School Name

Mathematics Test 2017

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)
- Identify line and rotational symmetries (ACMMG181)
- 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 or on the lines provided.

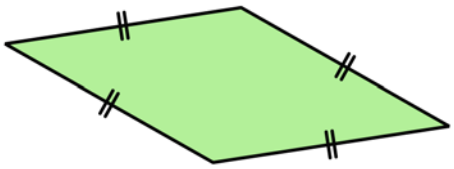
or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are allowed.

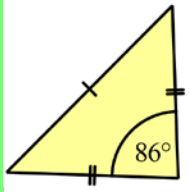
Geometric Instruments are required for this test.

1. What type of quadrilateral is shown here?



- ☐ A kite
- ☐ A parallelogram
- ☐ A rhombus.
- ☐ A trapezium

2. Which figure shows an acute scalene triangle? (Diagrams are not to scale.)



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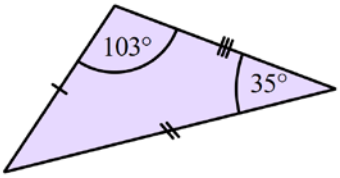

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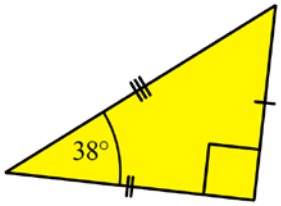

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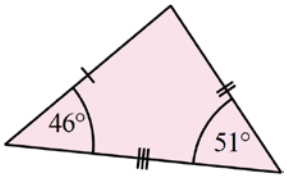

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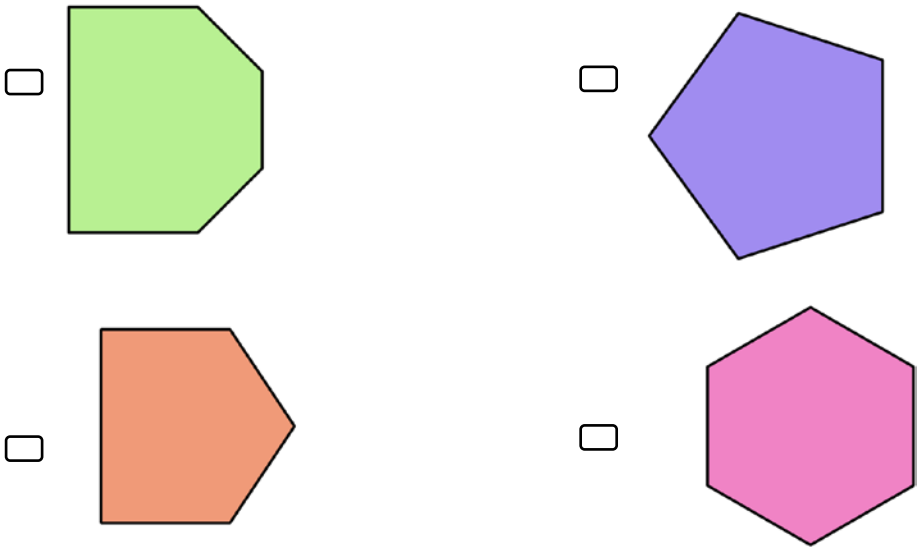
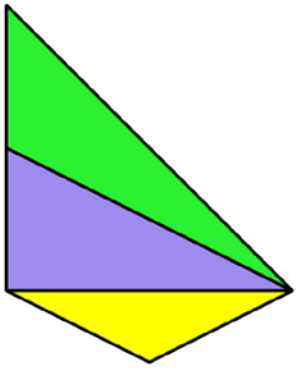
3. Which figure shows an irregular pentagon?



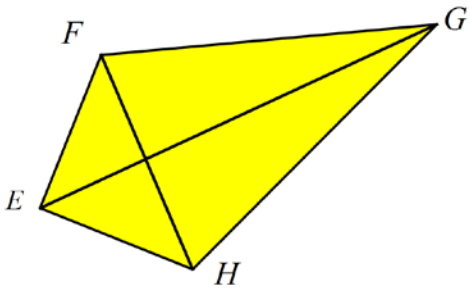
4. In the design below, which type of triangle is **not** included?

- ☐ Acute isosceles triangle
- ☐ Obtuse isosceles triangle
- ☐ Obtuse scalene triangle
- ☐ Right scalene triangle



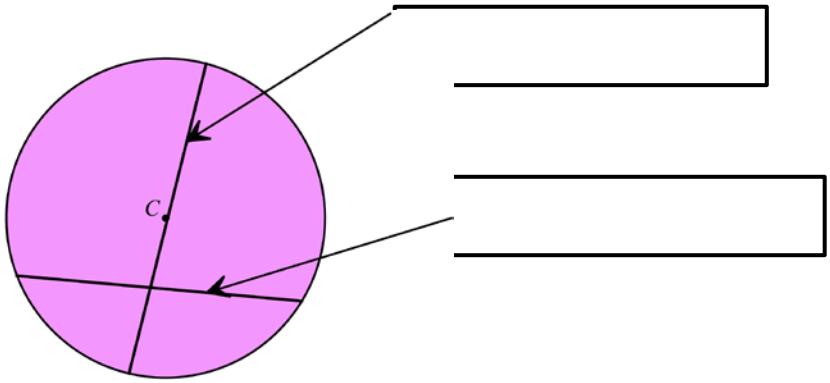
5. Which is a true statement about the kite shown?

- ☐ 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.



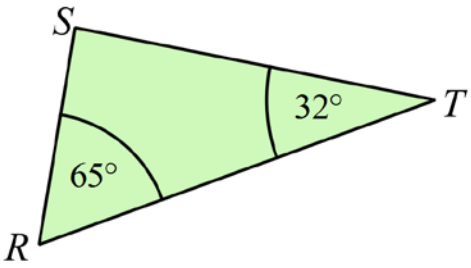
6. *C* is the centre of the circle shown.

Write down the names of the two features of the circle, indicated by the arrows.



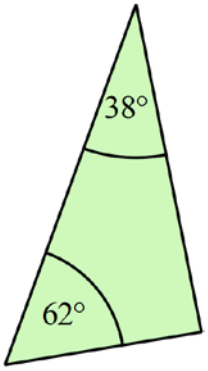
7. What is the size of $\angle RST$ in the triangle below?

NOT TO SCALE

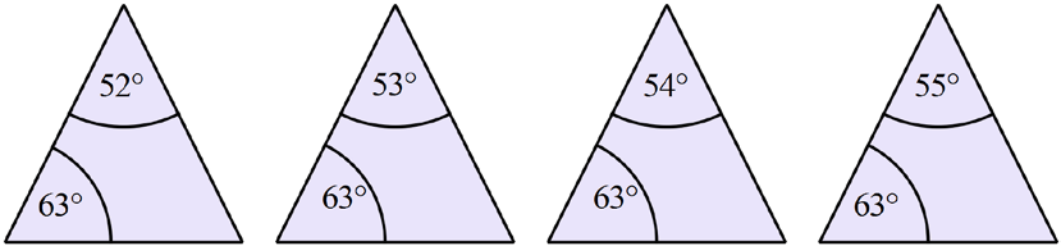


8. Is the triangle below, right angled ? (Explain why.)

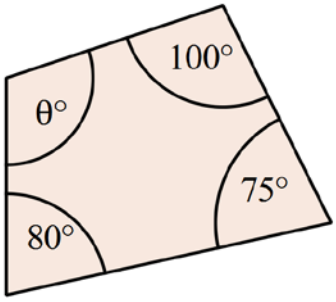
NOT TO SCALE



9. Which figure shows an isosceles triangle? (Diagrams are not to scale)



10. What is the value of θ in the quadrilateral below?



NOT TO SCALE

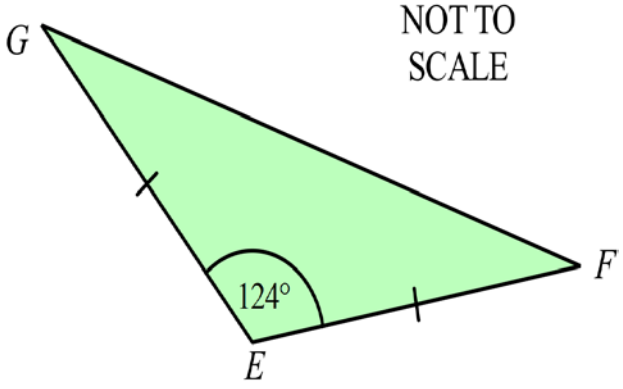
11. A polygon has the properties listed below.

- Angle sum is 360°.
- All sides are equal.
- Does not include a right angle.

What name could be given to the polygon?

- ☐ An equilateral triangle
- ☐ An isosceles triangle
- ☐ A rhombus
- ☐ A square

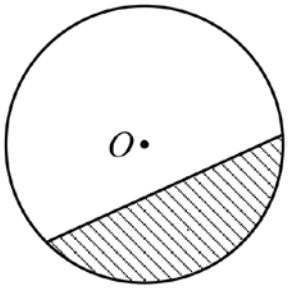
12. Find the size of $\angle EGF$ in the diagram below.



NOT TO SCALE

13. *O* is the centre of the circle below.

What name is given to the shaded region?

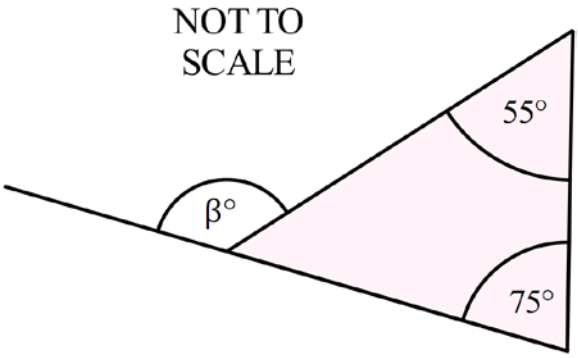


- ☐ A minor sector
- ☐ A minor segment
- ☐ A quadrant
- ☐ A semicircle

14. Which of the following quadrilaterals could be either a convex or non-convex polygon?

- ☐ A kite
- ☐ A parallelogram
- ☐ A rectangle
- ☐ A rhombus

15. What is the value of β ?



16. Which of the following has rotational symmetry but no line symmetry?

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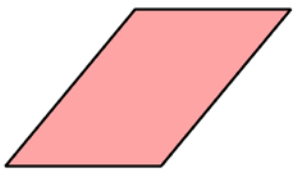

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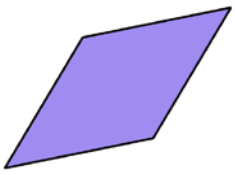

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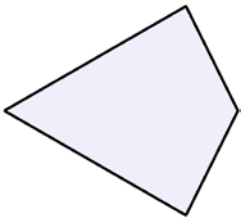

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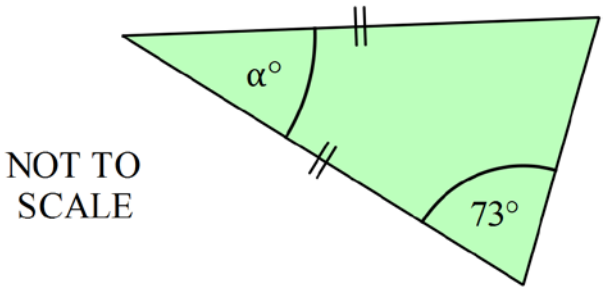
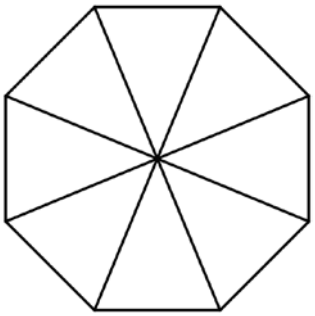
17. Find the value of α in the diagram below.

- ☐ $\alpha = 32$
- ☐ $\alpha = 34$
- ☐ $\alpha = 36$
- ☐ $\alpha = 53.5$



18. A regular octagon is shown below, with the opposite vertices joined by their diagonals.

Which of these shapes cannot be found within the diagram?

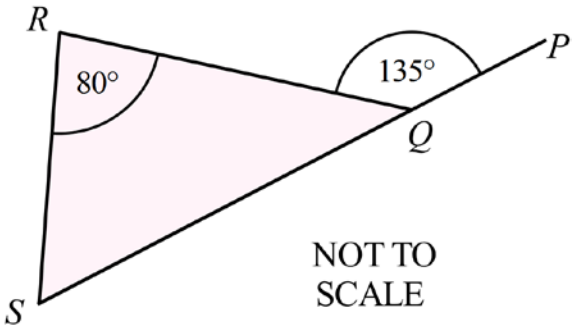


- ☐ An isosceles triangle
- ☐ A kite
- ☐ An irregular pentagon
- ☐ A rhombus

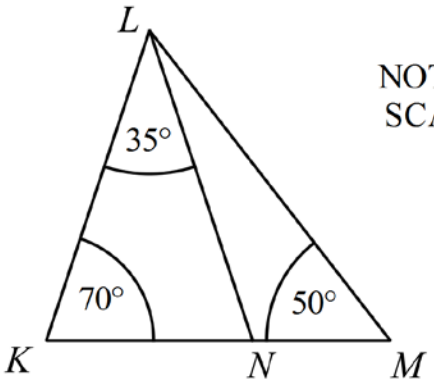
19. Which of the following quadrilaterals has diagonals which are equal and which bisect one another?

- ☐ A kite
- ☐ A parallelogram
- ☐ A rectangle
- ☐ A rhombus

20. What is the size of $\angle RSQ$?



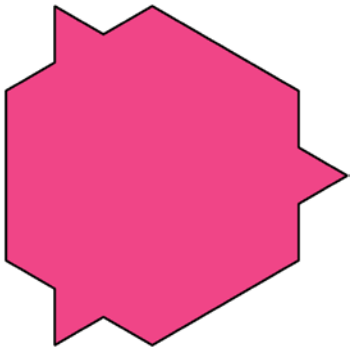
21. Find the size of $\angle NLM$. .



NOT TO SCALE

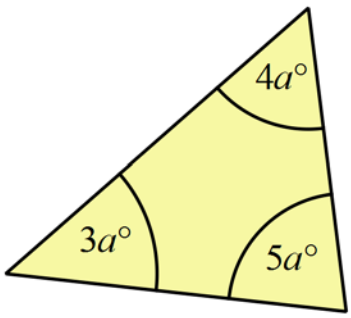
- ☐ 15°
- ☐ 20°
- ☐ 25°
- ☐ 35°

22. Which statement describes the symmetry of this shape?



- ☐ No line symmetry and rotational symmetry of order 3.
- ☐ 3 axes of symmetry and no rotational symmetry
- ☐ 3 axes of symmetry and rotational symmetry of order 3
- ☐ 6 axes of symmetry and rotational symmetry of order 6

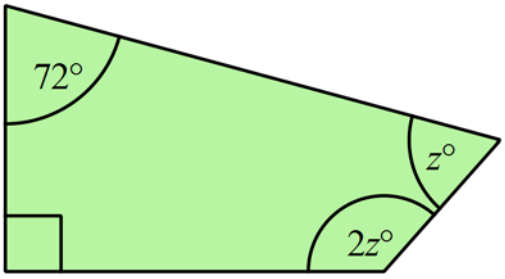
23. What is the value of a ?



NOT TO SCALE

- ☐ $a = 9$
- ☐ $a = 10$
- ☐ $a = 12$
- ☐ $a = 15$

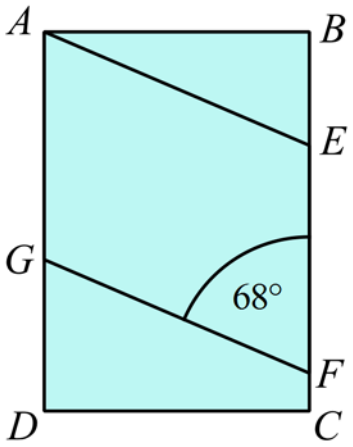
24. What is the value of z?



25. The figure *ABCD* is a rectangle and *AEFG* is a parallelogram.

What is the size of $\angle EAB$?

NOT TO SCALE



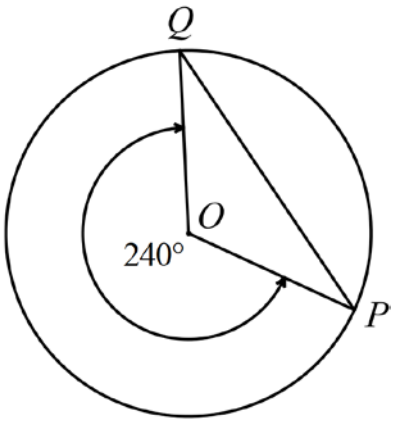
26. When you think of a kite, a rhombus and a parallelogram, which of these properties is only true of the rhombus and not of the other two quadrilaterals?

- ☐ Both diagonals are axes of line symmetry.
- ☐ Each diagonal bisects the other.
- ☐ The diagonals are equal.
- ☐ The diagonals meet at right angles.

27. *O* is the centre of the circle and *P* and *Q* are points on its circumference.

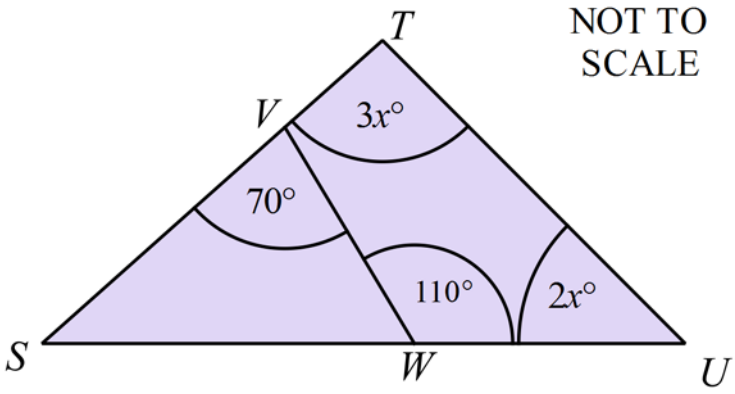
What is the size of $\angle OPQ$?

NOT TO SCALE

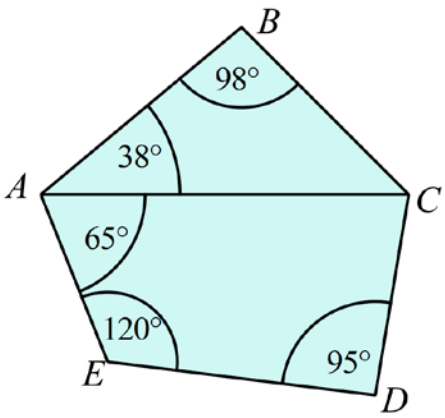


28. Find the value of *x*.

NOT TO SCALE



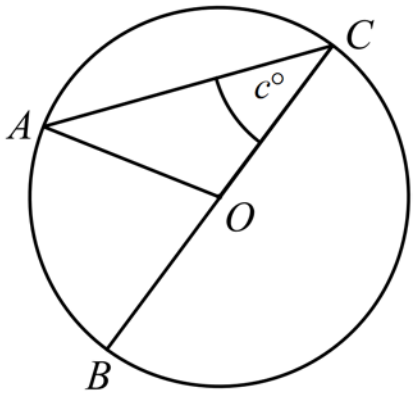
29. What is the size of $\angle BCD$?



NOT TO SCALE

30. O is the centre of the circle and A, B and C are points on its circumference.

Find an expression in terms of c for the size of $\angle AOB$.



School Name

Mathematics Test 2017

Year 8

Polygons and Circles

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 instruments to accurately draw a parallelogram *PQRS* and place markings on the diagram to show any equal sides and angles. **2**

(b) Measure the angles in the parallelogram and use this to describe one of the angle properties of the parallelogram. **2**

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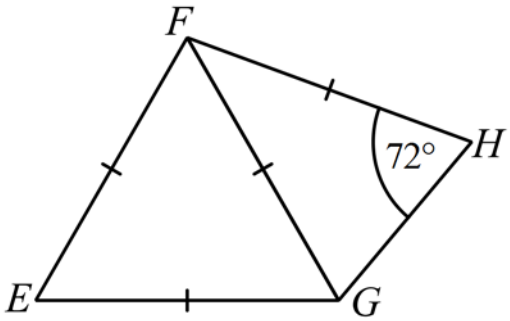
Marks

2. (a) *EFG* is an equilateral triangle and *FGH* is an isosceles triangle. **3**
$\angle DBC = 72°$.



NOT TO SCALE

Find the size of $\angle EFH$, giving reasons for your answer.

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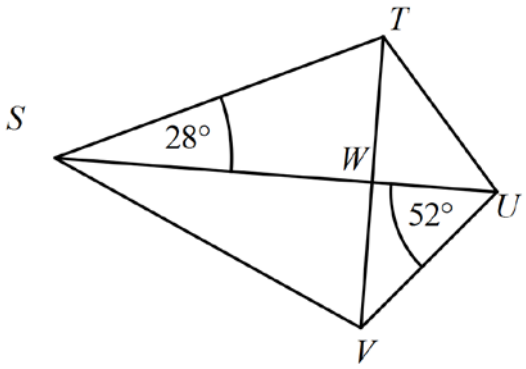
(b) *STUV* is a kite. *SU* and *TV* are the diagonals which intersect at *W*. **3**

$\angle TSW = 28°$ and $\angle WUV = 52°$.

Find the size of $\angle STU$, giving reasons for your answer.



NOT TO SCALE

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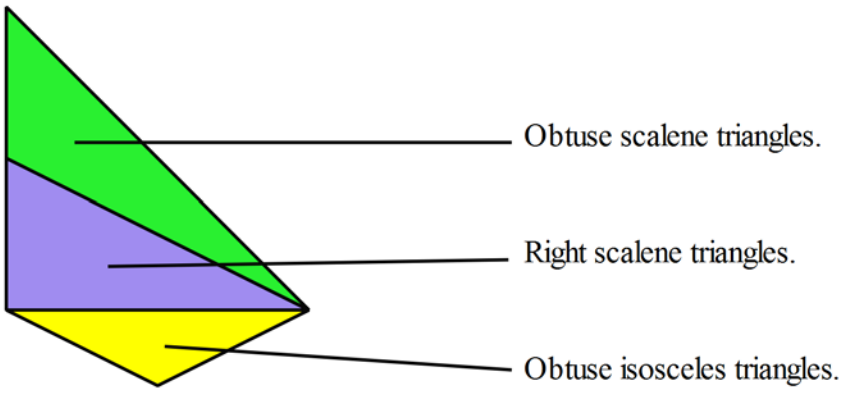
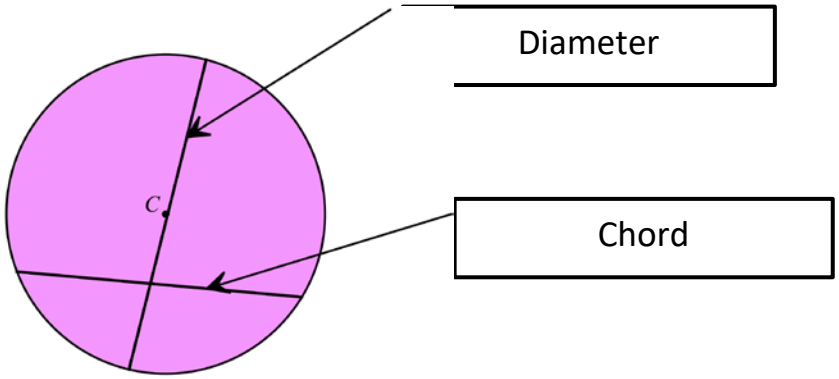
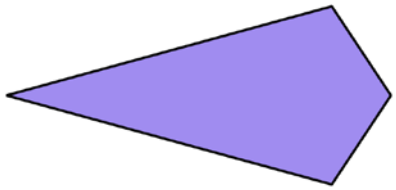
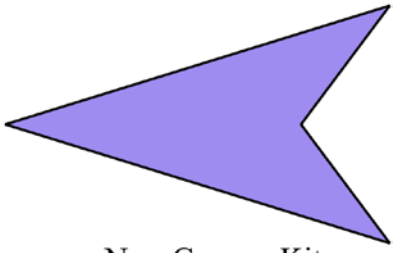
School Name
Mathematics Test 2017

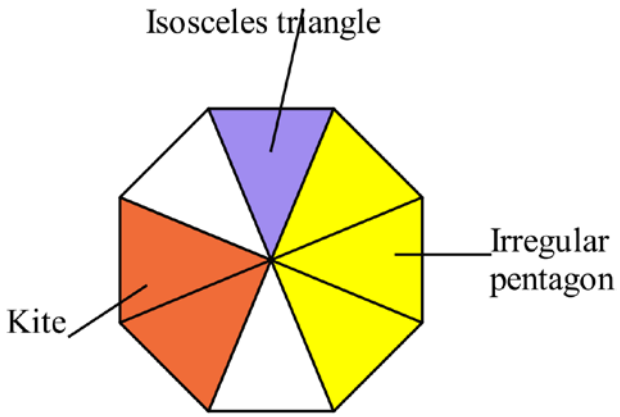
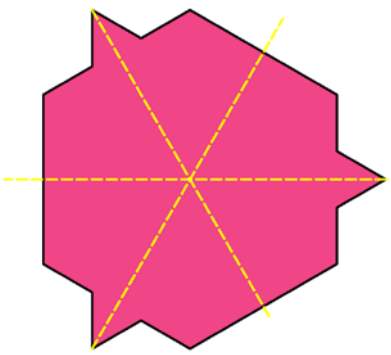
Year 8 **Polygons and Circles** Calculator Test

ANSWERS

Question	Working and Answer
1.	Having all sides equal, it is a rhombus. **3rd Answer**
2.	Only figure 4 is both scalene and acute angled, (the missing angle is 83°.) **4th Answer**
3.	The 2nd and 3rd figures are pentagons, only the 3rd is irregular. **3rd Answer**
4.	 There is no acute isosceles triangle **1st Answer**

Question	Working and Answer
5.	The sides adjacent to one another and on opposite sides of the axis of symmetry are equal, so side EF is equal to the side EH. **4th Answer.**
6.	A chord joins two points on the circumference. A diameter joins two points on the circumference and passes through the centre. 
7.	$\angle RST = 180 - (65 + 32) = 180 - 97 = 83°$ **83°**
8.	Missing angle = $180 - (62 + 38) = 180 - 100 = 80°$ **No it isn't right angled as the missing angle is 80°**
9.	If x is the size of the 3*rd* angle 1*st* triangle $x = 180 - (63 + 52) = 180 - 115 = 65°$ 2*nd* triangle $x = 180 - (63 + 53) = 180 - 116 = 64°$ 3*rd* triangle $x = 180 - (63 + 54) = 180 - 117 = 63°$ 4θ triangle $x = 180 - (63 + 55) = 180 - 118 = 62°$ 3*rd* Triangle has angles 54°, 63° and 63° so is isosceles. **3rd Answer**
10.	$\theta + 100 + 75 + 80 = 360$ (angle sum quadrilateral) $\theta + 255 = 360$ $\theta = 360 - 255$ $\theta = \mathbf{105}$

Question	Working and Answer
11.	▪ Angle sum is 360°. .□ It is a quadrilateral ▪ All sides are equal.□ it is a rhombus (or square) ▪ Does not include a right angle. .□ it isn't a square so rhombus **3rd Answer**
12.	$2 \times \angle EGF + 124 = 180$ $2 \times \angle EGF = 180 - 124 = 56°$ $\angle EGF = 56 \div 2$ $\boldsymbol{\angle EGF = = 28°}$
13.	The region is cut off by a chord and makes up less than half of the circle, so it is a minor segment. **2nd Answer**
14.	 Convex Kite  Non-Convex Kite **1st Answer**
15.	$\beta = 55 + 75$ (exterior angle) $\boldsymbol{\beta = 130}$
16.	The parallelogram (figure 2) has no line symmetry but has rotational symmetry of order 2. All of the others have line symmetry. **2nd Answer**
17.	$\alpha + 2 \times 73 = 180$ $\alpha + 146 = 180$ $\alpha = 180 - 146$ $\alpha = 34$

Question	Working and Answer
18.	 A rhombus cannot be found. **4th Answer**
19.	A kite □ Diagonals could be equal but only one bisects the other Parallelogram □ Diagonals are not equal A rectangle □ Diagonals are equal and bisect one another A rhombus □ Diagonals are not equal **3rd Answer**
20.	$\angle RSQ + 80° = 135°$ (exterior angle of Δ) $\angle RSQ = 135° - 80°$ $\boldsymbol{\angle RSQ = 55°}$
21.	$\angle KLM = 180 - (70 + 50)$ (angle sum Δ) $= 180 - 120$ $= 60°$ $\angle NLM = 60 - 35$ (adjacent $\angle$) $\angle NLM = 25°$ **3rd Answer**
22.	There are 3 axes of symmetry as shown There are 3 positions to which it can rotate, so order 3.  **3rd Answer**

Question	Working and Answer
23.	$3a + 4a + 5a = 180$ (angle sum Δ) $12a = 180$ $a = 180 \div 12$ $a = 15$ **4th Answer**
24.	$2z + z + 72 + 90 = 360$ (angle sum Quadrilateral) $3z + 162 = 360$ $3z = 360 - 162$ $3z = 198$ $x = 198 \div 3$ $\boldsymbol{z = 66}$
25.	$\angle EAG = 68°$ (opp $\angle$ parallelogram are equal) $\angle BAG = 90°$ ($\angle$ in a rectangle a right) $\angle EAB = 90 - 68$ (adjacent angles) $\boldsymbol{\angle EAB = 22°}$
26.	Both diagonals are axes of line symmetry. □ Only true of the rhombus, the parallelogram has no line symmetery and the kite has one diagoanl as an axis of symmetry Each diagonal bisects the other. □ True of the rhombus and the parallelogram The diagonals are equal. □ Not true of the rhombus The diagonals meet at right angles. □True of the rhombus and the kite **1st Answer**
27.	$OP = OQ$ (radii of circle) $\angle OPQ = \angle OQP$ (base $\angle$ of isos Δ) $\angle QOP$ (obtuse) $= 360 - 240 = 120°$ (angles at a point) $2 \times \angle OPQ + 120 = 180$ ($\angle$ sum isos Δ) $2 \times \angle OPQ = 60$ $\angle OPQ = 60 \div 2$ $\boldsymbol{\angle OPQ = 30}$
28.	$\angle TVW = 180 - 70 = 110°$ (straight line) $2x + 3x + 110 + 110 = 360$ (angle sum quad) $5x + 220 = 360$ $5x = 140$ $x = 140 \div 5$ $\boldsymbol{x = 28}$

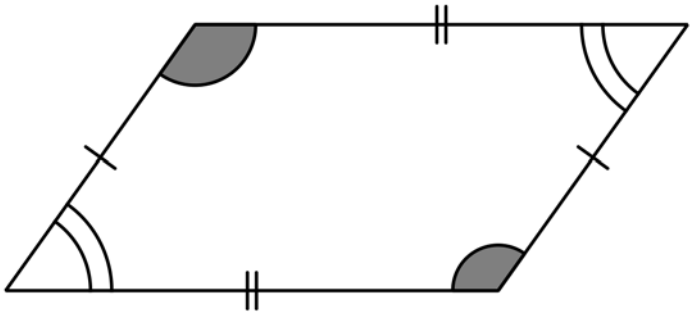
Question	Working and Answer
29.	$\angle BCA = 180 - (98 + 38)$ (angle sum Δ) $= 180 - 136$ $= 44°$ $\angle ACD = 360 - (120 + 65 + 95)$ (angle sum quad) $= 360 - 280$ $= 80°$ $\angle BCD = 44 + 80$ (adjacent angles) $\boldsymbol{\angle BCD = 124°}$
30.	$AO = CO$ (radii of circle) $\angle CAO = \angle ACO = c$` (angles in isos Δ) $\angle AOB = c + c$ (exterior angle of isos Δ) $\boldsymbol{\angle AOB = 2c}$

School Name
Mathematics Test 2017

Year 8 **Polygons and Circles**

Longer Answer Section

ANSWERS

Question	Answer	Marks
1.	(a) 	2 marks for accurately drawn and labelled diagram. 1 mark if accuracy or labelling are lacking
	(b) The angles above are 126^o and 54^o for example. The opposite angles of the parallelogram are equal. The cointerior angles of the parallelogram are supplementary. The angle sum is 360^o.	1 mark for accurately measured angles 1 mark for any correct statement about the angle properties

Question	Answer	Marks
2.	(a) $\angle EFG = 60°$ (equilateral Δ) $\angle GFH + 2 \times 72 = 180$ (angle sum isos Δ) $\angle GFH + 144 = 180$ $\angle GFH = 180 - 144$ $\angle GFH = 36°$ $\angle EFH = 60 + 36$ (adjacent $\angle$) $\angle EFH = 96°$	3 marks for fully reasoned answer 2 marks for reasoned answer with minor error 1 mark if some minor progress made
	(b) $\angle VST = 2 \times 28° = 56°$ (diagonal bisects angle of kite) $\angle VUT = 2 \times 52° = 104°$ (diagonal bisects angle of kite) $\angle STU = \angle SVU$ (symmetry of kite) $2 \times \angle STU + 56 + 104 = 360$ (angle sum kite) $2 \times \angle STU + 160 = 360$ $2 \times \angle STU = 360 - 160 = 200°$ $\angle STU = 200 \div 2 = 100°$	3 marks for fully reasoned answer 2 marks for reasoned answer with minor error 1 mark if some minor progress made