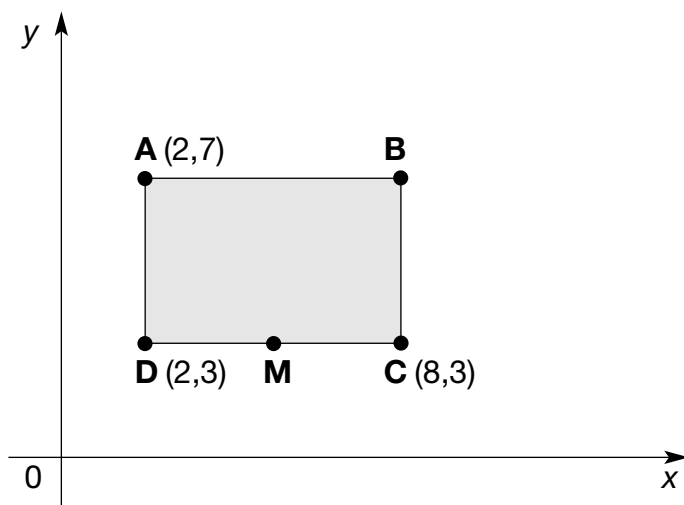
2 marks

Total

1996 Test A cont.

13

Here is a shaded rectangle.

What are the co-ordinates of **B**?

1 mark

13

M is half-way between **D** and **C**.What are the co-ordinates of **M**?

1 mark

13

Total

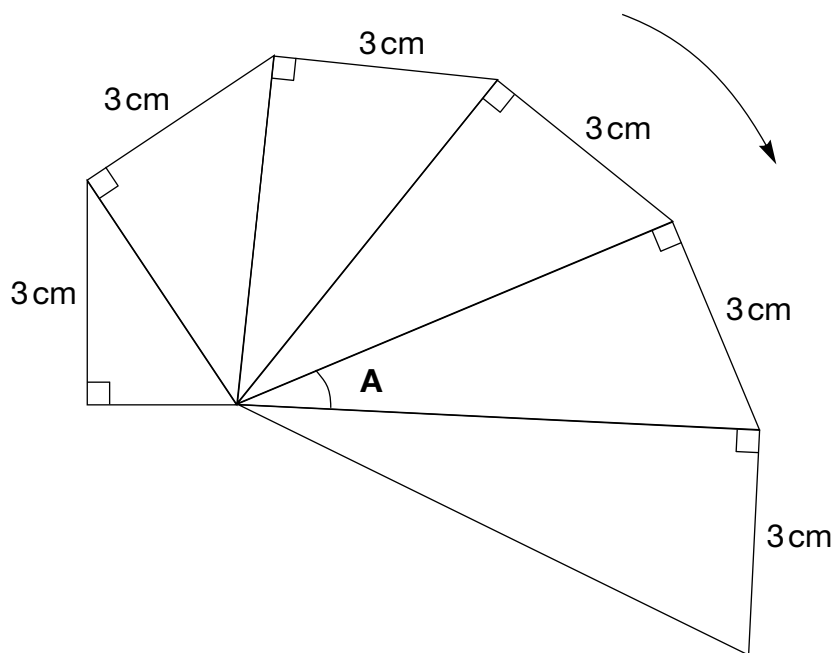
1996 Test A cont.

18

Here is the start of a spiral sequence of right-angled triangles.

Draw **accurately** the next right-angled triangle on the diagram.

You may use an angle measurer.



Use an angle measurer to find the size of angle A.



18

2 marks

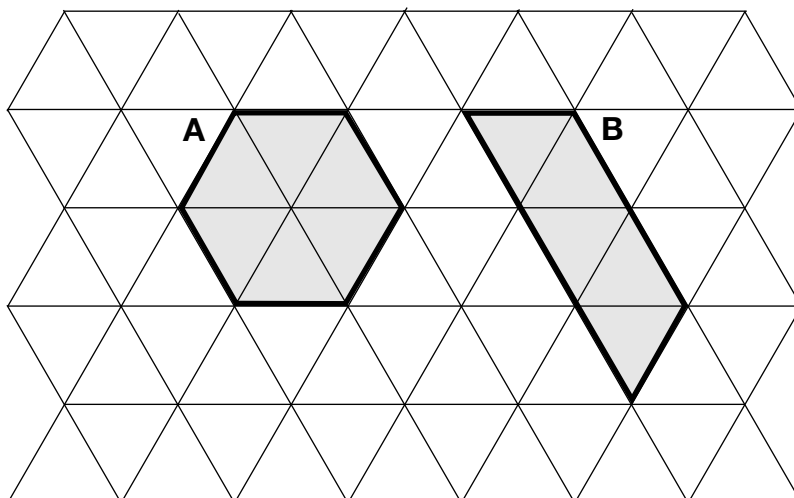
18

1 mark

Total

7

Leon's grid has two shaded shapes.



Leon says,

“Shape A has a larger area than shape B.”

Explain how he could have worked this out.

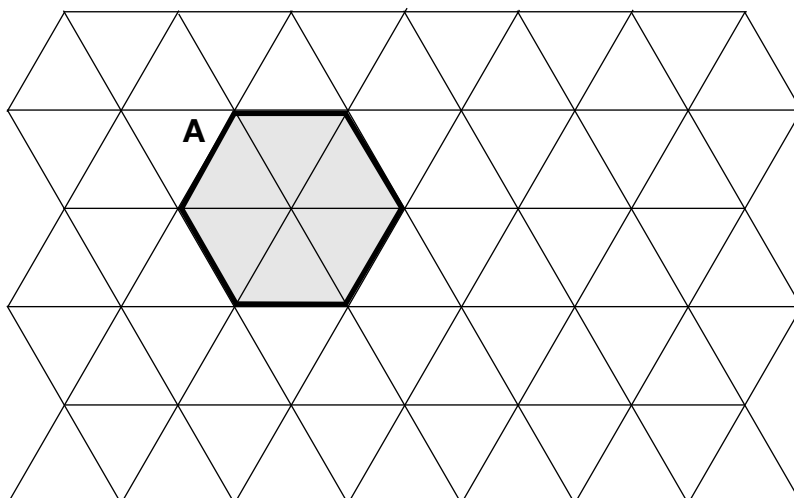




7

1 mark

On this grid draw a **different** shape. It **must** have the **same area** as shape **A**.



7

1 mark

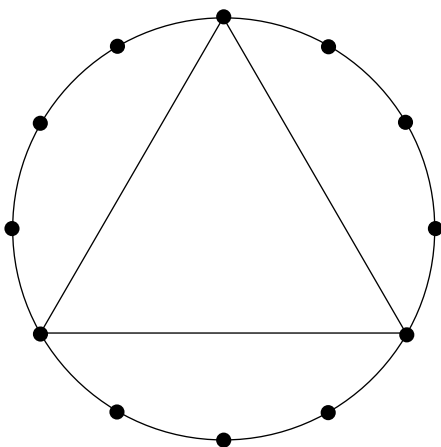
Total



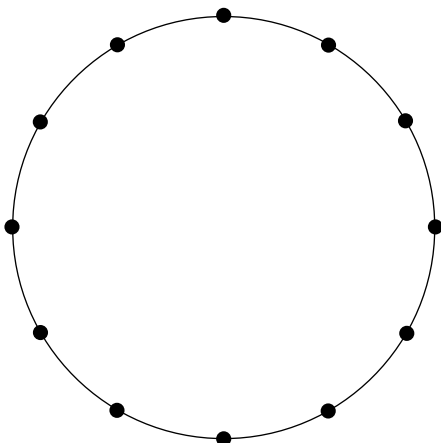
1996 Test B cont.

8

Here is an **equilateral triangle** drawn on a circle.

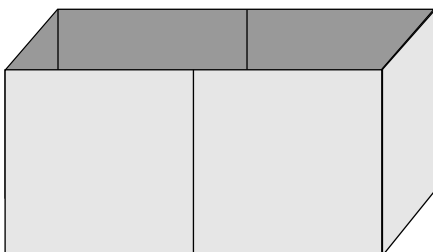


Use a ruler to draw a **regular hexagon** on this circle.



9

This is an open-top box.



Put a tick (✓) for each diagram **if it is a net** for the box.

Put a cross (✗) if it is not.

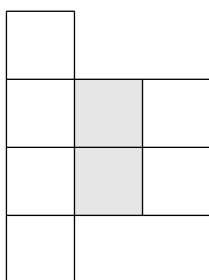
8

1 mark

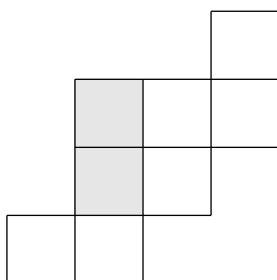
Total

1996 Test A cont.

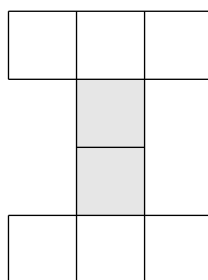
The base is shaded in each one.



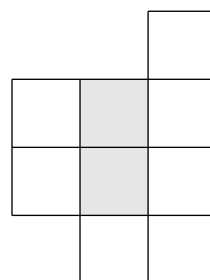
A



B



C



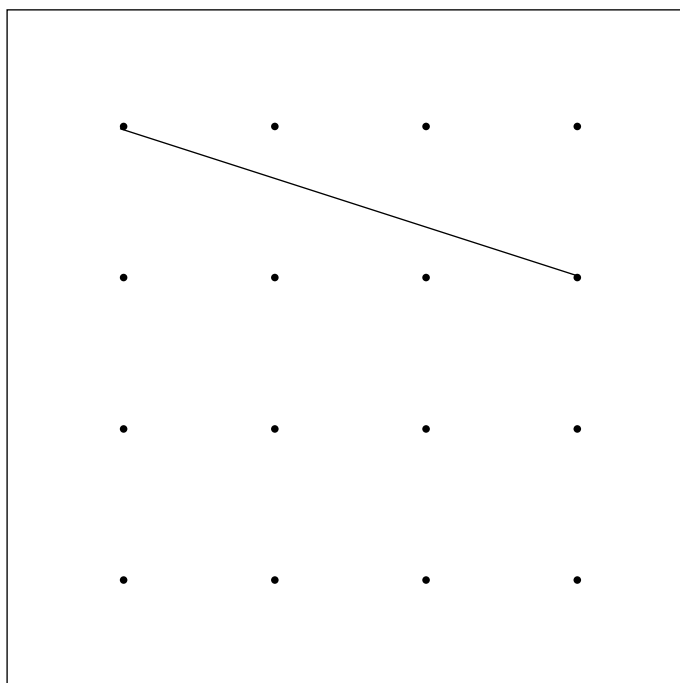
D

2 marks

9

11

Use a ruler to draw **2 more lines** to make an **isosceles** triangle.



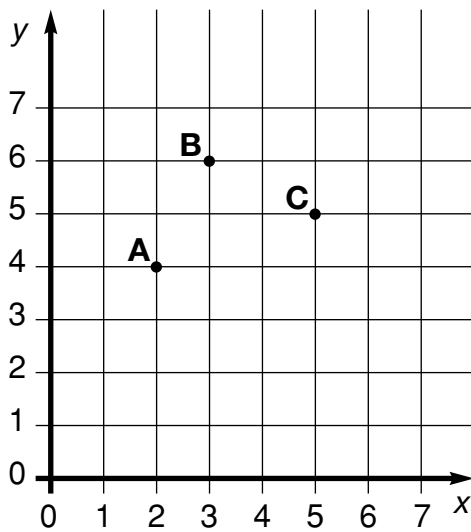
2 marks

11

Total

1996 Test B cont.

14



A, B and C are three corners of a **square**.

What are the **co-ordinates** of the **other corner**?



(,)

17



Sarah draws a quadrilateral.

It has these properties:

- it has 2 long sides the same length;
- it has 2 short sides the same length;
- it does NOT have any right angles;
- it does NOT have reflective symmetry.

Write the **mathematical** name for Sarah's quadrilateral.



.....

14

1 mark

17

1 mark

Total