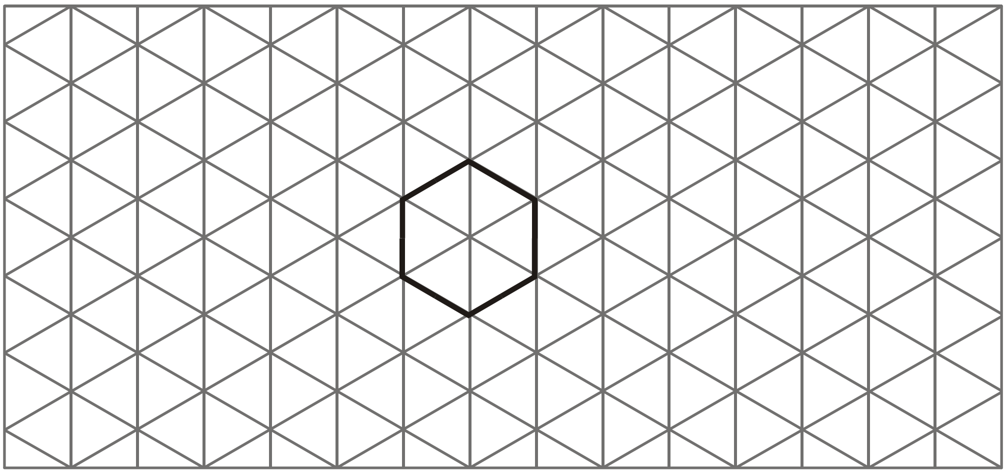
1. On the grid, show how this shape will tessellate.
You should draw at least 8 shapes.



(Total 2 marks)

2. The diagram shows a trapezium of height 3 m.

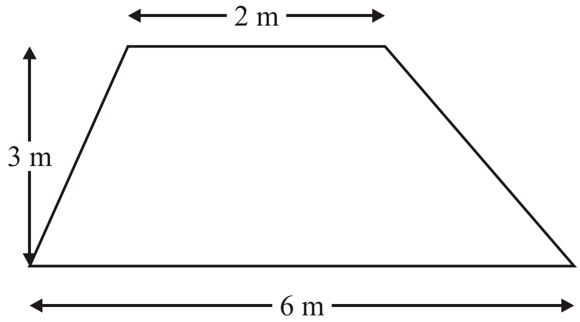


Diagram **NOT** accurately drawn

Find the area of this trapezium

State the units with our answer.

....

(Total 3 marks)

3.

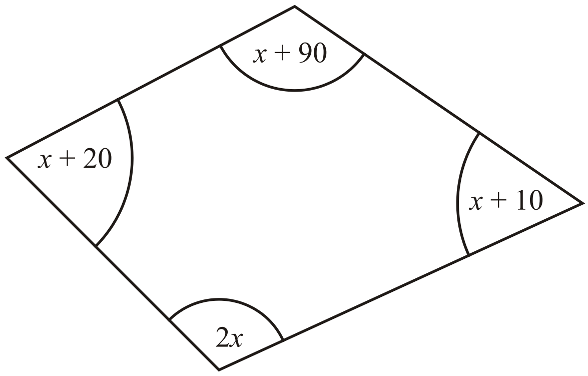


Diagram **NOT** accurately drawn

The sizes of the angles, in degrees, of the quadrilateral are

$x + 10$
$2x$
$x + 90$
$x + 20$

(a) Use this information to write down an equation in terms of x.

....

(2)

(b) Use your answer to part (a) to work out the size of the smallest angle of the quadrilateral.

.... °

(3)
(Total 5 marks)

4.

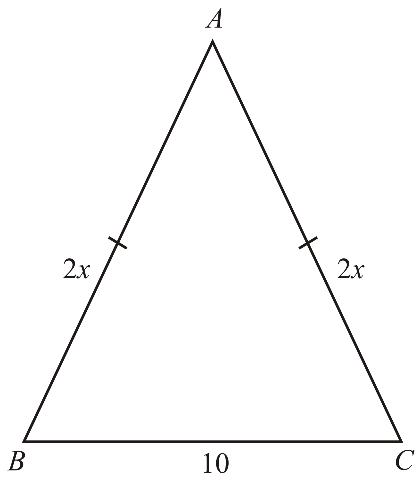


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

ABC is an isosceles triangle.
$AB = 2x$
$AC = 2x$
$BC = 10$

(a) Find an expression, in terms of x, for the **perimeter** of the triangle.
Simplify your expression.

………………………

(2)

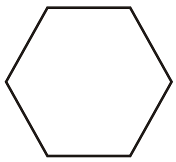
The perimeter of the triangle is 34 cm.

(b) Find the value of x.

x = ...

(2)
(Total 4 marks)

5.



This shape is a regular polygon.

(a) Write down the special name for this type of regular polygon.

....

(1)

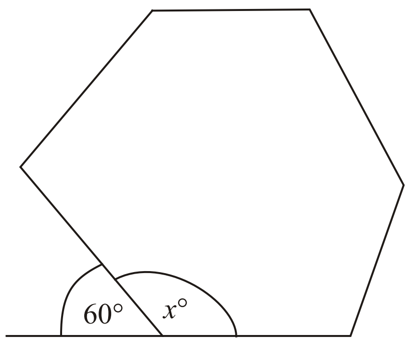


Diagram **NOT** accurately drawn

(b) (i) Work out the size of the angle marked $x°$.

.... °

(ii) Give a reason for your answer.

....

....

(2)

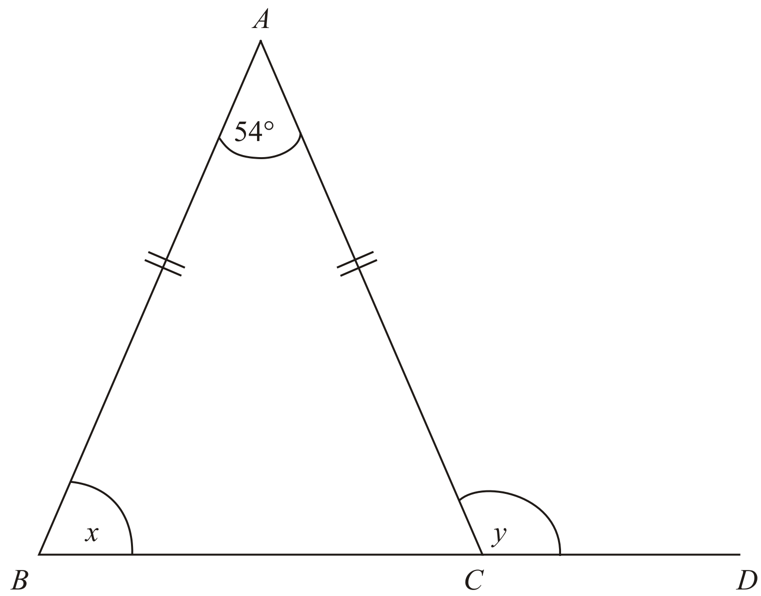
(c) Write down the special name for the angle marked $x°$.

....

(1)

(Total 4 marks)

6.



ABC is an isosceles triangle.
BCD is a straight line.
$AB = AC$.
Angle $A = 54°$.

(a) (i) Work out the size of the angle marked x.

.... °

(ii) Give a reason for your answer.

....

....

(3)

(b) Work out the size of the angle marked y.

.... °

(1)
(Total 4 marks)

7.

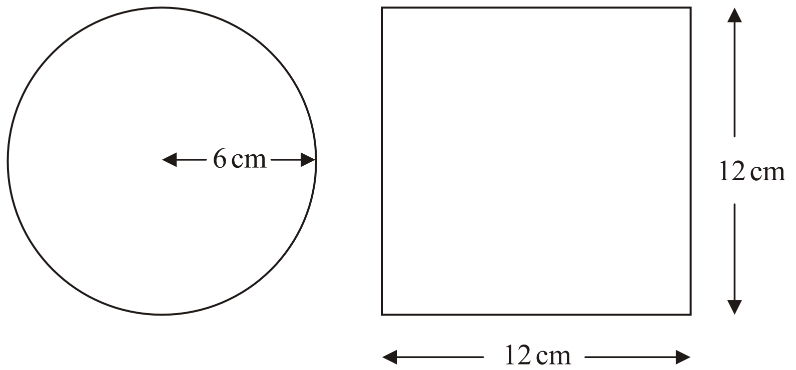


Diagram **NOT** accurately drawn

A circle has a radius of 6 cm.

A square has a side of length 12 cm.

Work out the difference between the area of the circle and the area of the square.
Give your answer correct to one decimal place.

.... cm^2
(Total 4 marks)

8.

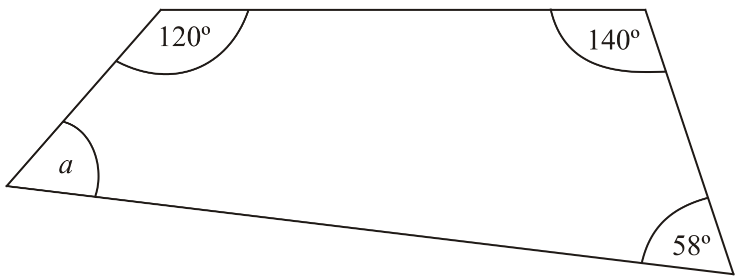
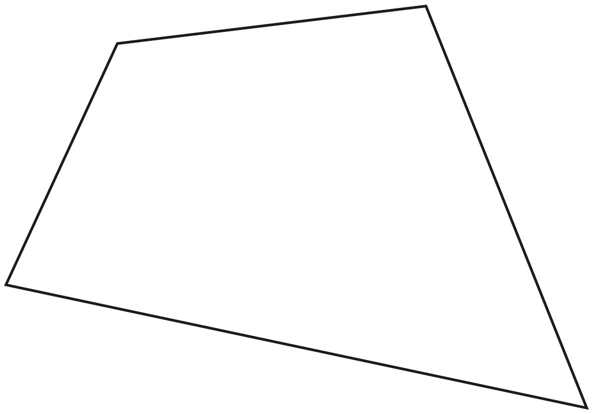


Diagram **NOT** accurately drawn

Work out the size of the angle *a*.

....°
(Total 2 marks)

9.



The sum of the angles of a triangle is 180°.
Use this fact to explain why the sum of the angles of any quadrilateral is 360°.

....

....

....

....

(Total 2 marks)

1. Drawing 2

Tessellation

B2 seven additional hexagons, with at least 2 points at which 3 hexagons meet
(B1 one point at which 3 hexagons meet).

[2]

2. Area = 0.5 × (2 + 6) × 3
= 0.5 × 8 ×3
= 12 m^2 3

M1 for 0.5 × (2 + 6) × 3 oe
A1 for 12
B1 for m^2

[3]

3.	(a)	$x + 10 + 2x + x + 90 + (x + 20) = 360$	2	
		M1 for $x + 10 + 2x + x + 90 + x + 20$ or $5x + 120$ or an indication of adding the terms on the paper *A1 cao* *NB: algebra seen in (b) can attract marks in (a)*		
	(b)	$5x + 120 = 360$ $5x = 240$ $x = 48$ Smallest angle is $x + 10 = 58$	3	
		M1 for simplifying to at least "$5x + 120 = 360$" (their equation) *A1 $x = 48$ or 48 seen cao* *B1 ft (adding 10)* *NB: M1 A1 can be awarded if this work is seen in (a)*		
				[5]
4.	(a)	$2x + 2x + 10$ $4x + 10$	2	
		B2 for $4x + 10$ *(B1 for $2x + 2x + 10$ oe)*		
	(b)	$4x + 10 = 34$ 6	2	
		M1 for "$4x + 10$" = 34 or $34 – 10 \div 4$ *A1 cao*		
				[4]
5.	(a)	Hexagon	1	
		B1		
	(b)	(i) 120		
		B1 cao		
		(ii) Str line	2	
		B1 reference to a (straight) line and 180°		
	(c)	Obtuse	1	
		B1 Accept "interior"		
				[4]

6. (a) (i) 180 – 54 (=126)
"126" ÷ 2 = 63
M1 for (180–54) ÷ 2
A1 cao

(ii) Reason 3
B1 (indep) angles in triangle add to 180 or equal angles in isosceles triangle or equal angles and 2 sides the same (B0 if any incorrect reasoning given eg parallel, equilateral triangle)

(b) 180 – "x" = 117 1
B1 117 or ft 180 – "x" if x < 90

[4]

7. $\pi \times 6^2$

$12^2 - \pi \times 6^2$

30.9 4

M1 for 12^2 or 144 seen
M1 for $\pi \times 6^2$ or 113. … seen
M1 (dep on M2) for "12^2" – "$\pi \times 6^2$"
A1 for 30.88 – 31

[4]

8. 360 – (120 + 140 + 58)
42 2
M1 360 – "(120 + 140 + 58)" or equivalent) or for (a + 58 + 120 + 140 = 360) oe seen
A1 cao
[Note: The subtraction MUST be from 360]

[2]

9. 2
B1 for 2 triangles or line on diagram
B1 indep for 180 × 2 oe

[2]

1. Mathematics A Paper 4

If a candidate knew what to do, they usually gained full marks. The only error in a few cases was when candidates failed to draw a sufficient number of hexagons.

Mathematics B Paper 17

This was usually well answered with the majority of candidates understanding the meaning of tessellating shapes.

2. Many candidates attempted to use the formula for the area of a trapezium although some seemed unaware that this is provided on the formulae page. Almost 30% of candidates found the correct area and included m^2 with their answer but some of those who used the formula wrote 6×2 inside the brackets instead of $6 + 2$. Some candidates simply worked out $2 \times 6 \times 3$.

3. **Intermediate Tier**

This question was poorly answered. In part (a) many candidates attempted to add the four terms but usually left their answer as an expression rather than an equation. The 10, 90 and 20 were correctly added, but often the xs were not. In part (b) the majority of candidates chose a numerical or trial and improvement approach, with little or no success.

Higher Tier

Many candidates were successful on both parts. They were able to formulate an equation and simplify it. The solution of the equation was generally carried out successfully and the correct angle of 58°. A few candidates thought that this question was testing the angle properties of cyclic quadrilaterals and assumed that the opposite angles were supplementary. This assumption leads, of course, to contradictory values for x, but went unremarked by the candidates. Other candidates did not give an equation but an expression for the sum of the interior angles. A few did not get either an equation or an expression, but found the value of x by trial and improvement.

4. **Specification A**

Foundation Tier

Candidates generally struggle with algebra in context and this year was no exception. 90% of the candidates were not able to show that they needed to find the sum of $2x$, $2x$ and 10 in part (a). Others showed some recognition by providing an answer of 14 or $2x2 + 10$ but, without showing where this came from, they were unable to score any marks. Others wrote $4x \times 10$. There was marginally greater success in part (b) with 10% of the candidates obtaining the correct answer of 6 for two marks, generally without solving an algebraic equation. Few saw the connection between parts (a) and (b). Many wrote $34 - 10 \div 2 = 12$ to score no marks.

Intermediate Tier

Most candidates realised that they had to add together the three terms shown on the diagram. About half put these together and successfully simplified their expression. The most common error was incorrectly assuming that $2x+2x$ was $2x^2$ or $4x^2$. Many did so without any other form of working, and therefore gained no marks. In part (b) candidates saw an opportunity to move from algebra back into number work, including those who had given an algebraic expression in part (a), though many who failed to attempt part (a) still had a go at part (b). Most methods were of a reversing type. A common error was to subtract 10 then divide by 2, rather than 4, getting the answer 12.

Specification B

Foundation Tier

Disappointingly few candidates attempted to write down an unsimplified expression for the perimeter of the triangle and as a result most failed to earn any marks in part (a) of the question. The incorrect expressions $14x$ and $2x^2 + 10$ were commonly seen without working and could not be awarded any credit. This is a pity as they are likely to have resulted from candidates realising the need to add together the lengths of the three sides of the triangle. Under 10% of candidates were able to find the correct value of x in (b). Where successful, this was usually done by a trial and improvement method.

5. This question proved to be a good discriminator with only about one third of the possible marks available being awarded. Just under a half of all candidates were able to name the regular hexagon correctly. “Pentagon” was a commonly seen incorrect answer. In part (b)(ii) the correct answer 120º was seen frequently but so was 130º. This suggested that a significant proportion of candidates thought that there are 190º on a straight line. Weaker candidates often used a protractor to measure the angle even though the diagram was clearly marked as not drawn accurately.

Clearly expressed reasons were sometimes given in (b)(ii), but all too often an incorrect answer in (ii) was followed by reference to a (straight) line and 190º in this part. It should also be noted that “they add up to 180” was insufficient reason.

Many of the more able candidates were able to write down the special name for the angle in (c). It was often incorrectly spelt but the mark was awarded if the intention was clear.

6. This question proved a real challenge to most candidates. In part (a)(i) the two main errors were failing to divide 126 by 2 after subtracting 54 from 180 or assuming that at least one of the acute angles at B and C was 54º.

In part (ii) reasons given were sometimes incomplete. For example " the angles of a triangle add up to 180º" was acceptable but "it adds up to 180º" was not.

A relatively small proportion of candidates gave the correct answer in part (b) or were able to follow through using their answer to (a)(i). Disappointingly, here a significant proportion of candidates gave angle sizes less than 90º when the diagram indicated otherwise. Despite the instructions to "work out" the angles in parts (a)(i) and (b) there were numerous occasions where the candidate had measured angles with a protractor.

7. Foundation

There was a wide variety of incorrect answers to this question although most candidates were able to score at least one mark, generally for sight of 12×12 (although it was disturbing to note how many candidates wrote $12 \times 12 = 48$ even when they could use a calculator and that 42% of the candidates scored no marks at all!). 108 was a common incorrect answer from $144 - 6^2$. A significant number were not able to find the area of the square, let alone the area of the circle. Many candidates realised they had to use π for the area of the circle but then used the formula for the circumference of the circle. As a result it was not uncommon to see an answer of 106.3. Others squared π or used π in their attempt at finding the area of the square! However just over 20% of the candidates did score all 4 available marks which was pleasing to see.

Higher

Most students managed to correctly find the area of the square as 12squared or 12×12, a common error was to double 12 instead of squaring. Others found the perimeter rather than the area. A significant number of candidates either used 6squared or $2 \times$ pi $\times 6$ for the area of the circle. For the final method mark, some candidates didn't realise they had to subtract. Most who gained the 3 method marks also gained the accuracy mark. The transcription error of 133(..) instead of 113(..) was frequently seen and led to some candidates losing the final accuracy mark. The correct answer was seen from about 57% of candidates.

8. Specification A

Many candidates were able to gain full marks in this question; however many did not as a result, once again, of poor arithmetic. Errors were made in summing the three given angles but the majority of mistakes were for inaccurate subtraction of 318 from 360; 52, 58 and 62 being seen often.

The greater concern in this question is the vast number of candidates thinking that 380° is the sum of the angles of a quadrilateral.

Specification B

This question was generally done well. Most candidates attempted to add the three given angles and subtract the result from 360º.

Repeated subtraction from 360 was less common. Some candidates had difficulty subtracting 318 from 360. Common incorrect answers here were 32, 52 and 62. A significant number of candidates thought that the sum of the angles in the quadrilateral was 380º.

9. Although most candidates were unable to offer a proof most candidates attempted to answer the question. Making use of the *sum of the angles of a triangle is 180°* was frequently ignored. Many relied upon noticing that a triangle had three sides whilst a quadrilateral had four, with no mention of angles. Other candidates opted for unusual statements such as *a quadrilateral is a triangle without a bottom*.