High School Mathematics Test 2014

Year 8

Polygons and Circles

Non Calculator Section

Skills and Knowledge Assessed:

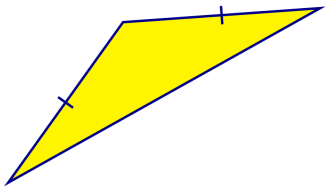
- Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165)
- Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166)
- Investigate the relationship between features of circles such as circumference,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

Name_____

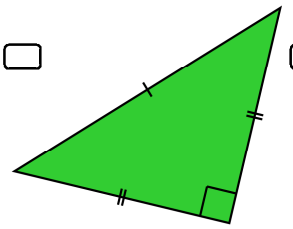
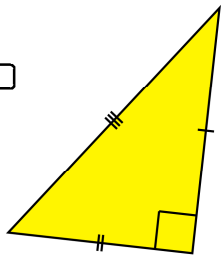
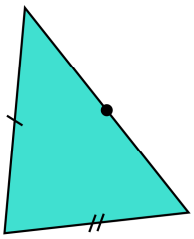
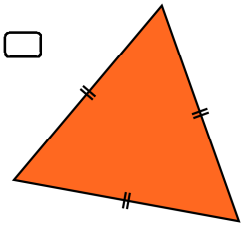
Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper. Calculators are ***not*** *allowed.*

1. What type of triangle is shown here?

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

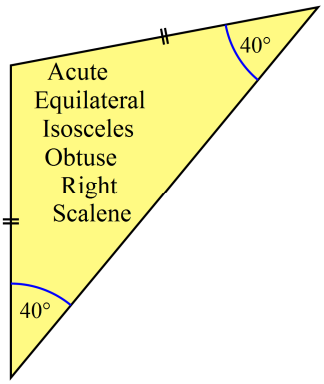


2. Which figure shows a right scalene triangle?

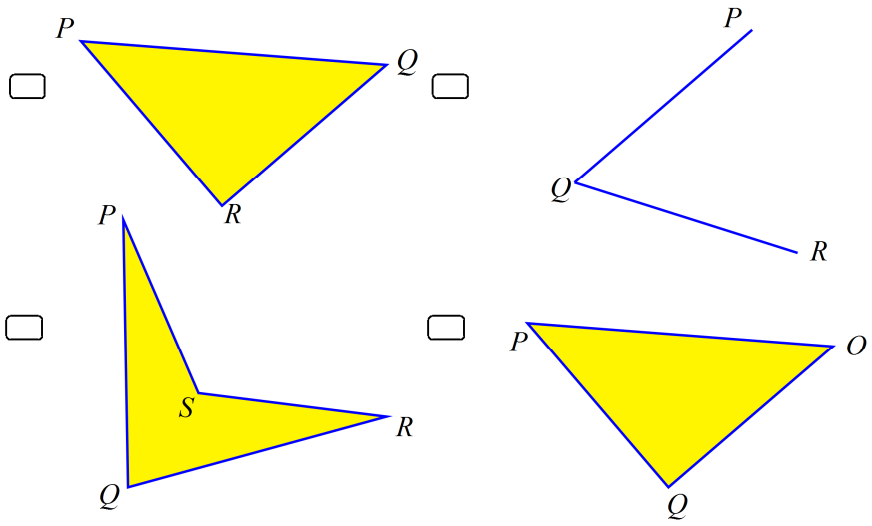
☐ 
☐ 
☐ 
☐ 

3. Write a description of this triangle using two of the words in the triangle.

This is a/an ☐ ☐ triangle.

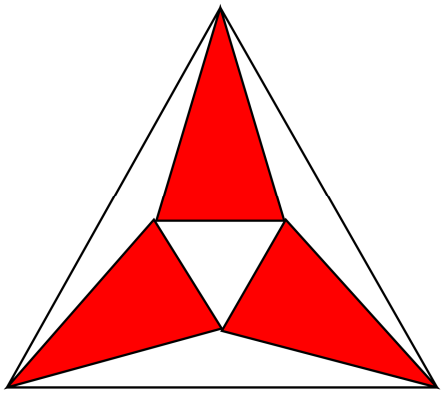


4. Which figure would be called ΔPQR. ?

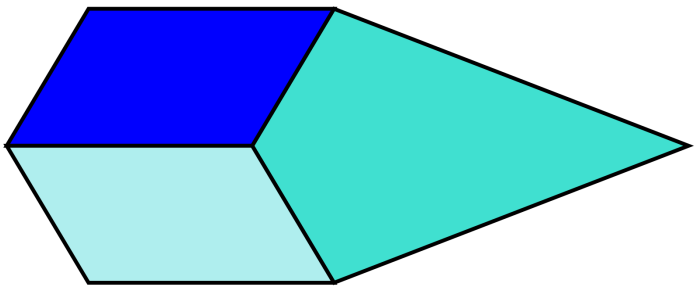


5. In the pattern below, which types of triangle are shaded?

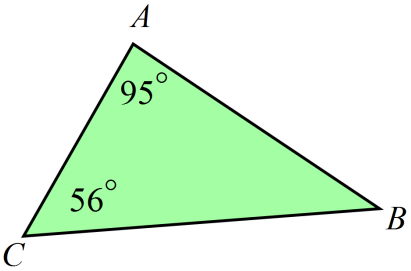
- ☐ Acute isosceles triangles.
- ☐ Acute scalene triangles.
- ☐ Obtuse isosceles triangles.
- ☐ Right isosceles triangles.



6. Write the names of the quadrilaterals that are used to make this design.

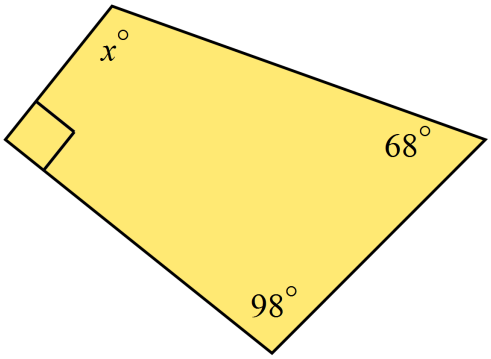


7. What is the size of $\angle ABC$?



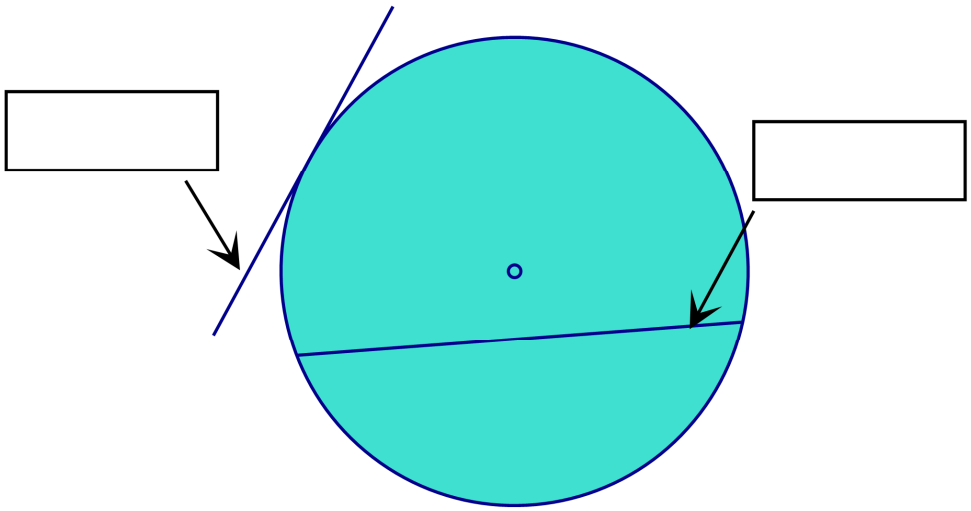
NOT TO SCALE.

8. In the quadrilateral shown, what is the value of x?

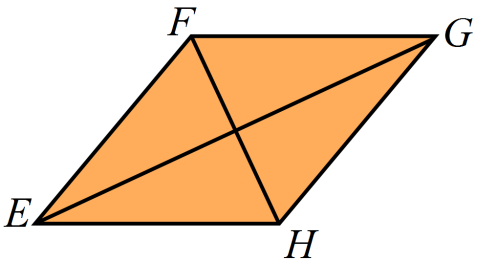


- ☐ 94°
- ☐ 96°
- ☐ 104°
- ☐ 106°

9. Write the names of the two features of a circle indicated by the arrows.

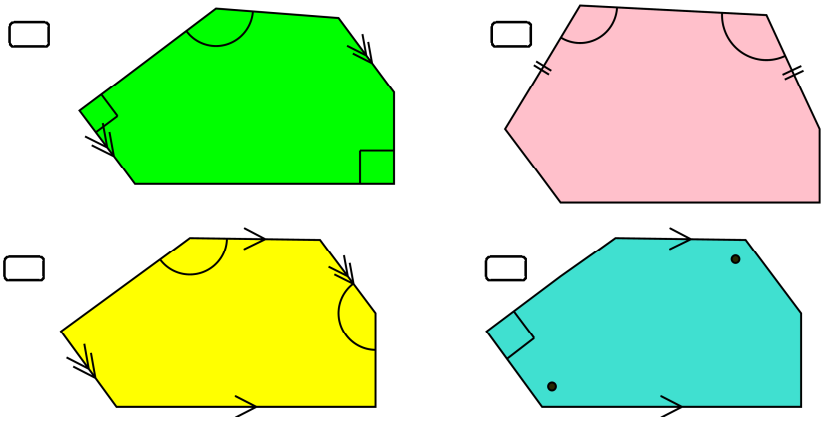


10. Which is true about the rhombus shown?



- ☐ The diagonals EG and FH are equal in length.
- ☐ The diagonal EG is equal to the side FG.
- ☐ The diagonal FH is equal to the side FG.
- ☐ The sides EF and FG are equal in length.

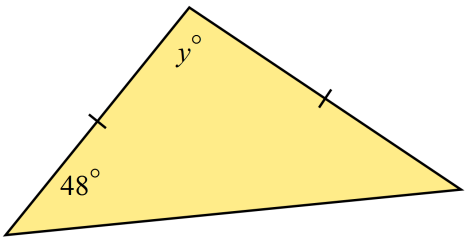
11. Which polygon has one pair of parallel sides and one pair of perpendicular sides?



12. Which of the following is true of an obtuse isosceles triangle?

- ☐ The angle sum is 180°.
- ☐ All the angles are obtuse.
- ☐ All sides are equal.
- ☐ There are three equal angles.

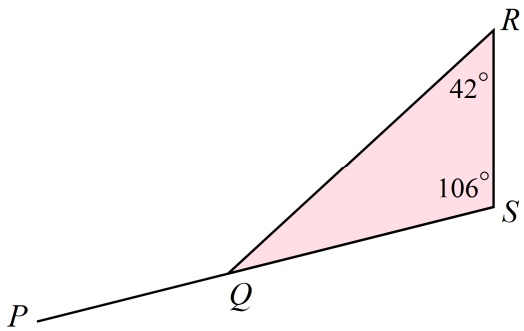
13. Find the value of y in the diagram below.



$y =$ ☐

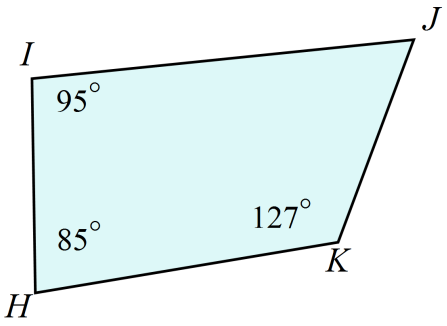
14. What is the size of the exterior angle PQR?

$\angle PQR =$ ☐ o

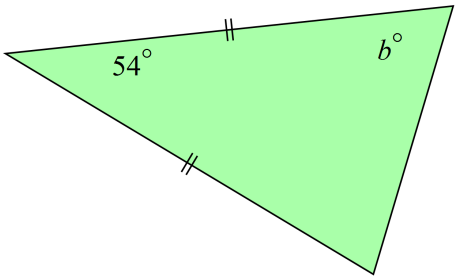


15. What is the size of angle *IJK*?

$\angle IJK = \square^\circ$

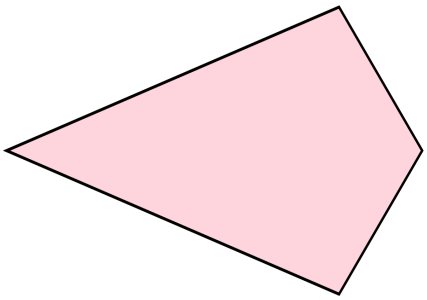


16. Find the value of *b* in the diagram below.



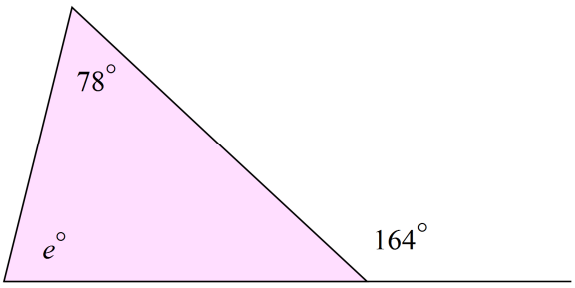
☐ 32° ☐ 63° ☐ 86° ☐ 126°

17. Which of the following is not a property of a kite?



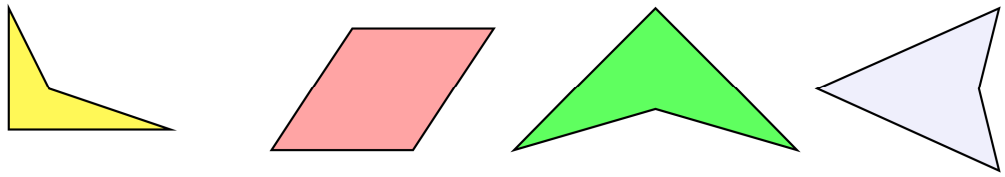
- ☐ Two pairs of adjacent sides are equal.
- ☐ Has two axes of line symmetry.
- ☐ One diagonal bisects the other.
- ☐ The diagonals are perpendicular.

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



☐ 12° ☐ 62° ☐ 86° ☐ 102°

19. Which diagram below shows a convex quadrilateral?



☐ ☐ ☐ ☐

20. A quadrilateral has these properties.

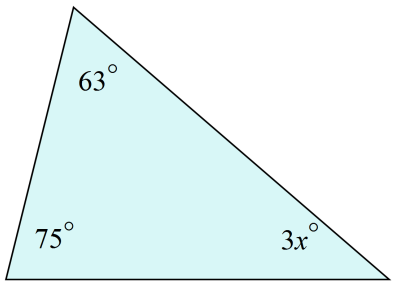
The diagonals are not equal in length but do bisect one another.

The quadrilateral could **not** be:

a kite	a parallelogram	a rhombus.	a rectangle.
☐	☐	☐	☐

21. The value of x is:

☐ 14°
☐ 42°
☐ 46°
☐ 138°

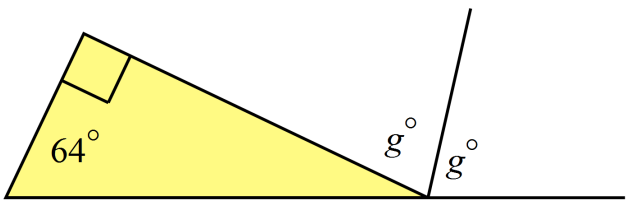


22. Which statement is true of all rhombuses?

☐ The angle sum is 360° and the diagonals are equal in length.
☐ The diagonals are equal in length and intersect at an angle of 45°.
☐ All sides are equal and all angles are 45°.
☐ The diagonals bisect one another at right angles.

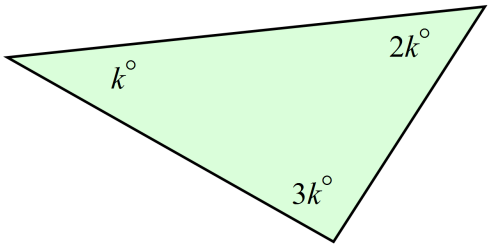
23. What is the value of g ?

$g =$ ☐



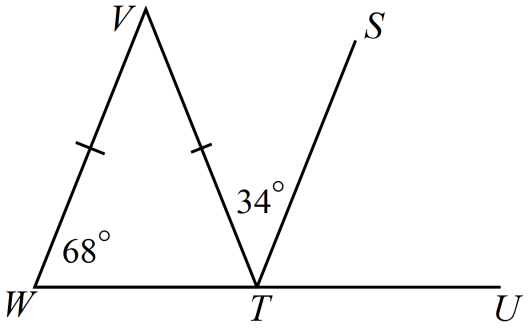
24. Find the value of k in the diagram below.

$k =$ ☐



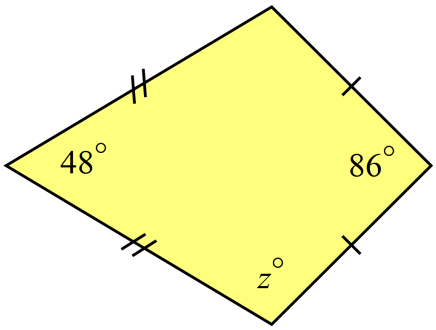
25. What is the size of $\angle STU$?

$\angle STU =$ ☐



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

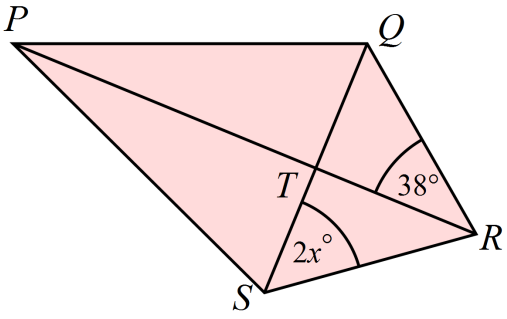
- ☐ 48°
- ☐ 86°
- ☐ 113°
- ☐ 134°



27. $PQRS$ is a kite. The diagonals intersect at T.

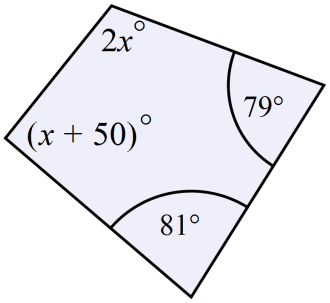
What is the value of x ?

$x =$ ☐



28. What is the value of x in the quadrilateral?

$x =$ ☐



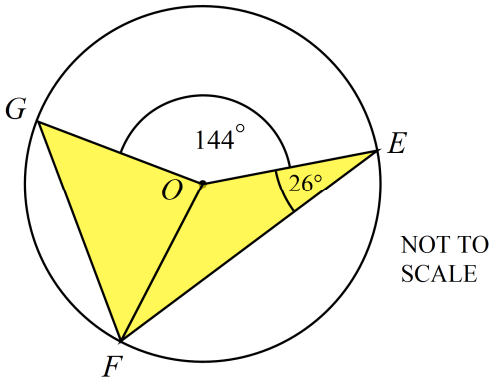
29. Which statement is **not** true about any circle.

- ☐ Any chord is longer than the radius.
- ☐ Any diameter passes through the centre.
- ☐ Any radius meets the circle at only one point.
- ☐ Any tangent meets the circle at only one point.

30. O is the centre of the circle.
E, F and G are points on the circumference.
$\angle GOE = 144^\circ$ and $\angle FEO = 26^\circ$.

What is the size of $\angle FGO$?

$\angle FGO =$ ☐ o



High School Mathematics Test 2014

Year 8

Polygons and Circles

Non Calculator Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Answers should be supported by relevant mathematical reasoning and/or calculations.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. (a) Draw an accurate diagram of an acute isosceles triangle ABC, and place markings on the diagram to show any equal sides and angles. **2**

(b) Describe any line symmetry or rotational symmetry the triangle may have. (You may add to your diagram to illustrate your answer.) **1**

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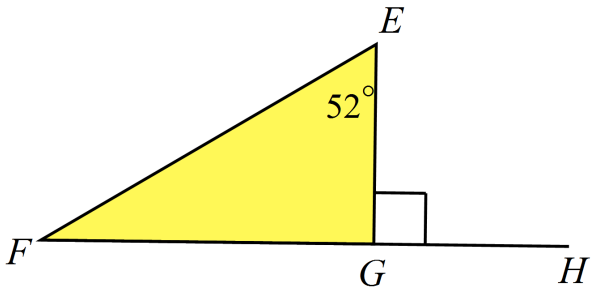
Marks

2. (a) Find the size of $\angle EFG$ in the diagram and explain how you obtained your answer. **2**



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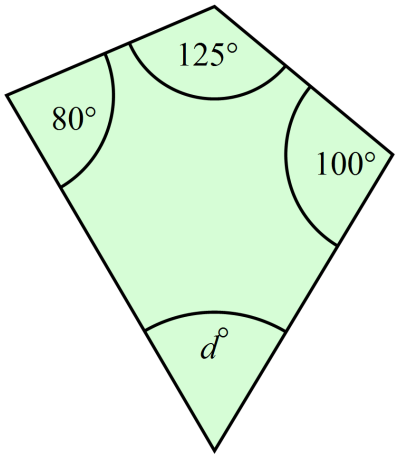
(b) Find the value of d in the diagram and explain how you obtained your answer. **2**



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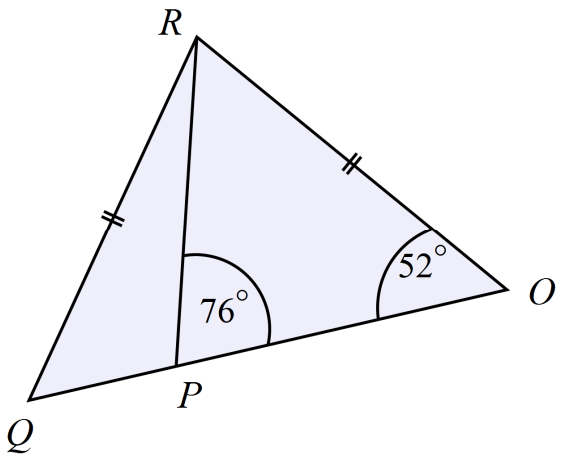
Marks

3. (a) Find the size of $\angle PRQ$ in the diagram and explain how you obtained your answer. **2**



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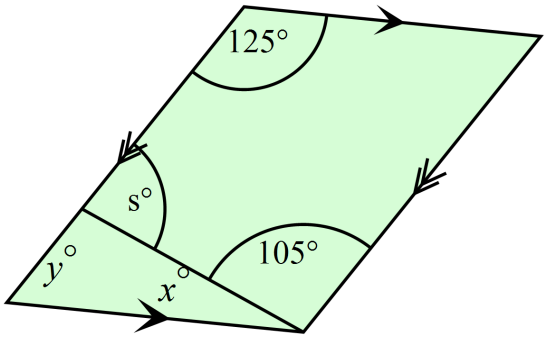
(b) Find the value of s in the diagram and explain how you obtained your answer. **3**



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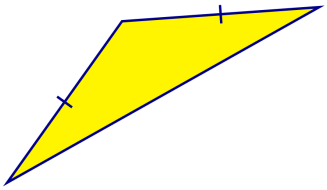
High School
Mathematics Test 2014
Polygons and Circles
ANSWERS

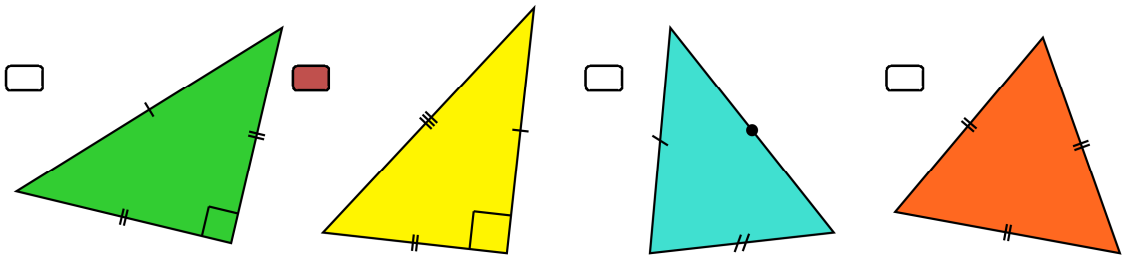
Non Calculator Section (1 mark each)

1. What type of triangle is shown here?



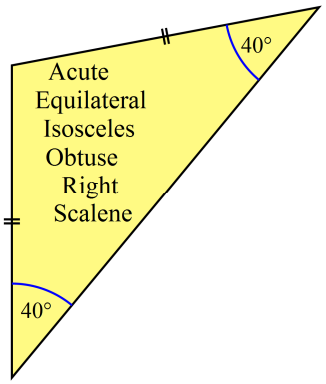
- ☐ An equilateral triangle.
- ☒ An isosceles triangle.
- ☐ A right triangle.
- ☐ A scalene triangle.

2. Which figure shows a right scalene triangle?



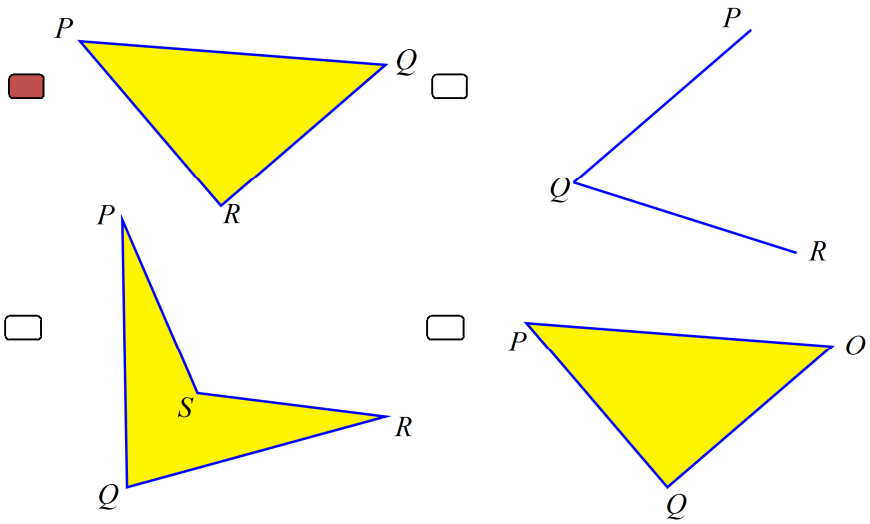
- ☐
- ☒
- ☐
- ☐

3. Write a description of this triangle using two of the words in the triangle.



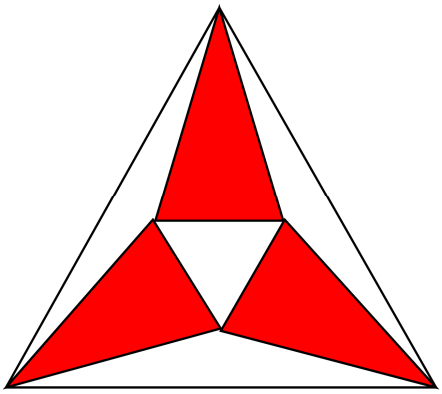
This is a/an Obtuse , Isosceles triangle.

4. Which figure would be called ΔPQR. ?



5. In the pattern below, which types of triangle are shaded?

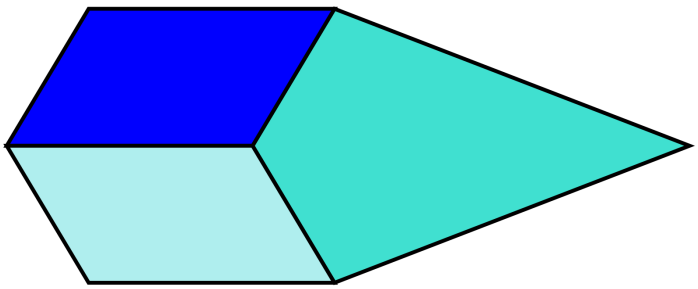
- [x] Acute isosceles triangles.
- [ ] Acute scalene triangles.
- [ ] Obtuse isosceles triangles.
- [ ] Right isosceles triangles.



6. Write the names of the quadrilaterals that are used to make this design.

Kite

Parallelogram



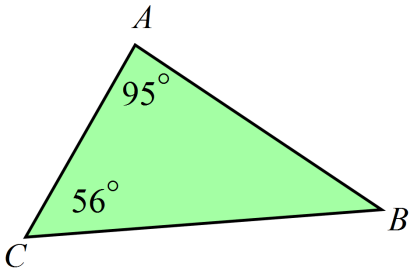
7. What is the size of $\angle ABC$?

$95 + 56 + \angle ABC = 180^\circ$

$\angle ABC = 180 - 151$

$= 29^\circ$

29°



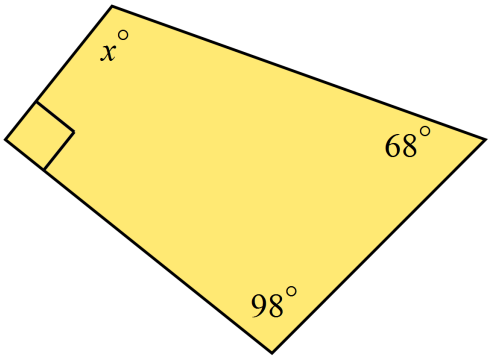
NOT TO SCALE.

8. In the quadrilateral shown, what is the value of x?

$x + 90 + 68 + 98 = 360$

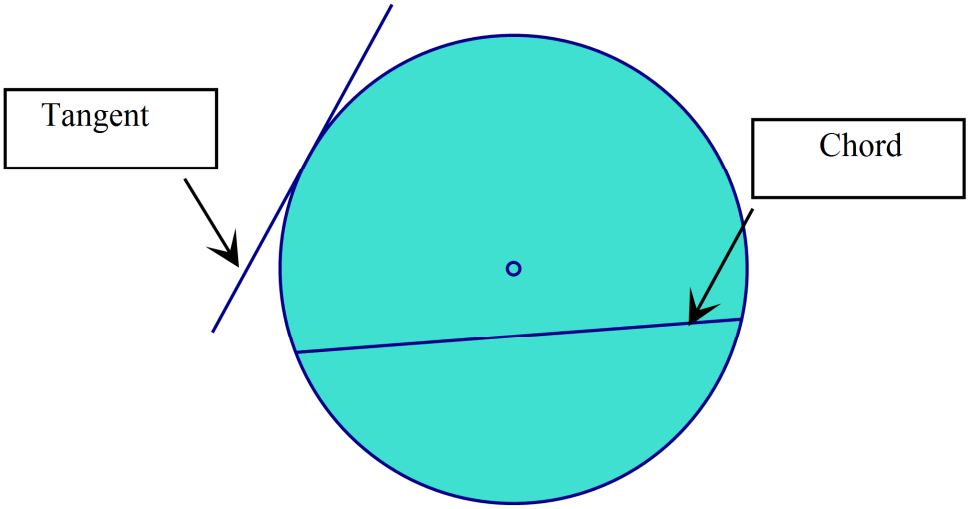
$x = 360 - 256$

$x = 104$



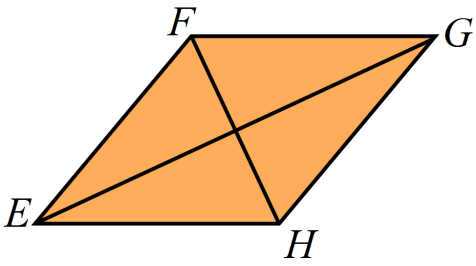
- ☐ 94°
- ☐ 96°
- ☒ 104°
- ☐ 106°

9. Write the names of the two features of a circle indicated by the arrows.

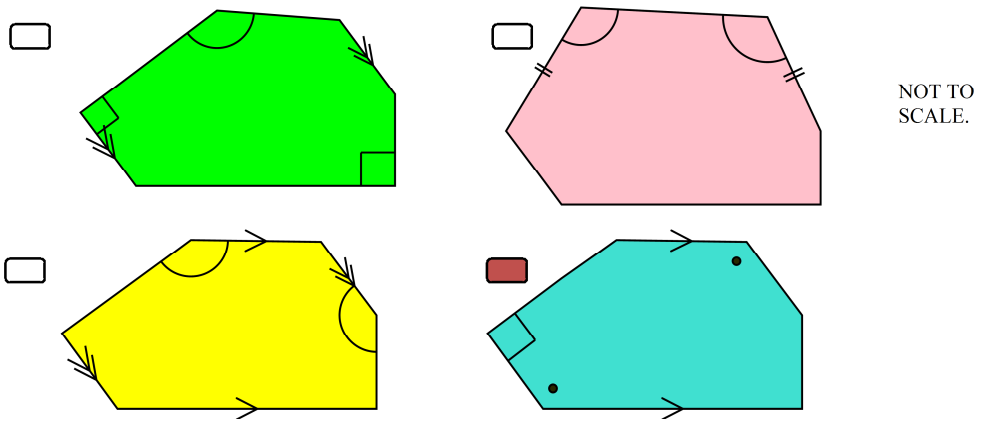


10. Which is true about the rhombus shown?

- ☐ The diagonals EG and FH are equal in length.
- ☐ The diagonal EG is equal to the side FG.
- ☐ The diagonal FH is equal to the side FG.
- ☒ The sides EF and FG are equal in length.



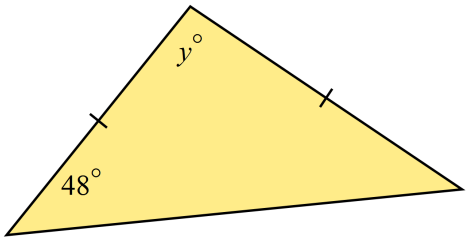
11. Which polygon has one pair of parallel sides and one pair of perpendicular sides?



12. Which of the following is true of an obtuse isosceles triangle?

- ☐ The angle sum is 180°.
- ☐ All the angles are obtuse.
- ☐ All sides are equal.
- ☐ There are three equal angles.

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



$y + 2 \times 48 = 180$

$y = 180 - 96$

$y = 84^\circ$

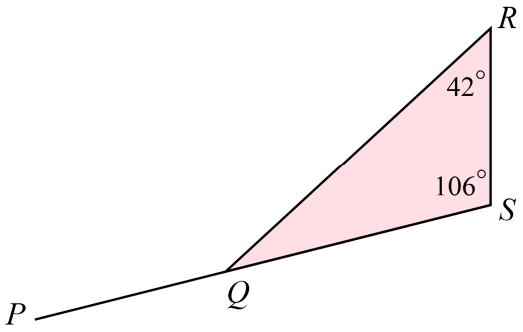
$y =$ 84

14. What is the size of the exterior angle PQR?

$\angle PQR = 42 + 106$

$= 148^\circ$

$\angle PQR =$ 148 °



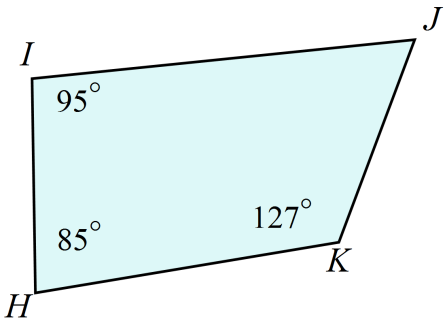
15. What is the size of angle *IJK*?

$\angle IJK + 95 + 85 + 127 = 360$

$\angle IJK = 360 - 307$

$= 53^\circ$

$\angle IJK =$ 53 °

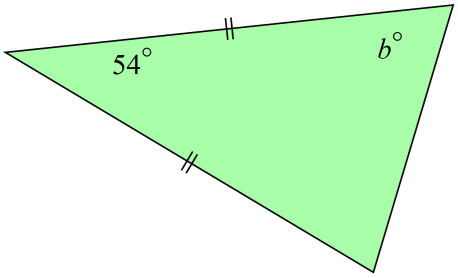


16. Find the value of *b* in the diagram below.

$54 + 2b = 180$

$2b = 126$

$b = 63$



☐ 32° ■ 63° ☐ 86° ☐ 126°

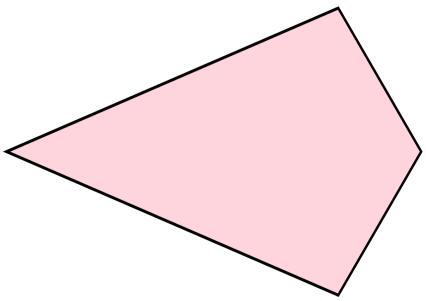
17. Which of the following is not a property of a kite?

☐ Two pairs of adjacent sides are equal.

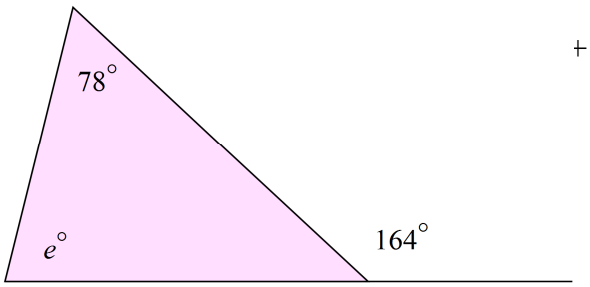
■ Has two axes of line symmetry.

☐ The diagonals bisect one another.

☐ The diagonals are perpendicular.



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



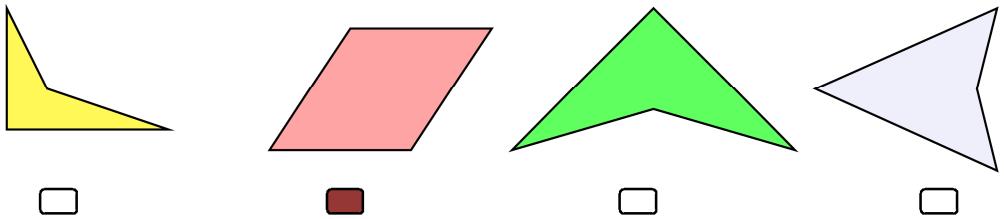
$+ 78 = 164$

$e = 164 - 78$

$e = 86^\circ$

☐ 12° ☐ 62° ■ 86° ☐ 102°

19. Which diagram below shows a convex quadrilateral?



☐ ■ ☐ ☐

20. A quadrilateral has these properties.

The diagonals are not equal in length but do bisect one another.

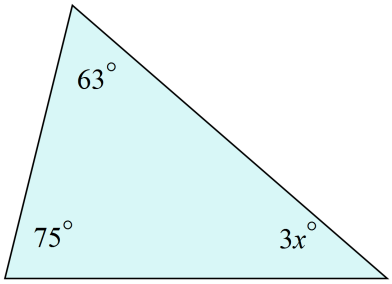
The quadrilateral could **not** be:

a kite	a parallelogram	a rhombus.	a rectangle.
☐	☐	☐	■

21. The value of x is:

$$75 + 63 + 3x = 180$$
$$3x = 180 - 138$$
$$3x = 42$$
$$x = \frac{42}{3} = 14$$

- ■ 14^o
- ☐ 42^o
- ☐ 46^o
- ☐ 138^o



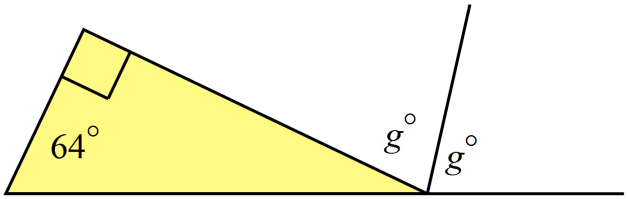
22. Which statement is true of all rhombuses?

- ☐ The angle sum is 360^o and the diagonals are equal in length.
- ☐ The diagonals are equal in length and intersect at an angle of 45^o.
- ☐ All sides are equal and all angles are 45^o.
- ■ The diagonals bisect one another at right angles.

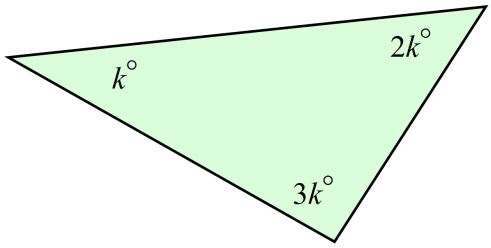
23. What is the value of g ?

$$g + g = 64 + 90$$
$$2g = 154$$
$$g = \frac{154}{2} = 77^\circ$$

$g =$ 77°



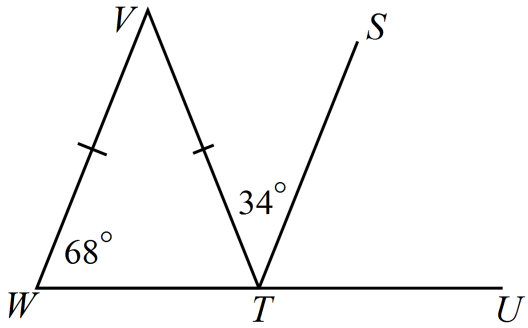
24. Find the value of k in the diagram below.



$$k + 2k + 3k = 180^\circ$$
$$6k = 180$$
$$k = \frac{180}{6} = 30$$

$k =$ 30°

25. What is the size of $\angle STU$?

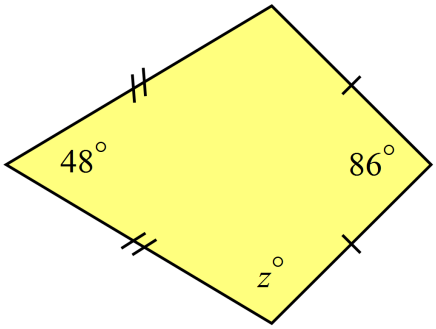


$$\angle VTW = 68^\circ$$
$$68 + 34 + \angle STU = 180^\circ$$
$$\angle STU = 180 - 102$$
$$= 78^\circ$$

$\angle STU =$ 78°

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

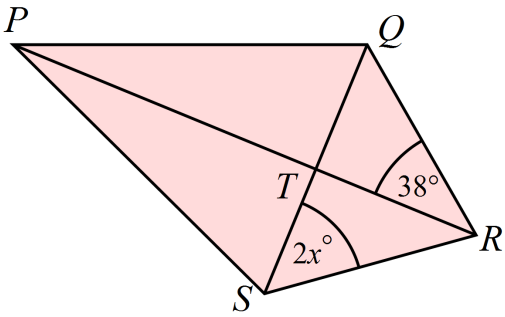
- ☐ 48°
- ☐ 86°
- ■ 113°
- ☐ 134°



$$48 + 86 + 2z = 360$$
$$2z = 360 - 134$$
$$2z = 226$$
$$z = 113$$

27. $PQRS$ is a kite. The diagonals intersect at T.

What is the value o

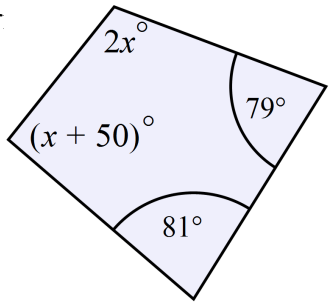


$$\angle QRS = 2 \times 38 = 76^\circ$$
$$2x + 2x + 76 = 180$$
$$4x = 104$$
$$x = \frac{104}{4} = 26$$

$x =$ 26

28. What is the value of x in the quadr

$x =$ 50



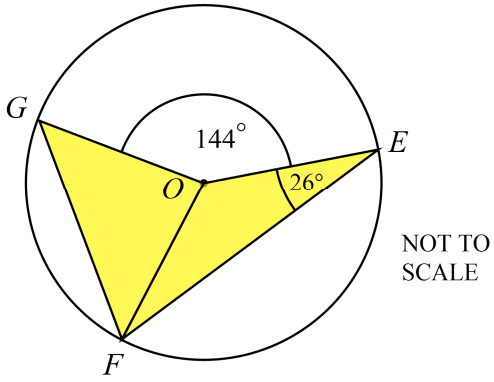
$2x + x + 50 + 81 + 79 = 360$
$3x + 210 = 360$
$3x = 150$
$x = 50$

29. Which statement is **not** true about any circle.

- [x] Every chord is longer than the radius.
- [ ] Every diameter passes through the centre.
- [ ] Every radius meets the circle at only one point.
- [ ] Every tangent meets the circle at only one point.

30. O is the centre of the circle.
E, F and G are points on the circumference.
$\angle GOE = 144^\circ$ and $\angle FEO = 26^\circ$.

What is the size of $\angle FGO$?



$\angle FGO =$ 46° o

$\angle OFG = 26^\circ$
$\angle FOE = 180 - 2 \times 26$
$\angle FOE = 128$
$\angle FOG = 360 - 144 - 128$
$= 88$
$2 \times \angle FGO = 180 - 88$
$= 92$
$\angle FGO = 46$

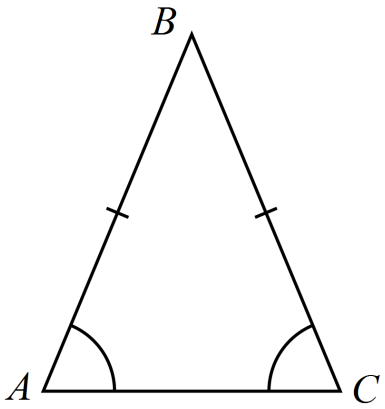
High School
Mathematics Test 2014

Answers

Longer Answer Section

Marks

1. (a) Draw an accurate diagram of an acute isosceles triangle ABC, and place markings on the diagram to show any equal sides and angles. **2**



1 for triangle

1 for angles and sides marked equal

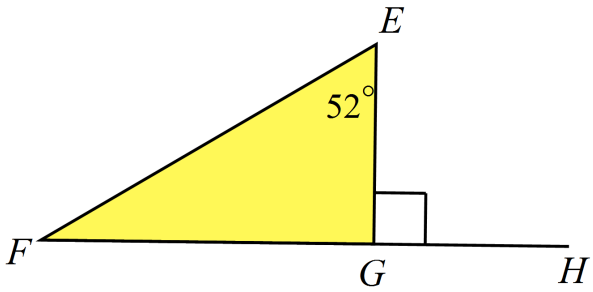
(b) Describe any line symmetry or rotational symmetry the triangle may have. (You may add to your diagram to illustrate your answer.) **1**

The triangle has one axis of line symmetry and no rotational symmetry.

1 mark as long as line symmetry mentioned.

Marks

2. (a) Find the size of $\angle EFG$ in the diagram and explain how you obtained your answer. **2**



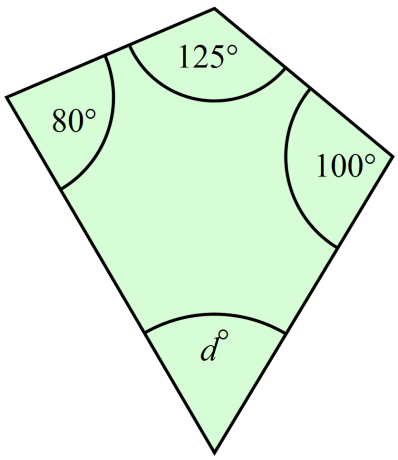
1 mark for answer

$\angle EFG + 52 = 90$ Exterior angle is equal to the sum of interior opposite angles

$\angle EFG = 90 - 52 = 38^\circ$

1 mark for reasonable explanation

(b) Find the value of d in the diagram and explain how you obtained your answer. **2**



1 mark for answer

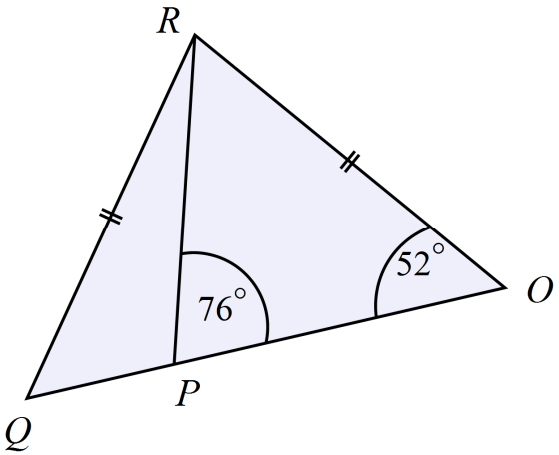
1 mark for reasonable explanation

$d + 80 + 125 + 100 = 360$ (angle sum of quadrilateral)

$d = 360 - 305 = 55^\circ$

Marks

3. (a) Find the size of $\angle PRQ$ in the diagram and explain how you obtained your answer. **2**



1 For RQP with reason

1 for PRQ with reason

$\angle RQP = 52^\circ$ (base angles of isos triangle are equal)

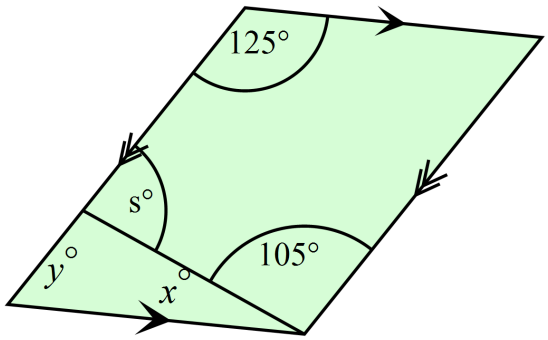
$\angle PRQ + 52 = 76^\circ$ (Exterior angle)

$\angle PRQ = 76 - 52 = 24^\circ$

OR EQUIVALENT

REASONING

(b) Find the value of s in the diagram and explain how you obtained your answer. **3**



1 for x with reason

1 for y with reason

$x + 105 = 125$ (opposite angles of parallelogram are equal)

$x = 20^\circ$

$y + 125 = 180$ (cointerior angles)

$y = 55^\circ$

$s = 20 + 55$ (exterior angle)

$s = 75^\circ$

1 for s with reason

OR EQUIVALENT

REASONING