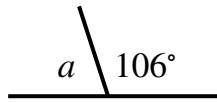


Angles in Triangles

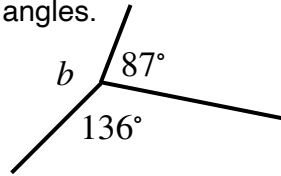
Starter

1. (Review of last lesson) Find the size of the missing angles.

(a)



(b)



Working: (a) $a = 180^\circ - 106^\circ = 74^\circ$

(b) $b = 360^\circ - 136^\circ - 87^\circ = 137^\circ$

2. (Review of last lesson)

The angles on a straight line are in the ratio 8 : 14 : 23. Find the three angles.

Working: $8 + 14 + 23 = 45$ parts

$$1 \text{ part} = \frac{180^\circ}{45} = 4^\circ$$

The three angles are $8 \times 4^\circ = 32^\circ$, $14 \times 4^\circ = 56^\circ$ and $23 \times 4^\circ = 92^\circ$.

3. State the three types of triangles, giving a description of each one.

Working: Equilateral: all sides are the same length, all angles are 60°
 Isosceles: two sides are same length, two angles are same size
 Scalene: all sides are different length, all angles are different size

4. The ratios of the angles of a triangle are in the ratio 2 : 3 : x . State the value(s) of x which give:

(a) an isosceles triangle

(b) a right-angled triangle

(c) a equilateral triangle

(c) a triangle with only acute angles

Working: (a) Isosceles triangle — two angles must be equal so $x = 2$ or $x = 3$

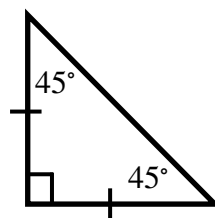
(b) A right-angled triangle has the largest angle (180°) being the sum of the other two angles. Therefore $x = 2 + 3 = 5$ or $x = 3 - 2 = 1$.

(c) No solution since $2 \neq 3$.

(d) From (b), $1 < x < 5$

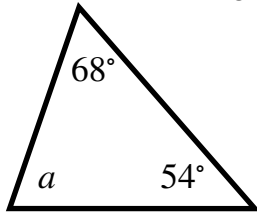
E.g. 1 True or false: all right-angled triangles are scalene.

Working: False — an isosceles triangle could be right-angled.

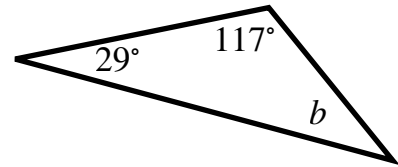


E.g. 2 Find the value of the missing angle.

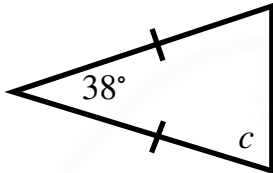
(a)



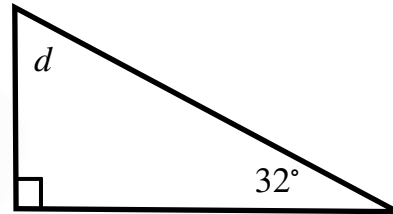
(b)



(c)



(d)



Working:

(a) $a = 180^\circ - 68^\circ - 54^\circ = 58^\circ$

(b) $b = 180^\circ - 117^\circ - 29^\circ = 34^\circ$

(c) Since the triangle is isosceles, the non-marked angle is also c .

$$2c + 38^\circ = 180^\circ$$

$$2c = 180^\circ - 38^\circ$$

$$2c = 142^\circ$$

$$c = \frac{142^\circ}{2}$$

$$c = 71^\circ$$

this line of working is not needed

this line of working is not needed

(d) $d = 180^\circ - 90^\circ - 32^\circ = 58^\circ$

E.g. 3 Copy and complete this sentence:
Give a reason for your answer.

interior angle + exterior angle =

Working:

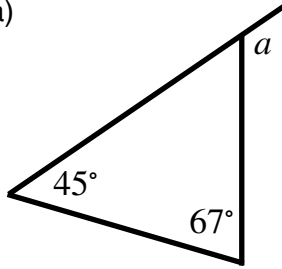
interior angle + exterior angle = 180°

The reason is that the angles are on a straight line.

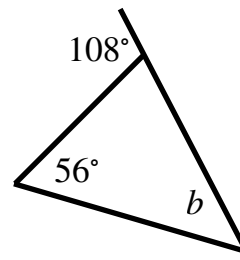
E.g. 4 Find the value of the missing angle.

N.B. You may find it useful to label and calculate other angles in the diagram.

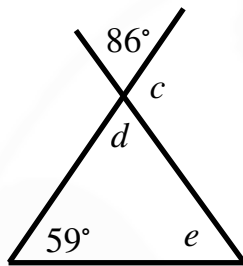
(a)



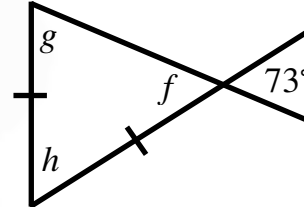
(b)



(c)

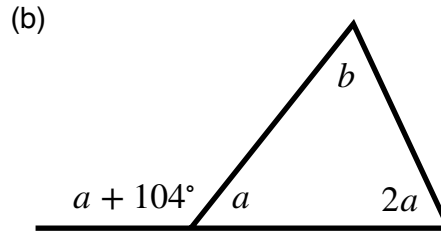
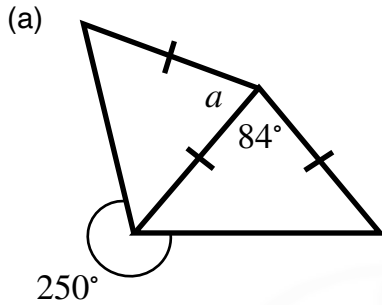


(d)



- Working:**
- (a) Other angle in triangle = $180^\circ - 45^\circ - 67^\circ = 68^\circ$
 Angles on a straight line add up to 180° : $a = 180^\circ - 68^\circ = 112^\circ$
- (b) Angles on a straight line add up to 180° :
 Third angle in triangle = $180^\circ - 108^\circ = 72^\circ$
 $b = 180^\circ - 56^\circ - 72^\circ = 52^\circ$
- (c) Angles on a straight line add up to 180° : $c = 180^\circ - 86^\circ = 94^\circ$
 Angles on a straight line add up to 180° : $d = 180^\circ - 94^\circ = 86^\circ$
 Angles in a triangle add up to 180° : $e = 180^\circ - 59^\circ - 86^\circ = 35^\circ$
- (d) Angle below $73^\circ = 180^\circ - 73^\circ = 107^\circ$
 Angles on a straight line add up to 180° : $f = 180^\circ - 107^\circ = 73^\circ$
 The triangle is isosceles: $g = f = 73^\circ$
 Angles in a triangle add up to 180° : $h = 180^\circ - 2 \times 73^\circ = 34^\circ$

E.g. 5 Find the value of the missing angles.



Working:

(a) The triangle with 84° is isosceles:
The other angles are both $= \frac{180^\circ - 84^\circ}{2} = 48^\circ$
Angles around a point add up to 360° :
Angle at bottom of a triangle $= 360^\circ - 250^\circ - 48^\circ = 62^\circ$
Triangle with a is isosceles: $a = 180^\circ - 2 \times 62^\circ = 56^\circ$

(b) Angles on a straight line add up to 180° :
 $a + 104^\circ + a = 180^\circ$
 $2a + 104^\circ = 180^\circ$
 $2a = 76^\circ$
 $a = 38^\circ$
Angles in a triangle add up to 180° :
Substitute $a = 38^\circ$ and $2a = 76^\circ$:
 $38^\circ + 76^\circ + b = 180^\circ$
Collecting like terms: $b + 114^\circ = 180^\circ$
 $b = 66^\circ$

Video: [Angles in triangles](#)

[Solutions to Starter and E.g.s](#)

Exercise

CIMT Y7A p85 Ex 5.6