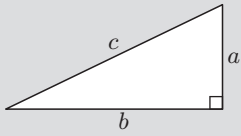


**CHAPTER 6: PYTHAGORAS' THEOREM**

**6A PYTHAGORAS' THEOREM**

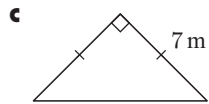
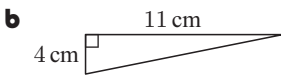
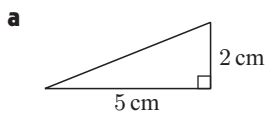
**REMINDER**



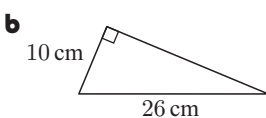
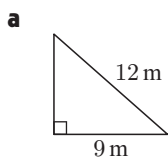
In a right angled triangle with hypotenuse  $c$  and legs  $a$  and  $b$ ,

$$c^2 = a^2 + b^2.$$

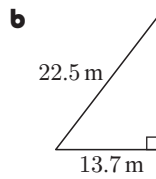
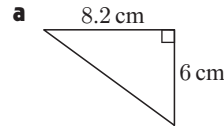
1 Find the length of the hypotenuse of each of the following triangles, leaving your answer in simplest radical form:



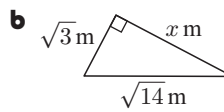
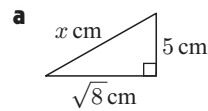
2 Find the length of the third side of each of the following right angled triangles. Where appropriate, leave your answer in simplest radical form:



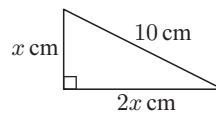
3 Find the length of the unknown side of each of the following right angled triangles. Give your answer to 1 decimal place.



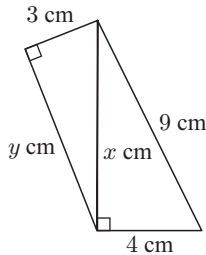
4 Find  $x$  in each of the following:



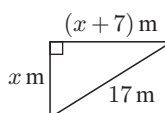
5 Find the value of  $x$ :



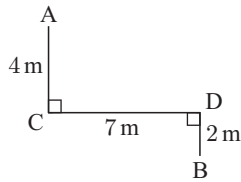
6 Find the value of the unknowns:



7 Find  $x$ :



8 Find the distance AB:



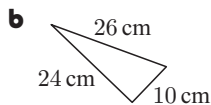
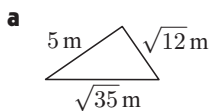
6B

THE CONVERSE OF PYTHAGORAS' THEOREM

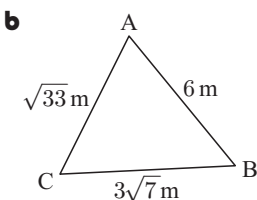
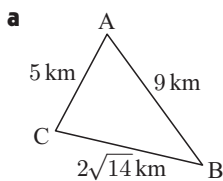
REMINDER

If a triangle has sides of length  $a$ ,  $b$ , and  $c$  units where  $a^2 + b^2 = c^2$ , then the triangle is right angled.

1 The following figures are not drawn to scale. Which of the triangles are right angled?



2 These triangles are not drawn to scale. If any of them is right angled, find the right angle.



6C

PYTHAGOREAN TRIPLES

REMINDER

The set of positive integers  $\{a, b, c\}$  is a **Pythagorean triple** if it obeys the rule  $a^2 + b^2 = c^2$ .

1 Determine whether the following are Pythagorean triples:

a  $\{21, 28, 35\}$

b  $\{3, -4, 5\}$

c  $\{4, 7.5, 8.5\}$

2 Find  $k$  given that the following are Pythagorean triples:

a  $\{12, k, 37\}$

b  $\{18, k, k + 6\}$

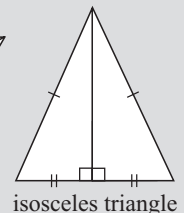
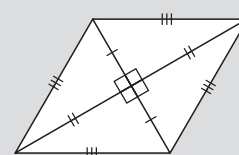
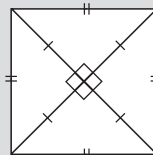
6D

PROBLEM SOLVING USING PYTHAGORAS

REMINDER

When solving problems, it is useful to draw a diagram of the situation.

The following special figures contain right angled triangles:



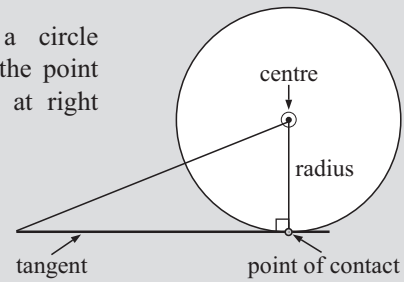
1 The longer side of a rectangle is twice the length of the shorter side. The length of the diagonal is 15 cm. Find the dimensions of the rectangle.

2 A rhombus has sides of length 9 cm. One of its diagonals is 14 cm long. Find the length of the other diagonal.

- 3 A square has diagonals of length 6 cm. Find its area.
  
- 4 A 4 m long ladder has its feet placed 1.4 m out from a vertical wall. How far up the wall will the ladder reach?
  
- 5 An isosceles triangle has equal sides of length 18 cm and an altitude of length 16 cm. Find the length of its base.

**TANGENT-RADIUS PROPERTY**

A tangent to a circle and a radius at the point of contact meet at right angles.



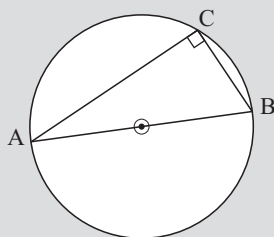
- 1 A circle has diameter  $[AB]$  of length 12 cm.  $C$  is a point on the circle such that  $AC$  is 7 cm. Find the length  $BC$ .
  
- 2 A chord of length 9 cm is 10 cm from the centre of a circle. Find the length of the circle's radius.
  
- 3 A chord is 3 cm from the centre of a circle of radius 13 cm. Find the length of the chord.

**6E CIRCLE PROBLEMS**

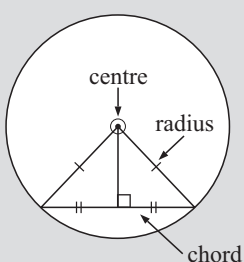
**REMINDER**

**ANGLE IN A SEMI-CIRCLE**

The angle in a semi-circle is a right angle.

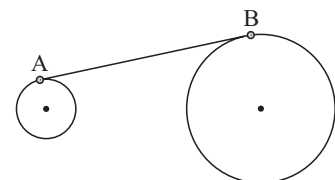


**A CHORD OF A CIRCLE**



The line drawn from the centre of a circle at right angles to a chord bisects the chord.

- 4 Two circles have radii 2 cm and 5 cm respectively. The centres of the circles are 14 cm apart. Find the length of the common tangent  $[AB]$ .

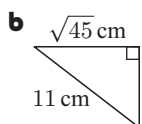
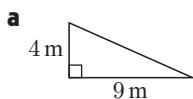


- 5 A tangent of length 8 cm is drawn to a circle with diameter 3 cm. How far is the centre of the circle from the end point of the tangent?

- 6 A car travels 60 km north, then east, and then 25 km south. If the car is 55 km from its starting point, how far east did it travel?

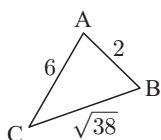
**REVIEW OF CHAPTER 6**

- 1 Find the length of the unknown sides in the following triangles:

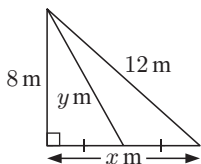


- 2 Determine whether  $\{20, 21, 29\}$  is a Pythagorean triple.

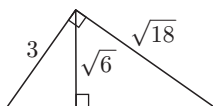
- 3 Is the following triangle right angled? Explain your answer.



- 4 Find the values of the unknowns:



- 5 Use the figure below to show that  $\sqrt{3} + \sqrt{12} = \sqrt{27}$ .



- 7 The longer diagonal of a rhombus is twice the length of the shorter diagonal. The sides are 20 cm long. Find the length of the diagonals.

- 8 An equilateral triangle has perimeter 21 cm. Find its area.

- 9 A circle has diameter [AB] of length 11 cm. C is a point on the circle such that AC is 5 cm. Find the length BC.

- 10 Find the distance AB:

