High School
Mathematics Test 2014

Year 9

Basic Geometry

Non Calculator

Skills and Knowledge Assessed:

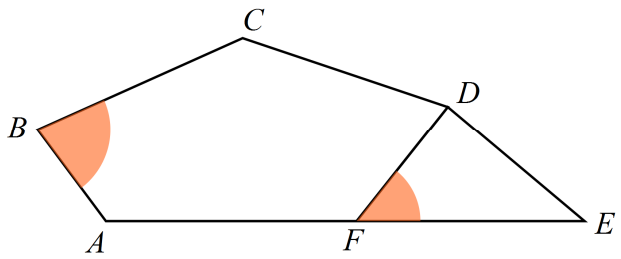
- Use the language, notation and conventions of geometry
- Identify line and rotational symmetries (ACMMG181
- Recognise the geometrical properties of angles at a point.
- Identify corresponding, alternate and cointerior angles when two straight lines are crossed by a transversal (ACMMG163)
- Investigate 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

Write all working and answers in the spaces provided on this test paper.
Provide mathematical reasoning and calculations to support your answer.

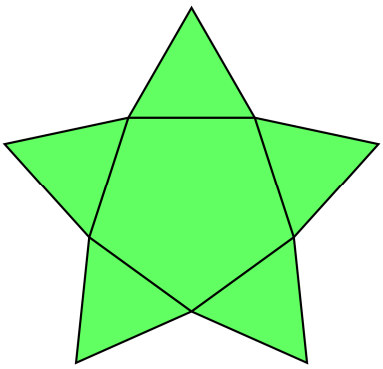
1. Name the two angles which are shaded in the diagram below.



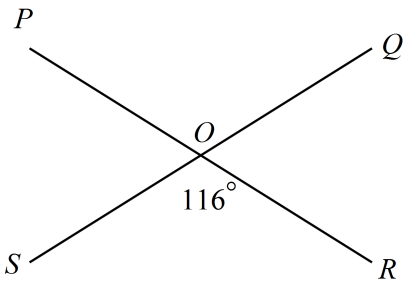
.....

.....

2. Draw any of the axes of line symmetry in this shape.



3. Find the size of $\angle POQ$.

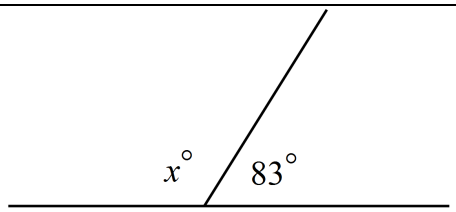


.....

.....

.....

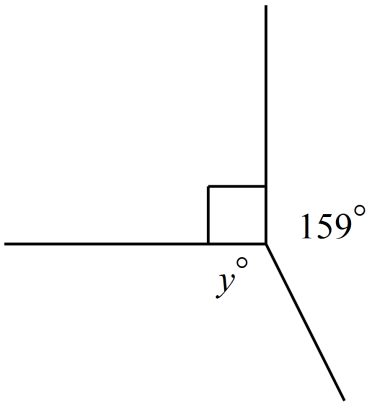
4. Find the value of x.



……

……

5. Find the value of y.

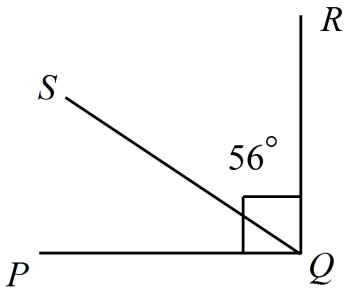


……

……

……

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

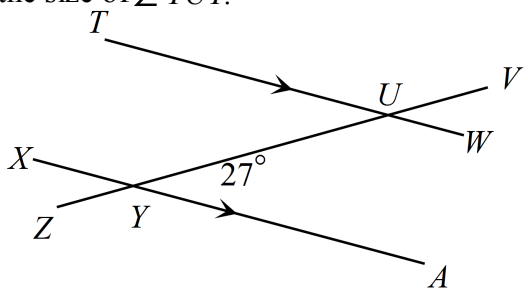


……

……

……

7. Find the size of $\angle TUY$.

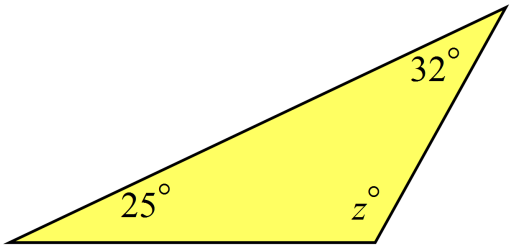


……

……

……

8. Find the value of z.

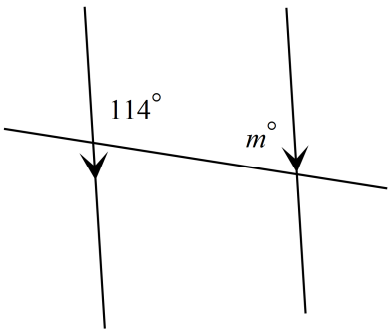


……

……

……

9. Find the value of m.



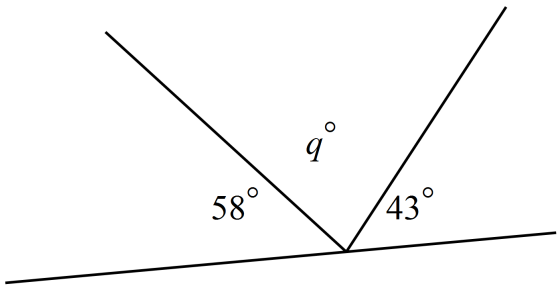
.....

.....

.....

.....

10. Find the value of q.



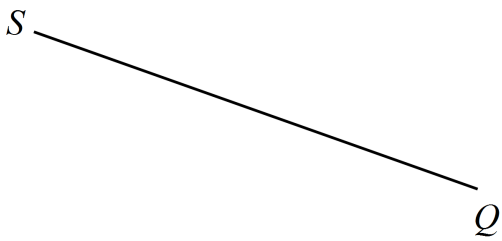
.....

.....

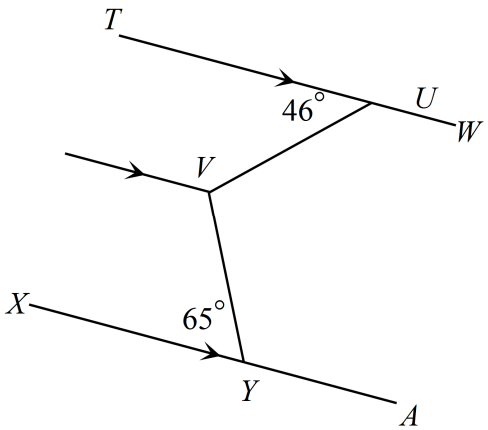
.....

.....

11. Use a protractor to draw $\angle SQP = 76^\circ$.



12. Find the size of $\angle UVY$.

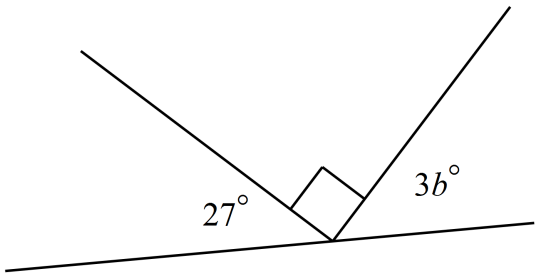


.....

.....

.....

13. What is the value of b?

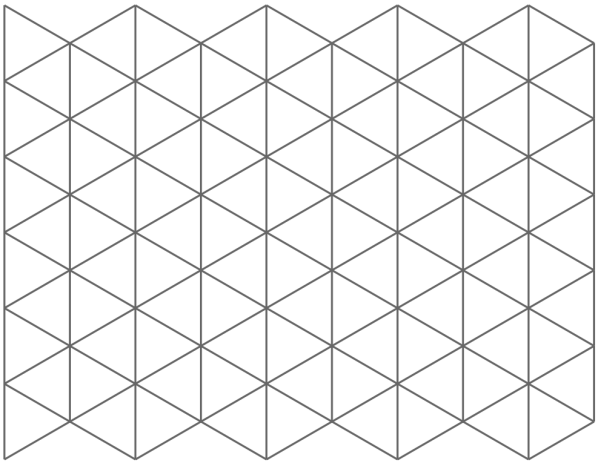


.....

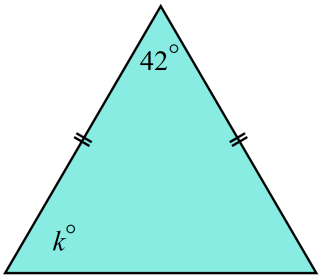
.....

.....

14. Use the grid provided to draw ΔABC which is an obtuse isosceles triangle.



15. Find the value of k.

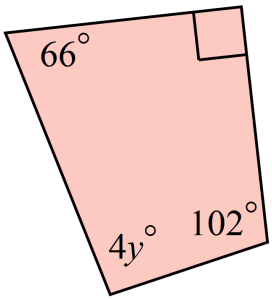


.....

.....

.....

16. Find the value of y.



.....

.....

.....

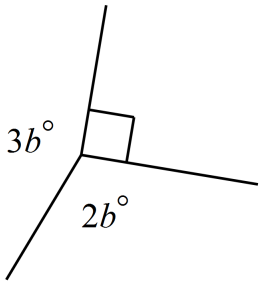
17. Find the value of b.

.....

.....

.....

.....



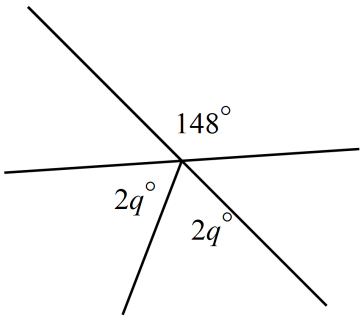
18. Find the value of q.

.....

.....

.....

.....

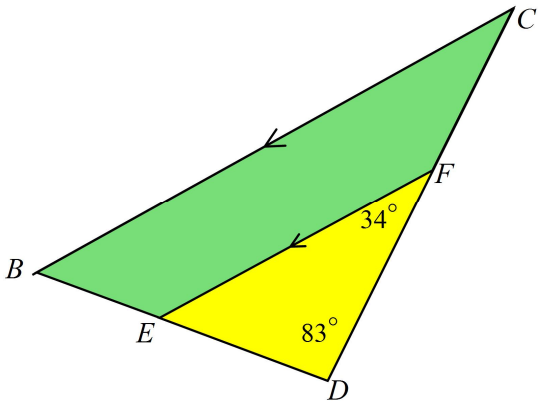


19. Find the size of $\angle CBE$.

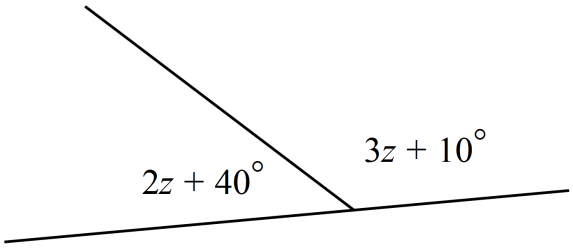
.....

.....

.....



20. What is the value of z?



.....

.....

.....

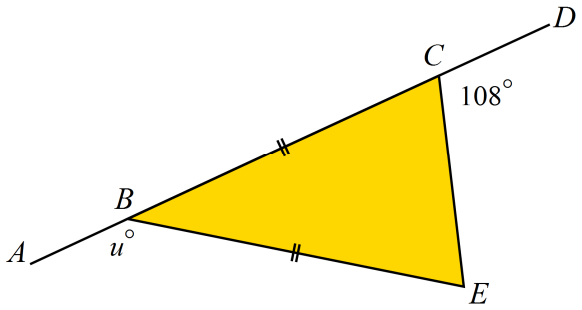
21. $BC = BE$.
Find the value of u.

.....

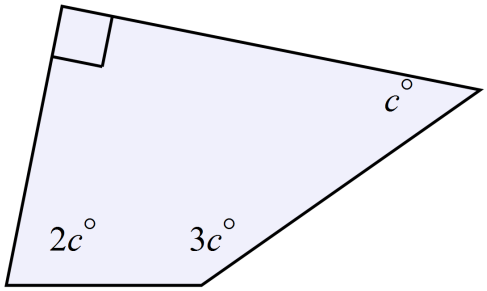
.....

.....

.....



22. Find the size of $\angle CBE$.



.....

.....

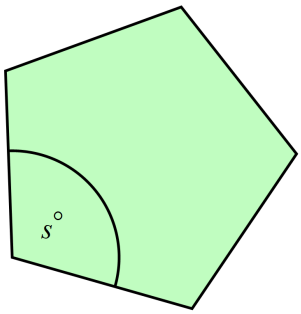
.....

23. A regular pentagon is shown.
What is the value of s?

.....

.....

.....



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

PROPERTY	Kite	Parallelogram	Rhombus
Opposite sides are equal	✗	✓	
Diagonals meet at right angles.	✓		✓
Opposite sides are parallel.		✓	✓

High School
Mathematics Test 2014

Year 9

Basic Geometry

Calculator Allowed

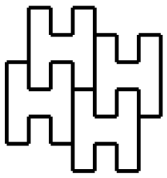
Name_____

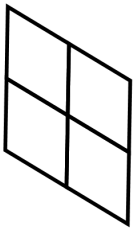
Section 2 Multiple Choice Section

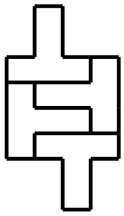
Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

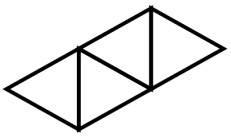
DIAGRAMS ARE NOT TO SCALE UNLESS OTHERWISE STATED.

1. Tessellations are tiling patterns. Which of the tessellations shown has both rotational symmetry and line symmetry?

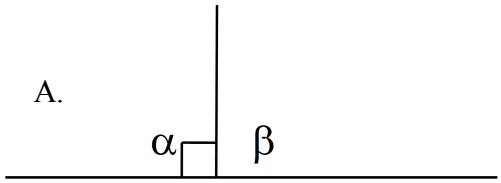
A 

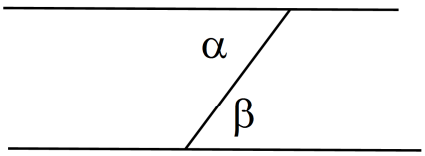
B. 

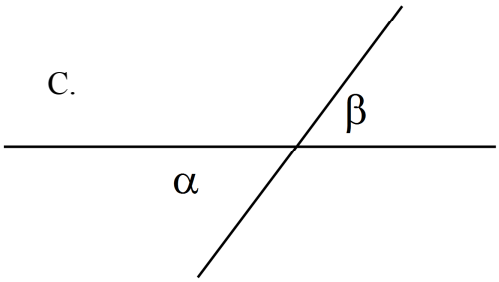
C. 

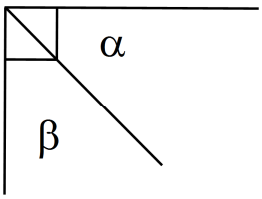
D. 

2. Which diagram includes a pair of equal supplementary angles α and β ?

A. 

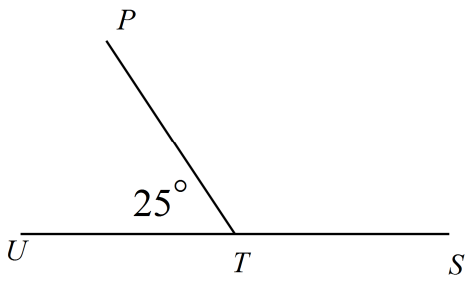
B. 

C. 

D. 

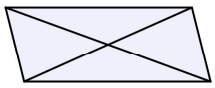
3. What is the size of $\angle STP$?

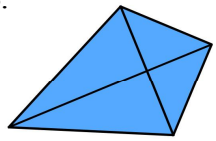
A. 25°.
B. 50°.
C. 65°.
D. 155°.

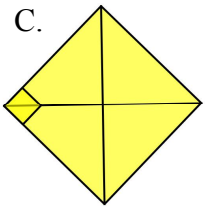


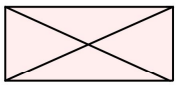
NOT TO SCALE

4. Which figure shows a quadrilateral which has equal diagonals which bisect one another at right angles? (These figures are to scale)

A. 

B. 

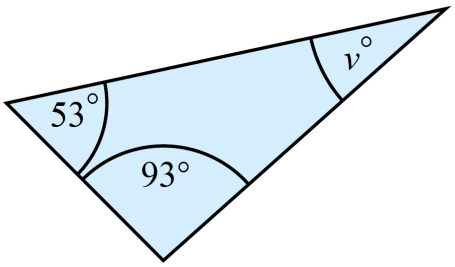
C. 

D. 

5. What is the value of v ?

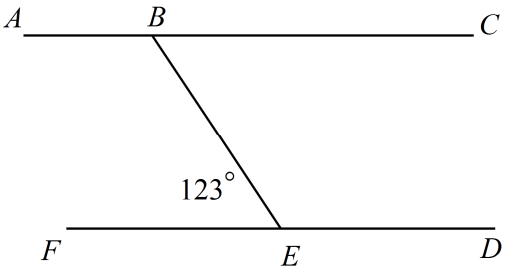
A. $v = 34$
B. $v = 56$
C. $v = 68$
D. $v = 146$

NOT TO SCALE



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

A. 33°.
B. 50°.
C. 57°.
D. 123°.

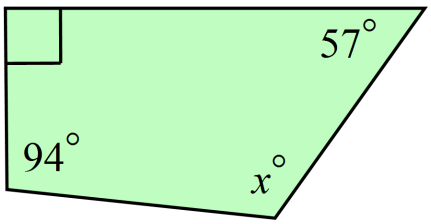


NOT TO SCALE

7. What is the value of x ?

A. $x = 29$
B. $x = 119$
C. $x = 151$
D. $x = 241$

NOT TO SCALE



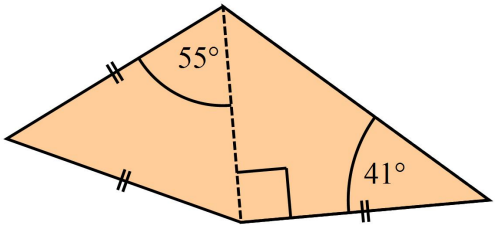
8. A quadrilateral is divided into two triangles by drawing in one diagonal.
Which description best represents the two triangles?

A. A right isosceles triangle and an equilateral triangle.

B. A right isosceles triangle and an acute isosceles triangle.

C. A right scalene triangle and an obtuse isosceles triangle.

D. A right scalene triangle and an acute isosceles triangle.



NOT TO SCALE

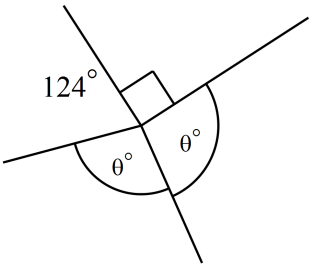
9. What is the value of θ ?

A. 73

B. 107

C. 146

D. 214



NOT TO SCALE

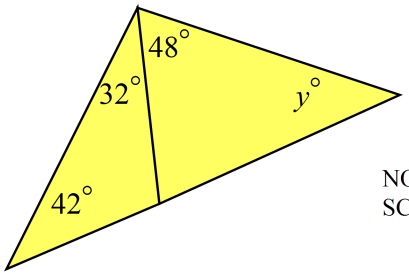
10. What is the value of y ?

A. $y = 29$

B. $y = 58$

C. $y = 76$

D. $y = 80$



NOT TO SCALE

11. Which property is true for a parallelogram but not for a kite?

A. The diagonals intersect at right angles.

B. The opposite sides are parallel.

C. There are two pairs of equal sides.

D. There is one axis of symmetry.

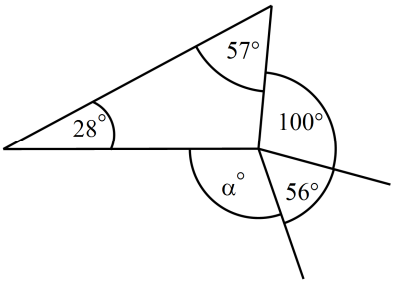
12. What is the value of α ?

A. 85

B. 95

C. 109

D. 119



NOT TO SCALE

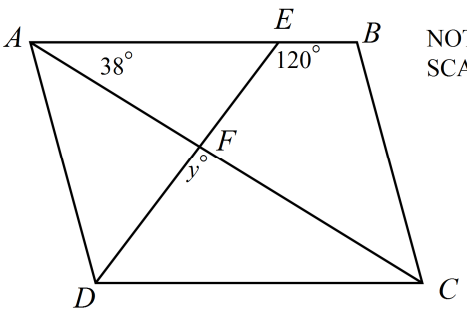
13. *ABCD* is a parallelogram.
E is a point on *AB* and *AC* and *DE* intersect at *F*.
What is the value of *y* ?

A. $y = 38$

B. $y = 60$

C. $y = 82$

D. $y = 98$



NOT TO SCALE

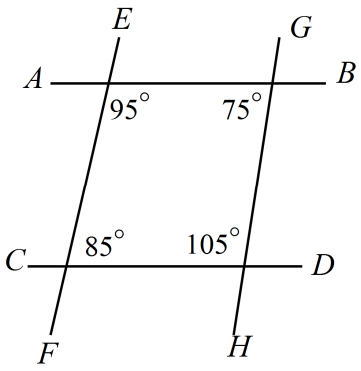
14. Which statement is true?

A. *AB* || *CD* only.

B. *EF* || *GH* only.

C. *AB* || *CD* and *EF* || *GH*.

D. No lines are parallel.



NOT TO SCALE

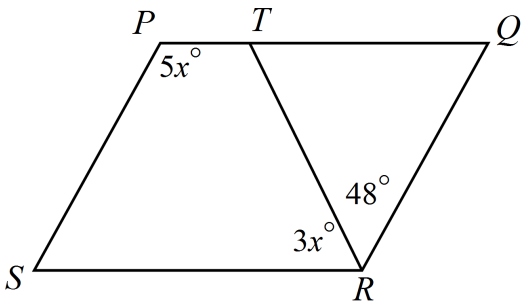
15. *PQRS* is a parallelogram.
T is a point on the side *PQ*.
What is the value of *x*?

A. $x = 8$

B. $x = 12$

C. $x = 16$

D. $x = 24$



High School
Mathematics Test 2014

Year 9

Basic Geometry

Calculator Allowed

Name_____

Section 3 Longer Answer Section

Answers should be supported by relevant mathematical reasoning and/or calculations.
Write all working and answers in the spaces provided on this test paper.

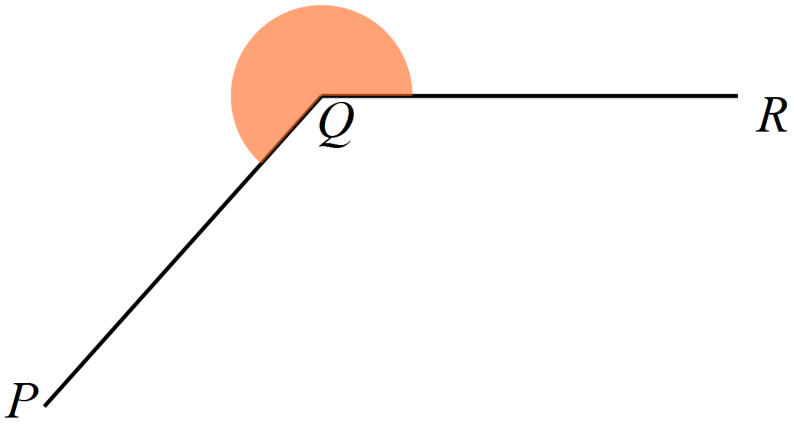
Marks

Complete the following using only the instruments indicated.

Do not erase any of your construction lines.

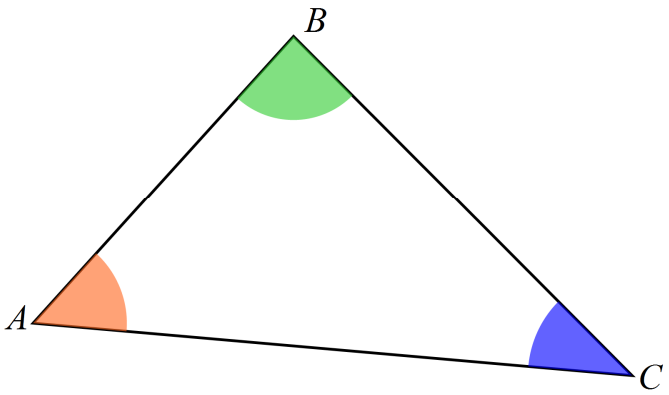
1. (a) Using only a protractor and straight edge, draw an angle of 125°. **1**

(b) Use a protractor to measure the size of the angle *PQR*, indicated by the shading. **1**



Marks

(c) i) Use a protractor to complete the table for the angles in this triangle. **2**

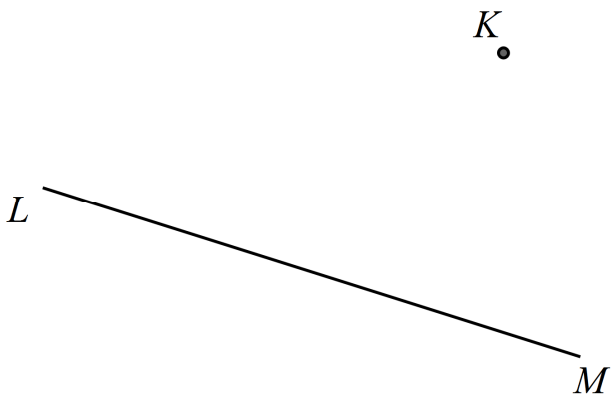


Angle	Size in degrees
A	
B	
C	

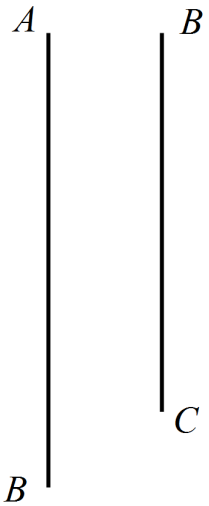
ii) Use the results in the table above to illustrate the angle sum property of triangles. **1**

$\angle A + \angle B + \angle C =$ _____+_____+_____=_____

2. (a) Using only a compass and straight edge, draw a line which passes through K and which is parallel to LM. **2**



(b) A triangle has two sides, AB and BC, equal in length to the intervals below. **3**
The angle BAC is 72°.
Using only a compass, protractor and straight edge accurately draw the triangle ABC.



High School
Mathematics Test 2014

Basic Geometry Test

Multiple Choice Answer Sheet

Name _____

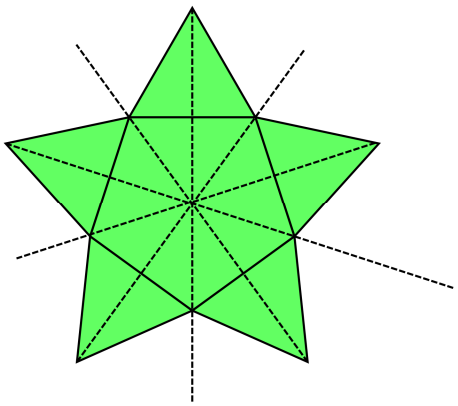
Completely fill the response oval representing the most correct answer.

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 ⬭

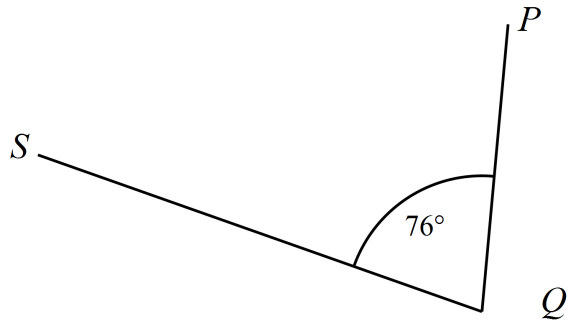
High School
Mathematics Test 2014

Basic Geometry

ANSWERS

Section 1 (1 mark each)	
	Working and Answers
1.	$\angle B$ or $\angle ABC$ and $\angle DFE$.
2.	
3.	$\angle POQ = 116^\circ$ (vertically opposite angles)
4.	$x = 180 - 83 = 97^\circ$ (Supplementary angles)
5.	$y + 90 + 159 = 360$ (angles at a point) $y = 360 - 249$ $y = 111$
6.	$\angle SQP = 90 - 56 = 34^\circ$ (Complementary angles)
7.	$\angle TUY = 27^\circ$ (Alternate angles)
8.	$z + 32 + 25 = 180$ $z = 180 - 57$ $z = 123$
9.	$m + 114 = 180^\circ$ (cointerior angles) $m = 180 - 114$ $m = 66^\circ$
10.	$q + 58 + 43 = 180^\circ$ (angle on st line) $q = 180 - 101^\circ$ $q = 79^\circ$

11.



12.

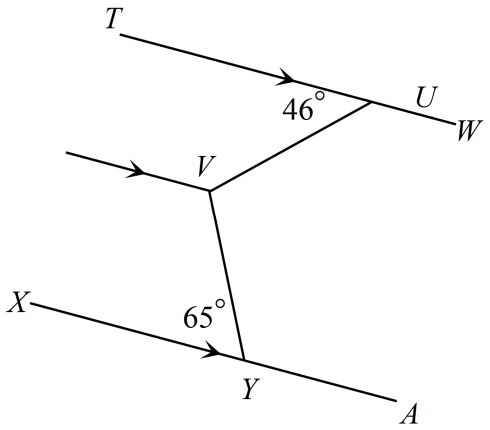
$\angle SVU = 180 - 46 = 134^\circ$ (cointerior angles)

$\angle SVY = 180 - 65 = 115^\circ$ (cointerior angles)

$\angle UVY = 360 - 134 - 115$ (angles at a point)

$\angle UVY = 360 - 249$

$\angle UVY = 111^\circ$



13.

$3b + 27 + 90 = 180$ (straight angle)

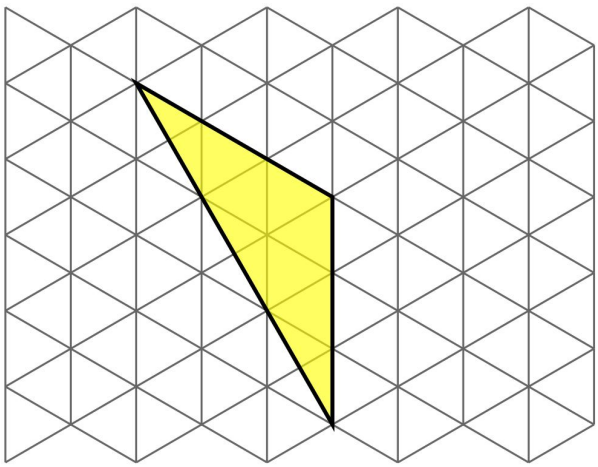
$3b + 117 = 180$

$3b = 63$

$b = 21$

14.

One example, others possible.



15.

$2k + 42 = 180$ (angle sum isos Δ)

$2k = 138$

$k = \frac{138}{2} = 69^\circ$

16.

$4y + 66 + 102 + 90 = 360$ (angle sum quadrilateral)

$4y = 360 - 258$

$4y = 102$

$y = \frac{102}{4} = 25\frac{1}{2}$

17.

$3b + 2b + 90 = 360$ (angles at a point)

$5b = 270$

$b = \frac{270}{5} = 54$

18.

$2q + 2q = 148$(vertically opposite angles)

$4q = 148$

$q = \frac{148}{4} = 37$

19.

$\angle FED = 180 - (34 + 83)$ (angle sum Δ)

$\angle FED = 180 - 117$

$\angle FED = 63$

$\angle CBE = \angle FED = 63^\circ$ (corresp $\angle$on $\|$ lines)

20.

$2z + 40 + 3z + 10 = 180$ (supplementary angles)

$5z + 50 = 180$

$5z = 130$

$z = \frac{130}{5} = 26$

21.

$\angle BCE = 180 - 108 = 72^\circ$(supplementary angles)

$\angle BEC = \angle BCE = 72^\circ$(base angles isos Δ)

$\angle ABE = \angle BEC + \angle BCE$ (exterior angle Δ)

$u = 72 + 72$

$u = 144$

22.

$2c + 3c + c + 90 = 360$ (angle sum quadrilateral)

$6c + 90 = 360$

$6c = 270$

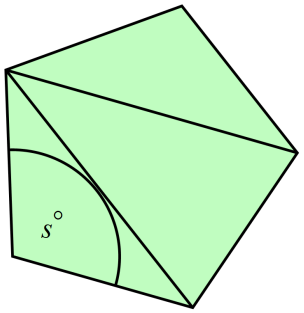
$c = \frac{270}{6} = 45$

23.

Angle sum pentagon $= 3 \times 180^\circ$

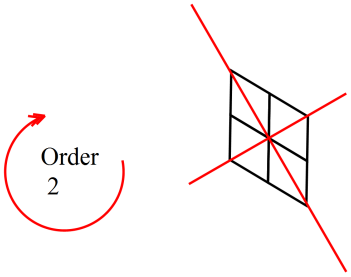
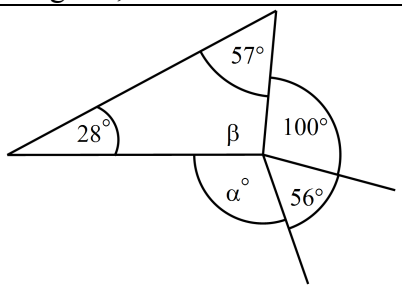
$= 540^\circ$

Angle size $= \frac{540}{5} = 108^\circ$

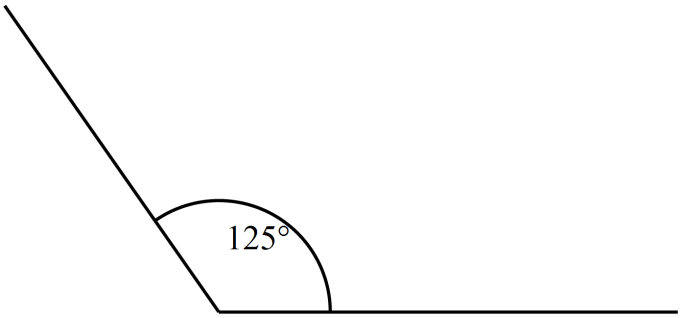
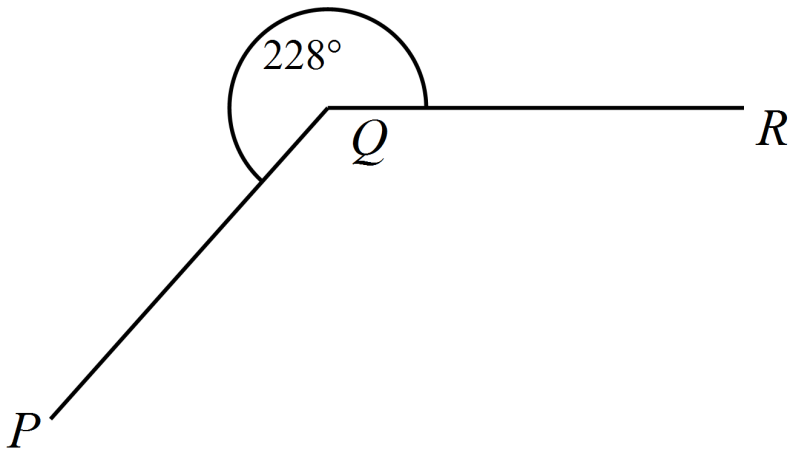


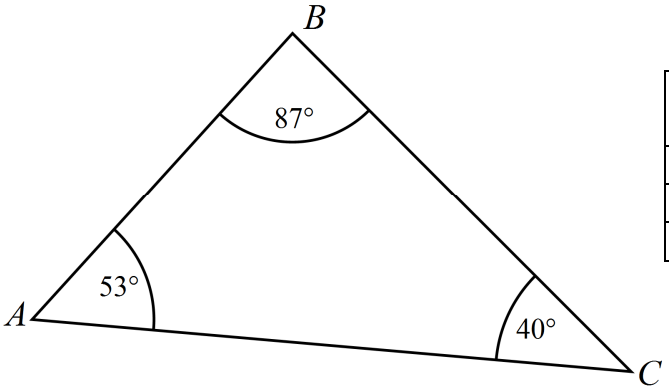
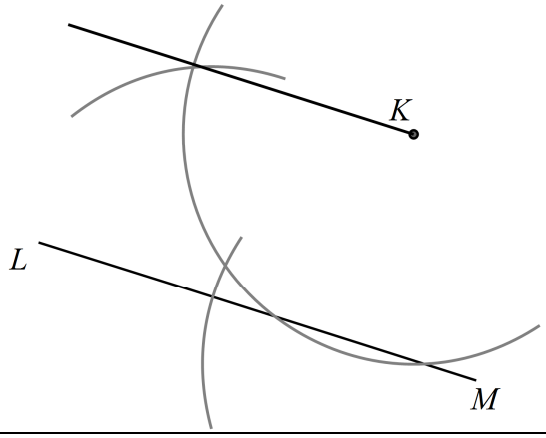
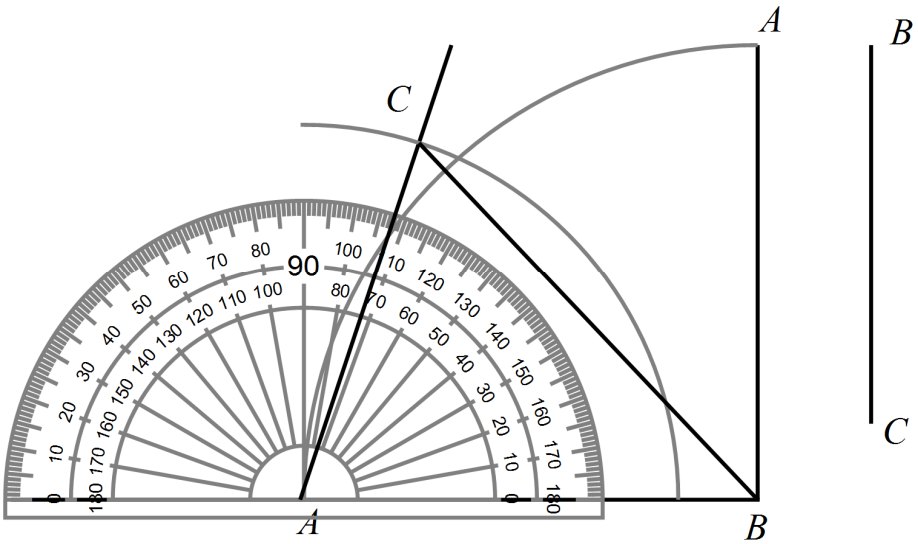
24.

PROPERTY	Kite	Parallelogram	Rhombus
Opposite sides are equal	✗	✓	✓
Diagonals meet at right angles.	✓	✗	✓
Opposite sides are parallel.	✗	✓	✓

Section 2 (1 mark each)		
	Working	Answers
1.	Only B has both types. 	B
2.	Diagram A has a right angle on a straight line, so the supplementary angle is also 90º. Hence equal supplementary angles.	A
3.	$\angle STP = 180^\circ - 25^\circ$ (Angles on Straight line) $\angle STP = 155^\circ$	D
4.	The square has equal diagonals which bisect at right angles.	C
5.	$v = 180 - (53 + 93)$ $= 180 - 146$ $= 34$	A
6.	$\angle ABE + 123^\circ = 180^\circ$ (cointerior angles on|| lines) $\angle ABE = 180 - 123$ $= 57^\circ$	C
7.	$x = 360 - (94 + 90 + 57)$ $= 360 - 241$ $= 119$	B
8.	Left triangle has angles of 55º, 55º and 70º and two equal sides, so is an acute isosceles triangle. Left triangle has angles of 90º, 41º and 49º and hence no equal sides, so is a right scalene triangle.	D
9.	$2\theta + 124 + 90 = 360$ (angles at a point) $2\theta + 214 = 360$ $2\theta = 360 - 214 = 146$ $\theta = \frac{146}{2} = 73$	A
10.	$y + 42 + 32 + 48 = 180$ $y + 122 = 180$ $y = 58$	B
11.	Opposite sides are parallel on a parallelogram, but not on a kite.	B
12.	$\beta + 28 + 57 = 180$ $\beta + 85 = 180$ $\beta = 95$ $\alpha + 95 + 56 + 100 = 360$ $\alpha + 251 = 360$ $\alpha = 109$ 	C

13.	$\angle EDC = 180 - 120$ (cointerior angles) $= 60^\circ$ $\angle ACD = \angle BAC = 38$ (alternate angles) $y + 60 + 38 = 180$ (angle sum Δ) $y + 98 = 180$ $y = 82$	C
14.	The cointerior angles between AB and CD both have a sum of 180°, while those between EF and GH have sums of 170° and 190°. Only AB and CD are parallel.	A
15.	$5x = 3x + 48$ (opposite sides of parallelogram are equal) $2x = 48$ $x = 24$	D

Section 3		
	Working and Answers	Marks
1.	(a) Using only a protractor and straight edge, draw an angle of 125°.  	1
	(b) Use a protractor to measure the size of the angle PQR, indicated by the shading.  	1

	(c) i) Use a protractor to complete the table for the angles in this triangle.  | Angle | Size in degrees | |---|---| | A | 53° | | B | 87° | | C | 40° |	2 marks deduct 1 for any error. Allow error of up to 2 degrees.
	ii) Use the results in the table above to illustrate the angle sum property of triangles. $\angle A + \angle B + \angle C = 53^\circ + 87^\circ + 40^\circ = 180^\circ$	1 mark
2.	a)  All arcs are equal forming the vertices of a rhombus Can also be done by copying the angles to form equal corresponding angles.	2 marks for any valid method showing working lines. 1 mark if a reasonable attempt is made.
	b)  	3 marks for any complete and correct method showing working lines. 2 marks for an almost correct or almost complete attempt. 1 mark if a start is made.

High School
Mathematics Test 2014

Multiple Choice Answer Sheet

Name Marking Sheet

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 ●