# CHAPTER 10: POLYGONS

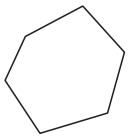
## 10A POLYGONS

**REMINDER**

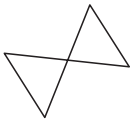
A **polygon** is a closed plane figure with straight line sides which do not cross over.

**1** Which of these figures can be classified as a polygon? Give a reason if the figure is not a polygon.

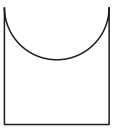
**a**



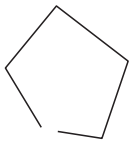
**b**



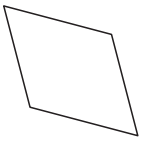
**c**



**d**



**e**



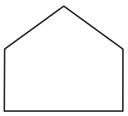
**2** What special name is given to a polygon with five sides?

**REMINDER**

A **convex polygon** is a polygon with no interior reflex angles.

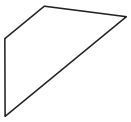
**3** Name these polygons according to their number of sides and whether they are convex:

**a**

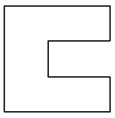


**b**

**c**



**d**



**4** Draw a freehand sketch of:

**a** a convex 5-sided polygon

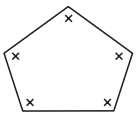
**b** a non-convex quadrilateral

**REMINDER**

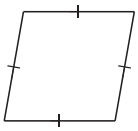
A **regular polygon** has all sides of equal length **and** all angles of equal measure.

**5** Explain why these figures are not regular polygons:

**a**



**b**



**6** **a** Draw a freehand sketch of a convex hexagon, and draw all of its diagonals.

**b** How many diagonals does a hexagon have?

## 10B TRIANGLES

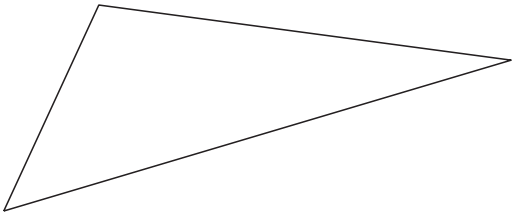
### REMINDER

A triangle is:

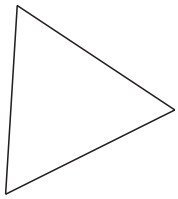
- **equilateral** if its sides are all equal in length
- **isosceles** if at least two of its sides are equal in length
- **scalene** if none of its sides are equal in length.

**1** Measure the lengths of the sides of these triangles. Use your measurements to classify each as equilateral, isosceles, or scalene.

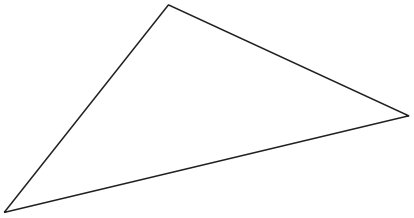
**a**



**b**



**c**



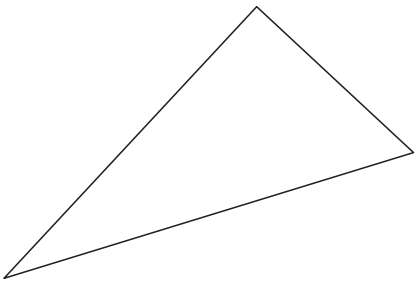
### REMINDER

A triangle is:

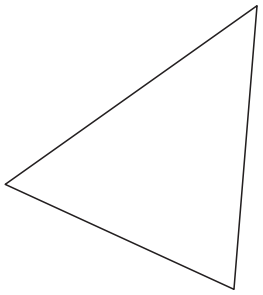
- **acute angled** if *all* of its angles are acute
- **right angled** if one of its angles is a right angle (90°)
- **obtuse angled** if one of its angles is obtuse.

**2** Measure the sizes of the angles of these triangles. Use your measurements to classify each as acute, obtuse, or right angled.

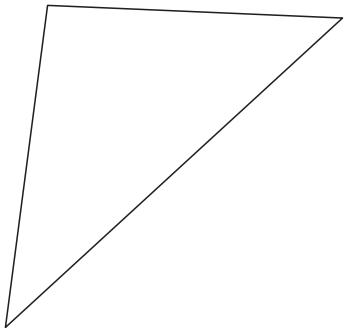
**a**



**b**

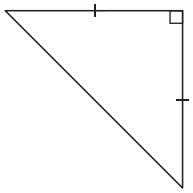


**c**

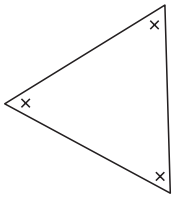


**3** The following diagrams are *not* drawn to scale, but the information marked on them is correct. Classify each triangle using at least *two* descriptive words.

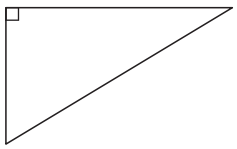
**a**



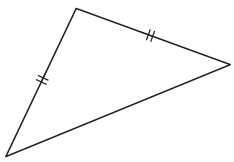
**b**



**c**



**d**



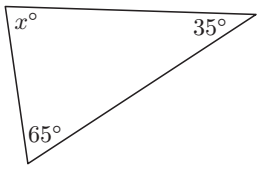
## 10C ANGLES OF A TRIANGLE

### REMINDER

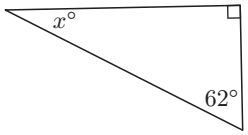
The sum of the angles in a triangle is 180°.

**1** Find $x$ in the following:

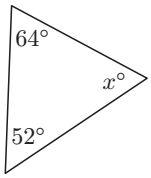
**a**




**b**

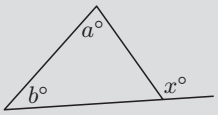



**c**




**REMINDER**

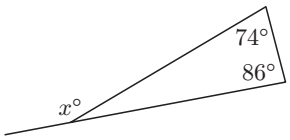
The exterior angle of a triangle is equal to the sum of the two interior opposite angles.



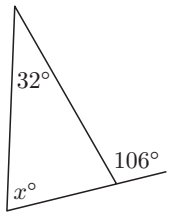

$x° = a° + b°$

**2** Find $x$ in the following:

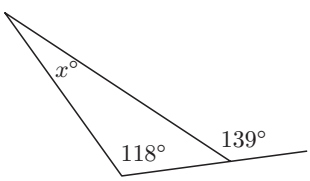
**a**




**b**

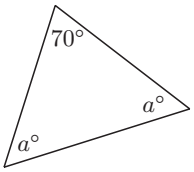



**c**

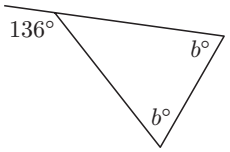



**3** Find the unknowns in these triangles, giving brief reasons for your answers:

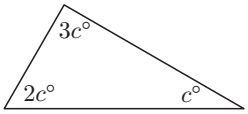
**a**




**b**

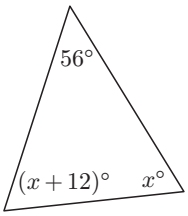



**c**

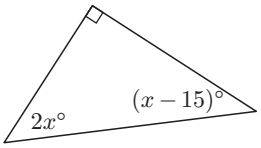



**4** Find $x$ in the following:

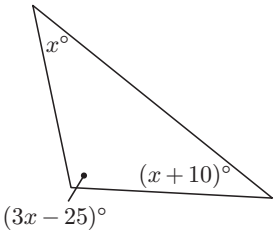
**a**




**b**




**c**



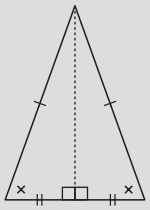
## 10D ISOSCELES TRIANGLES

### REMINDER

An isosceles triangle has at least two sides equal in length.

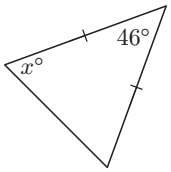
In any isosceles triangle:

- the base angles are equal
- the line joining the apex to the midpoint of the base is perpendicular to the base.

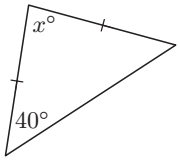


**1** Find the unknowns in the following which have *not been drawn to scale*:

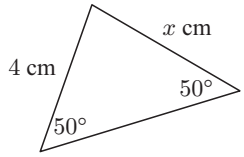
**a**



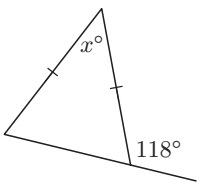

**b**



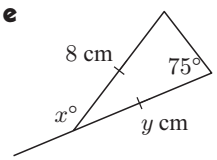

**c**



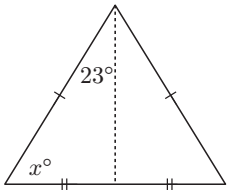

**d**




**e**

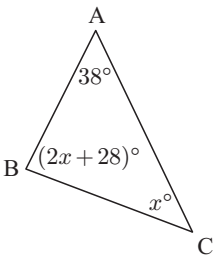



**f**

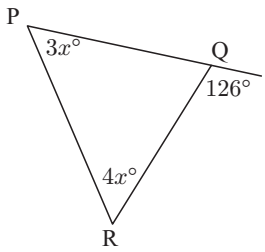



**2** In each of the following triangles, find the value of $x$. Hence deduce something about the triangle.

**a**




**b**




## 10E QUADRILATERALS

### REMINDER

A quadrilateral is a polygon with four sides.

**1** Match each quadrilateral name with the most appropriate description.

| | | | | | |
|---|---|---|---|---|---|
| parallelogram | rectangle | rhombus | square | trapezium | kite |

**a** A ..... is a quadrilateral which has exactly one pair of opposite sides parallel.

**b** A ..... is a quadrilateral in which all sides are equal.

**c** A ..... is a quadrilateral which has two pairs of adjacent sides equal.

**d** A ..... is a quadrilateral which has opposite sides parallel.

**e** A ..... is a quadrilateral in which all angles are equal *and* all sides are equal.

**f** A ..... is a quadrilateral in which all angles equal.

**2** Draw a fully labelled sketch of a rectangle.

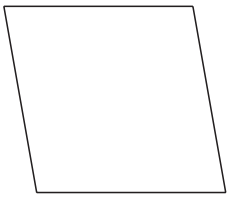
**3** True or false? Explain your answer.

**a** All squares are rhombuses.

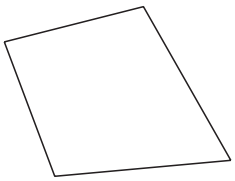
**b** There are no rectangles which are also kites.

**4** Use a ruler to help classify the following:

**a**



**b**

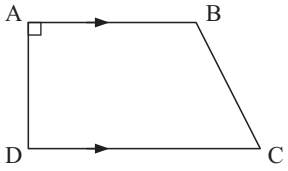


**REMINDER**

|| reads *is parallel to*.

$\perp$ reads *is perpendicular to*.

**5** Using $\perp$ and ||, write two statements about the following figure:

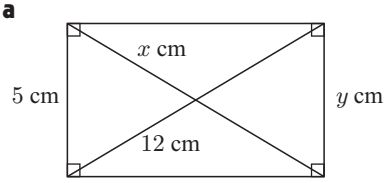



**6** Draw a diagram to fit the following instructions. Make sure you label all of the given information.

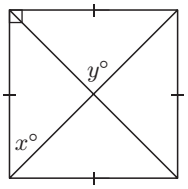
ABC is a triangle where [BC] is 8 cm long, [AB] is 6 cm long, and [AB] $\perp$ [BC].

**7** Find the values of the variables in these figures, giving reasons for your answers:

**a**



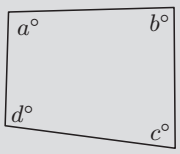

**b**




## 10F ANGLES OF A QUADRILATERAL

**REMINDER**

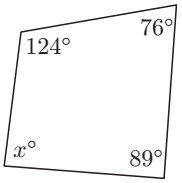
The sum of the angles of a quadrilateral is 360°.



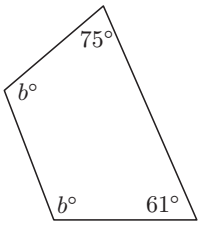

$a + b + c + d = 360$

**1** Find the values of the variables, giving brief reasons for your answers:

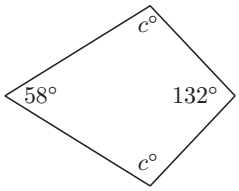
**a**



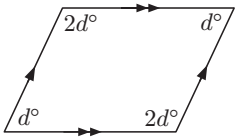

**b**



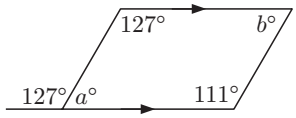

**c**



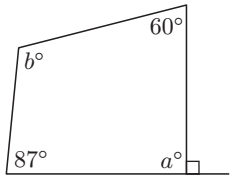

**d**



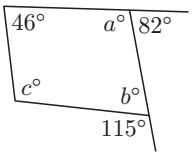

**e**




**f**




**2** Consider the following diagram:




**a** Find the values of $a$ and $b$.

**b** Hence find the value of $c$.

## REVIEW OF CHAPTER 10

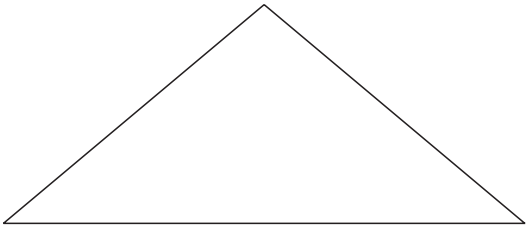
**1** Which of these figures can be classified as a polygon?

**a**

**b**

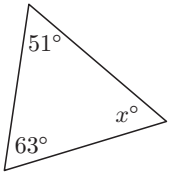
**c**

**2** Use a ruler and protractor to completely classify the following triangle. You should have *two* descriptions.

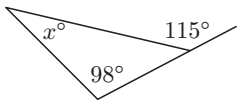


**3** Find, giving reasons, the value of $x$:

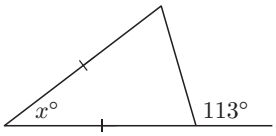
**a**



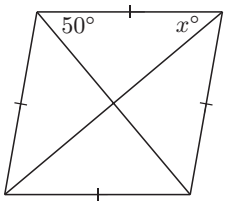
**b**



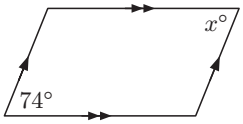

**c**



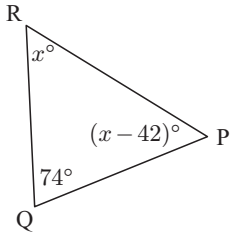

**d**




**e**

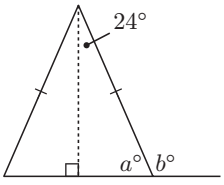



**4** Find the value of $x$, and hence classify triangle PQR.

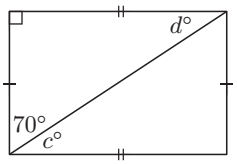



**5** Can a parallelogram be a kite? Explain your answer.

**6** Find the values of $a$ and $b$.




**7** Using the information on the diagram, name the figure and find the values of $c$ and $d$.




**8** Find the values of $a$ and $b$ in this figure, giving reasons for your answer.