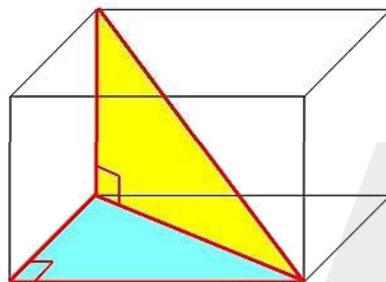# Year 07
Maths

Lesson 4
## Practical Applications of Pythagoras' Theorem

1. Practical Applications of Pythagoras' Theorem

☐ Real-life Problems

- ■ Pythagoras' theorem has many **everyday applications.** It is used widely in building construction, calculating the size of monitors, working out the shortest distance between two points, etc.

- ■ Problems involving Pythagoras' theorem will often be word problems. These should be answered the following way:

  — Read the question carefully and underline/highlight **key words.**

  — Draw a **diagram** to represent the situation. Mark all known angles and dimensions and use pronumerals for unknowns.

  — **Write out Pythagoras' theorem and substitute** known values.

  — Solve for the unknown and then **state the answer** to the question in words.
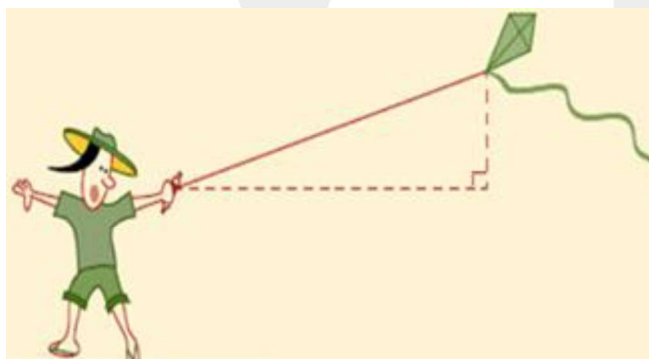
☐ **Revision of Pythagoras' Theorem**

$$h^2 = a^2 + b^2$$

The square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.

Concept Check 1.1

(a) Complete each of the following Pythagorean triads, leaving your answer in squared form.
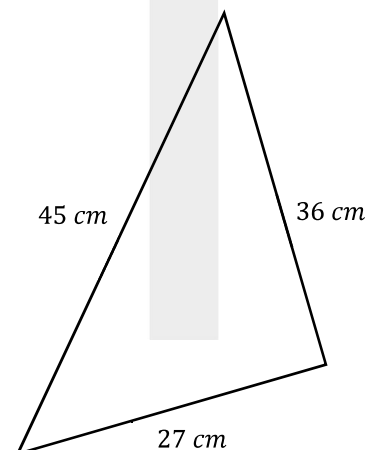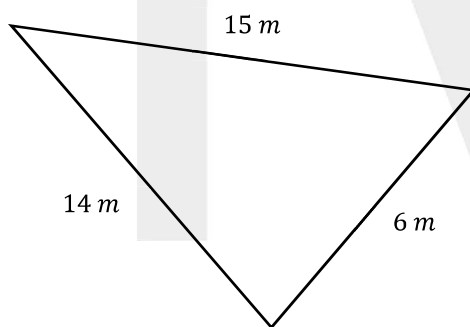
(i) $24^2 + 32^2 =$ _____ [1]

(i)   _____ [2] $+$ _____ [3] $= 10^2$

(ii) $36^2 + 15^2 =$ _____ [4]

(ii)   _____ [5] $+15^2 = 17^2$

(iii)   _____ [6] $+24^2 = 51^2$

(b) Which of the following triangles are right angled? Explain why/ why not. [7]
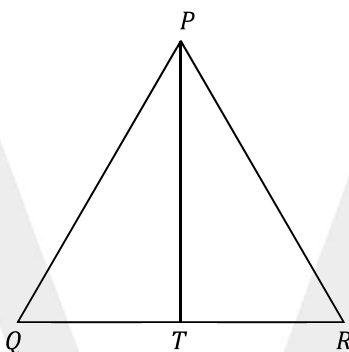
15 m   14 m   6 m

45 cm   36 cm   27 cm

_____

_____

_____

Concept Check 1.2

(a) The longest side of an isosceles right-angled triangle is 16 cm. Find the exact length of the equal sides.   [6]

16 cm

x cm
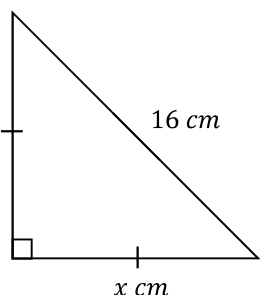
(b) An equilateral $\triangle PQR$ with sides 16 cm and $PT \perp QR$ is shown below.

P

Q   T   R
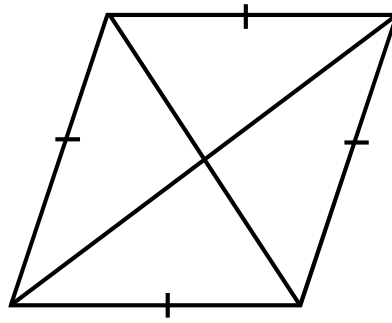
(i)   What is the length of TR? Give a reason.   [9]

(ii) Find the height of $\triangle PQR$.   [10]

(iii) Calculate the area of $\triangle PQR$ to 2 decimal places.   [11]

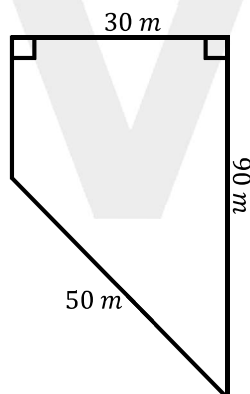(c) The diagram shows a rhombus $ABCD$. The lengths of the diagonals are 12 cm and 20 cm.

Find the length of the sides of the rhombus correct to the nearest mm.   [12]
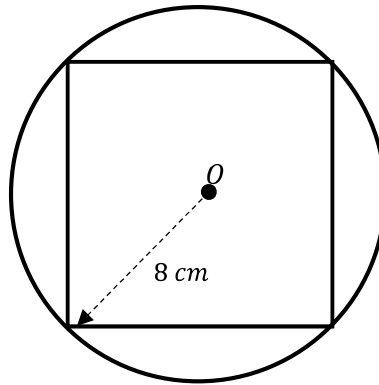
> **Note to students**
>
> Recall that the diagonals of a rhombus bisect each other at right angles.

(d) The plan for an enclosed paddock is shown below. Calculate the amount of fence wire required to enclose the paddock.   [13]

(e) A square is enclosed inside a circle of radius 8 cm. Find the exact length of the sides of the square. [14]

(f) Farmer Joe's paddock is in the shape of a trapezium as shown in the diagram.
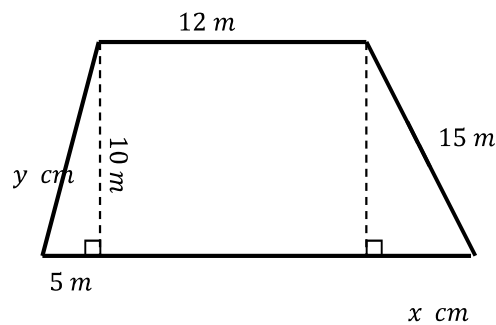
(i) Find the lengths of the missing sides of the paddock. Give your answer correct to the nearest metre. [15]

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(ii) Fencing material costs \$35.50 per metre. How much would it cost to fence the paddock? [16]

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_____

(iii) Farmer Joe also wanted to turf his paddock. He had been quoted \$12 per square metre for the turf and labour. How much would it cost him to turf his paddock? Give your answer to the nearest dollar. [17]

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(g) A front door is 2100 mm high. It is divided into two equal parts by a wooden bracket. To strengthen the door, wooden braces that are 1300 mm long are placed diagonally across each part. How wide is the door?   [18]
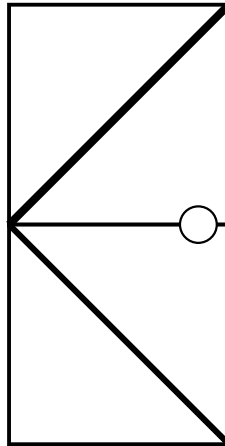
(h) The diagram shows a kite with a maximum width 22 cm. Special coloured tape was placed around the edges of the kite. Find the total length of tape required, correct to the nearest mm.
[19]