Name: _____

Higher Unit 5a topic test

Date:

Time: 50 minutes

Total marks available: 49

Total marks achieved: _____

Questions

Q1.

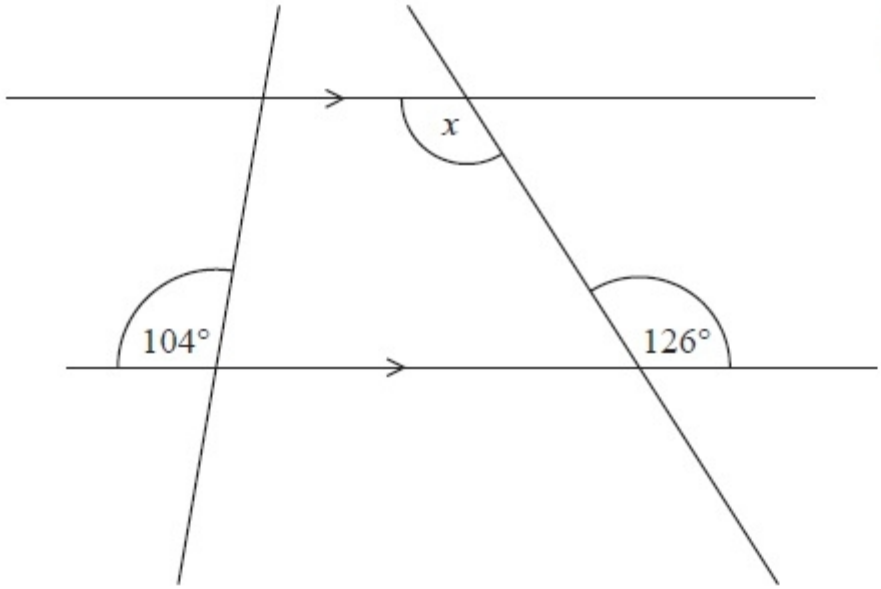


Diagram **NOT** accurately drawn

(i) Find the size of the angle marked *x*.

..... °

(ii) Give a reason for your answer.

.....

(Total for Question is 2 marks)

Q2.

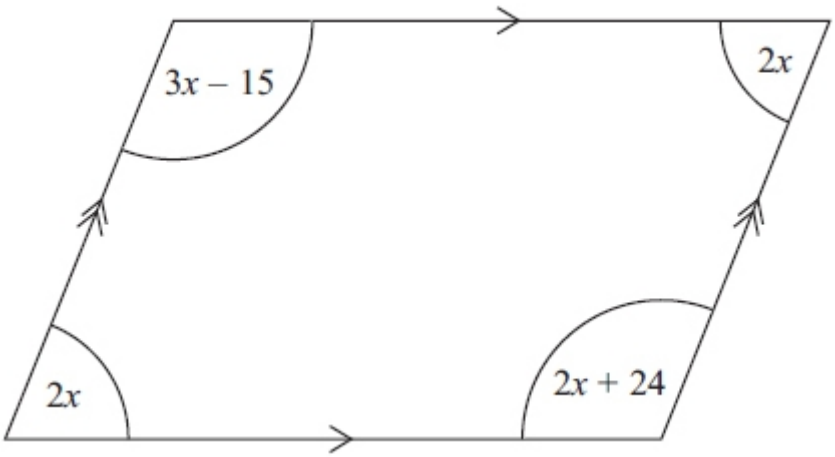


Diagram **NOT** accurately drawn

The diagram shows a parallelogram.
The sizes of the angles, in degrees, are

$2x$
$3x - 15$
$2x$
$2x + 24$

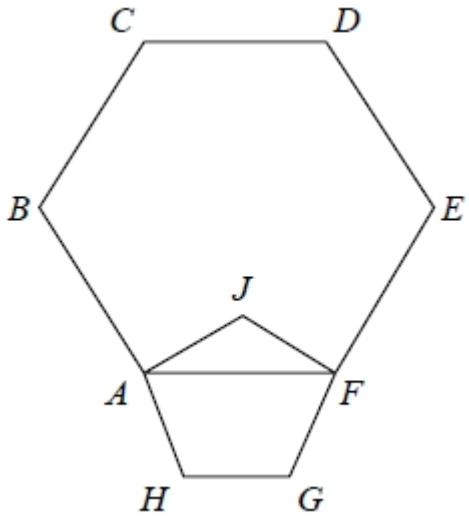
Work out the value of x.

x = ...

(Total for Question is 3 marks)

Q3.

ABCDEF is a regular hexagon.
AJFGH is a regular pentagon.



Work out the size of angle *BAJ*.

(Total for question = 4 marks)

Q4.

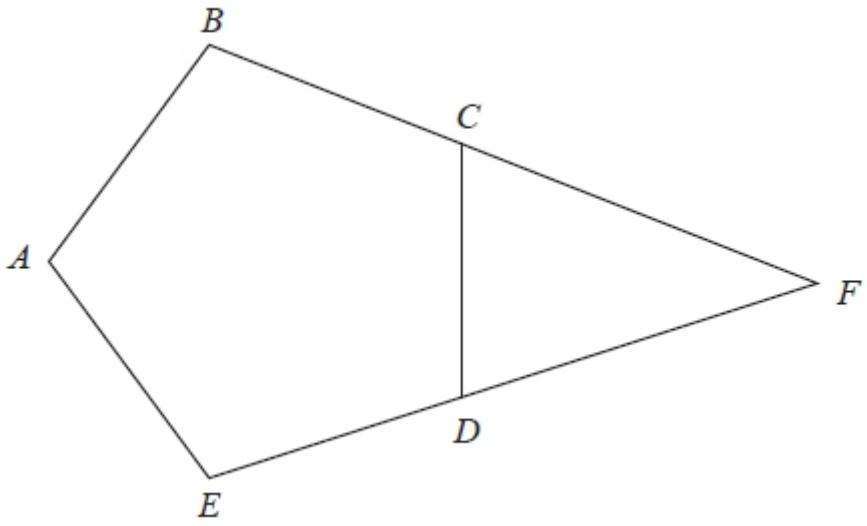


Diagram **NOT** accurately drawn

ABCDE is a regular pentagon.
BCF and *EDF* are straight lines.

Work out the size of angle *CFD*.
You must show how you got your answer.

..... °

(Total for Question is 3 marks)

Q5.

*

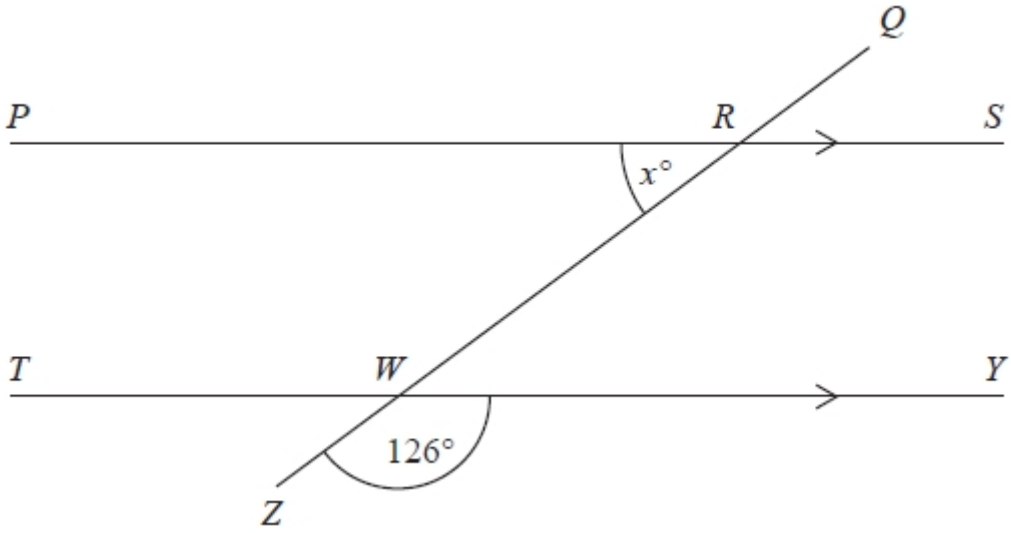


Diagram **NOT** accurately drawn

PRS and *TWY* are parallel straight lines.
QRWZ is a straight line.

Work out the value of *x*.
Give reasons for your answer.

(Total for Question is 3 marks)

Q6.

*

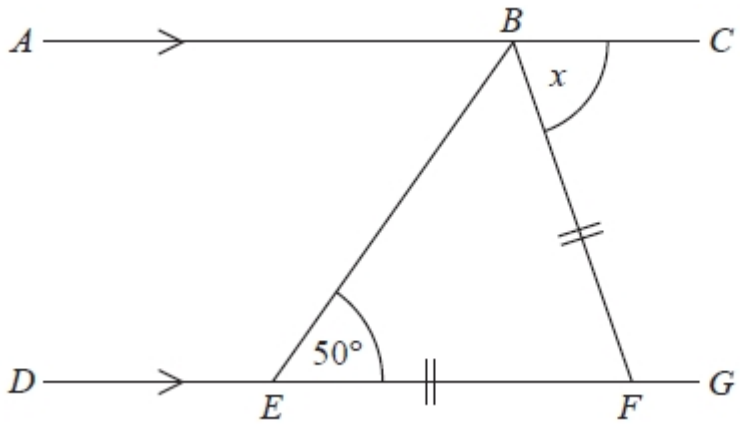


Diagram **NOT** accurately drawn

ABC is a straight line.
DEFG is a straight line.
AC is parallel to *DG*.
EF = *BF*.
Angle *BEF* = 50°.

Work out the size of the angle marked *x*.
Give reasons for your answer.

..... °

(Total for Question is 4 marks)

Q7.

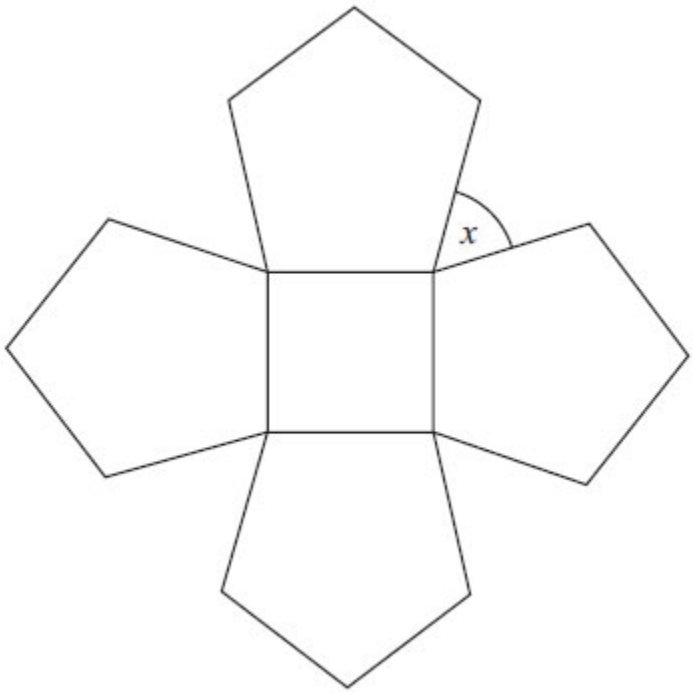


Diagram **NOT** accurately drawn

The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked *x*.

.....

(Total for Question is 3 marks)

Q8.

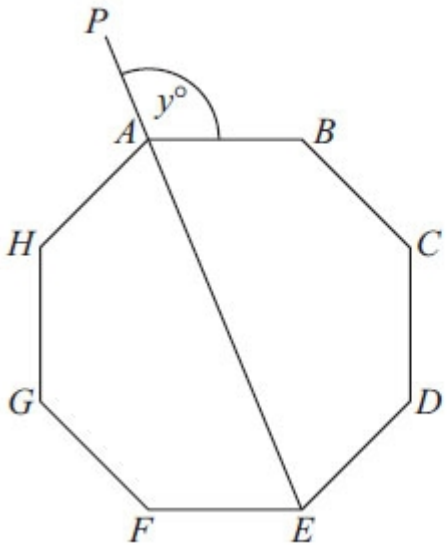


Diagram **NOT** accurately drawn

ABCDEFGH is a regular octagon.
PAE is a straight line.

Angle *PAB* = *y*°

Work out the value of *y*

y = ...

(Total for Question is 4 marks)

Q9.
The diagram shows a pattern using four identical rhombuses.

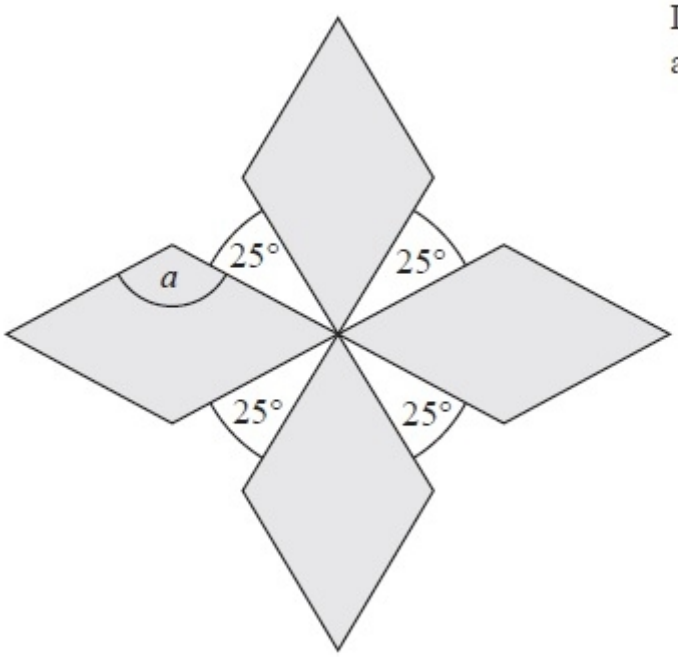


Diagram **NOT** accurately drawn

Work out the size of the angle marked *a*.

You must show your working.

..... °

(Total for Question is 4 marks)

Q10.

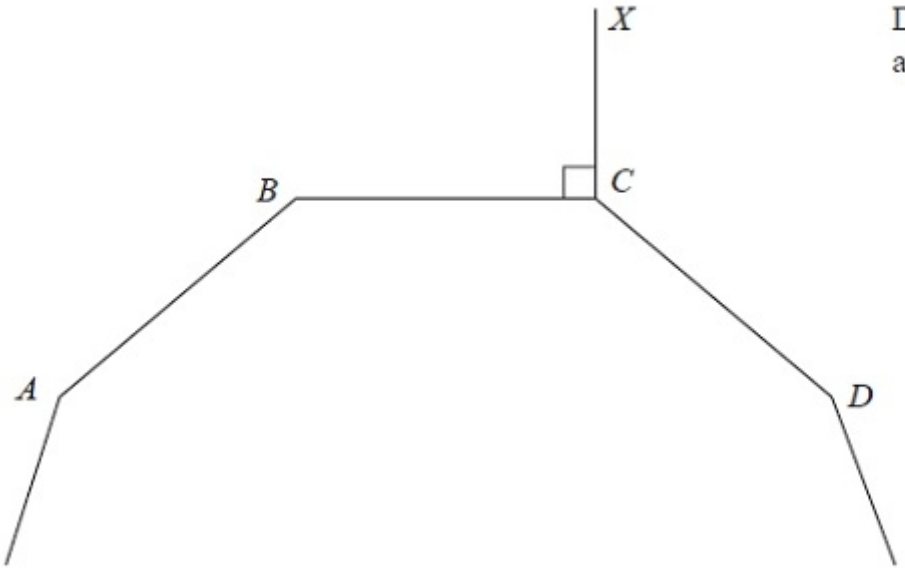


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are four vertices of a regular 10-sided polygon.

Angle *BCX* = 90°.

Work out the size of angle *DCX*.

..... °

(Total for Question is 3 marks)

Q11.

The diagram shows 3 sides of a regular polygon.

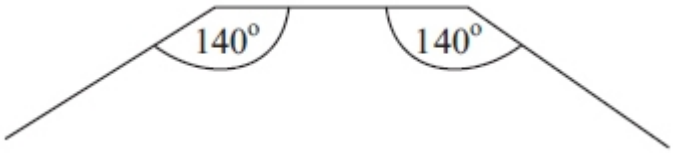


Diagram **NOT** accurately drawn

Each interior angle of the regular polygon is 140°.

Work out the number of sides of the regular polygon.

.....

(Total for Question is 3 marks)

Q12.

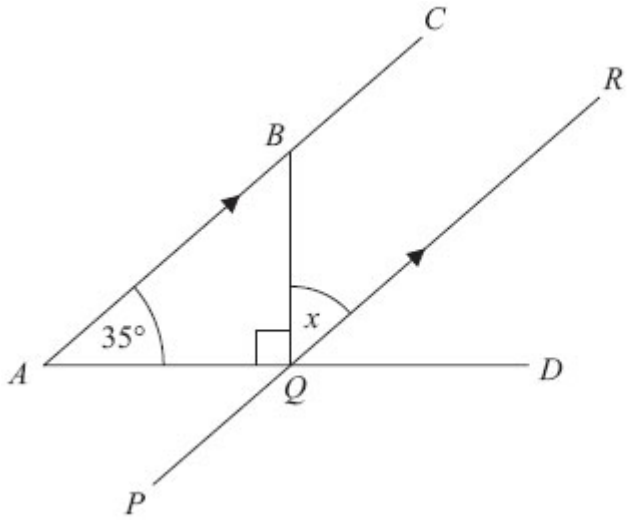


Diagram **NOT** accurately drawn

ABC, *PQR* and *AQD* are straight lines.
ABC is parallel to *PQR.*

Angle *BAQ* = 35°
Angle *BQA* = 90°

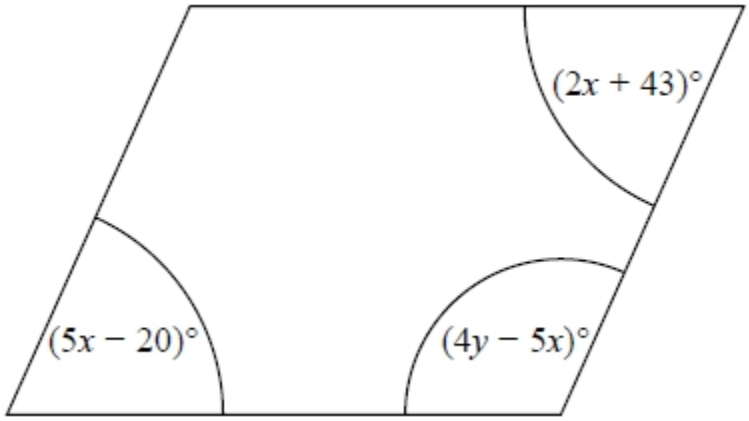
Work out the size of the angle marked *x*.
Give reasons for each stage of your working.

x = ... °

(Total for Question is 4 marks)

Q13.

Here is a parallelogram.



Work out the value of x and the value of y.

x = ...

y = ...

(Total for question = 5 marks)

Q14.

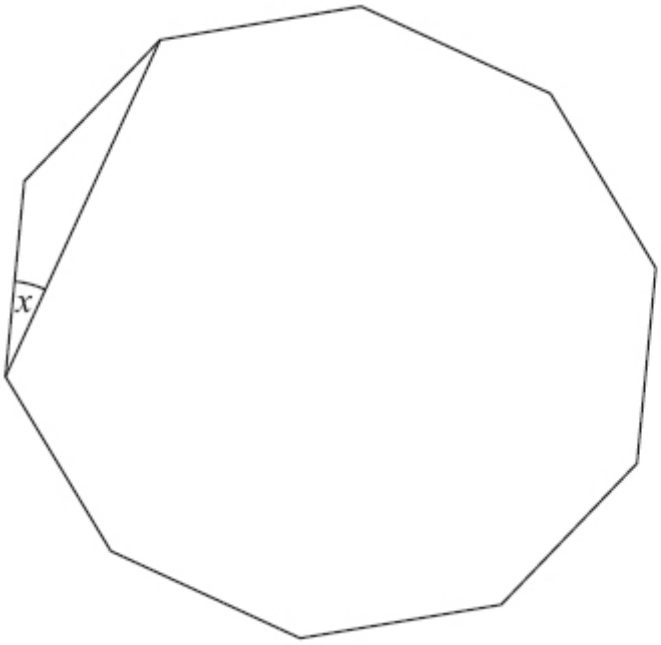


Diagram **NOT** accurately drawn

The diagram shows a regular decagon.
Work out the size of angle *x*.

.....

(Total for Question is 4 marks)

Examiner's Report

Q1.

Generally this question was done well. In part (i), most candidates were able to find the size of the required angle either directly or by initially finding some or all of the other angles in the diagram. A common incorrect answer here was 104. In part (ii), a significant number of candidates were unable to give a correct reason using the properties of parallel lines. A common incorrect answer was "opposite angle are equal".

Q2.

There were a number of possible equations that could be formed from the diagram. Generally speaking those who managed to form a correct equation went on to score at least two marks. Some candidates experienced difficulty in carrying out the final division, usually 351 ÷ 9. As the answer was an integer value it was necessary to give the final answer as 39 rather than a top-heavy fraction. The most popular method of solution was to find an expression for the sum of the angles and then equate this to 360. A large number of candidates did find the correct sum of the angles but then either equated this to zero or 180 or tried to solve $9x = 9$, none of these approaches enabled any marks to be awarded. A minority of candidates realised that a more efficient method of solution was to equate the opposite angles or sum the co-interior angles to 180. There was very little evidence of the checking of final solutions which may have helped come candidates to reconsider their answer.

Q3.

No Examiner's Report available for this question

Q4.

Candidates attempts generally fell into three groups.

(a) Those who worked out 360 ÷ 5 or 540 ÷ 5 and were able to identify that they were finding the exterior angle or interior angle respectively. They generally went on to score all 3 marks.
(b) Those who worked out 360 ÷ 5 or 540 ÷ 5 but were confused over which angle they had worked out – they generally scored 0 marks as the mark scheme was such that if it was clear they had confused interior and exterior, then they got 0 marks.
(c) Those who had little idea – too commonly thinking that the interior angles were 60° for example. They invariably scored 0 marks.

Once again, some candidates lost marks because of numerical weaknesses. In this question this was often an error of the form 360 ÷ 5 = 62, for example. It was pleasing to see some candidates giving reasons at each stage of their calculation.

Q5.

Most candidates were able to achieve 2 marks for correctly calculating the angle as 54 degrees. However, many candidates were not awarded the mark for correct reasons for their chosen method. Frequently only one reason was offered, or the vocabulary used was ambiguous or not sufficiently rigorous for geometrical reasoning. It was not uncommon to see confusion between alternate and corresponding angles.

Q6.

This was well answered by many students with many working out that the angle marked *x* was 80°. However not many students scored the communication mark for providing all 3 reasons that included all the relevant words underlined in the mark scheme. The most common error was to either make angles *EBC* and *EFG* each 65° or to write that angle *EFB* was 50°. These students could only score a maximum of 1 mark for indicating that angle *ABE* was 50° either by writing a statement or putting 50° in the correct place on the diagram. A few students extended *EB* or *BF* and used the rule that corresponding angles are equal. This was also acceptable.

Q7.

Although few candidates gave a fully correct answer to this question, there was much misunderstanding of the relevance of dividing 360° by 5. A small number of candidates found 108° as the interior angle in a regular pentagon but could make no further progress and those who understood the question but showed inaccurate calculations scored 2 marks.

It was also clear that many candidates did not use the diagram, as they did not appreciate that the interior angle of a regular pentagon was obtuse and could not be 72°.

Q8.

The most common approach was 360 ÷ 8 = 45 and 180 – 45 = 135. Candidates felt it useful to write their angles on the diagram, aiding them to work through to a solution. It was clear candidates knew how to calculate interior and exterior angles but many were confused as to *which* angles they were calculating, leading some to write interior angles as exterior on the diagram, or vice versa, even when this meant them showing obtuse angles in the space for an acute angle. *A* common arithmetic error was 360 ÷ 8 = 40.

Q9.

Most found an acute angle of a rhombus by considering the angles around the point at the centre of the diagram. Some went no further but gained 2 marks credit to this point, having stated this angle as 65°. A few spoiled their working by using 180° as the sum of the angles of a quadrilateral. Some worked out 360/9 but in many cases the labelling and their explanations suggested that they thought that they were finding an exterior angle of a quadrilateral. It is particularly important for candidates to realise that the instruction "you must show your working" must be adhered to in order to gain full marks.

Q10.

This question was done quite well but it was evident that many candidates could not distinguish between the calculation needed for the interior angle and the calculation needed for the exterior angle. A very common incorrect answer here was 234. Usually obtained by calculating 360 ÷ 10 (= 36), marking the *interior angle* on the diagram as 36 and then calculating angle *DCX* as 360 − 90 − 36 (= 234).

Q11.

Where candidates calculated the correct exterior angle, the correct answer usually followed although 360 ÷ 40 = 8 was quite common. Some candidates added that the shape was a nonagon. Many candidates chose the less efficient and more error prone strategy of listing multiples of 140 to compare with a list of the multiples of 180. Some did not appreciate that only part of a regular polygon was shown and instead drew horizontal and/or vertical lines to close the shape and form a trapezium or hexagon.

Q12.

Nearly all candidates worked within the right angled triangle to find angle ABQ, and most then went on to give angle *x* as 55°

The mark for giving an appropriate reason within the context of the question was not always earned since a geometrical reference had to be precise such as "alternative" or "corresponding". Hence merely stating "parallel lines" or "Z angles" was insufficient. It is always useful to show the angles on the diagram as well as in working.

Q13.
No Examiner's Report available for this question

Q14.

Two common approaches were seen in answers to this question. Most candidates calculated the size of each exterior angle as a first step. The best candidates went on to produce concise and clear working leading to a correct answer while weaker candidates could not see how to complete the method or made errors along the way. A second approach started with the calculation of the size of each interior angle. This was not as successful as most of the candidates using this method needed to work out the sum of the interior angles by splitting the decagon into 8 triangles, often making mistakes with the arithmetic on the way.

Many candidates were confused between interior and exterior angles – a surprising number of candidates marked an angle on the diagram with 36° even though it should have been obvious that it was obtuse. Other candidates assumed a decagon had 8 sides despite a diagram being given. The diagram was not always fully utilised and annotation and working were not always clearly presented. Approximately 30% of candidates scored full marks. A further 30% of candidates were awarded 2 or 3 marks.

Mark Scheme

Q1.

PAPER: 5MB2H_01					
Question		Working	Answer	Mark	Notes
	(i)		126	2	B1 cao
	(ii)		Reason		B1 for reason relating to geometrical property & parallel lines which is not contradicted by method shown elsewhere eg alternate angles are equal, corresponding angles are equal, allied angles / co-interior angles add up to 180°

Q2.

Question		Working	Answer	Mark	Notes
		$3x-15 = 2x+24$ $x = 39$ **OR** $2x+3x-15+2x+2x+24 = 360$ $9x + 9 = 360$ $9x = 351$ $x = 39$ **OR** $2x + 2x+24 = 180$ $4x + 24 = 180$ $4x = 156$ $x = 39$ **OR** $2x + 3x-15 = 180$ $5x - 15 = 180$ $5x = 195$ $x = 39$	39	3	M1 for forming an appropriate equation eg. $3x - 15 = 2x + 24$ **OR** $2x + 3x - 15 + 2x + 2x + 24 = 360$ **OR** $2x + 2x + 24 = 180$ **OR** $2x + 3x - 15 = 180$ **OR** $2x + 3x - 15 = 2x + 2x + 24$ M1 (dep) for correct **operation(s)** to isolate x and non-x terms in an equation to get to $ax = b$ A1 cao **OR** M2 for $^{351}/_{9}$ oe **or** $^{195}/_{5}$ oe **or** $^{156}/_{4}$ oe A1 cao

Q3.

Question	Working	Answer	Mark	AO	Notes
		84°	P	3.1b	P1 for process to find size of interior angle of hexagon or pentagon
			P	3.1b	P1 for establishing a correct process to find angle *JAF*, e.g. *JAF* = (180 − 108) ÷ 2
			P	3.1b	P1 for a complete process to find angle *BAJ*
			A	1.3b	A1 cao

Q4.

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
			36	3	M1 for a correct method to find either an interior or an exterior angle; eg. (180 × 3) ÷ 5 or 540 ÷ 5 (=108) or 360 ÷ 5 (=72) M1 (dep) for a complete method to find angle *CFD*. A1 cao

Q5.

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
*			54 with reasons	3	M1 for angle *RWY* or angle TWZ = 180 − 126 (= 54) or angle *TWR* or angle *WRS* = 126 (may be marked on diagram) A1 for 54 C1 for appropriate reasons for method shown eg. Angles on a straight line add up to 180 and Alternate angles are equal OR Corresponding angles are equal and Angles on a straight line add up to 180 OR Vertically opposite angles are equal and Allied angles / Co-interior angles add up to 180 OR Angles at a point add up to 360 with other reasons as above.

Q6.

PAPER: 5MB2H_01					
Question		Working	Answer	Mark	Notes
*			80	4	B1 for $EBF = 50$ or $ABE = 50$ M1 for angles given that can lead to $x = 80$ as the next step eg $EBF = 50$ and $ABE = 50$ eg $EBF = 50$ and $BFG = 100$ eg $EBF = 50$ and $BFE = 80$ eg $EBF = 50$ and $DEB = 130$ and $ABE = 50$ A1 cao C1 for stating correct reasons appropriate to their method shown eg Base angles of an isosceles triangle are equal. with Angles in a triangle add up to 180° with Alternate angles are equal eg Base angles of an isosceles triangle are equal. with Alternate angles are equal with Angles on a straight line add up to 180° eg Base angles of an isosceles triangle are equal. with The exterior angle of a triangle is equal to the sum of the opposite interior angles. with Allied angles / Co-interior angles add up to 180°

Q7.

		Working	Answer	Mark	Notes
			54	3	M1 for 180 – 360 ÷ 5 **or** 108 seen as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao **OR** M1 for 180 × (5 – 2) (= 540) ÷ 5 or 108 given as the interior angle of a pentagon M1 (dep on previous M1) for 360 – 2 × '108' – 90 A1 for 54 cao

Q8.

Question		Working	Answer	Mark	Notes
			112½	4	M1 for exterior angle = 360 ÷ 8 (=45) M1 for interior angle = 180 – "45" (=135) M1 (dep on at least M1) for ½ (360 – "135") or 180 - ½ ("135") A1 for 112½ oe OR M1 for 360 ÷ 8 (=45) M1 for 180 + "45" (=225) or 180 – "45" M1 (dep on at least M1) for "225" ÷ 2 or for ½ (360 – "135") or 180 - ½ ("135") A1 for 112½ oe OR M1 for Sum of interior angles = 180×(8-2) (=1080) M1 for interior angle = "1080" ÷8 (=135) M1 (dep on at least M1) for ½ (360 – "135") or 180 - ½ ("135") A1 for 112.5 oe NB do not award marks for angles that are stated in working but contradicted by their position on the diagram.

Q9.

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		115	4	M1 for 360 – 4 × 25 (=260) M1 (dep) for '260'÷4 (=65) M1 for 180 – '65' **or** (360 –2× '65') ÷ 2 A1 for 115 with working **OR** M1 for 360÷4 (=90) M1 (dep) for '90' – 25 (=65) M1 for 180 – '65' **or** (360 – 2×'65') ÷ 2 A1 for 115 with working

Q10.

PAPER: 5MB2H 01					
Question		Working	Answer	Mark	Notes
			126	3	M1 for (angle BCD =) $\frac{180\times(10-2)}{10}$ (= 144) M1 (dep) for (angle DCX =) 360 – '144' – 90 oe A1 cao OR M1 for (exterior angle =) $\frac{360}{10}$ (= 36) M1 (dep) for (angle DCX =) 90 + '36' oe, eg 180 – (90 – 36) A1 cao

Q11.

Question	Working	Answer	Mark	Notes
	180−140(= 40) 360÷"40"	9	3	M1 for 180−140(= 40) M1 (dep) for 360÷"40" A1 cao

Q12.

		Working	Answer	Mark	Notes
			55	4	M1 for a correct method to find a different angle using 35° M1 for setting up a complete process to calculate angle *x* A1 cao B1 states one of the following reasons relating to their chosen method: Alternate angles are equal; Corresponding angles are equal; Allied angles / Co-interior angles add up to 180; the exterior angle of a triangle is equal to the sum of the interior opposite angles.

Q13.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		$x = 21$, $y = 50$	P1 process to start solving problem eg. form an appropriate equation P1 complete process to isolate terms in x A1 for $x = 21$ P1 complete process to find second variable A1 $y = 50$

Q14.

Question	Working	Answer	Mark	Notes
	360 ÷ 10 36 ÷ 2	18°	4	M1 for correct method to find the size of an exterior angle eg 360 ÷ 10 A1 for 36 M1 for '36' ÷ 2 or (180 – (180 – 36)) ÷ 2 A1 cao OR M1 for correct method to find the size of an interior angle eg(180 × 8) ÷ 10 A1 144 M1 (180 '144') ÷ 2 A1 cao