The Pythagorean Theorem

Copy the outcome in your scribbler and then **read** the achievement indicators.

SS1: Develop and apply the Pythagorean theorem to solve problems.

ACHIEVEMENT INDICATORS

- Model and explain the Pythagorean theorem concretely, pictorially or using technology, and symbolically.

- Explain, using examples, that the Pythagorean theorem applies only to right triangles.

- Determine whether or not a given triangle is a right triangle by applying the Pythagorean theorem.

- Determine the measure of the third side of a right triangle, given the measures of the other two sides, to solve a given problem.

- Solve a given problem that involves Pythagorean triples, e.g., 3, 4, 5 or 5, 12, 13.

View the following videos and take notes in your scribbler.

- https://www.youtube.com/watch?v=YompsDlEdtc

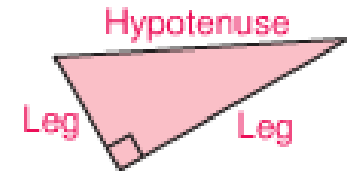- https://www.youtube.com/watch?v=uaj0XcLtN5c
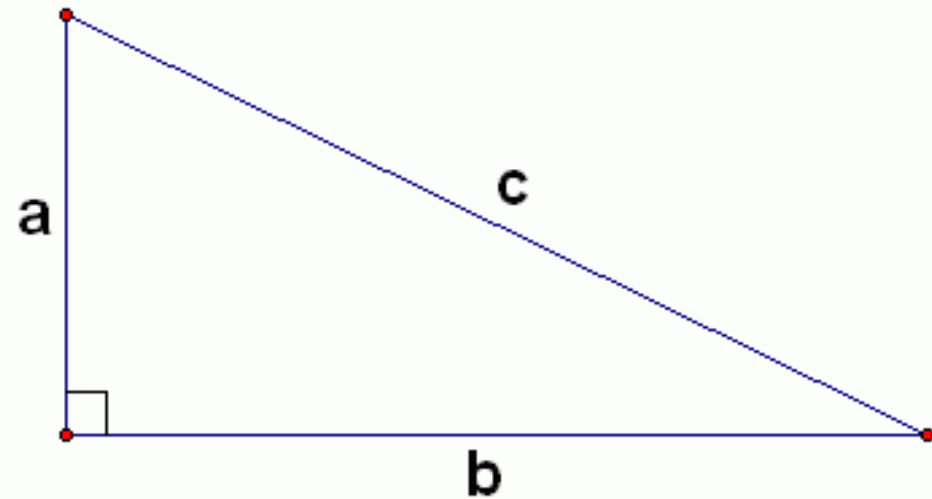
$$a^2 + b^2 = c^2$$

We can use the properties of a right triangle to find the length of a line segment. A right triangle has two sides that form the right angle. The third side of the right triangle is called the **hypotenuse**. The two shorter sides are called the **legs**.

Leg

Hypotenuse

Leg
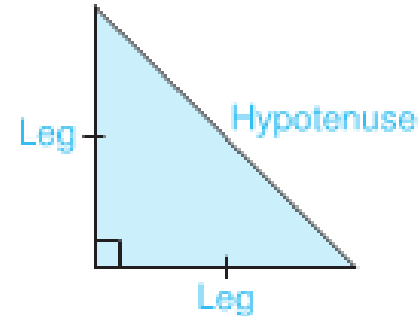
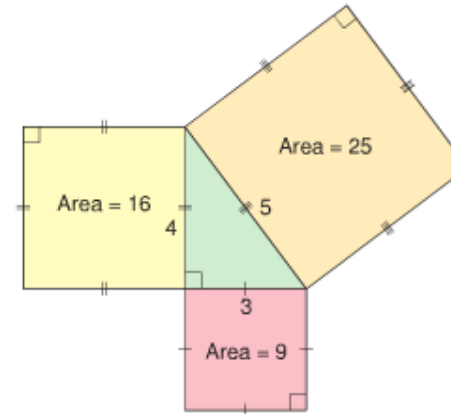**Isosceles right triangle**

Hypotenuse

Leg

Leg

Scalene right triangle

**Copy** this slide in your scribbler.

1.5 - Connect

- **Read** the Connect section on page 32 (also in the image to the left).
- **Copy** the definition for **Pythagorean Theorem** in your scribbler.
- **Read** *Examples* 1 and 2 on pages 32 and 33.

Here is a right triangle, with a square drawn on each side.

Area = 25

Area = 16

4

5

3

Area = 9

The area of the square on the hypotenuse is 25.
The areas of the squares on the legs are 9 and 16.
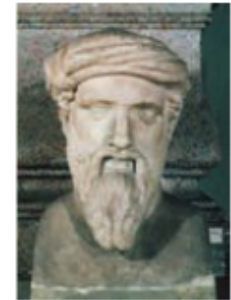
The Pythagorean Theorem is named for the Greek mathematician, Pythagoras.

Notice that: $25 = 9 + 16$
A similar relationship is true for all right triangles.

In a right triangle, the area of the square on the hypotenuse is equal to the sum of the areas of the squares on the legs.

This relationship is called the **Pythagorean Theorem**.

We can use this relationship to find the length of any side of a right triangle, when we know the lengths of the other two sides.
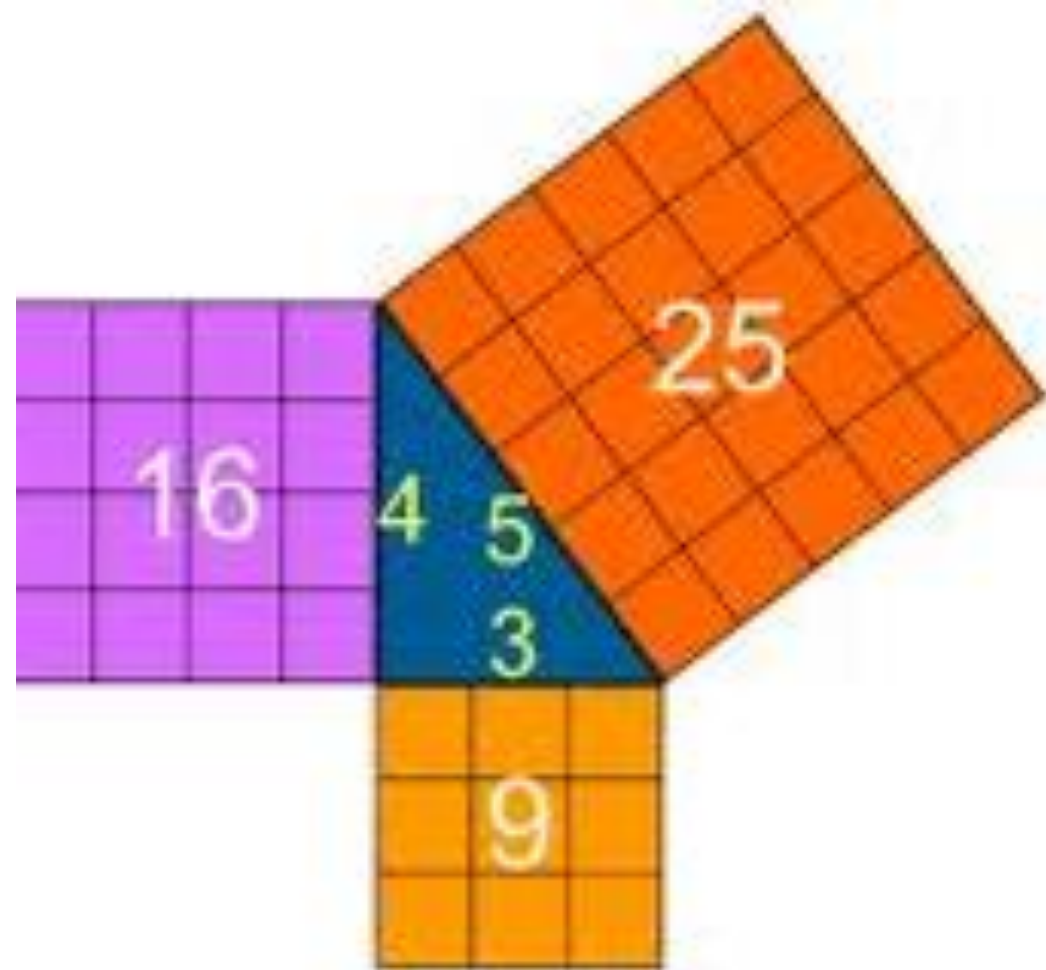
Review

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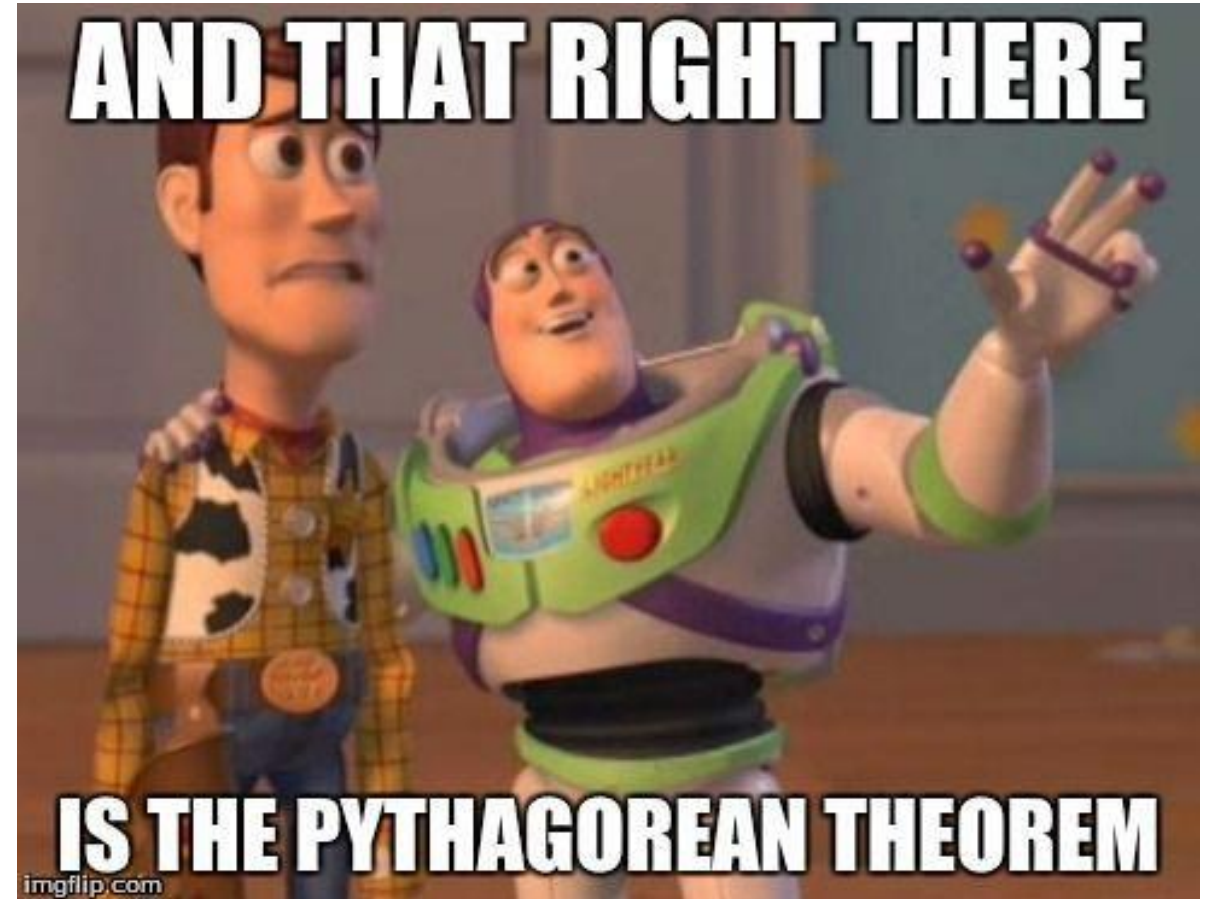
$a^2 + b^2 = h^2$

$3^2 + 4^2 = 5^2$

$9 + 16 = 25$

$25 = 25$

Create your own **right triangle** using **grid paper** for the following **measurements (6,8,and10). Glue** this **example** into your **math scribbler).**

Practice

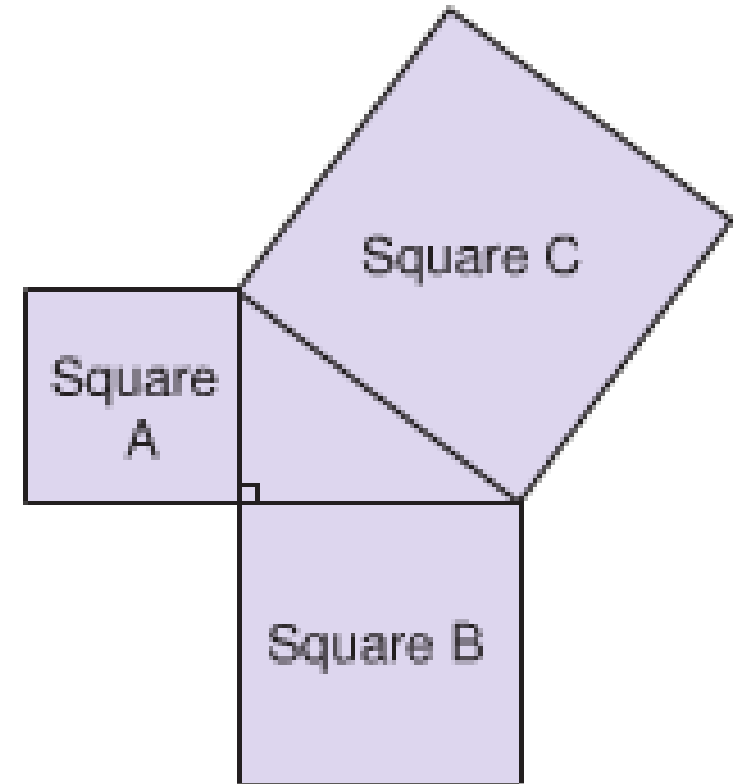1) **Complete** questions 1,2,3,4 and 7 on pages 33 and 34.

Worksheet 1.5

SS1 Journal Question #1
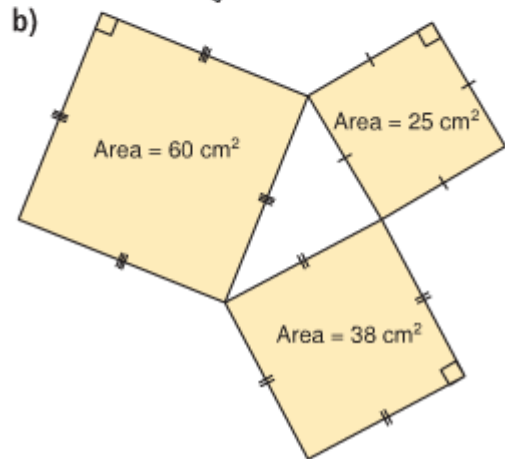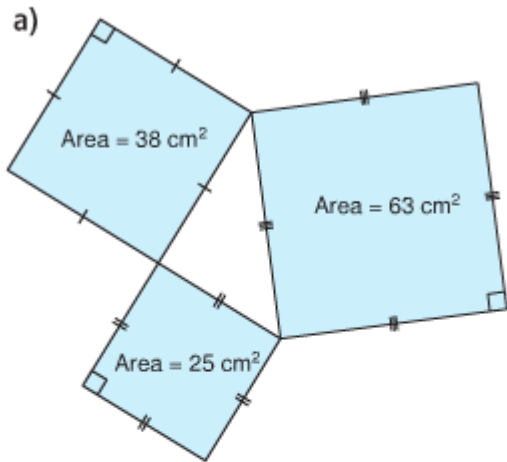
1.6 Exploring the Pythagorean Theorem

- **Read** the Connect section on page 40.

- **Read** Examples 1 and 2 on pages 41 and 42.

- **Copy** the definition for **Pythagorean triple** and **include** an example.

Square C

Square A

Square B

The symbol ≠ means "does not equal."

Practice - **Complete** questions 3, 4, 5, 7 & 8 on pages 43 and 44.

3. The area of the square on each side of a triangle is given. Is the triangle a right triangle? How do you know?

a)

Area = 38 cm²

Area = 63 cm²

Area = 25 cm²

b)

Area = 60 cm²

Area = 25 cm²

Area = 38 cm²

4. Which of these triangles appears to be a right triangle? Determine whether each triangle is a right triangle. Justify your answers.

a)

13 cm

10 cm

7 cm

b)

8 cm

7 cm

5 cm

c)

17 cm

15 cm

8 cm
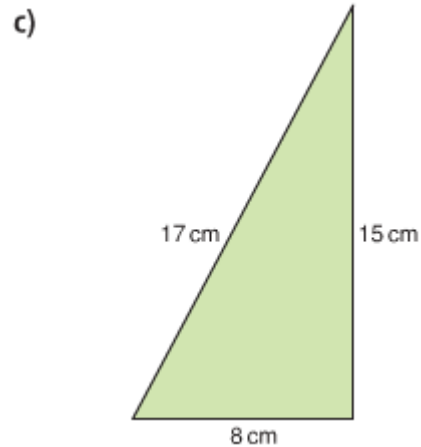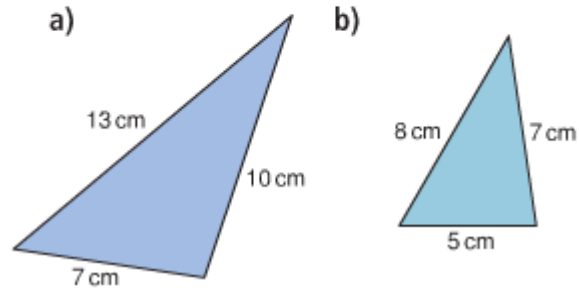
5. Look at the triangle below. Can the Pythagorean Theorem be used to find the length of the side labelled with a variable? Why or why not?

ℓ

8 cm

6 cm
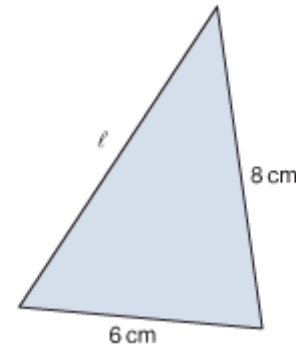
7. Which sets of numbers below are Pythagorean triples? How did you decide?
a) 16, 30, 34
b) 6, 8, 9
c) 15, 39, 36
d) 16, 65, 63
e) 9, 30, 35
f) 40, 42, 58

8. An elder and his granddaughter, Kashala, are laying a plywood floor in a cabin.

The floor is rectangular, with side lengths 9 m and 12 m.

Kashala measures the diagonal of the floor as 15 m.

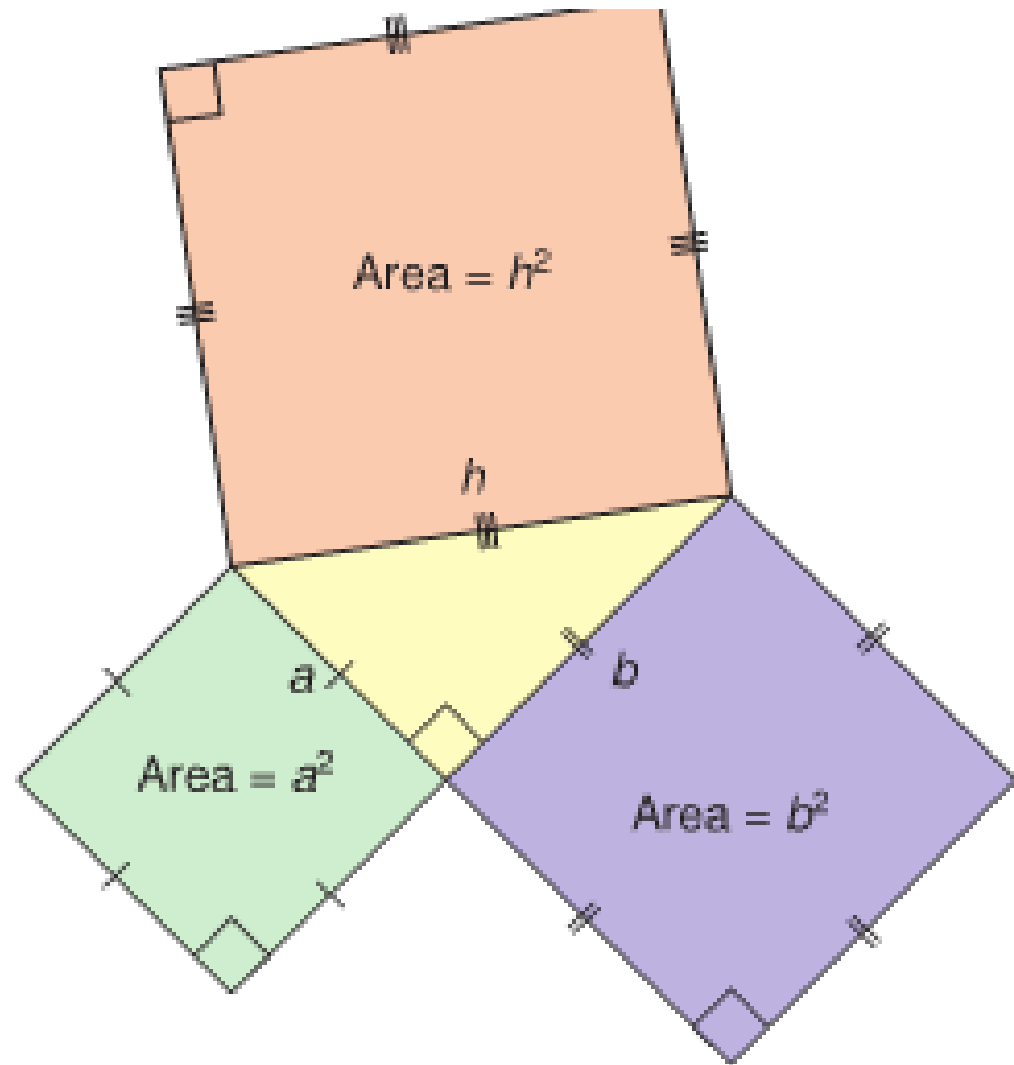Is the angle between the two sides a right angle?

Justify your answer.

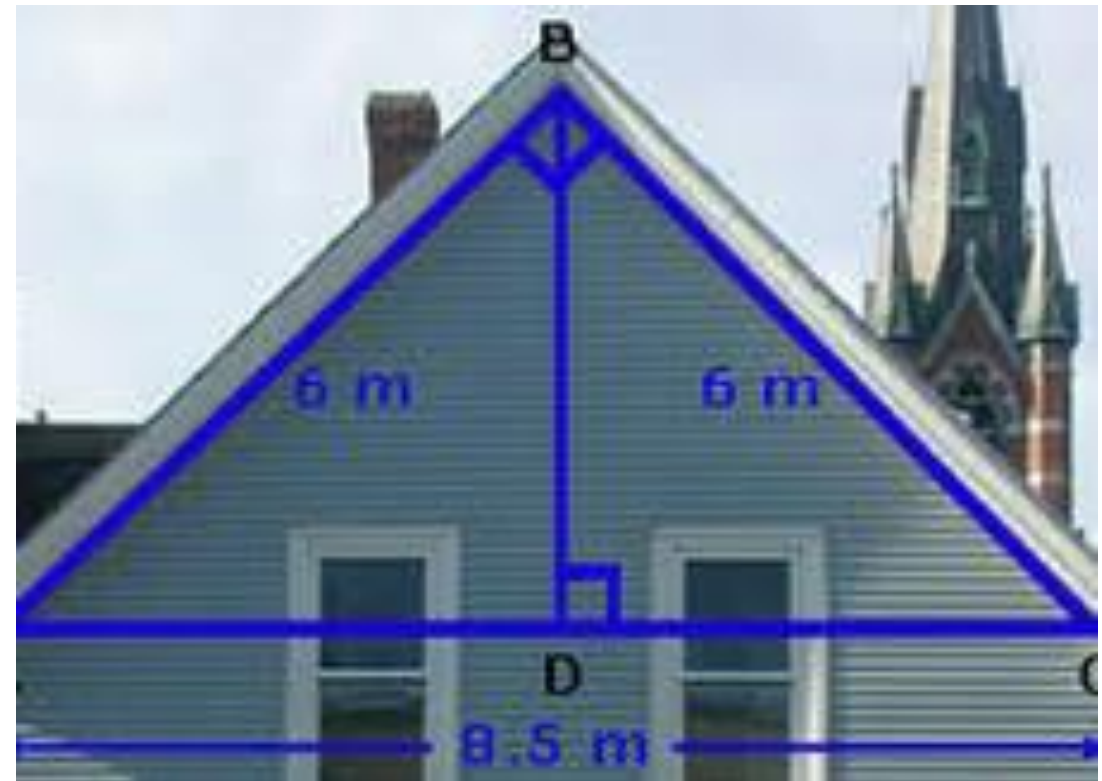# Worksheet 1.6

SS1 Journal Question #2

1.7 Applying the Pythagorean Theorem

- **Read** the *Connect* section on pages 46 and 47.
- **Read** *Examples* 1 and 2 on pages 47 and 48.

Area = h^2

h

a

b

Area = a^2

Area = b^2

Real-world applications

- https://www.youtube.com/watch?v=gRf780Pce7o

- **View** the video above to see

where the Pythagorean Theorem

is used.

Practice

- **Complete** questions 4, 5 and 9 on page 49. You may **use** a calculator but must **show** all your work.
  - NOTE: When answering word problems, create a drawing to support your work.

- **Worksheet 1.7** – Applying the Pythagorean Theorem (pages 18-20 in the Homework and Practice Book)

SS1 Journal Question #3