

Square Roots and the Pythagorean Theorem

Just for Fun

What Do You Notice?

Follow the steps. An example is given.

- | | |
|---|----------------------|
| 1. Pick a 4-digit number with different digits. | Example
3078 |
| 2. Find the greatest number that can be made with these digits. | 8730 |
| 3. Find the least number that can be made with these digits. | 0378 |
| 4. Subtract the least from the greatest. | $8730 - 0378 = 8352$ |
| 5. Repeat steps 2, 3, and 4 with the result. | $8532 - 2358 = 6174$ |
| 6. Continue to repeat steps 2, 3, and 4 until you notice something interesting. | $7641 - 1476 = 6174$ |

What do you notice?

Try these steps with the number 2395. What do you notice? Pick any 4-digit number.
What do you notice?

Letter Symmetry

A letter has mirror symmetry if a straight line can be drawn through the letter so that one half of the letter is a mirror image of the other half. The straight lines can be vertical, horizontal, or slanted. For example, the letter A has mirror symmetry, but the letter F does not.

A
F

Which letters have mirror symmetry?

Which letters have more than one line of symmetry?

Activating Prior Knowledge

Areas of Rectangles and Triangles

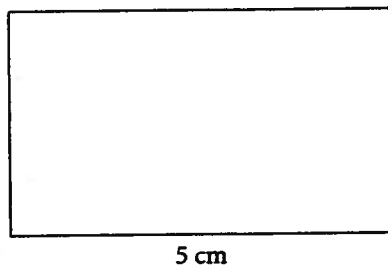
Area is the amount of surface a figure covers. It is measured in square units.

- To find the area of a rectangle, use the formula $A = bh$, where b is the base length and h the height of the rectangle.
- To find the area of a triangle use the formula $A = \frac{1}{2}bh$, where b is the base length and h is the height of the triangle.

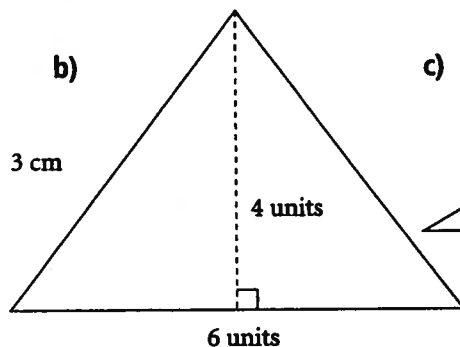
Example 1

Find the area of each figure.

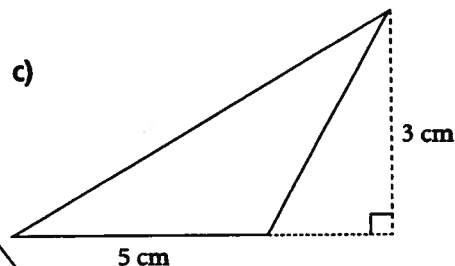
a)



b)



c)



Solution

- a) The figure is a rectangle with base 5 cm and height 3 cm.

Substitute $b = 5$ cm and $h = 3$ cm into $A = bh$.

$$\begin{aligned} A &= 5 \text{ cm} \times 3 \text{ cm} \\ &= 15 \text{ cm}^2 \end{aligned}$$

The area is 15 cm^2 . The abbreviation cm^2 stands for "square centimetres."

- b) The figure is a triangle with base 6 units and height 4 units.

Substitute $b = 6$ units and $h = 4$ units into $A = \frac{1}{2}bh$.

$$\begin{aligned} A &= \frac{1}{2}(6 \text{ units} \times 4 \text{ units}) \\ &= 12 \text{ square units} \end{aligned}$$

The area is 12 square units.

- c) The figure is a triangle with base 5 cm and height 3 cm.

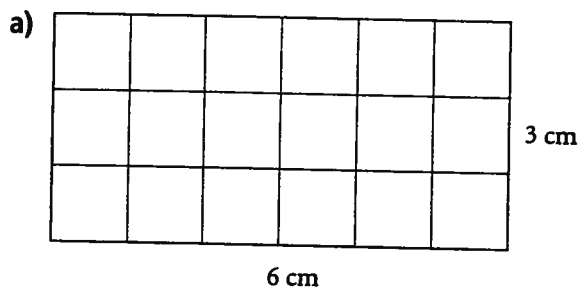
Substitute $b = 5$ cm and $h = 3$ cm into $A = \frac{1}{2}bh$.

$$\begin{aligned} A &= \frac{1}{2}(5 \text{ cm} \times 3 \text{ cm}) \\ &= \frac{1}{2}(15 \text{ cm}^2) \\ &= 7.5 \text{ cm}^2 \end{aligned}$$

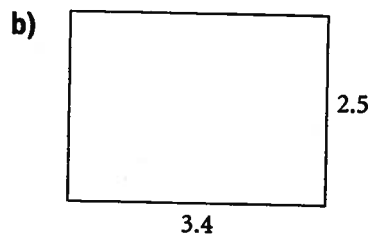
The area is 7.5 cm^2 .

Check

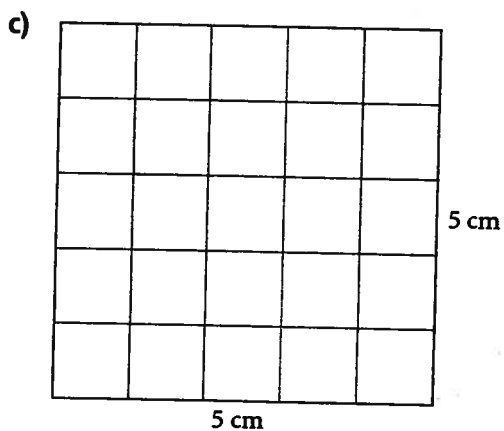
1. Find the area of each figure.



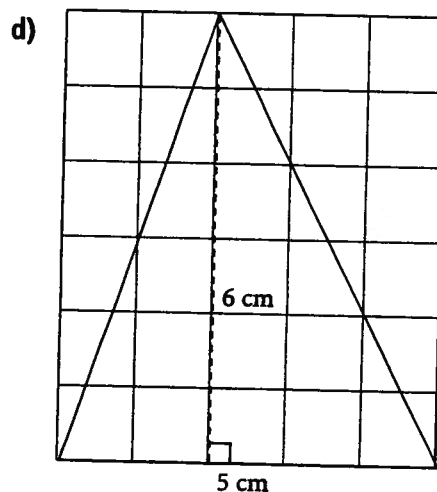
The area is ____ cm $\times$ ____ cm = ____



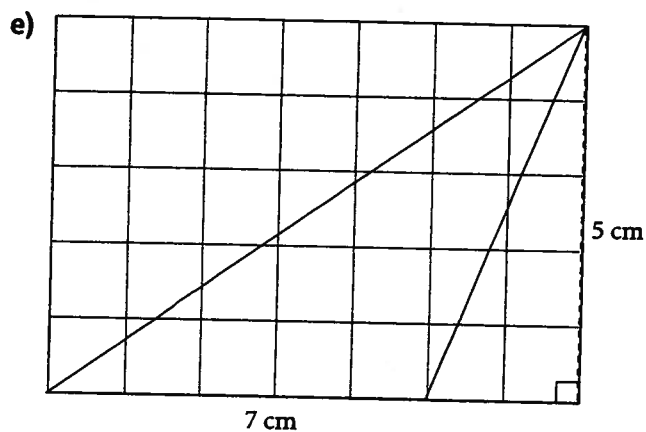
The area is _____



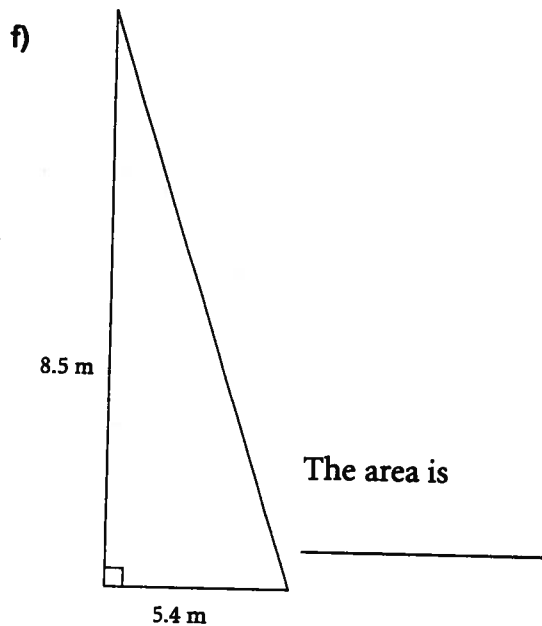
The area is _____



The area is $\frac{1}{2}$ (____ cm $\times$ ____ cm) = ____



The area is _____





Quick Review

- When you multiply a number by itself, you *square* the number.

The square of 5 is $5 \times 5 = 25$

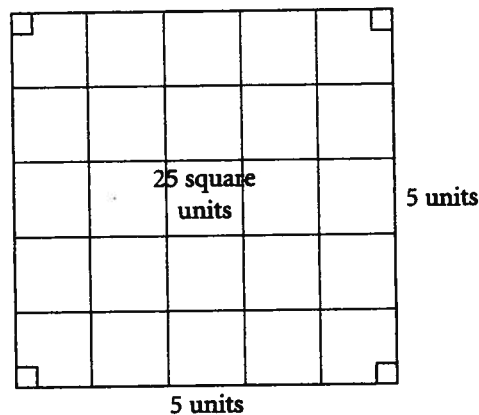
We write: $5^2 = 5 \times 5 = 25$

We say: Five squared is twenty five.

25 is a **square number**, or a **perfect square**.

- You can model a square number by drawing a square whose area is equal to the square number.

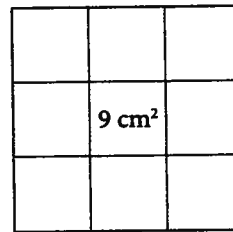
You can model 25 using a square with side length 5 units.



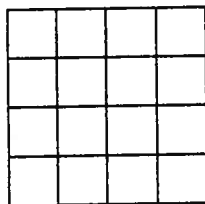
Find the perimeter of a square with area 9 cm^2 .

First, find the side length of the square.

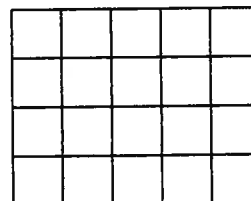
Since $3 \times 3 = 9$, the side length is 3 cm. So, the perimeter is $3 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} = 12 \text{ cm}$



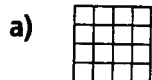
16 is a perfect square because you can create a square with area 16 square units using square tiles.



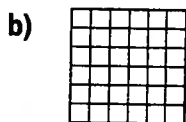
20 is not a perfect square because you cannot create a square with area 20 square units using square tiles. The 4×5 rectangle is the closest to a square that you can get.



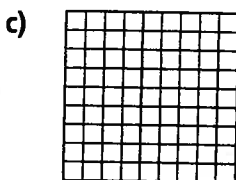
1. Match each diagram to the correct square number.



i) 36



ii) 81



iii) 16

2. Complete the statement for each square number.

a) 64 is a square number because $64 = \underline{\quad} \times \underline{\quad} = \underline{\quad}$

b) 49 is a square number because $49 = \underline{\quad} \times \underline{\quad} = \underline{\quad}$

3. Complete the table. The first row has been done for you.

a)	4^2	4×4	16
b)	3^2	$\underline{\quad} \times \underline{\quad}$	
c)	$\underline{\quad}^2$	7×7	
d)	11^2	$\underline{\quad} \times \underline{\quad}$	

4. Match the area of the square with the correct side length.

a) 25 cm^2

i) 2 cm

b) 64 cm^2

ii) 10 cm

c) 4 cm^2

iii) 5 cm

d) 100 cm^2

iv) 8 cm

5. Use square tiles to decide whether 32 is a square number.



-

-

-



Quick Review

- When a number is multiplied by itself, the result is a square number.
For example, 9 is a square number because $3 \times 3 = 9$.
- A number is a square number if it has an *odd* number of factors.
For example, to check if 36 is a square number, first create a list of the factors of 36 in pairs as shown:

$$1 \times 36$$

$$2 \times 18$$

$$3 \times 12$$

$$4 \times 9$$

$$6 \times 6$$

Write these factors in ascending order, starting at 1:

1, 2, 3, 4, (6), 9, 12, 18, 36

There are nine factors of 36. This is an odd number, so 36 is a square number.

Tip

A number with an even number of factors is not a square number.

In the ordered list of factors, notice that 6 is the middle number, and that $6 \times 6 = 36$. 6 is called the **square root** of 36.

We write the square root of 36 as $\sqrt{36}$

- Squaring and taking the square root are inverse operations.

So, $\sqrt{36} = 6$ because $6^2 = 6 \times 6 = 36$.

This means $\sqrt{6^2} = 6$

H I N T

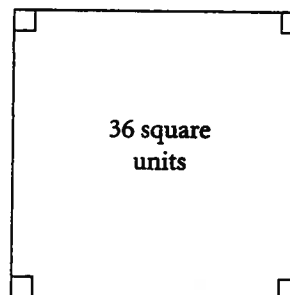
To find the square of a number, multiply the number by itself.



- You can find a square root using a diagram of square. The area is the square number.
- The side length of the square is the square root of the area.

H I N T

To find the square root of a number, model with a square, or make a list of factors.



36 square units

$\sqrt{36} = 6$ units

$\sqrt{36} = 6$ units

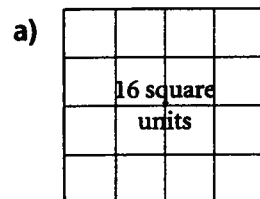
1. List the factors of each number in ascending order. Which numbers are square numbers? For each of the square numbers, find the square root.

a) 196: _____

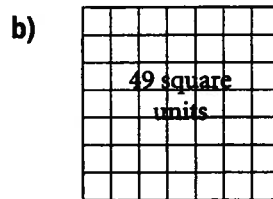
b) 200: _____

c) 441: _____

2. For each square, state the square number and the square root.



square number _____
square root _____



square number _____
square root _____

3. Complete the sentence for each square root. The first one has been done for you.

a) $\sqrt{25} = 5$ because $5^2 = 25$

b) $\sqrt{49} =$ _____ because _____ = _____

c) $\sqrt{100} =$ _____ because _____ = _____

d) $\sqrt{144} =$ _____ because _____ = _____

4. Complete each sentence. The first one has been done for you.

a) $\sqrt{16} = 4$ because $4^2 = 16$

b) _____ = 8 because $8^2 =$ _____

c) _____ = 9 because _____ = _____

d) _____ = 11 because _____ = _____

5. Match each number in column 1 to the number that is equal to it in column 2.

a) $\sqrt{9}$ i) 9

b) 81 ii) 9^2

c) 3^2 iii) $\sqrt{81}$

d) 9 iv) 3

6. Find each square root.

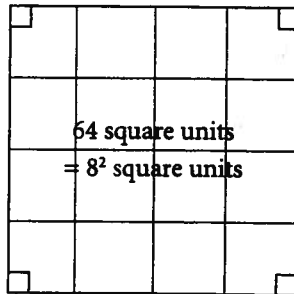
a) $\sqrt{64} =$ _____ b) $\sqrt{400} =$ _____ c) $\sqrt{225} =$ _____ d) $\sqrt{324} =$ _____

7. Find the square root of each number:

a) $5^2 =$ _____ b) $8^2 =$ _____ c) $16^2 =$ _____ d) $54^2 =$ _____

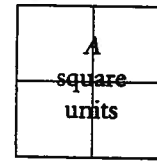
8. Find the number whose square root is

a) 17 _____ = _____ b) 22 _____ c) 30 _____



$$8 \text{ units} = \sqrt{64} \text{ units}$$

➤ This is true for all squares.



$$l = \sqrt{A} \text{ units}$$

$$l = \sqrt{A} \text{ units}$$

➤ In the square:

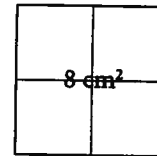
- the side length is 8 units and the area is 8^2 square units
- the area is 64 square units and the side length is $\sqrt{64}$ units

➤ In the square:

- the side length is l units and the area is l^2 square units
- the area is A square units and the side length is $\sqrt{A}$ units

➤ Squares can have areas that are not square numbers. The side length of this square is $\sqrt{8}$ cm and the area is $(\sqrt{8})^2 = 8 \text{ cm}^2$

The area is 8 cm^2 and the side length is $\sqrt{8}$ cm.

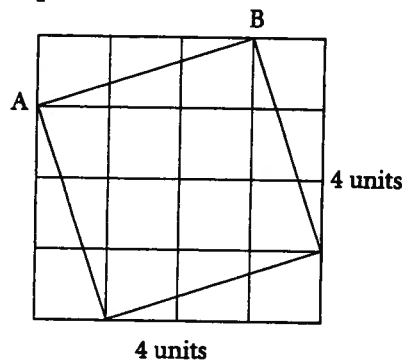


$$l = \sqrt{8} \text{ cm}$$

➤ You can find the length of a line segment AB on a grid by constructing a square on the segment. The length AB is the square root of the area of the square.

Draw an enclosing square around the square containing AB.

Then find the area of the enclosing square, and subtract the sum of the areas of the triangles.



Tip

The square of the square root of a number is that number. For example, $(\sqrt{2})^2 = 2$. $\sqrt{8}$ is not a whole number. It is called an irrational number.

The area of the enclosing square is 4^2 square units = 16 square units

Each triangle has area $\frac{1}{2} \times 1 \text{ unit} \times 3 \text{ units} = 1.5$ square units

4 triangles have area 4×1.5 square units = 6 square units

The area of the square with AB as a side is

16 square units – 6 square units = 10 square units

So, the length of AB is $\sqrt{10}$ units.

HINT

Use the formulas $A = s^2$ for the area of a square and $A = \frac{1}{2}bh$ for the area of a triangle.



1. Circle the correct answer for each question.

- a) $16^2 = ?$ 4 256 b) $\sqrt{100} = ?$ 50 10 c) $25^2 = ?$ 5 625

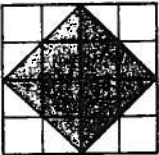
2. The area of a square is given. Find its side length. Which of the side lengths are whole numbers?

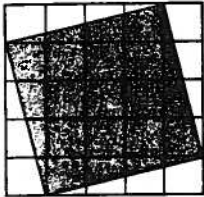
- a) $A = 81 \text{ cm}^2$, $l =$ _____ b) $A = 30 \text{ cm}^2$, $l =$ _____
c) $A = 144 \text{ mm}^2$, $l =$ _____ d) $A = 58 \text{ m}^2$, $l =$ _____

3. The side length of a square is given. Find its area.

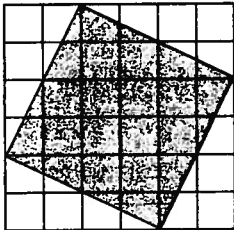
- a) $l = 7 \text{ cm}$, $A =$ _____ b) $l = 15 \text{ m}$, $A =$ _____ c) $l = \sqrt{36} \text{ cm}$, $A =$ _____
d) $l = \sqrt{50} \text{ mm}$, $A =$ _____ e) $l = \sqrt{24} \text{ cm}$, $A =$ _____ f) $l = \sqrt{121} \text{ mm}$, $A =$ _____

4. Find the area of each shaded square. Then write the side length of the square.

a)  Area of large square = _____ square units
Area of each triangle = _____ square units
Area of shaded square = area of large square - _____ $\times$ area of each triangle
= _____
= _____
Side length = _____

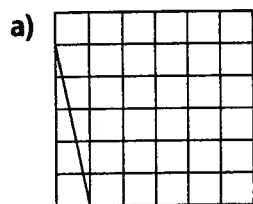
b)  Area of square

Side length

c)  Area of square

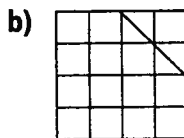
Side length

5. Copy each line segment and square onto grid paper. Draw a square on each line segment. Find the area of the square and the length of the line segment.



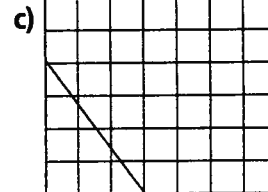
Area of square

Length of line segment



Area of square

Length of line segment



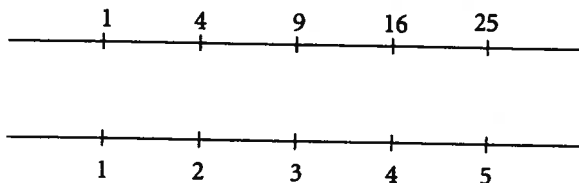
Area of square

Length of line segment



Quick Review

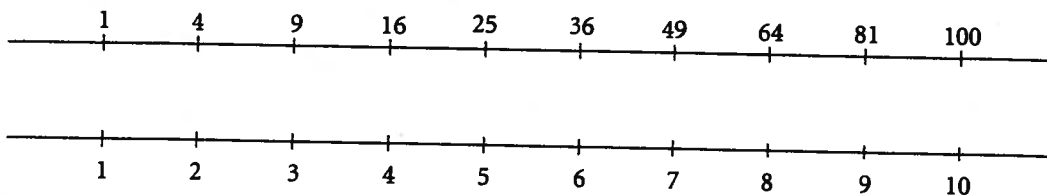
- To estimate the square root of a number that is not a perfect square, you can use a number line.



To estimate $\sqrt{10}$: Note that $\sqrt{10}$ lies between $\sqrt{9}$ and $\sqrt{16}$. So, $\sqrt{10}$ must have a value between 3 and 4, but closer to 3. Use trial and error and a calculator to get a closer approximation. Round to 2 decimal places.

Try 3.3: $3.3 \times 3.3 = 10.89$ too big
 Try 3.2: $3.2 \times 3.2 = 10.24$ too big
 Try 3.1: $3.1 \times 3.1 = 9.61$ too small
 Try 3.16: $3.16 \times 3.16 = 9.99$ very close
 $\sqrt{10}$ is approximately 3.16.

1. Use the number lines to complete each statement with whole numbers. The first one is done for you.



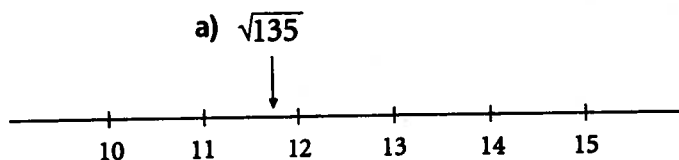
- a) $\sqrt{5}$ lies between _____ and _____
 b) $\sqrt{20}$ lies between _____ and _____
 c) $\sqrt{55}$ lies between _____ and _____
 d) $\sqrt{2}$ lies between _____ and _____

HINT

Find perfect squares close to the number inside the square root symbol.



2. Place the letter of the question on the number line below. The first one is done for you.



- a) $\sqrt{135}$ b) $\sqrt{201}$ c) $\sqrt{108}$ d) $\sqrt{167}$ e) $\sqrt{188}$

3. Which statements are true, and which are false?

- a) $\sqrt{20}$ is between 19 and 21. _____ b) $\sqrt{20}$ is between 4 and 5. _____
 c) $\sqrt{20}$ is closer to 4 than 5. _____ d) $\sqrt{20}$ is between $\sqrt{19}$ and $\sqrt{21}$. _____

4. Which are good estimates of the square roots?

- a) $\sqrt{19} = 4.75$ _____ b) $\sqrt{220} = 14.83$ _____

5. Use a calculator and the trial and error method to approximate each square root to 1 decimal place. Record each trial.

- a) $\sqrt{20} =$ _____ b) $\sqrt{57} =$ _____ c) $\sqrt{115} =$ _____ d) $\sqrt{175} =$ _____

6. Find the approximate side length of the square with each area.
 Answer to 1 decimal place.

- a) $A = 50 \text{ cm}^2$ b) $A = 125 \text{ cm}^2$ c) $A = 18 \text{ cm}^2$
 $s =$ _____ $s =$ _____ $s =$ _____

7. Which is the closest estimate of $\sqrt{99}$: 9.94 or 9.95 or 9.96? How did you find out?

8. What length of fencing is required to surround a square field with area 250 m^2 ? Answer to 2 decimal places.

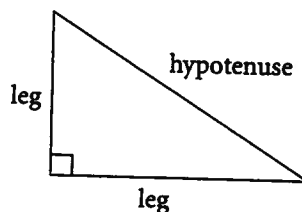
Side length = $\sqrt{\quad} =$ _____

Perimeter = _____ + _____ + _____ + _____ = _____



Quick Review

- A right triangle has two **legs** that form the right angle. The side opposite the right angle is called the **hypotenuse**.



- The three sides of a right triangle form a relationship known as the **Pythagorean Theorem**.

Pythagorean Theorem: The area of the square on the hypotenuse is equal to the sum of the areas of the squares on the legs.

- In the diagram:

Area of square on hypotenuse:

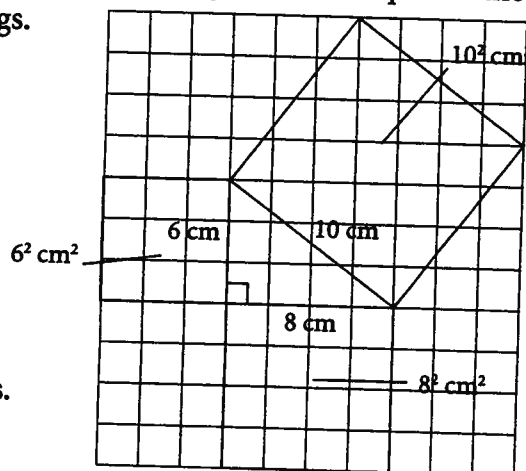
$$10^2 \text{ cm}^2 = 100 \text{ cm}^2$$

Areas of squares on legs:

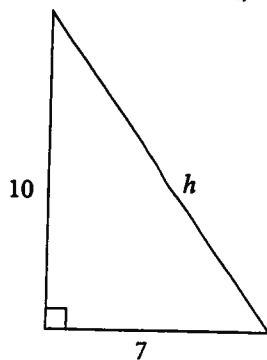
$$6^2 \text{ cm}^2 + 8^2 \text{ cm}^2 = 36 \text{ cm}^2 + 64 \text{ cm}^2 \\ = 100 \text{ cm}^2$$

Notice that $10^2 = 6^2 + 8^2$.

This theorem is true for all right triangles.



- You can use the Pythagorean Theorem to find the length of any side of a right triangle when you know the lengths of the other two sides.



To calculate the hypotenuse h , solve for h in this equation:

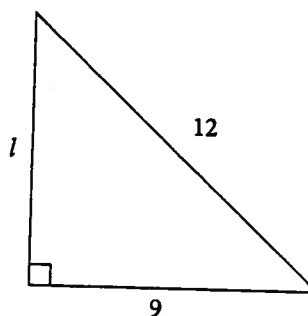
$$h^2 = 7^2 + 10^2$$

$$h^2 = 49 + 100$$

$$h^2 = 149$$

$$h = \sqrt{149}$$

Use a calculator: $h \approx 12.2$



To calculate the leg with length l , solve for l in this equation:

$$12^2 = l^2 + 9^2$$

$$144 = l^2 + 81$$

$$144 - 81 = l^2 + 81 - 81$$

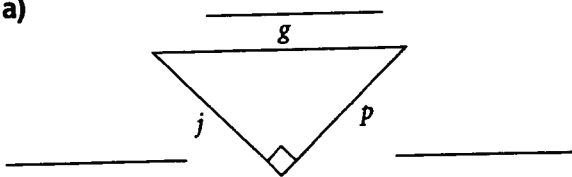
$$63 = l^2$$

$$\sqrt{63} = l$$

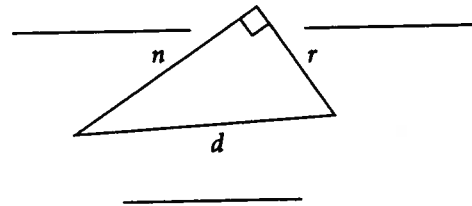
Use a calculator: $l \approx 7.9 \text{ cm}$

1. Identify the legs and the hypotenuse of each right triangle.

a)

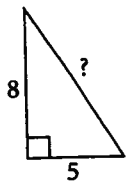


b)



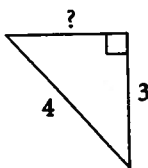
2. Circle the length of the unknown side in each right triangle.

a)



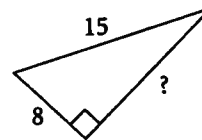
$\sqrt{13}$ $\sqrt{89}$

b)



$\sqrt{7}$ 5

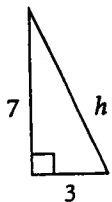
c)



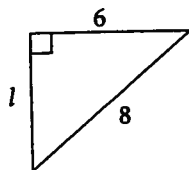
17 $\sqrt{161}$

3. Find the length of the unknown side in each right triangle. Use a calculator to approximate each length to 2 decimal places, if necessary.

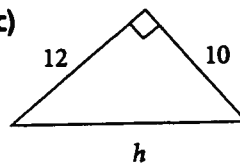
a)



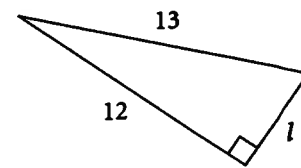
b)



c)



d)

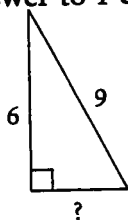


$$h^2 = \underline{\quad} + \underline{\quad} \quad \underline{\quad} = \underline{\quad} + \underline{\quad}$$

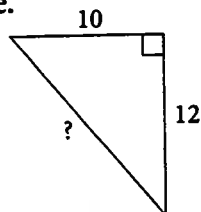
$$= \quad \quad \quad =$$

4. Find the length of the unknown side in each triangle. Use a calculator to approximate each answer to 1 decimal place.

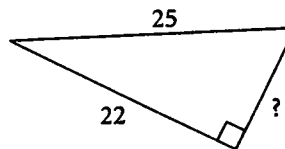
a)



b)



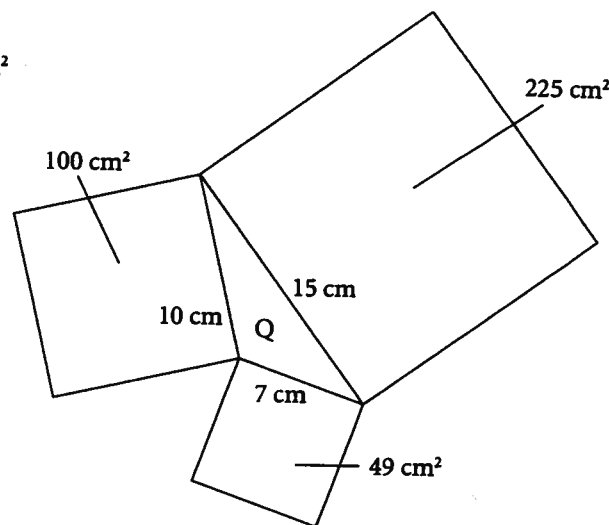
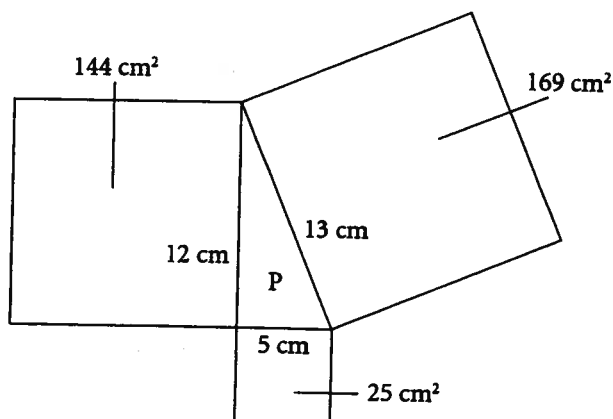
c)





Quick Review

- The Pythagorean Theorem is true for right triangles only.
- To see which triangle is a right triangle, check to see if the area of the square on the longest side is equal to the sum of the areas of the squares on the other two sides.

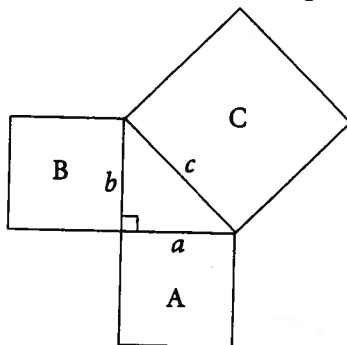


$$25 \text{ cm}^2 + 144 \text{ cm}^2 = 169 \text{ cm}^2$$

$$49 \text{ cm}^2 + 100 \text{ cm}^2 \neq 225 \text{ cm}^2$$

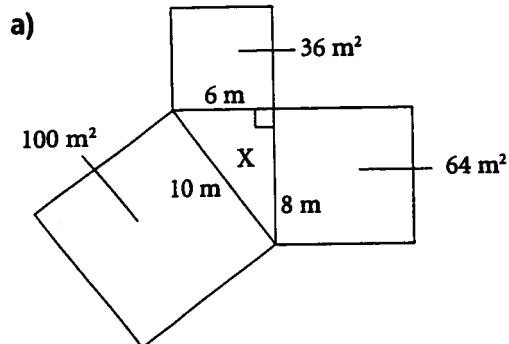
The Pythagorean Theorem applies to triangle P, but not to triangle Q.

- A set of three whole numbers that satisfy the Pythagorean Theorem is called a Pythagorean triple. For example, 5-12-13 is a Pythagorean triple because $5^2 + 12^2 = 13^2$.
- For a right triangle:
area of square on the longest side (square C) = area of square A + area of square B



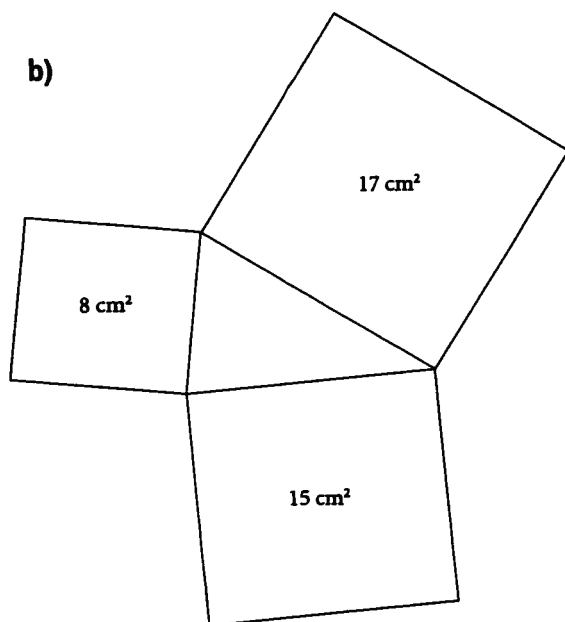
- For a Pythagorean triple a - b - c :
 $c^2 = a^2 + b^2$

1. Fill in the blanks from the list of choices to make the sentence true.



Triangle X _____ a right triangle because

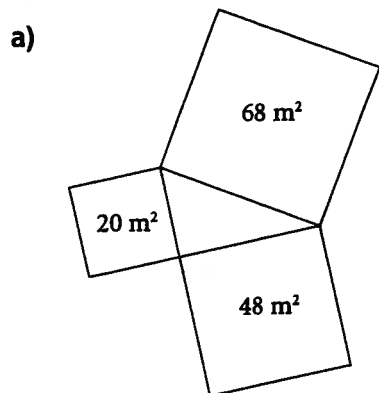
is is not $6 + 8 \neq 10$ $100 = 64 + 36$

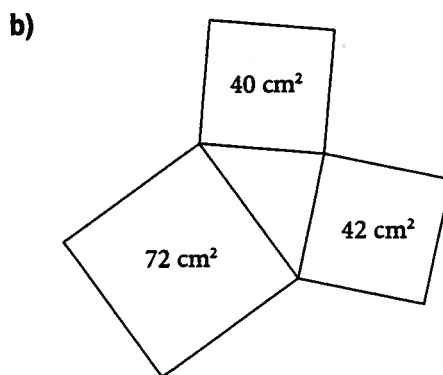


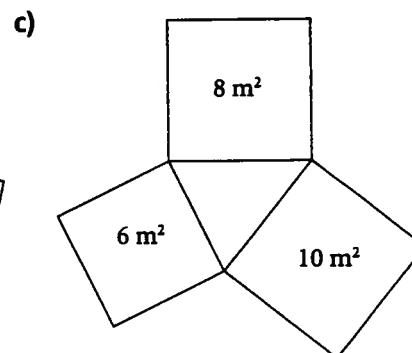
Triangle Y _____ a right triangle because

is is not $8^2 + 15^2 = 17^2$ $8 + 15 \neq 17$

2. Which of the following triangles are right triangles? Explain.







- 

b) 30 mm, 40 mm, 50 mm

because _____

d) 60 cm, 11 cm, 62 cm

- 4. Fill in the blanks to make the sentence true.**

The set of numbers 7, 24, 25 is a Pythagorean triple because $7^2 + 24^2 = 25^2$.

- 5. Which of these sets of numbers are Pythagorean triples? Explain.**

b) 12, 35, 37

- 6.** Two numbers of a Pythagorean triple are given. Find the missing number. The numbers are listed in ascending order.

a) 7, 24, _____

The missing number is the _____ of the sum of the _____ of the first two numbers.

== _____

b) 16, 30, _____

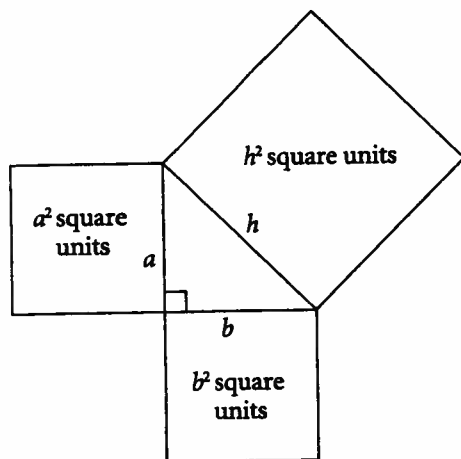
c) 10, _____, 26

- 7.** Doug wants to check that a lawn he is planting is a rectangle. He measures the width of the lawn to be 10 m, the length to be 24 m, and the diagonal to be 26 m. Is the lawn a rectangle? Explain.

If the lawn is a rectangle, then the width, length, and diagonal form a _____ triangle.

Quick Review

- The Pythagorean Theorem applies to right triangles.
- An algebraic equation for the Pythagorean Theorem is $h^2 = a^2 + b^2$, where h is the length of the hypotenuse and a and b are the lengths of the legs.



- You can apply the Pythagorean Theorem to problems involving right triangles.

You can calculate how high up the wall the ladder in the diagram reaches using the formula $h^2 = a^2 + b^2$

Since the length of the ladder is the hypotenuse of the right triangle, we label it h . The lengths of the two legs of this triangle are labelled a and b .

Substitute $b = 4$ and $h = 10$ into $h^2 = a^2 + b^2$

$$10^2 = a^2 + 4^2$$

$$100 = a^2 + 16$$

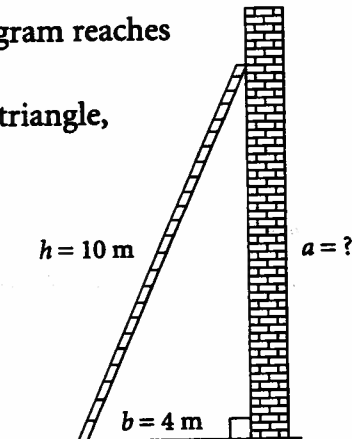
$$100 - 16 = a^2 + 16 - 16$$

$$84 = a^2$$

$$\sqrt{84} = a$$

$$9.2 \doteq a$$

a is approximately 9.2 m. The ladder reaches approximately 9.2 m up the wall.



Tip

It does not matter which leg is labelled a and which leg is labelled b , so long as a and b label the legs and h labels the hypotenuse.

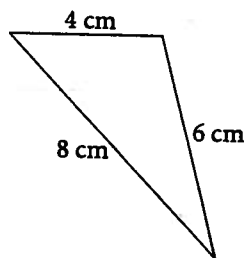
1. Use the Pythagorean Theorem to check if this is a right triangle.

Substitute $a = \underline{\hspace{1cm}}$, $b = \underline{\hspace{1cm}}$, and $h = \underline{\hspace{1cm}}$
into the formula $h^2 = a^2 + b^2$

$h^2 = \underline{\hspace{1cm}}$ $a^2 + b^2 = \underline{\hspace{1cm}}$

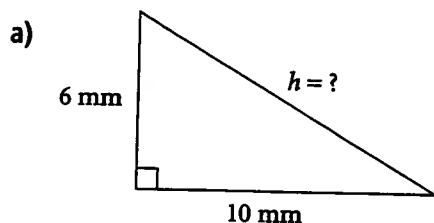
Circle the choices that make the sentence true.

Since h^2 equals / does not equal $a^2 + b^2$, the triangle is / is not a right triangle.

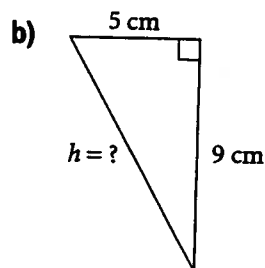


For questions 2 to 5, give each length to 1 decimal place.

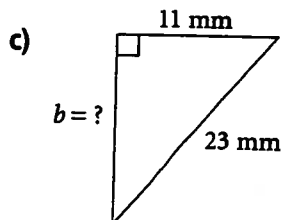
2. Use the equation $h^2 = a^2 + b^2$ to find the length of the unknown side.



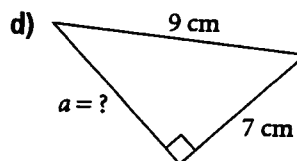
$h \doteq \underline{\hspace{1cm}}$



$h \doteq \underline{\hspace{1cm}}$

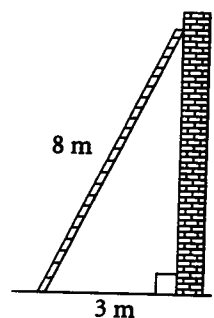
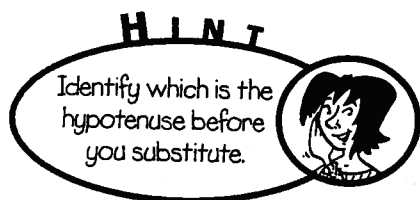


$b \doteq \underline{\hspace{1cm}}$



$a \doteq \underline{\hspace{1cm}}$

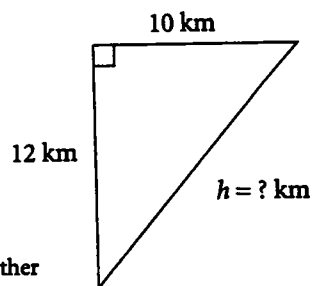
3. An 8-m ladder leans against a wall. How far up the wall does the ladder reach if the foot of the ladder is 3 m from the base of the wall? Show your work.



$b \doteq \underline{\hspace{1cm}}$

The ladder can reach a height of $\underline{\hspace{1cm}}$, to 1 decimal place.

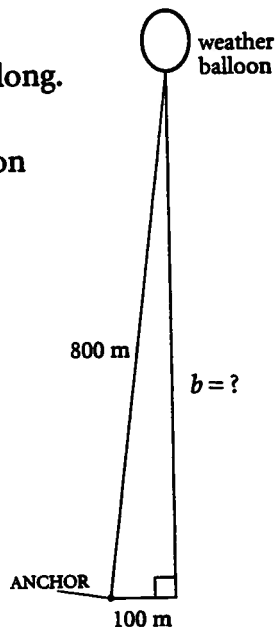
4. A ship leaves port and travels 12 km due north. It then changes direction and travels due east for 10 km. How far must it travel to go directly back to port?
Sketch a diagram to explain.



The ship must travel _____, to 1 decimal place, to go directly back to port.

5. A weather balloon is anchored by a cable 800 m long. The balloon is flying directly above a point that is 100 m from the anchor. How high is the balloon flying? Give your answer to the nearest metre.

The balloon is flying at a height of _____, to the nearest metre.



6. A rectangular field is 40 m long and 30 m wide. Carl walks from one corner of the field to the opposite corner, along the edge of the field. Jade walks across the field diagonally to arrive at the same corner. How much shorter is Jade's shortcut?

Tip

Sketch a diagram first.

The diagonal of the field measures _____.

Jade walks _____.

Carl walks _____ + _____ = _____

Jade's shortcut is _____ - _____ = _____ shorter.

7. What is the length of a diagonal of a square with area 100 cm^2 ? Give your answer to 1 decimal place.

The side length of the square is the square root of _____, or _____ cm.

The diagonal of the square is the _____ of the right triangle with sides _____ and _____.

The length of the diagonal of the square is _____, to 1 decimal place.

In Your Words

Unit ①

Here are some of the important mathematical words of this unit.

Build your own glossary by recording definitions and examples here. The first one is done for you.

perfect square (square number)

*the product of a whole number multiplied
by itself*

*For example, 25 is 5×5 , so 25 is a
perfect square.*

square root

legs of a right triangle

hypotenuse

Pythagorean Theorem

Pythagorean triple

List other mathematical words you need to know.

Unit Review

LESSON

1.1 1. Circle the perfect squares. Use a diagram to support your answer.

a) 36

b) 63

c) 121

d) 99

1.2 2. Simplify without using a calculator.

a) $8^2 =$ _____

b) $\sqrt{49} =$ _____

c) $12^2 =$ _____

d) $\sqrt{121} =$ _____

3. List the factors of each number in ascending order. Circle the numbers that are perfect squares.

a) 50

b) 196

c) 84

d) 225

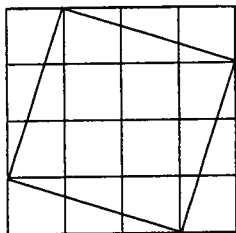
1.3 4. The area of a square is given. Find its side length. Circle the side lengths that are whole numbers.

a) 18 cm^2

b) 169 cm^2

c) 200 cm^2

5. Find the area of the square. Then write the side length of the square.

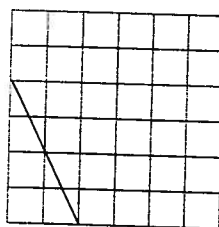


Area = _____

Side length = _____

6. Construct a square on the line segment.
Find the length of the line segment.

Length = _____



- 1.4 7. Evaluate.

a) $\sqrt{8 \times 8} =$ _____

b) $\sqrt{54 \times 54} =$ _____

c) $\sqrt{153 \times 153} =$ _____

8. Between which two whole numbers is each square root?

a) $\sqrt{45}$

b) $\sqrt{18}$

c) $\sqrt{55}$

d) $\sqrt{135}$

9. Estimate each root in question 8 to 1 decimal place.

a) _____

b) _____

c) _____

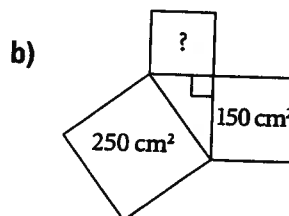
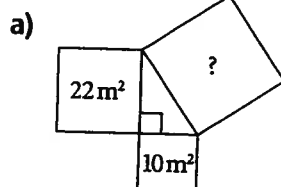
d) _____

10. Circle the better estimate.

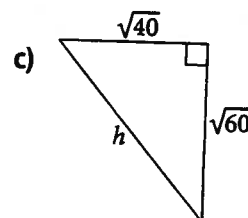
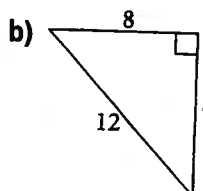
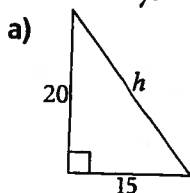
a) $\sqrt{75} \div 8.65$ or 8.66 ?

b) $\sqrt{90} \div 9.49$ or 9.50 ?

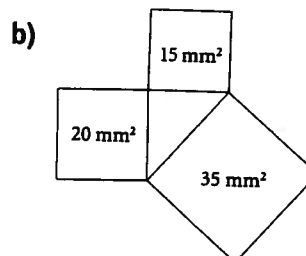
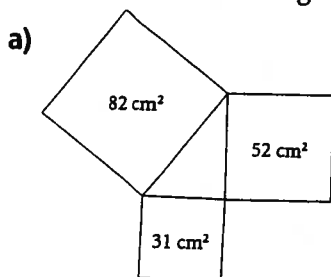
- 1.5 11. Find the area of each indicated square.



12. Find the length of each side labelled with a variable. Give answers to 1 decimal place, if necessary.



- 1.6 13. Which of the following are right triangles? Justify your answer.



14. Circle the sets of numbers that are Pythagorean triples.

a) 10, 24, 26

b) 12, 15, 20

c) 7, 24, 26

d) 11, 60, 61

- 15.** A ship travels for 14 km toward the south. It then changes direction and travels for 9 km toward the east. How far does the ship have to travel to return directly to its starting point? Answer correct to 2 decimal places.

Tip

Draw a diagram.

The ship must travel _____

- 16.** How high up the wall does the ladder reach? Answer correct to 2 decimal places.

