High School Mathematics Test 2015

Year 9

Basic Geometry

Non Calculator

Skills and Knowledge Assessed:

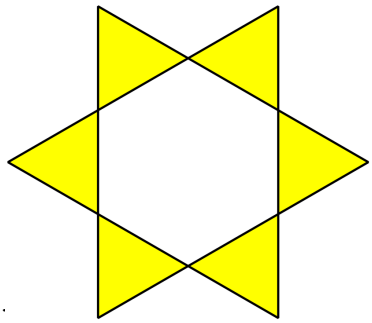
- Use the language, notation and conventions of geometry
- Identify line and rotational symmetries (ACMMG181
- Recognise the geometrical properties of angles at a point.
- Identify corresponding, alternate and co-interior angles when two straight lines are crossed by a transversal (ACMMG163)
- Investigate conditions for two lines to be parallel and solve simple numerical problems using reasoning (ACMMG164)
- Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166)
- Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165)
- Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202)

Name_____

Section 1 Short Answer Section

IN ALL QUESTIONS, GIVE REASON(S) FOR YOUR ANSWER.
YOU WILL NEED A RULER AND PROTRACTOR FOR THIS TEST.
Write all working and answers in the spaces provided on this test paper.
DIAGRAMS ARE NOT TO SCALE. (Unless otherwise stated).

1. What order of rotational symmetry does this shape have?



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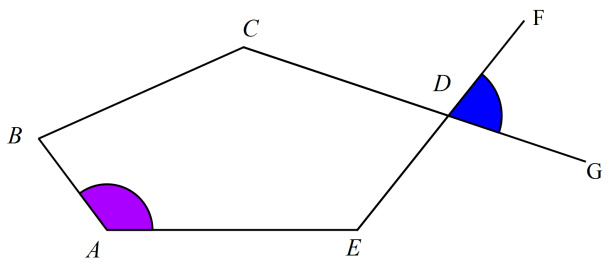
2. Name the two angles which are shaded in the diagram below.



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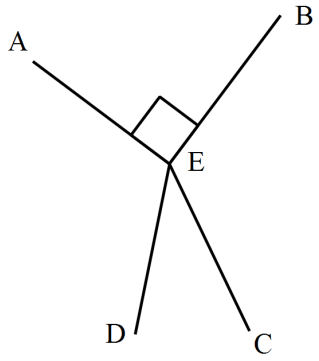
3. Name an acute angle in the diagram below.



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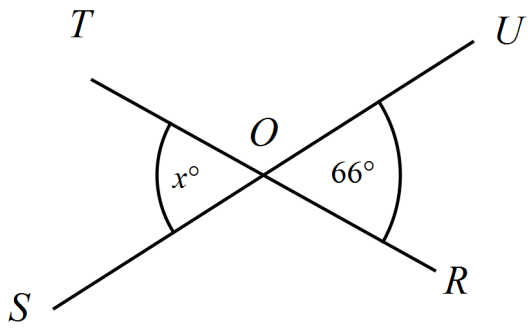
4. Find the value of x.



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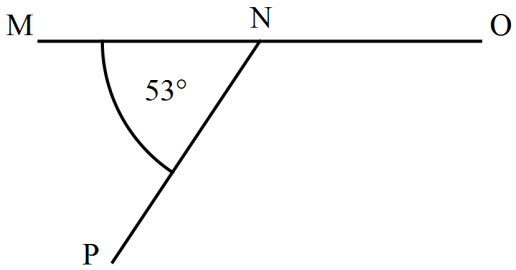
5. Find the size of ∠ PNO.



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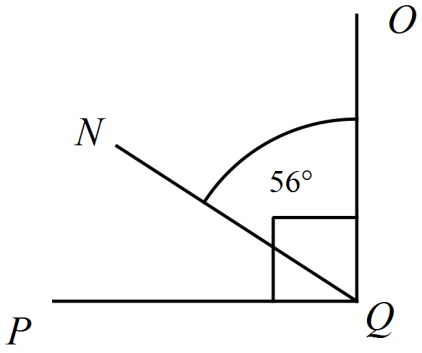
6. Find the size of $\angle NQP$.



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7. Find the value of x.

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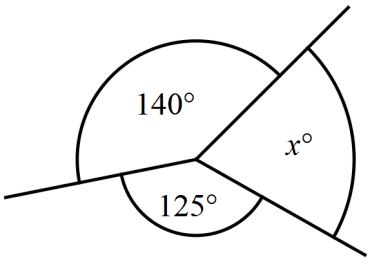

8. Find the size of $\angle VUW$.

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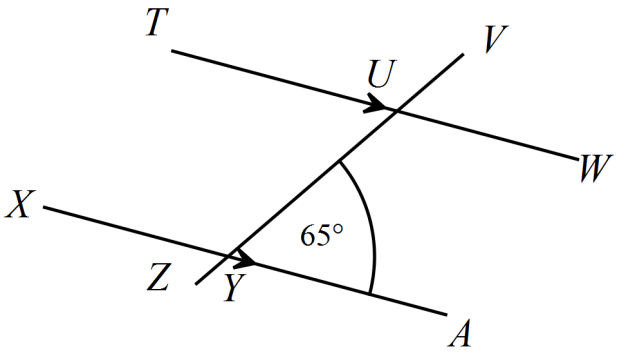

9. Find the value of x.

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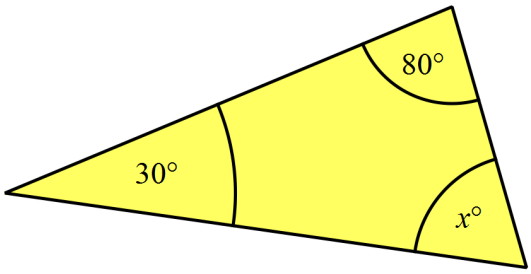

10. Find the value of a.

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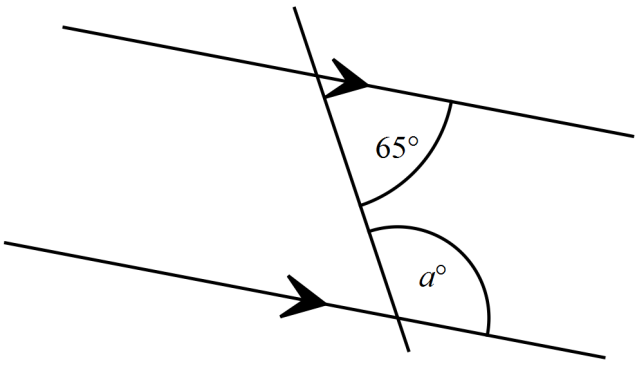

11. Find the value of p.

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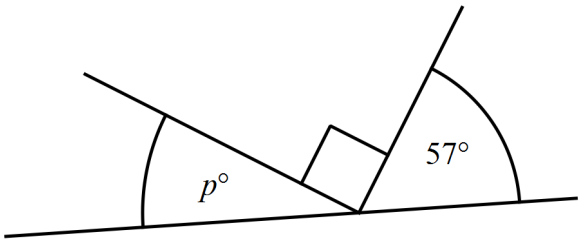

12. Use a protractor to draw $\angle STU = 85°$.

13. Find the value of x.

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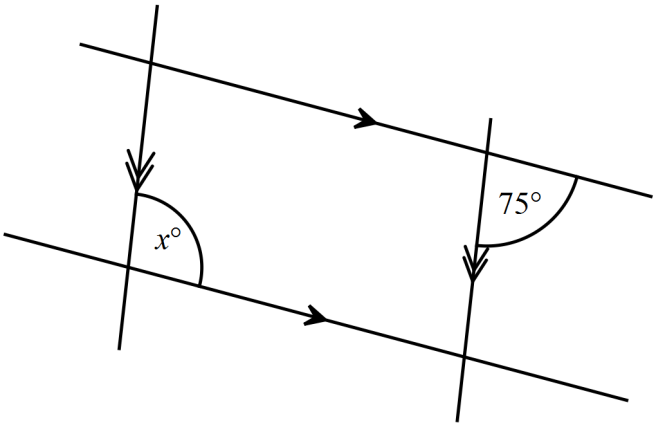
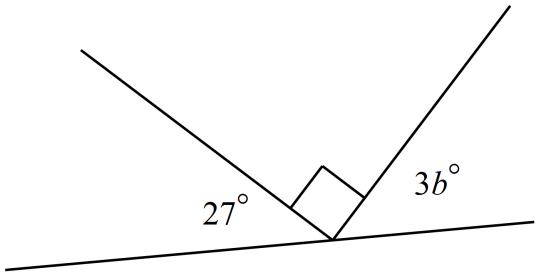


14. What is the value of b?



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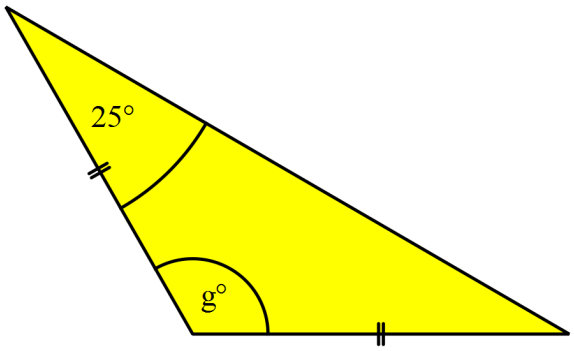
15. Use the grid provided to draw ΔPQR which is a right isosceles triangle.

16. Find the value of g.



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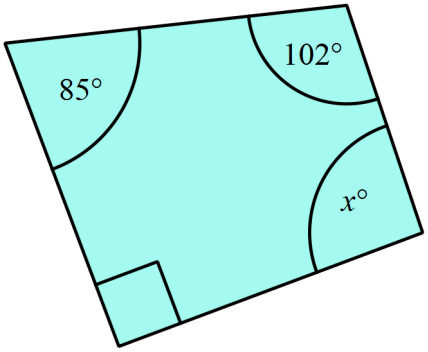
17. Find the value of x.



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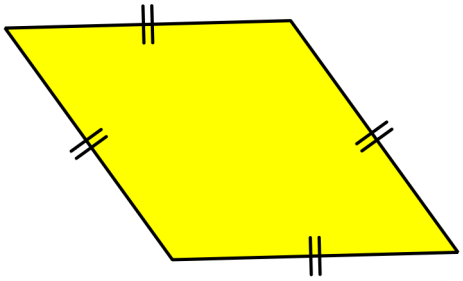
18. What name could be used to describe the quadrilateral shown?



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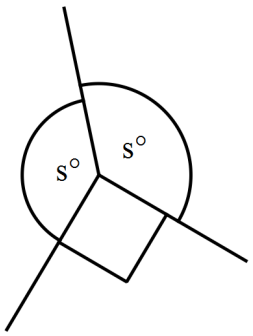
19. Find the value of s.



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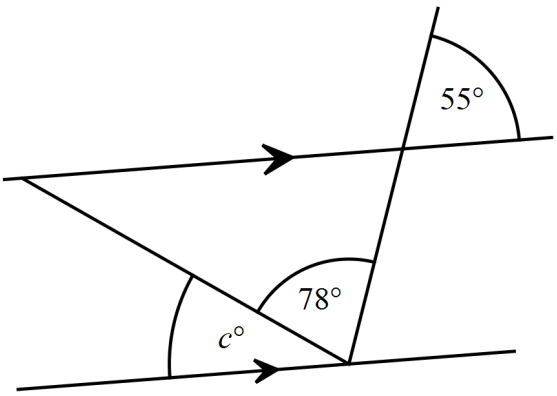
20. Find the value of c.



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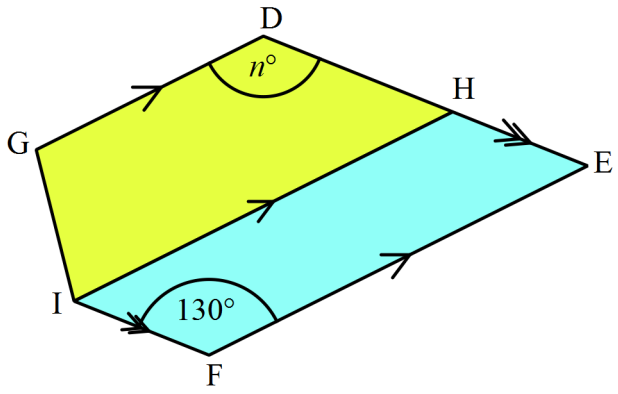
21. *GDHI* is a trapezium and *HEFI* is a parallelogram.

DE is a straight line segment.

Find the value of *n*.



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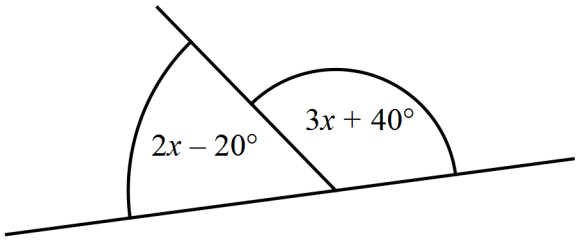
22. What is the value of *x*?



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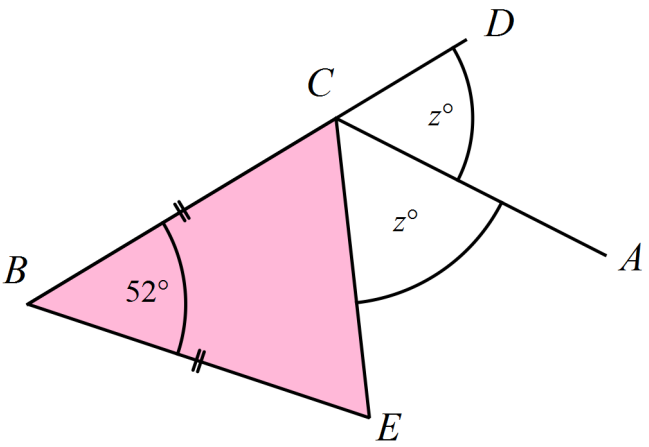
23. *BC* = *BE*.

∠ *DCA* = ∠ *ACE*.

Find the value of *z*.



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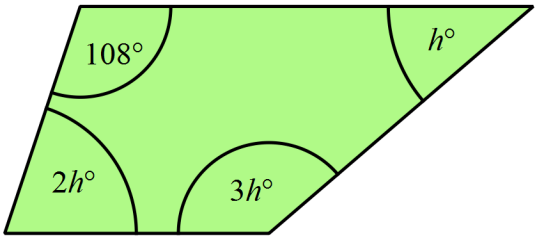
24. Find the value of h.



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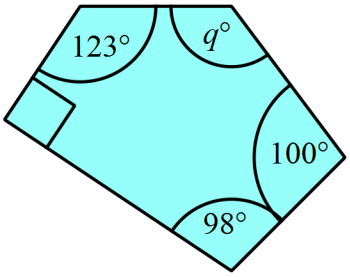
25. An irregular pentagon is shown.

What is the value of q?



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26. Complete the missing spaces in the table of properties of quadrilaterals, by placing a tick or a cross in the appropriate spaces.

PROPERTY	Square	Parallelogram	Rectangle
Diagonals are perpendicular			
Diagonals bisect one another.			

High School
Mathematics Test 2015

Year 9

Basic Geometry

Calculator Allowed

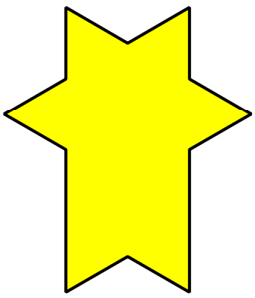
Name_____

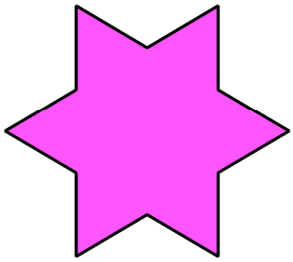
Section 2 Multiple Choice Section

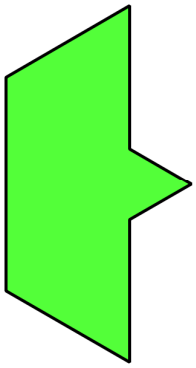
Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

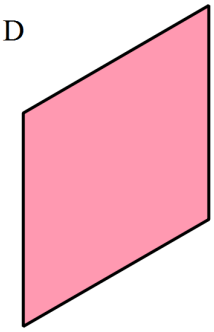
DIAGRAMS ARE NOT TO SCALE UNLESS OTHERWISE STATED

1. Which of the shapes shown has rotational symmetry but no line symmetry?

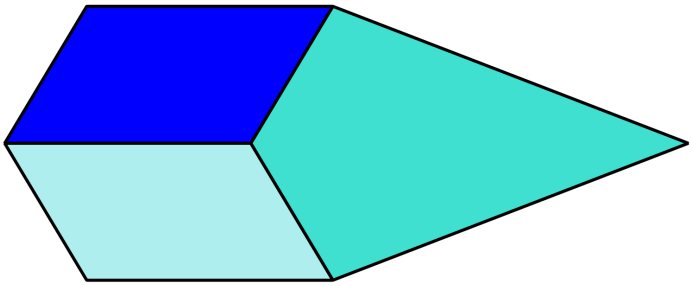
A 

B 

C 

D 

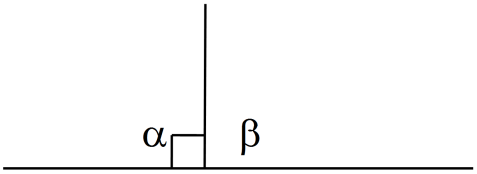
2. What are the names of the quadrilaterals that are used to make this design?



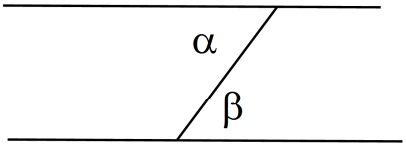
A. Kite and parrallelogram.
B. Kite and rhombus.
C. Parralelogram and rhombus.
D. Rectangle and Rhombus.

3. Which diagram includes a pair of vertically opposite angles α and β ?

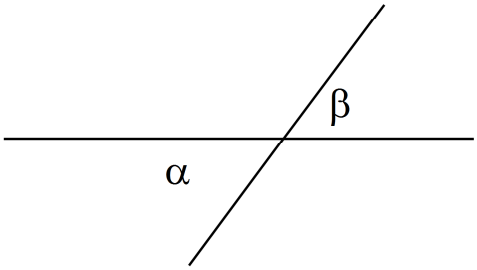
A.



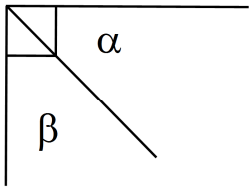
B.



C.

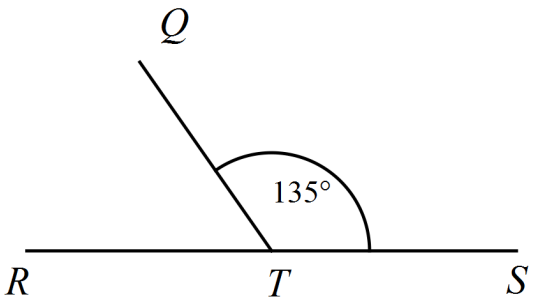


D.



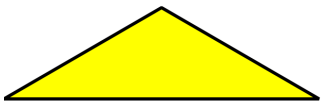
4. What is the size of $\angle QTR$?

A. 35°.
B. 45°
C. 55°.
D. 65°.

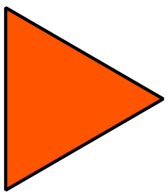


5. Which figure shows an obtuse scalene triangle? (These figures are to scale)

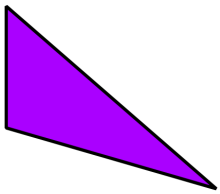
A.



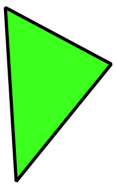
B.



C.

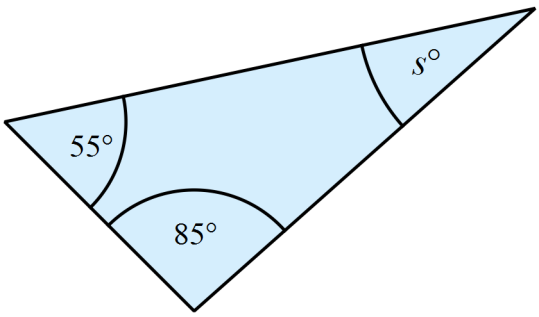


D.

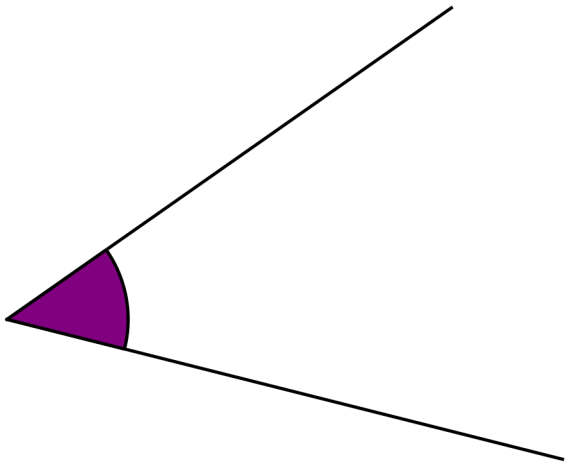


6. What is the value of s?

A. $s = 30°$
B. $s = 35°$
C. $s = 40°$
D. $s = 45°$

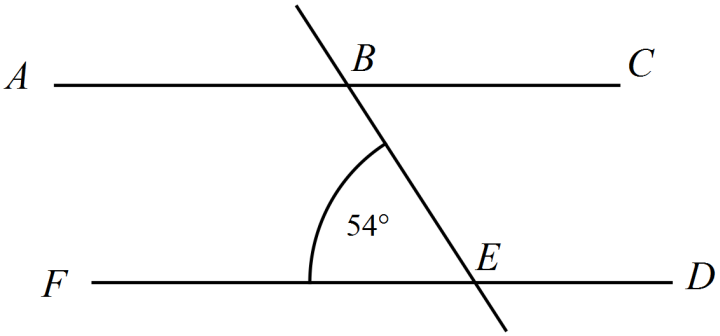


7. Measure the size of $\angle HIJ$ with a protractor.



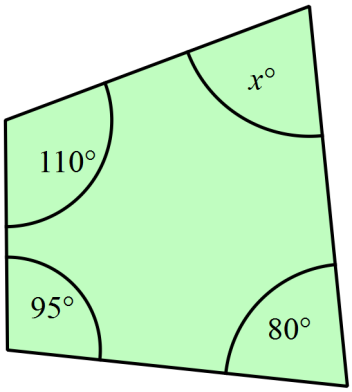
A. 39°
B. 41°
C. 44°
D. 49°

8. What is the size of $\angle ABE$?



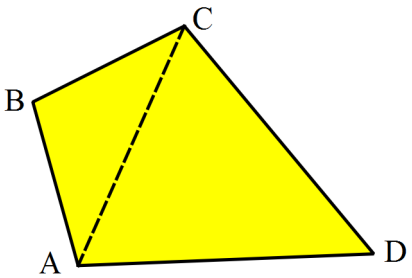
A. 36°
B. 54°
C. 116°
D. 126°

9. What is the value of x?



A. $x = 25$
B. $x = 65$
C. $x = 75$
D. $x = 125$

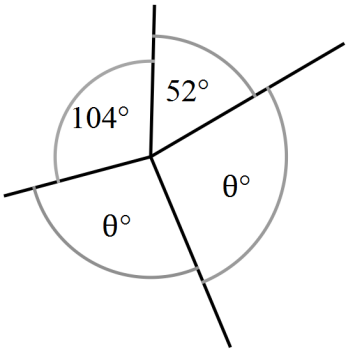
10. ΔABC and ΔADC are non-congruent isosceles triangles.
What type of quadrilateral is $ABCD$?



A. A kite.
B. A parallelogram.
C. A rhombus
D. A trapezium.

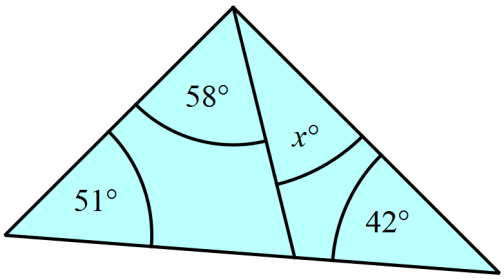
11. What is the value of θ ?

A. 24
B. 102
C. 156
D. 204



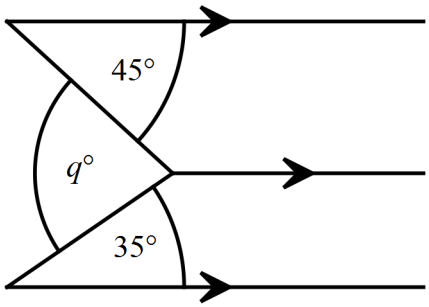
12. What is the value of x?

A. $x = 29$
B. $x = 42$
C. $x = 45$
D. $x = 87$

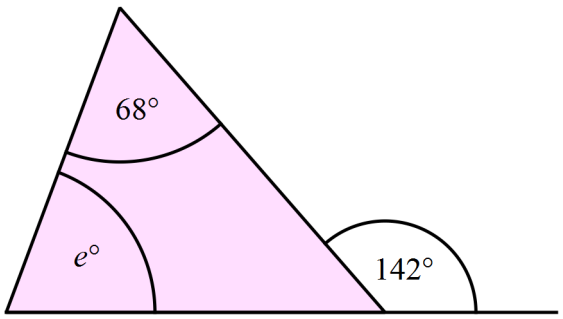


13. Find the value of q.

A. $q = 45$
B. $q = 70$
C. $q = 80$
D. $q = 85$

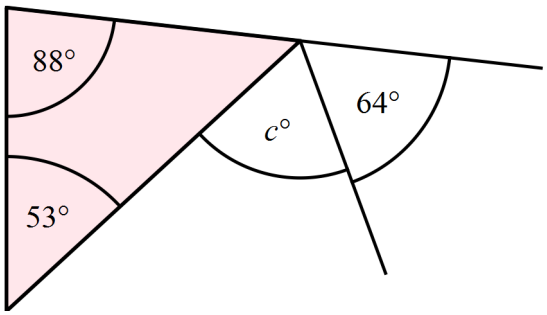


14. The value of e in the diagram below is:



A. $e = 68$ B. $e = 74$ C. $e = 80$ D. $e = 210$

15. Find the value of c.



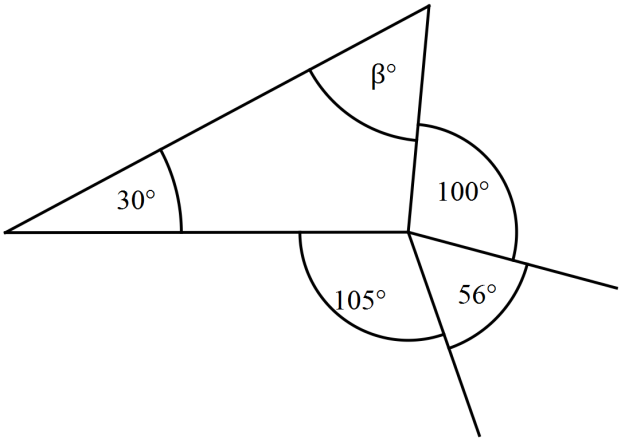
A. $c = 39$
B. $c = 53$
C. $c = 64$
D. $c = 77$

16. Which two quadrilaterals both have the property below?

Both diagonals bisect one another at right angles.

A. A kite and a square
B. A kite and a parallelogram.
C. A rectangle and a rhombus.
D. A rhombus and a square.

17. What is the value of β ?

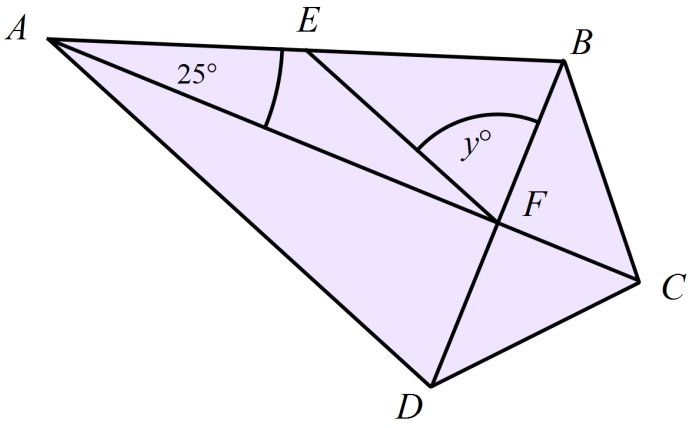


A. 51
B. 99
C. 129
D. 261

18. $ABCD$ is a kite whose diagonals intersect at F.

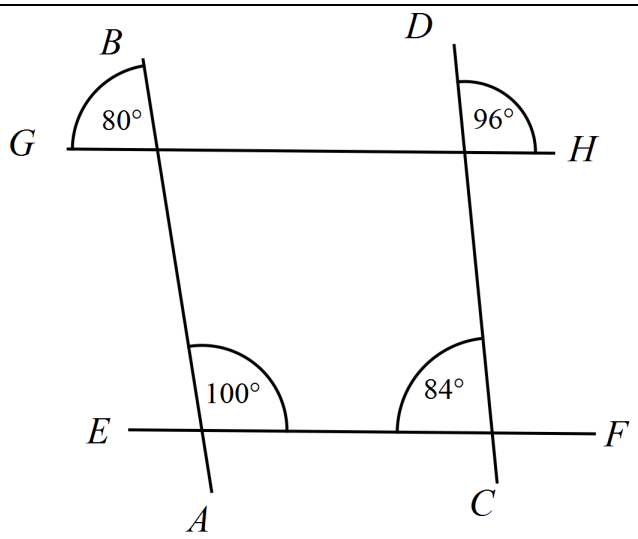
E is a point on AB such that $AE = EF$.

What is the value of y?



A. $y = 50$
B. $y = 65$
C. $y = 75$
D. $y = 130$

19. Which lines are parallel?



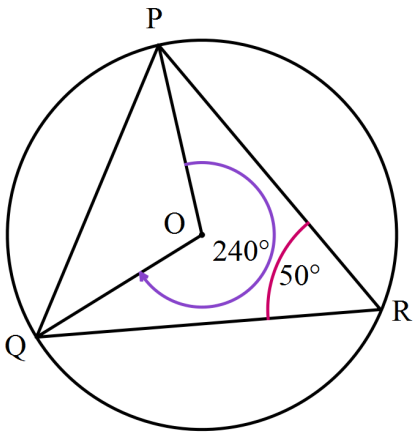
A. $AB \parallel CD$ only.

B. $EF \parallel GH$ only.

C. $AB \parallel CD$ and $EF \parallel GH$.

D. No lines are parallel.

20. PQ and R are points on a circle, centre O.
PO and QO are radii and $PR = QR$.
What is the size of $\angle OPR$? ?



A. 35 °

B. 45 °

C. 65 °

D. 130°

High School
Mathematics Test 2015

Year 9

Basic Geometry

Calculator Allowed

Name_____

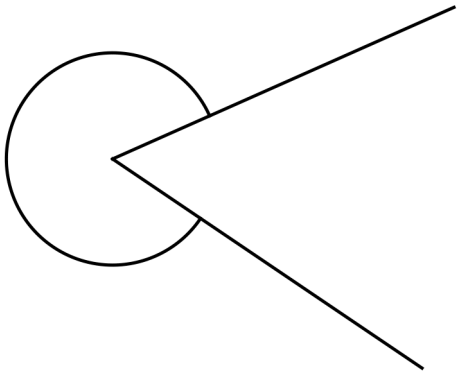
Section 3 Longer Answer Section

Write all working and answers in the spaces provided on this test paper.

Marks

1. Complete the following using geometric instruments.
Do not erase any of your construction lines.

(a) Use a protractor to help determine the size of the reflex angle marked below. **1**

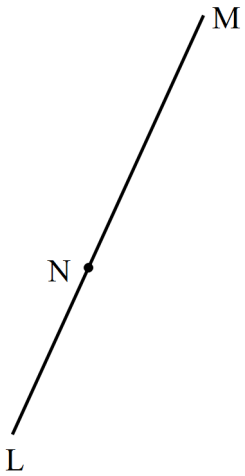


(b) Draw a right angled triangle which has one angle equal to 56°. **2**

Marks

2. Complete the following using geometric instruments.
Do not erase any of your construction lines.

(a) Draw a line which passes through N and is perpendicular to LM. **2**



(b) Draw a rhombus which has 6 cm sides and an internal angle of 125°. **2**

High School Mathematics Test 2015

Multiple Choice Answer Sheet

Basic Geometry

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭
11.	A ⬭	B ⬭	C ⬭	D ⬭
12.	A ⬭	B ⬭	C ⬭	D ⬭
13.	A ⬭	B ⬭	C ⬭	D ⬭
14.	A ⬭	B ⬭	C ⬭	D ⬭
15.	A ⬭	B ⬭	C ⬭	D ⬭
16.	A ⬭	B ⬭	C ⬭	D ⬭
17.	A ⬭	B ⬭	C ⬭	D ⬭
18.	A ⬭	B ⬭	C ⬭	D ⬭
19.	A ⬭	B ⬭	C ⬭	D ⬭
20.	A ⬭	B ⬭	C ⬭	D ⬭

High School Mathematics Test 2015

Year 9

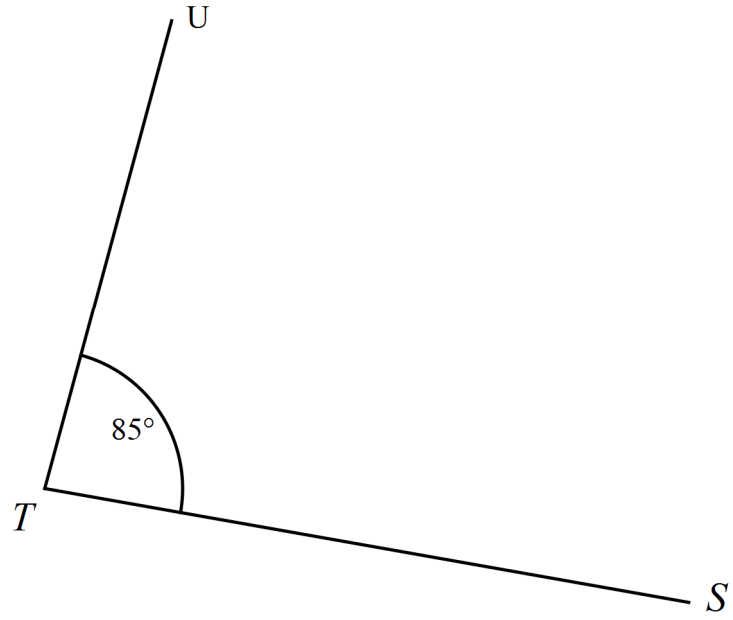
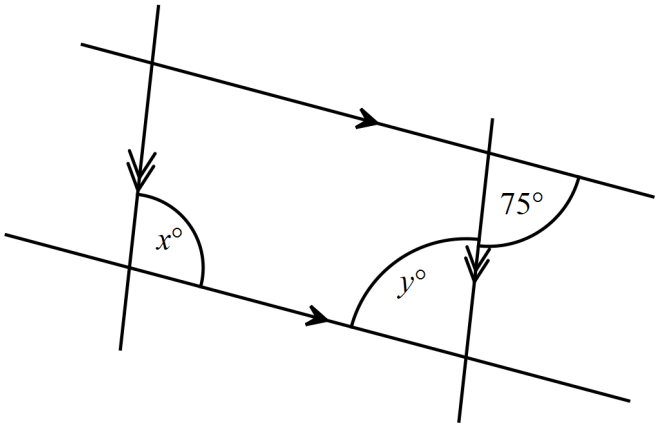
Basic Geometry

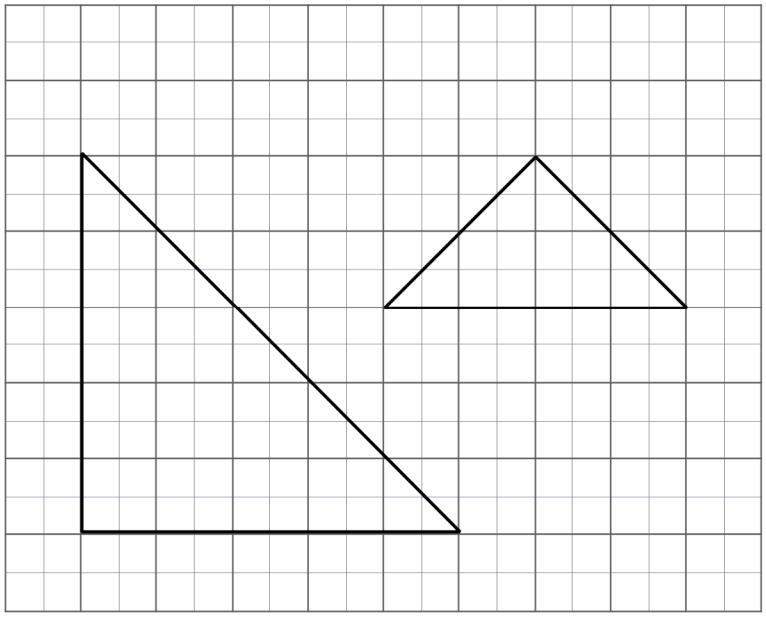
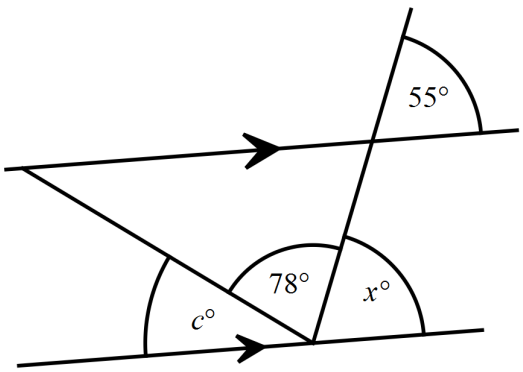
Non Calculator

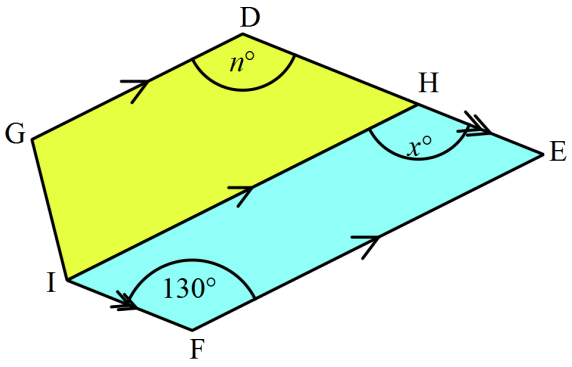
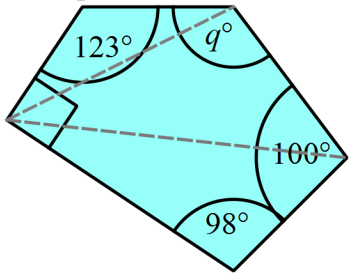
Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	Order 6 as each point can be rotated to the next to look the same.	Order 6
2.		∠ BAE and ∠ FDG or in reverse order.
3.		∠ DEC or ∠ CED
4.	Vertically opposite angles	$x = 66$
5.	∠ PNO + 53 = 180 ∠ PNO = 180 – 53 = 127 (Supplementary Angles on Straight Line)	127°
6.	∠ NQP + 56 = 90 ∠ NQP = 90 – 56 = 34 (Complementary Angles)	34°
7.	$x + 140 + 125 = 360$ $x + 265 = 360$ $x = 360 – 265 = 95$ (Angles at a point)	$x = 95$
8.	∠ VUW = 65° Corresponding angles on || lines are equal	∠ VUW = 65°
9.	$x + 80 + 30 = 180$ $x = 180 – 110$ $= 70$ (Angle sum of triangle)	$x = 70$
10.	$a + 65 = 180$ $a = 180 – 65$ $= 115$ (Cointerior angles are supplementary on || lines)	$a = 115$
11.	$p + 90 + 57 = 180$ $p = 180 – 147$ $= 33$ (Supplementary Angles on Straight Line)	$p = 33$

12.		See diagram
13.	 $y = 75$ (alternate ∠ on ∥ lines) $x + y = 180$ (cointerior ∠ on ∥ lines) $x = 180 - 75$ $= 105$	$x = 105$
14.	$27 + 90 + 3b = 180$ (straight line) $3b = 180 - 117$ $3b = 63$ $b = \frac{63}{3} = 21$	$b = 21$

15.		Many possible triangles, two examples shown.
16.	$g + 25 \times 2 = 180$ (∠ sum isos Δ) $g = 180 - 50 = 130$	$g = 130$
17.	$x + 90 + 85 + 102 = 360$ (∠ sum quad) $x + 277 = 360$ $x = 360 - 277$ $= 83$	$x = 83$
18.	All sides are equal so it is a rhombus	Rhombus
19.	$90 + 2s = 360$ (angles at a point) $2s = 360 - 90 = 270$ $s = \frac{270}{2} = 135$	$s = 135$
20.	 $x = 55$ (corresp ∠ on || lines) $x + 78 + c = 180$ (∠ on straight line) $c + 133 = 180$ $c = 180 - 133 = 47$	$c = 47$

21.	 $x =$ 130 (opposite angles in ‖*gram*) $n = x =$ 130 (corr ∠ on ‖ lines)	$n = 130$
22.	$2x - 20 + 3x + 40 = 180$ (∠ on st line) $5x + 20 = 180$ $5x = 180 - 20 = 160$ $x = \frac{160}{5} = 32$	$x = 32$
23.	$2 \times \angle BEC = 180 - 52 = 128$ $\angle BEC = \frac{128}{2} = 64$ $2z = 52 + 64$ (exterior ∠ of Δ) $2z = 116$ $z = \frac{116}{2} = 58$	$z = 58$
24.	$2h + 3h + h + 108 = 360$ (∠ sum quadrilateral) $6h = 360 - 108 = 252$ $h = \frac{252}{6} = 42$	$h = 42$
25.	Pentagon can be divided into 3 triangles angle sum = $180 \times 3 = 540$ $q + 100 + 98 + 90 + 123 = 540$ $q + 411 = 540$ $q = 540 - 411 = 129$ 	$q = 129$

26.

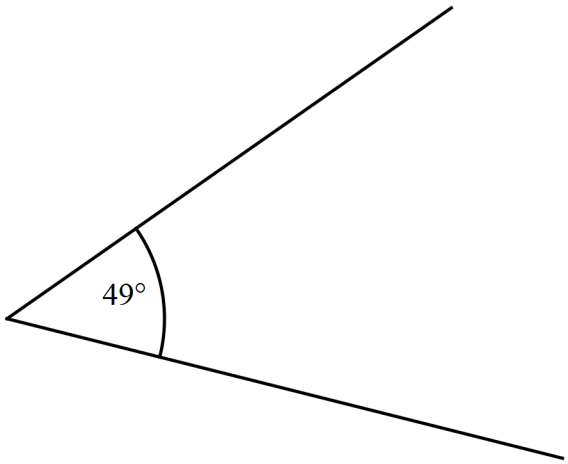
PROPERTY	Square	Parallelogram	Rectangle
Diagonals are perpendicular	✓	✗	✗
Diagonals bisect one another.	✓	✓	✓

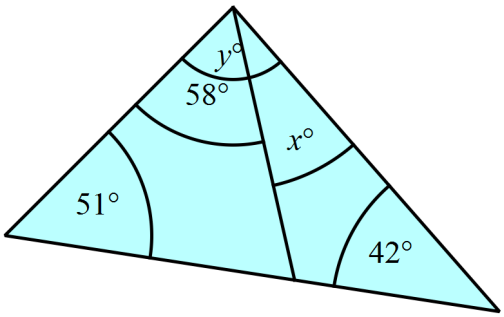
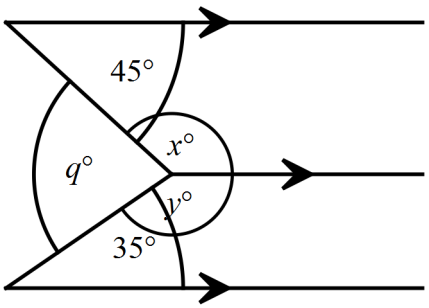
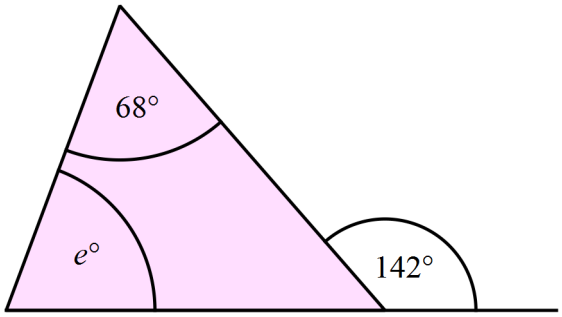
High School Mathematics Test 2015

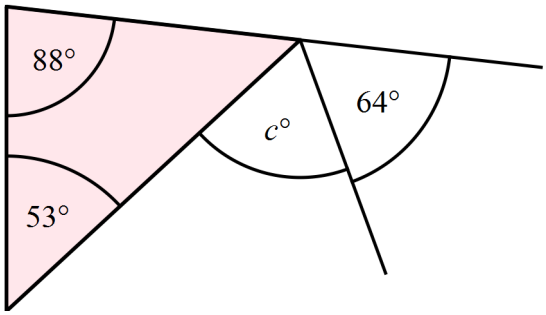
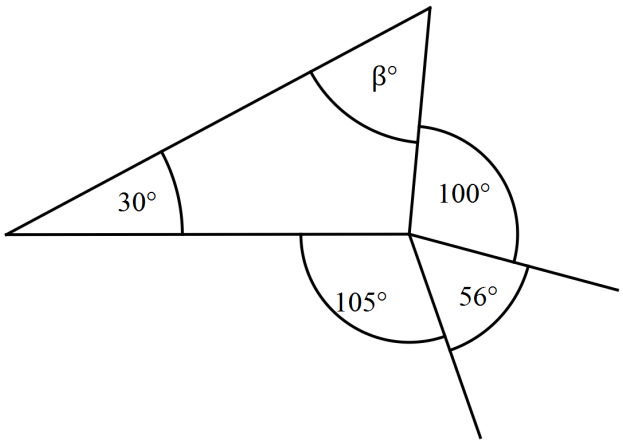
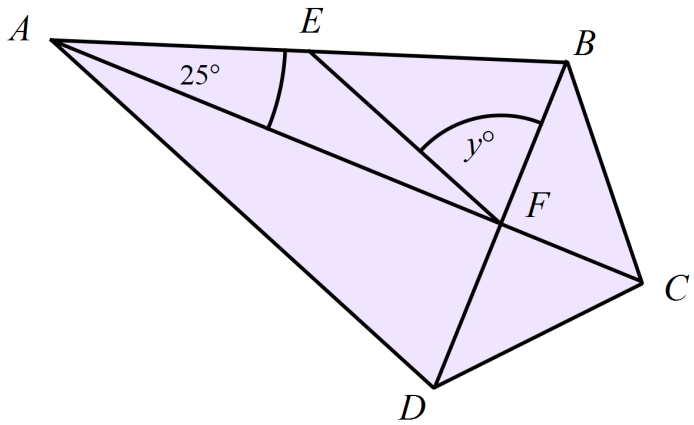
Year 9 — **Basic Geometry** — Calculator Allowed

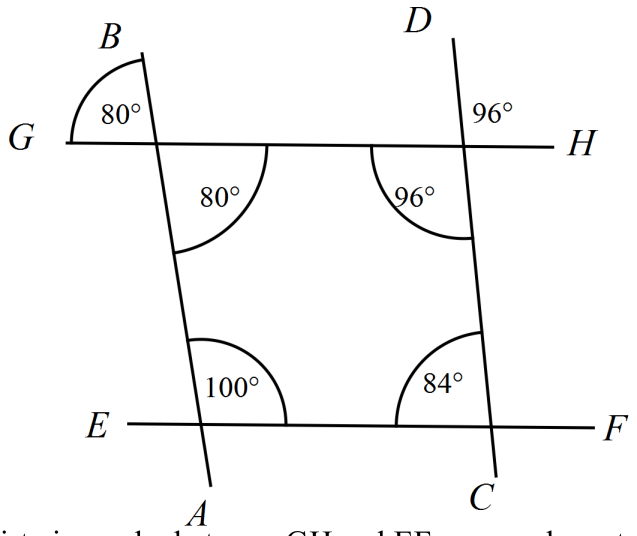
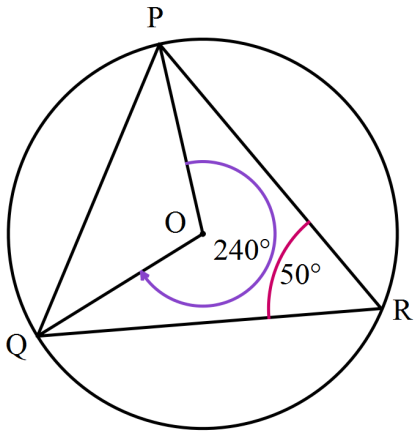
Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	B and D have rotational symmetry but B also has line symmetry	D
2.	Kite and Parallelogram	A
3.	C are vertically opposite	C
4.	$\angle QTR + 135 = 180$ (st li $\angle QTR = 180 - 135 = 45$	B
5.	C has all sides different and an obtuse angle	C
6.	$s + 55 + 85 = 180$ ($\angle$ sum Δ) $s = 180 - 140 = 40$	C
7.		D
8.	$\angle ABE + 54 = 180$ (cointerior $\angle$ on $\parallel$ lines) $\angle ABE = 180 - 54 = 126$	D
9.	$x + 110 + 95 + 80 = 360$ ($\angle$ sum quadrilateral) $x + 285 = 360$ $x = 360 - 285$ $= 75$	C
10.	2 pairs of adjacent sides equal so it is a kite	A

11.	$2\theta + 104 + 52 = 360$ ($\angle$ at a point) $2\theta = 360 - 156 = 204$ $\theta = \frac{204}{2} = 102$	B
12.	 $y = 180 - (51 + 42)$ $\angle$ sum Δ) $y = 180 - 93 = 87$ $x + 58 = 87$ (*adj* $\angle$) $x = 87 - 58$ $= 29$	A
13.	 $x = 180 - 45 = 135$ (cointerior $\angle$ on $\parallel$ lines) $y = 180 - 35 = 145$ (cointerior $\angle$ on $\parallel$ lines) $x + y + q = 360$ ($\angle$ at a point) $q + 280 = 360$ $q = 360 - 280 = 80$	C
14.	 $68 + e = 142$ (exterior $\angle$ Δ) $e = 142 - 68 = 74$	B

15.	 $c + 64 = 88 + 53$ (Exterior ∠ of Δ) $c = 141 - 64 = 77$	D
16.	Only the rhombus and square have both parts of the property	D
17.	 $\alpha = 360 - (100 + 105 + 56)$ (∠ at a point) $= 360 - 261 = 99$ $\beta + 30 + 99 = 180$ (∠ sum Δ) $\beta = 180 - 129 = 51$	A
18.	 $\angle EFA = 25°$ (base angles of isosceles Δ) $\angle AFB = 90°$ (diagonals of kite) $y = 90 - 25 = 65$	B

19.	 The cointerior angles between GH and EF are supplementary and those between BA and DC are not. So EF ∥ GH.	B
20.	 ∠ QOP = 120° ∠ QPO = ∠ PQO = 30° ∠ PQR = ∠ QPR = 65° ∠ OPR = 65 – 30 = 35°	A

High School
Mathematics Test 2015

Multiple Choice Answer Sheet

Basic Geometry

Name _____ANSWERS_____

Completely fill the response oval representing the most correct answer.

1.	A ○	B ○	C ○	D ●
2.	A ●	B ○	C ○	D ○
3.	A ○	B ○	C ●	D ○
4.	A ○	B ●	C ○	D ○
5.	A ○	B ○	C ●	D ○
6.	A ○	B ○	C ●	D ○
7.	A ○	B ○	C ○	D ●
8.	A ○	B ○	C ○	D ●
9.	A ○	B ○	C ●	D ○
10.	A ●	B ○	C ○	D ○
11.	A ○	B ●	C ○	D ○
12.	A ●	B ○	C ○	D ○
13.	A ○	B ○	C ●	D ○
14.	A ○	B ●	C ○	D ○
15.	A ○	B ○	C ○	D ●
16.	A ○	B ○	C ○	D ●
17.	A ●	B ○	C ○	D ○
18.	A ○	B ●	C ○	D ○
19.	A ○	B ●	C ○	D ○
20.	A ●	B ○	C ○	D ○

High School Mathematics Test 2015

Year 9

Basic Geometry

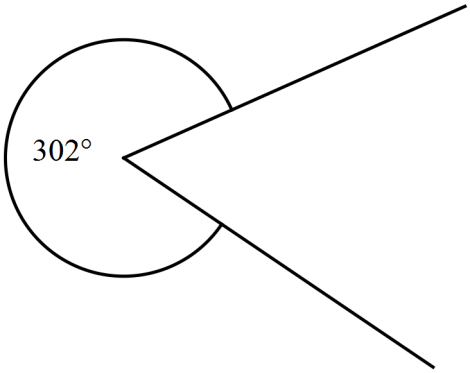
Calculator Allowed

Section 3 Longer Answer Section

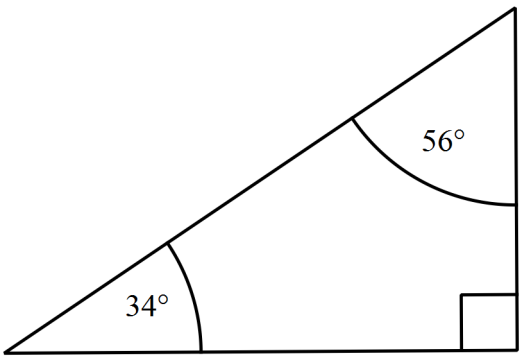
ANSWERS

Marks

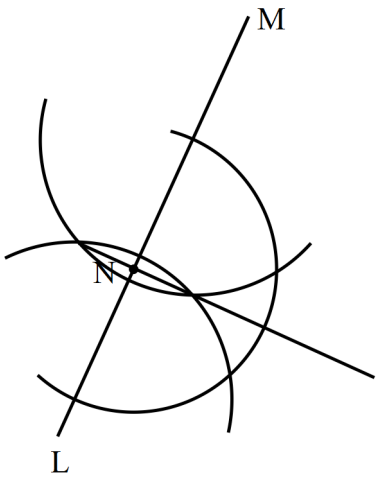
1. (a) **1**



(b) A right angled triangle which also has an angle of 56º.



2. (a) **2**



(b) **2**