

Name: _____

Geometric Reasoning

Date:

Time:

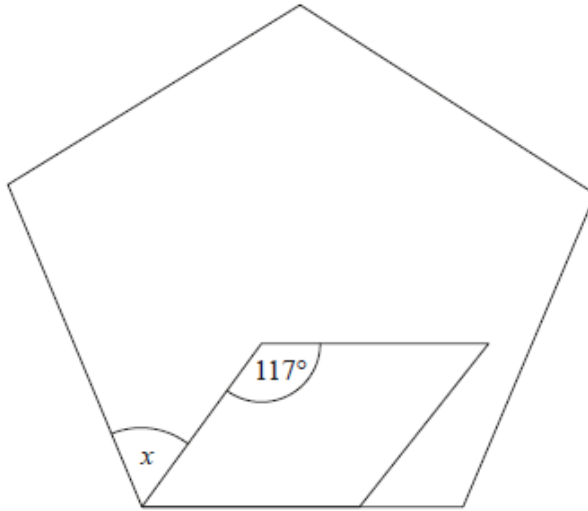
Total marks available:

Total marks achieved: _____

Questions

Q1.

The diagram shows a regular pentagon and a parallelogram.

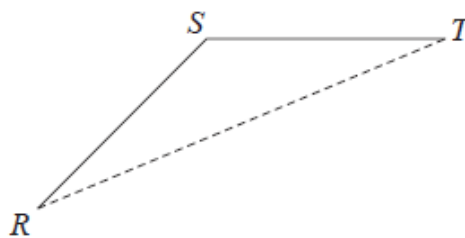


Work out the size of the angle marked x .
You must show all your working.

..... °

(Total for question = 4 marks)

Q2.



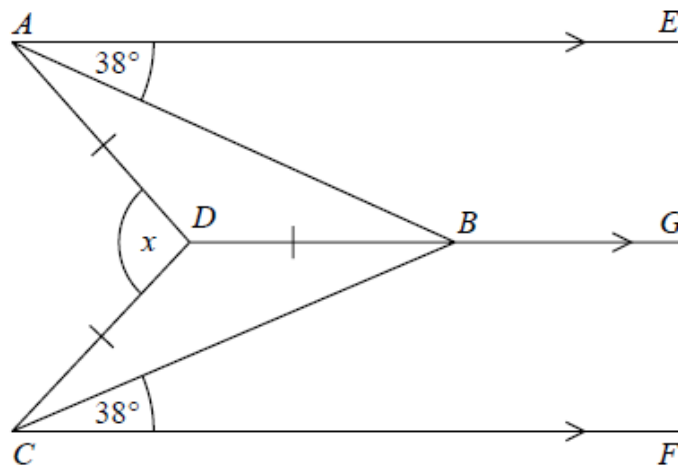
RS and ST are 2 sides of a regular 12-sided polygon.
 RT is a diagonal of the polygon.

Work out the size of angle STR .
You must show your working.

..... °

(Total for question = 3 marks)

Q3.



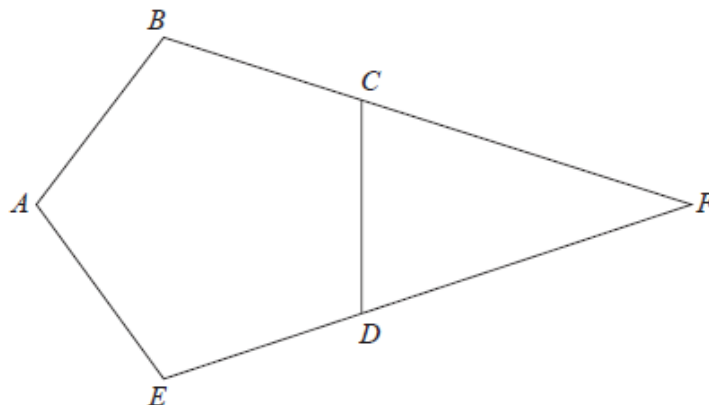
AE , DBG and CF are parallel.
 $DA = DB = DC$.
 Angle $EAB = \text{angle } BCF = 38^\circ$

Work out the size of the angle marked x .
 You must show your working.

..... °

(Total for question = 3 marks)

Q4.



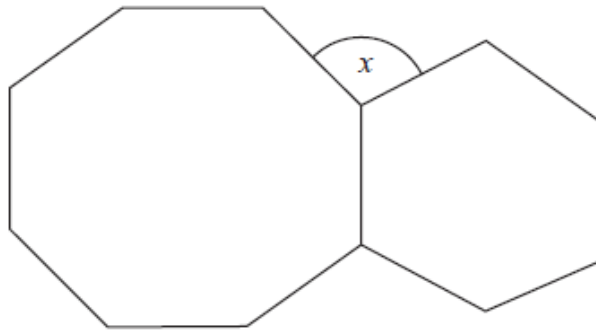
$ABCDE$ is a regular pentagon.
 BCF and EDF are straight lines.

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

..... °

(Total for question = 3 marks)

Q5.



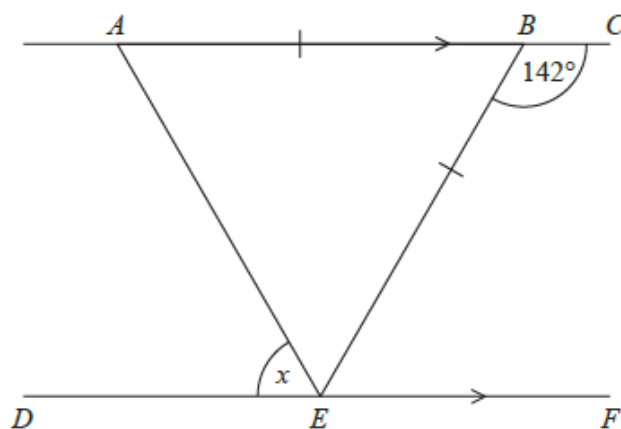
The diagram shows a regular octagon and a regular hexagon.

Find the size of the angle marked x
You must show all your working.

$x = \dots\dots\dots^\circ$

(Total for question = 3 marks)

Q6.



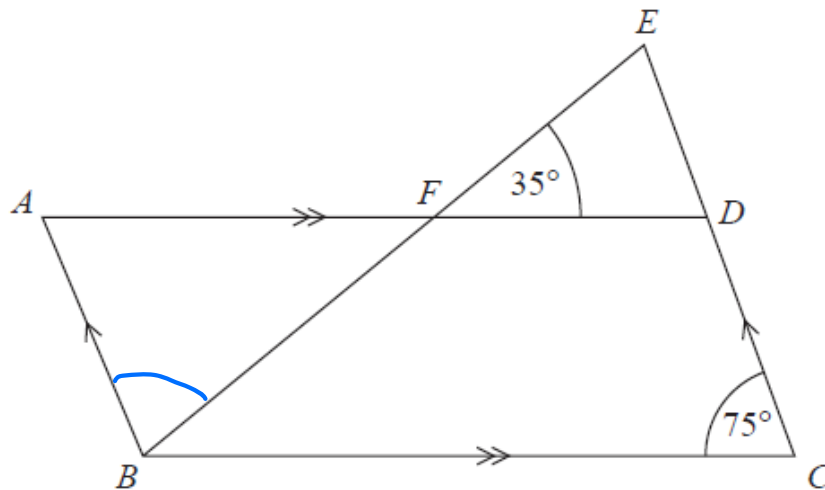
ABC and DEF are parallel straight lines.
 ABE is an isosceles triangle with $AB = BE$.
Angle $CBE = 142^\circ$

Work out the size of angle x .
Give a reason for each stage in your working.

..... °

(Total for question = 5 marks)

Q7.



$ABCD$ is a parallelogram.
 EDC is a straight line.
 F is the point on AD so that BFE is a straight line.

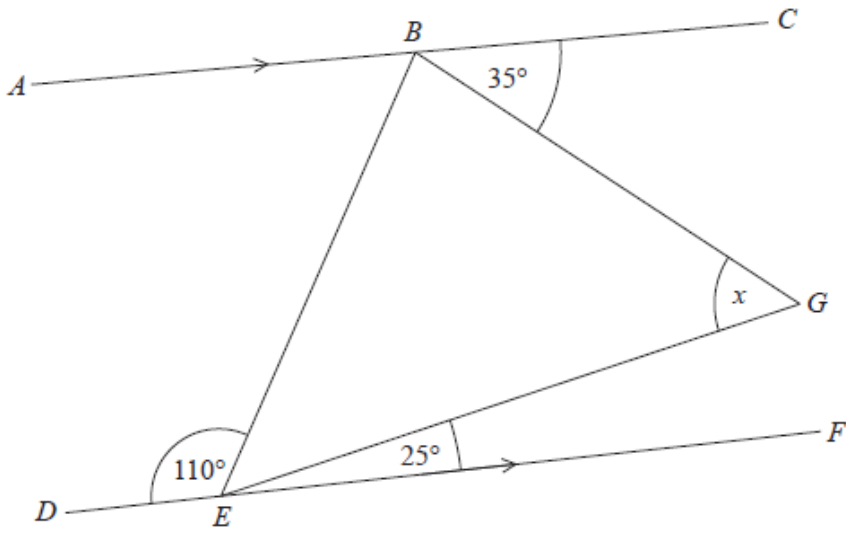
Angle $EFD = 35^\circ$
Angle $DCB = 75^\circ$

Show that angle $ABF = 70^\circ$
Give a reason for each stage of your working.

(Total for question = 4 marks)

Q8.

BEG is a triangle.



ABC and DEF are parallel lines.

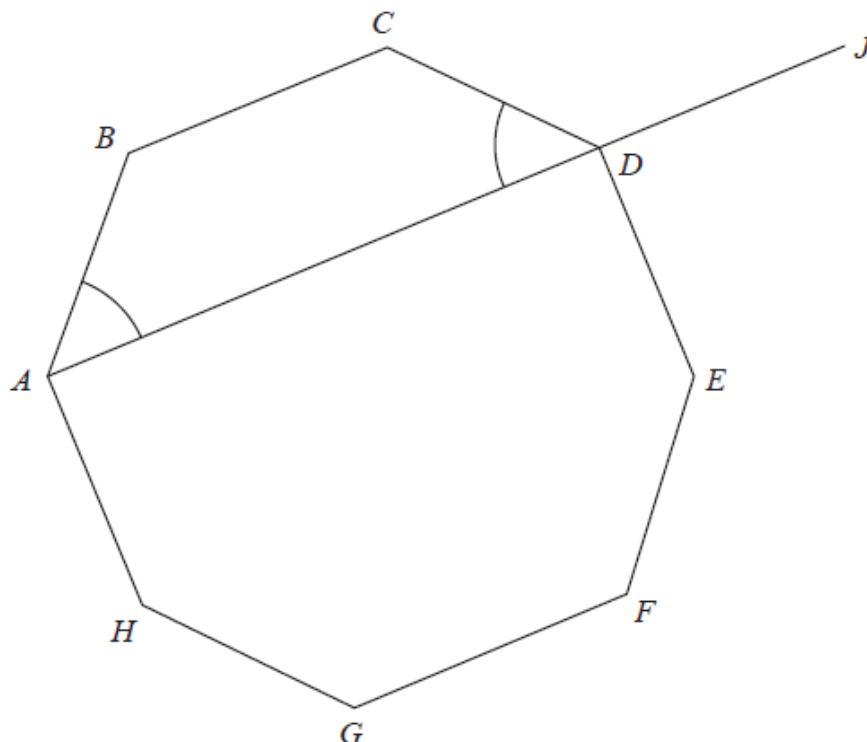
Work out the size of angle x .

Give a reason for each stage of your working.

..... °

(Total for question = 4 marks)

Q9.



$ABCDEFGH$ is a regular octagon.

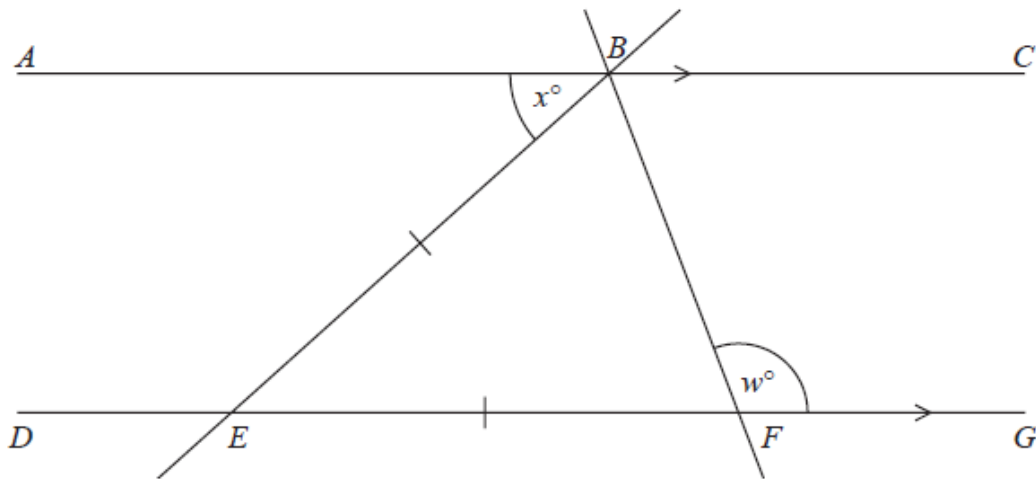
ADJ is a straight line.

angle $BAD =$ angle CDA

Show that angle $CDJ = 135^\circ$

(Total for question = 4 marks)

Q10.



In the diagram ABC and $DEFG$ are parallel lines.

Angle $ABE = x^\circ$

$EB = EF$

Show that $w = 90 + \frac{1}{2}x$

Give a reason for each stage of your working.

(Total for question = 4 marks)

Mark Scheme

Q1.

Question	Answer	Mark	Mark scheme	Additional guidance
	45	P1	for $180 - 117 (=63)$ or states, or uses, exterior angle $+ x = 117$	Angles may be shown on the diagram. Any angle labelled correctly as 63 and not contradicted scores this mark
		P1	for process to find the exterior or the interior angle of the pentagon, eg $360 \div 5 (=72)$ or $180 - (360 \div 5) (=108)$ or $((5-2) \times 180) \div 5 (=108)$	Exterior = 108 or interior = 72 does not score the mark
		P1	for a complete process to find x , eg $180 - "72" - "63"$ or $"108" - "63"$ or $117 - "72"$	
		A1	cao	An answer of 45 with no supporting working scores 0

Q2.

Question	Working	Answer	Mark	Notes
		15	P1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10 \times 180}{12} (= 150)$ or $\frac{360}{12} (= 30)$, must be no contradictions
			P1	for process to find angle STR , eg $\frac{180 - "150"}{2}$ or $\frac{"30"}{2}$
			A1	cao

Q3.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		152	M1 Start to method $ABD = 38^\circ$ and BAD or DBC or $DCB = 38^\circ$
			M1 ADB or $BDC = 180 - 2 \times 38 (= 104)$
			A1 for 152 with working

Q4.

Question	Working	Answer	Mark	Notes
		36	3	P1 a correct process to find either an interior or an exterior angle, e.g. $(180 \times 3) \div 5 (= 108)$ or $360 \div 5 (= 72)$ P1 (dep) a complete process to find angle <i>CFD</i> A1 cao

Q5.

Question	Working	Answer	Notes
		105	P1 for process to find the exterior angle or interior angle of a hexagon or octagon P1 for process to find the both exterior angles or both interior angles A1 for 105 from correct working

Q6.

Question	Working	Answer	Mark	Notes
		71°	M1	finds an angle using parallel lines, e.g. <i>BEF</i> as 38° or <i>EAB</i> as <i>x</i> .
			M1	shows a complete process to arrive at the required angle could be evidenced by angles shown on the diagram
			A1	cao
			C1	<u>alternate</u> , <u>corresponding</u> or <u>allied (co-interior)</u> unambiguously given and appropriate for their working
			C1	for all other reasons given, e.g. <u>Angles on a straight line</u> add up to 180, <u>Angles in a triangle</u> add up to 180, <u>Base angles of an isosceles triangle</u> are <u>equal</u> and appropriate for their working

Q7.

Question	Working	Answer	Mark	Notes
	<i>CB</i> extended to form <i>CG</i>	Reasoning	B1 M1 C2 (C1	for 35 or 75 or 145 or 105 or $DEF = 70$, marked on the diagram or 3 letter description for 180-70-35 or 180-75-35 or a correct pair of angles that would lead to 75 or 70, eg $AFB = 35$ and $FAB = 75$ or $AFB = 35$ and $ABG = 75$ or $FBC = 35$ and $ABG = 75$ or $EDF = 75$ and $DEF = 70$ or $FDC = 105$ and $FBC = 35$ or $ABC = 105$ and $FBC = 35$ (dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen (dep on B1 or M1) for one reason clearly used and stated.) <u>Corresponding angles are equal</u> , <u>alternate angles are equal</u> , <u>opposite angles in a parallelogram are equal</u> , <u>angles in a triangle sum to 180</u> , <u>angles on a straight line sum to 180</u> , <u>vertically opposite angles are equal</u> , <u>vertically opposite angles are equal</u> , <u>angles in a quadrilateral sum to 360</u> , <u>co-interior angles sum to 180</u> , <u>allied angles sum to 180</u> , <u>angles around a point sum to 360</u>

Q8.

Question	Answer	Mark	Mark scheme	Additional guidance
	60	M1 M1 A1 C1	use of parallel lines to find an angle eg $ABE=70$ or $EBG=75$ or $EBC = 110$ or shows parts of x as 35 or 25 for a complete method to find angle x ; could be in working or on the diagram for $x = 60$ (dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: <u>alternate angles are equal</u> , <u>allied angles / co-interior angles add up to 180</u> , <u>angles on a straight line add up to 180</u> , <u>angles in a triangle add up to 180°</u>	Parts of x should be identified on the diagram by the insertion of a dividing line through angle x (need not be identified or drawn parallel). Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.

Q9.

Question	Working	Answer	Mark	Notes
		Correct conclusion from correct working	M1 A1 M1 C1	for a method to find the interior angle, e.g. $(8 - 2) \times 180 \div 8 (= 135)$ or exterior angle, e.g. $360 \div 8 (= 45)$ of a regular octagon for interior angle = 135 or exterior angle = 45 for method to find size of angle CDA , e.g. $(360 - 135 \times 2)/2 (= 45)$ or for stating and using BC parallel to AD for method to complete the solution with angle $CDJ = 135$ e.g. $180 - "45" (= 135)$ or angle BCD and angle CDJ are alternate angles

Q10.

Question	Working	Answer	Mark	Notes
		shown	M1 M1 M1 C1	for use of parallel lines to find an angle, e.g. angle $BEF = x$ (dep M1) for second step, e.g. for angle $EBF = \frac{180 - x}{2}$ oe or angle $EFB = \frac{180 - x}{2}$ oe for complete method leading to $w = 90 + \frac{1}{2} x$ for complete set of reasons linked to method: <u>Alternate angles are equal</u> <u>Base angles of an isosceles triangle are equal</u> , <u>Angles in a triangle add up to 180</u> <u>Angles on a straight line add up to 180</u>