High School
Mathematics Test 2015

| Year 8 | *Polygons and Circles* | Calculator Allowed Test |

Name_____

Skills and Knowledge Assessed:

- Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165)
- Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166)
- Investigate the relationship between features of circles such as circumference, area, radius and diameter. (ACMMG197)

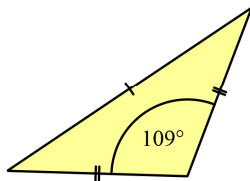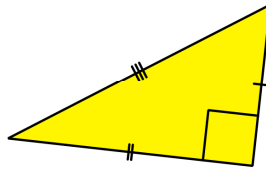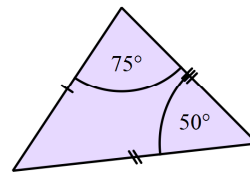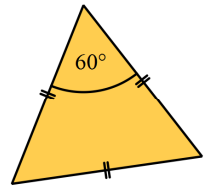Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
     or
Shading in the bubble for the correct answer from the four choices provided.
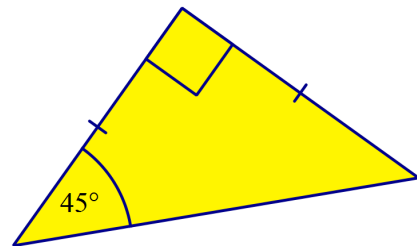Show any working out on the test paper.   Calculators are allowed.

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1. Which figure shows an obtuse isosceles triangle?
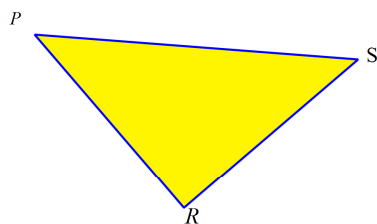
109°   75° 50°   60°

☐   ☐   ☐   ☐

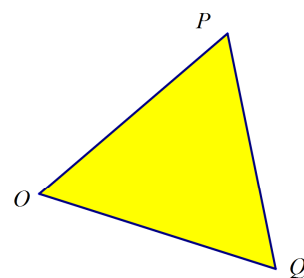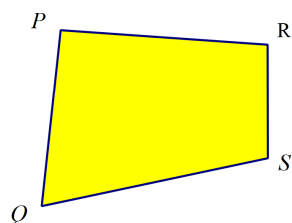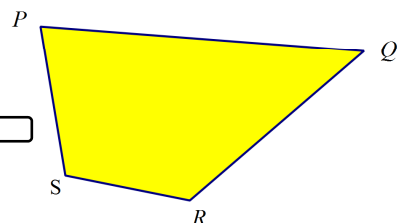**2.** What type of triangle is shown here?

☐ An equilateral triangle.
☐ An obtuse isosceles triangle.
☐ A right isosceles triangle.
☐ A right scalene triangle.

45°

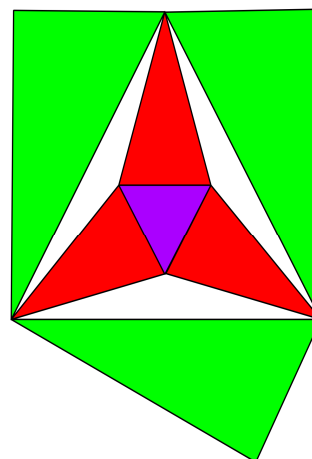**3.**   Which figure contains ∠ *PQR*?

4.   In the pattern below, which types of triangle are unshaded?

      ☐   Acute isosceles triangles.

      ☐   Acute scalene triangles.

      ☐   Obtuse isosceles triangles.

      ☐   Right scalene triangles.

5.   Which two words from the list provided, could be used to describe this triangle.
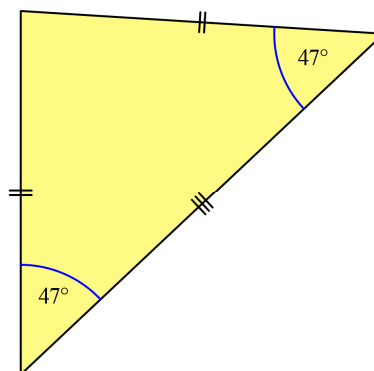
Acute

Equilateral

Isosceles

Obtuse

Right

Scalene

6.	Write the names of the quadrilaterals that are used to make this design.
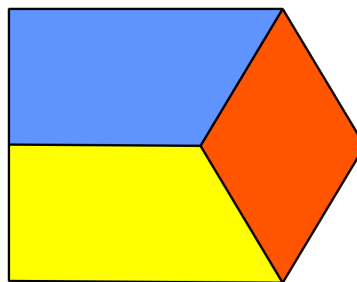
7. C is the centre of the circle shown.

What are the names of the two features of the circle, indicated by the arrows.

- [ ] A chord and a diameter
- [ ] A chord and a radius
- [ ] A diameter and a radius
- [ ] A diameter and a tangent
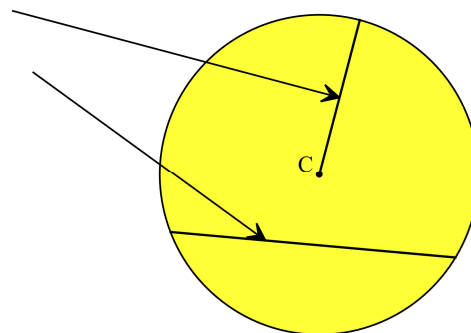
8. Which is true about the kite shown?

- [ ] The diagonals EG and FH are equal in length.
- [ ] The diagonal EG is equal to the side FG.
- [ ] The side FG is equal to the side FE.
- [ ] The side EF is equal to the side EH.
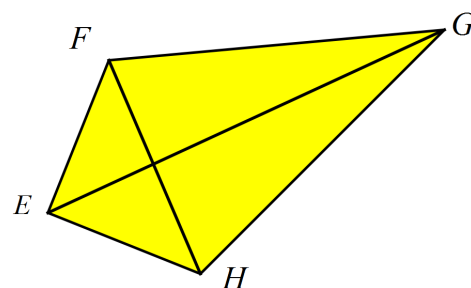
9. What is the size of $\angle ABC$?

NOT TO SCALE.

A

$100°$

$35°$

C B

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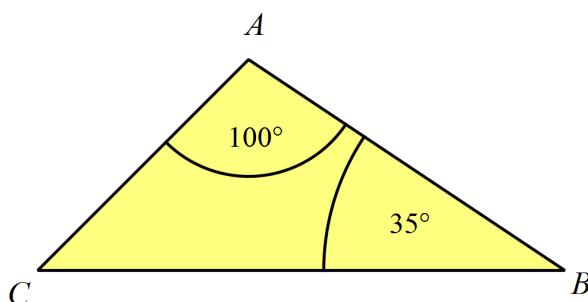
10. In the quadrilateral shown, what is the value of m?

☐ 80
☐ 100
☐ 160
☐ 260

NOT TO SCALE

$80°$

$115°$

$65°$

$m°$

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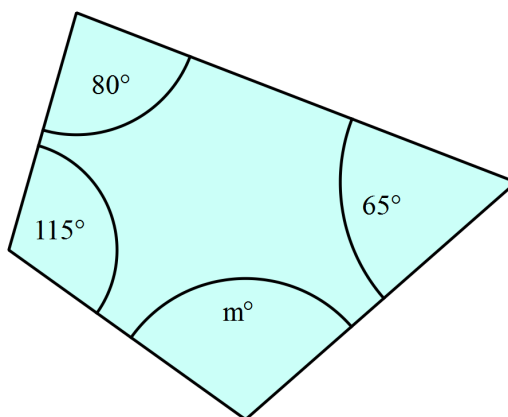
11. Which of the following is true of an right scalene triangle?

☐ The angle sum is 90°.
☐ All the angles are acute.
☐ No two sides are equal.
☐ There are two equal angles.

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12. Which statement is **not** true based on the information shown on this polygon?

☐   BC ‖ FE
☐   ∠ BAF = ∠ CDE
☐   ∠ BCD = ∠ AFE
☐   ∠ BCD = ∠ CDE

B   C

A   D

F   E
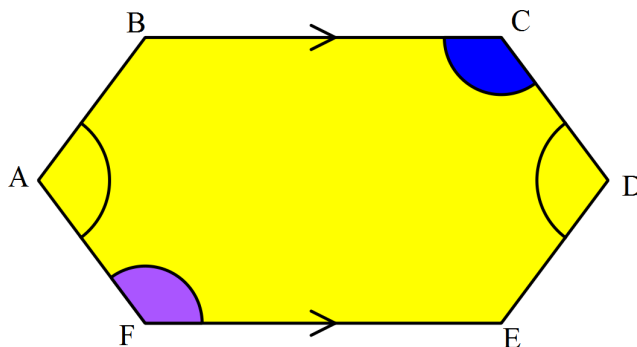
NOT TO SCALE

13.   Find the value of x in the diagram below.

25°

x°
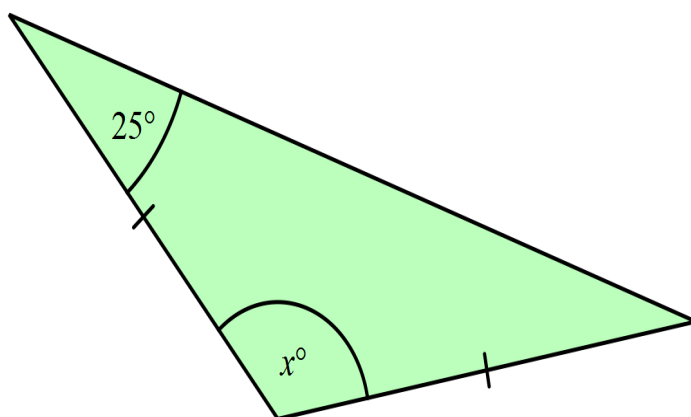
$x =$

14.   What is the size of the exterior angle *MLO*?

$\angle MLO =$ [   ] º

M

45°

98°

N

O   L
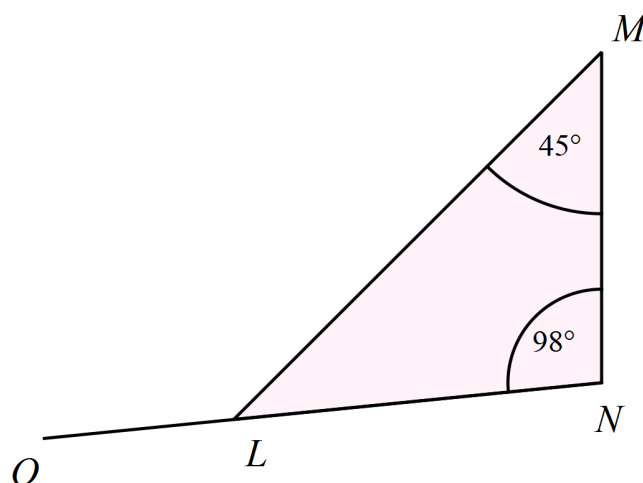
15.   Find the size of $\angle ACB$ in the diagram below.

☐ 38°
☐ 71°
☐ 76°
☐ 106°

B

A

38°

C
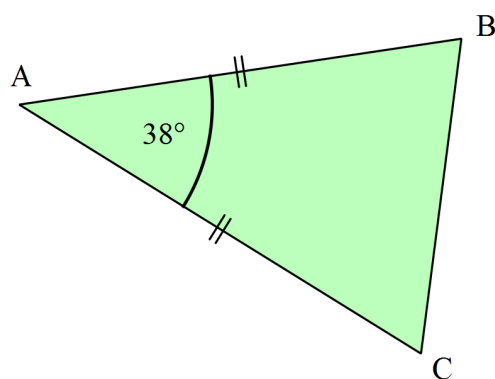
16.	Which of the following is **not** a property of a parallelogram?

▢ It has two axes of line symmetry.
▢ One diagonal bisects the other.
▢ The opposite sides are equal.
▢ The opposite angles are equal.

17.	What is the value of p in the diagram below.

NOT TO SCALE

$p°$

$65°$ $143°$
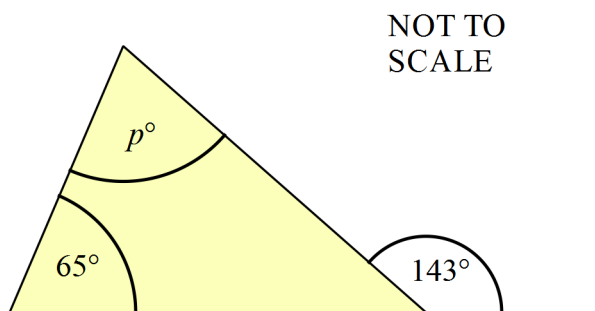
18.	What is the size of angle *JKH*?

NOT TO SCALE

$\angle JKH =$ ▢

I   *J*

$72°$

$83°$ *K*

H
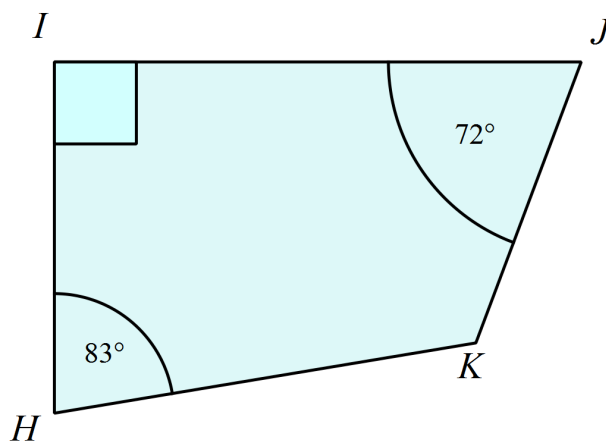
19.	Which shape below is **not** a convex quadrilateral?

▢   ▢   ▢   ▢
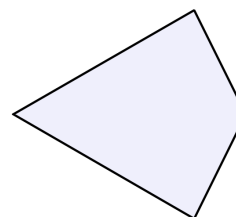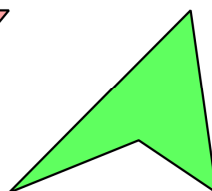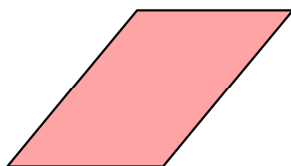
20. A quadrilateral has these properties.

The opposite sides are equal.
The diagonals are equal in length.
The diagonals bisect one another.

The quadrilateral could be:

     A kite   A parallelogram   A rhombus.   A rectangle.

     ☐   ☐   ☐   ☐

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21. The value of x is:

☐ 31º
☐ 62º
☐ 75º
☐ 118º

$2x°$

NOT TO SCALE

75°   43°

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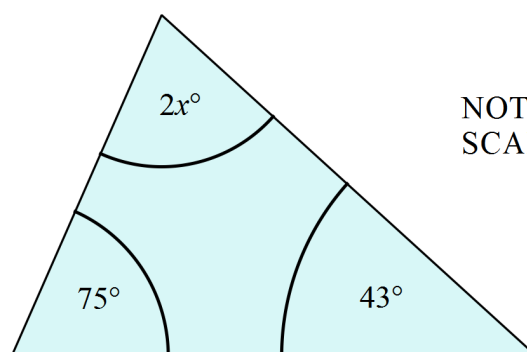
22. What is the value of x ?

$x =$ [   ]

58° $x°$ $x°$

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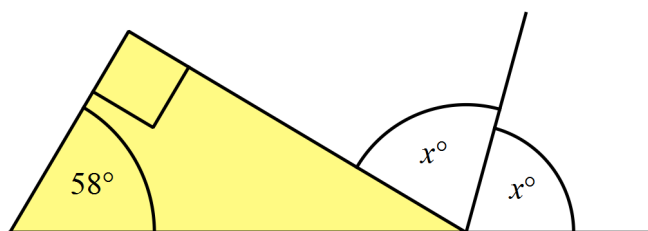
23. Find the value of g in the diagram below.

$g =$ [   ]

36° $g°$

$2g°$
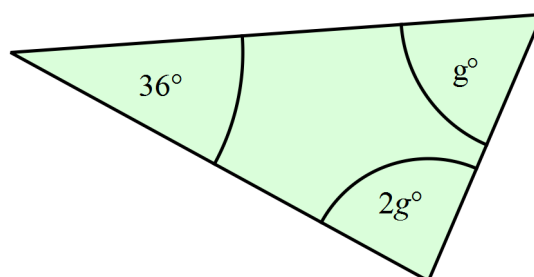
24.	In $\triangle LMN$ $LM = LN$. O is a point on NM. 　$\angle LMN = 50°$ 　$\angle LON = 110°$ What is the value of g ?
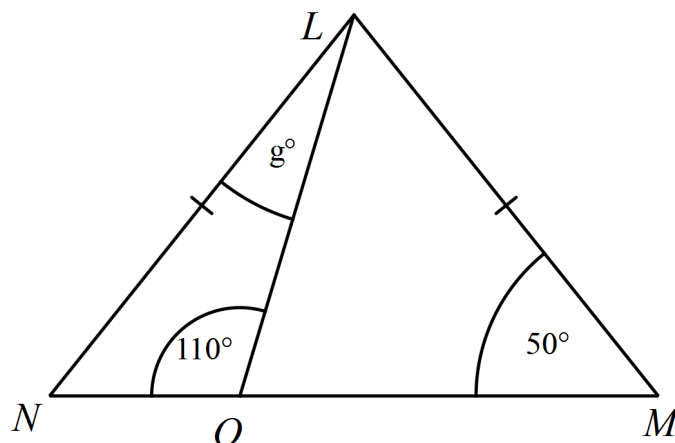
25.	Which statement is true of all quadrilaterals?

☐ The angle sum is 360º and there are two diagonals.

☐ The angle sum is 360º and the diagonals are equal in length.

☐ There are 4 sides and the diagonals intersect at 90º.

☐ There are 4 sides and the diagonals bisect one another.

26.	Find the value of x in the kite below.

☐ 10º

☐ 20º

☐ 40º

☐ 80º

NOT TO SCALE
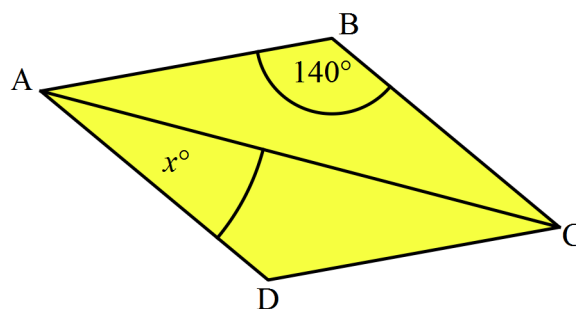
27.	$KLMN$ is a parallelogram. The diagonal KM meets the side ML at 90º. What is the value of y ? 　$y = \boxed{}$
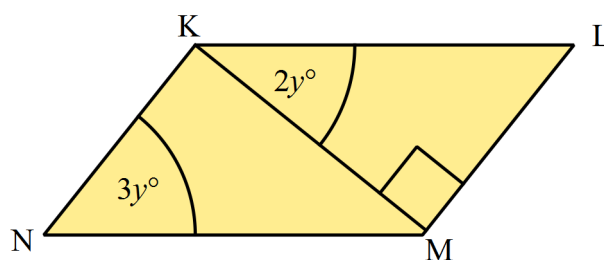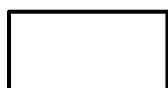
28.	ABCD is a rectangle and EBFD is a parallelogram. What is the size of ∠ AEB ? ? ∠ AEB = ☐

40°

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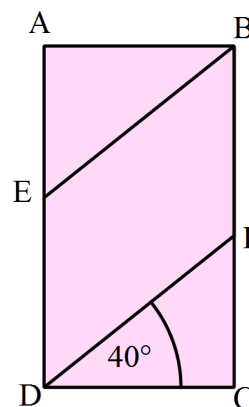
29. Which statement is **not** true about a chord in any circle.

☐ It joins two points on the circumference of the circle.

☐ It is never longer than the diameter.

☐ It is always longer than the radius.

☐ It divides the circle into two segments.

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30. *O* is the centre of both circles.

SQ is a straight line segment.

∠ OPQ = 66°

What is the size of ∠ SRO ?

∠ SRO = ☐ °
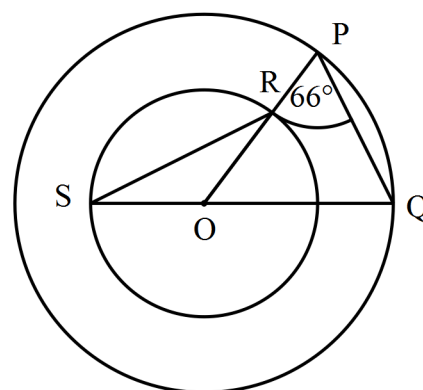
High School
Mathematics Test 2015

Year 8

Polygons and Circles

Calculator Allowed
Longer Answer
Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. (a) Use a ruler and instruments to draw an accurate diagram of a   **2**
        rhombus ABCD and place markings on the diagram to show any equal
        sides and angles.

    (b) Describe any line symmetry or rotational symmetry the rhombus may have.   **2**
        (You may add to your diagram to illustrate your answer.)

    …………………………………………………………………………………..

    …………………………………………………………………………………..

Marks

2.   (a) ABC is a right isosceles triangle with AB = BC.   **3**
     D is a point on AC produced.
     ∠ DBC = 20°.
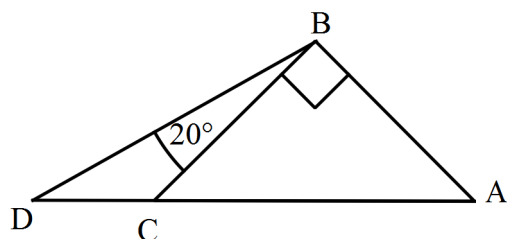
NOT TO SCALE

Find the size of ∠ BDC, giving reasons for your answer.

……………………………………………………………………………………………..

……………………………………………………………………………………………..

……………………………………………………………………………………………..

   (b) PQRS is a rectangle. PR and QS are the diagonals which intersect at T.   **3**

     ∠ QTR = 66°.

     Find the value of *x*, giving reasons for your answer..

NOT TO SCALE

……………………………………………………………………………………………..

……………………………………………………………………………………………..

……………………………………………………………………………………………..

11
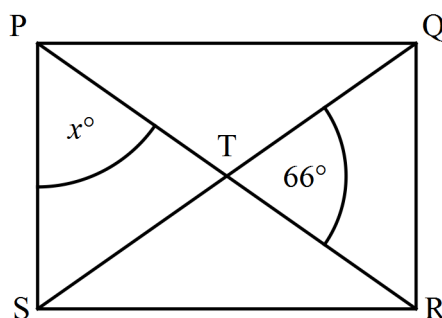
High School
Mathematics Test 2015

| Year 8 | *Polygons and Circles* | Non Calculator Section |

ANSWERS

No.	WORKING	ANSWER
1.	1st diagram has an obtuse angle and a 2 sides equal	1st answer
2.	It has a right angle and has 2 sides equal	3rd answer
3.	The 4th figure has an angle PQR.	4th answer
4.	They are obtuse isosceles triangles	3rd answer
5.	It is an isosceles acute triangle	Acute and isosceles
6.	There are 2 trapezia and a rhombus	Trapezium and Rhombus
7.	A chord and a radius are shown	2nd answer
8.	The two adjacent sides are equal	4th answer
9.	$\angle ABC = 180 - (100 + 35) = 180 - 135 = 45°$	45°
10.	$m = 360 - (80 + 65 + 115) = 360 - 260 = 100°$	2nd answer
11.	In a scalene triangle, no two sides are equal.	3rd answer
12.	$\angle BCD = \angle CDE$ is not true according to the markings on the triangle.	4th answer
13.	$x + 25 + 25 = 180°$ $x = 180 - 50$ $x = 130$	130
14.	$\angle MLO = 45 + 98 = 143°$ (exterior angle	143°
15.	$38 + 2 \times \angle ACB = 180°$ $2 \angle ACB = 142$ $\angle ACB = 71$	2nd answer
16.	A parallelogram has no axes of symmetry.	1st answer
17.	$p + 65 = 143$ (exterior angle Δ) $p = 143 - 65$ $p = 78$	78
18.	$\angle JKH + 83 + 72 + 90 = 360$ (angle sum quadrilatera $\angle JKH + 245 = 360$ $\angle JKH = 360 - 245$ $\angle JKH = 115$	115

| 19.	The third shape has a diagonal which passes outside the shape, so it is not convex.	3rd answer
20.	Only a rectangle has all these properties	4th answer
21.	$2x + 75 + 43 = 180$ (angle sum triangle) $\qquad 2x + 118 = 180$ $\qquad\qquad 2x = 180 - 118 = 62$ $\qquad\qquad x = \dfrac{62}{2} = 31$	1st answer
22.	$x + x = 58 + 90$ (exterior angle of Δ) $\qquad 2x = 148$ $\qquad x = \dfrac{148}{2} = 74$	74
23.	$2g + g + 36 = 180$ (angle sum Δ) $\qquad 3g + 36 = 180$ $\qquad\qquad 3g = 180 - 36 = 144$ $\qquad\qquad g = \dfrac{144}{3} = 48$	48
24.	$\angle LNM = 50°$ (base angles of isosceles Δ) $g + 110 + 50 = 180$ (angle sum Δ LON) $\qquad g + 160 = 180$ $\qquad\qquad g = 180 - 160 = 20$	20
25.	Only the first statement is true in both assertions.	1st answer
26.	$2 \times \angle ABC + 140 = 180$ (angle sum isosceles Δ) $2 \times \angle ABC = 180 - 140 = 40$ $\angle ABC = \dfrac{40}{2} = 20$ $x = 20$ (diagonal bisects angle of rhombus)	2nd answer
27.	$\angle KLM = 3y$ (opposite angles or ‖ gram equal) $2y + 3y + 90 = 180$ (angle sum Δ KLM) $5y = 180 - 90 = 90$ $y = 90 \div 5 = 18$	18
28.	$\angle EDF = 90 - 40 = 50$ (right angle in rectangle) $\angle AEB = 50$ (corresponding $\angle$ on ‖ lines EB and DF)	50
29.	It can be longer or shorter than the radius.	3rd answer
30.	$\angle PQO = 66°$ (base angles of isosceles Δ) $\angle POQ = 180 - 2 \times 66 = 48°$ ($\angle$ sum Δ POQ) $\angle SOR = 180 - 48 = 132$ (st line) $\angle SOR = \dfrac{180 - 132}{2} = 24$ ($\angle$ sum Δ SOR)	24

High School
Mathematics Test 2015

Polygons and Circles

Year 8

Calculator Allowed Longer Answer Section

ANSWERS

Marks

1. (a)
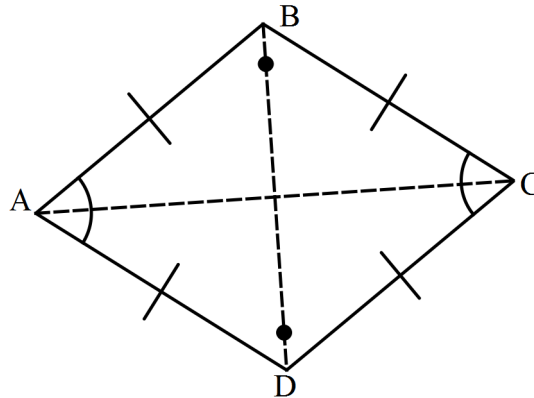
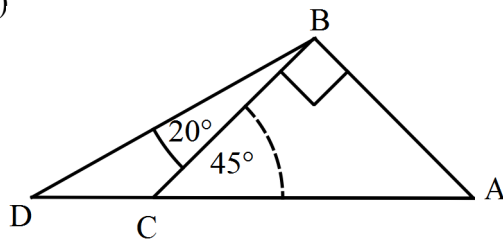**1 mark for drawing of rhombus**

1 mark for markings

(b)   It has 2 axes of line symmetry (dotted lines) and rotational symmetry order 2.

1 mark for line symmetry

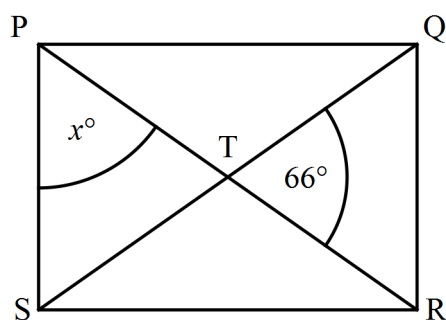**1 mark for order of rotational symmetry**

2. (a)

NOT TO SCALE

∠ BCA = 45° (base angles of right isosceles Δ)
∠ DCB = 180 – 45 = 135 (straight line)
∠ BDC = 180 − (135 + 20) (∠ sum Δ *DBC*)
  = 25°

3 marks for correct answer with reasons.

2 marks for small error in reasons

1 mark for obtaining at least one correct angle

(b)

NOT TO
SCALE

$\angle$ PTS = 66° (vert opp $\angle$)
$2x + 66 = 180$ ($\angle$ sum Δ)
$2x = 180 - 66 = 114$
$x = \dfrac{114}{2} = 57$