

Key Words

For #1 to #5, write in your notebook the terms from the list that complete the sentences below.

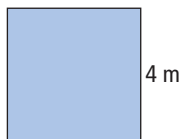
hypotenuse perfect square
prime factorization Pythagorean relationship
square root

- The of 36 is 6.
- The number 25 is a because it is the product of the same two factors, $5 \times 5 = 25$.
- In a right triangle, the longest side is known as the .
- If the sides of a right triangle are a , b , and c , and c is the longest side, the equation $c^2 = a^2 + b^2$ is known as the .
- The of 18 is $2 \times 3 \times 3$.

3.1 Squares and Square Roots, pages 80–87

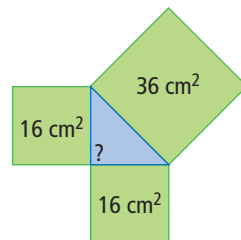
- Determine the square of each number.
 - 6
 - 11
 - 25
- Determine each square root.
 - $\sqrt{49}$
 - $\sqrt{256}$
 - $\sqrt{100\,000\,000}$

- Lisa needs at least 17 m^2 of fabric to make curtains. Is this square piece of fabric large enough? Show your work.

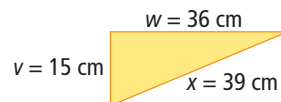


3.2 Exploring the Pythagorean Relationship, pages 88–94

- A triangle has squares on each of its sides.
 - Is the triangle a right triangle? Explain.
 - What is the length of each of the three sides?



- Is the triangle a right triangle? Explain.



- The table shows the side lengths of four triangles. Which triangles are right angled?

Triangle	Side x	Side y	Side z
A	9	12	15
B	5	6	7
C	12	35	37
D	30 000	40 000	50 000

3.3 Estimating Square Roots, pages 95–100

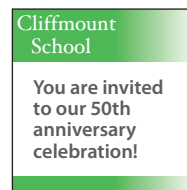
- Cliffmount School is creating invitations for its 50th anniversary celebration. There are three possible designs.



25 cm^2



 cm^2

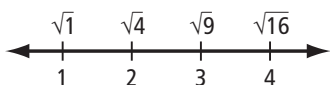


36 cm^2

- What is a possible whole number area for the middle invitation?

- b) What is the side length of the smallest one? the largest one?
- c) What is an estimate for the side length of the middle invitation? Express your answer to one decimal place.
- d) With a calculator, use the area in part a) to check the side length in part c). Give your answer to the nearest tenth of a centimetre.

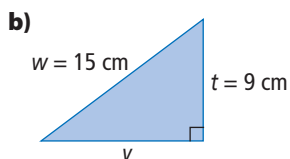
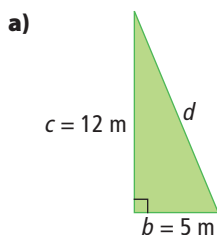
13. Use the number line to answer the following questions.



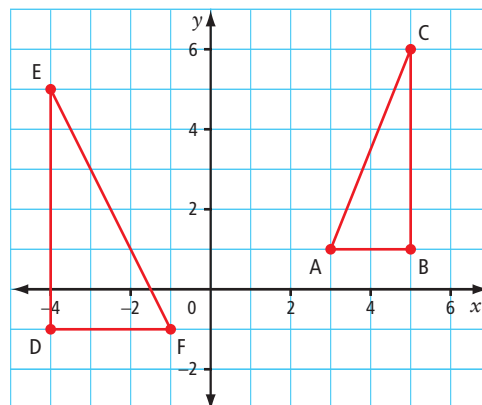
- a) What is an estimate for $\sqrt{10}$? Give your answer to one decimal place.
- b) Is $\sqrt{6}$ closer to 2 or 3? Explain.
- c) A calculator shows that the approximate square root of a certain whole number is 3.61. What is a reasonable value for this whole number? Explain.

3.4 Using the Pythagorean Relationship, pages 101–105

14. Find the missing side length of each triangle.



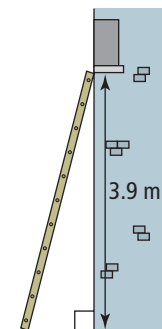
15. The coordinate grid shown was drawn on centimetre grid paper. Answer the following questions to the nearest tenth of a centimetre where appropriate.



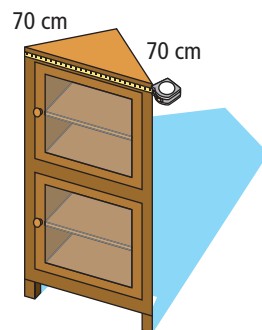
- a) What is the length of the hypotenuse in $\triangle ABC$? in $\triangle DEF$?
- b) What is the perimeter of $\triangle DEF$?

3.5 Applying the Pythagorean Relationship, pages 106–111

16. A 4-m ladder is being used for a production of *Romeo and Juliet*. The bottom of the ladder will be placed 1 m from the base of Juliet's house. Will the ladder reach the window? Show your work.



17. Yosef wants to buy a hutch. It must fit in the 90° corner of his dining room. Yosef measures as shown. What should his measurement be? Give your answer to the nearest tenth of a centimetre.




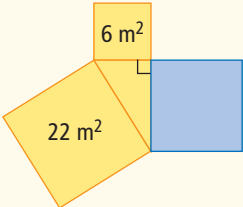
Chapter Review, pages 112–113

1. square root
2. perfect square
3. hypotenuse
4. Pythagorean relationship
5. prime factorization
6. **a)** 36 **b)** 121 **c)** 625
7. **a)** 7 **b)** 16 **c)** 10 000
8. No, the fabric has an area of 4×4 or 16 m^2 . Lisa needs 17 m^2 .
9. **a)** No, the triangle is not a right triangle. The sum of the two smaller squares is $16 \text{ cm}^2 + 16 \text{ cm}^2 = 32 \text{ cm}^2$. This does not equal the area of the largest square, which is 36 cm^2 . **b)** 4 cm; 4 cm; 6 cm
10. Yes, the triangle is a right triangle since the sum of the squares of the two smaller sides is $225 + 1296 = 1521$, which is equal to the square of the largest side.
11. Triangles A, C, and D are right triangles.
12. **a)** Answer may vary. Example: 30 cm^2 **b)** 5 cm, 6 cm
c) Answer may vary. Example: 5.5 cm
d) Answer may vary. Example: 5.5 cm
13. **a)** 3.2 **b)** $\sqrt{6}$ is closer to 2 than 3 because 6 is closer to 4 (2^2) than 9 (3^2). **c)** When 3.61 is squared the result is 13.0321, which is closest to 13.
14. **a)** $d = 13 \text{ m}$ **b)** $v = 12 \text{ cm}$
15. **a)** 5.4 cm; 6.7 cm **b)** 15.7 cm
16. No, the ladder will not reach the window. The length the ladder needs to reach is greater than 4 m: $1^2 + 3.9^2 \approx 4.03^2$.
17. 99.0 cm

3

Practice Test

For #1 to #5, choose the best answer.

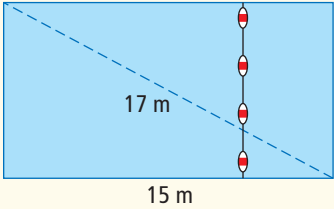
- Which number is a perfect square?
A 10 **B** 20
C 50 **D** 100
- What is the side length of the square in the diagram?

- A square has a side length of 7 cm. What is the area of the square?
A 14 cm² **B** 21 cm²
C 28 cm² **D** 49 cm²
- A right triangle has squares on each of its sides. What is the area of the blue square?


- A** 4 m² **B** 14 m²
C 16 m² **D** 28 m²
- The value of $\sqrt{51}$ is closest to which whole number?
A 7 **B** 8
C 49 **D** 51

Complete the statements in #6 and #7.

- For a right triangle with sides a , b , and c , the Pythagorean relationship is $c^2 = a^2 + b^2$. The variable that represents the length of the hypotenuse is **■**.
- A square has an area of 53 cm². When you calculate the side length of the square, to the nearest tenth, the answer is **■**.

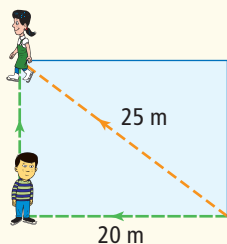
Short Answer

- The legs of a right triangle measure 3 cm and 7 cm.
 - Use a calculator to determine the approximate length of the hypotenuse, to the nearest tenth of a centimetre.
 - Explain why the length is an approximation both before and after you round the answer.
- The rectangular pool at Wild Water World has a length that measures 15 m and a diagonal that measures 17 m. A float line divides the shallow end and deep end. What is the length of the float line?


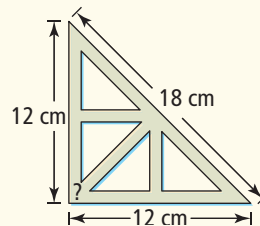
- Identify a whole number that has its square root between 7 and 8.
 - How many whole numbers have a square root between 7 and 8? Identify these whole numbers.

11. Use the Pythagorean relationship to determine whether a triangle with sides of 14 mm, 48 mm, and 50 mm is a right triangle. Show your work.

12. Josie skated diagonally across a rectangular ice rink. Han is skating along two sides of the rink and has just reached the first corner. How much farther does he have to skate to meet up with Josie?

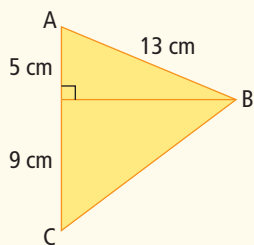


14. A carpenter's square is a tool in the shape of a right triangle. Joe thinks there may be something wrong with the one he bought. Determine whether the carpenter's square shown is a right triangle. Explain your reasoning.



Extended Response

13. Determine the perimeter of $\triangle ABC$.



15. The prime factorization of 15 876 is $2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 7 \times 7$.
- How can you use prime factorization to determine that 15 876 is a perfect square?
 - Use a calculator to check that 15 876 is a perfect square. Show your work.
 - Explain how you can calculate $\sqrt{15\,876}$ using its prime factors.

WRAP IT UP!

Create a game of your own. Include squares and right triangles in the game board. Write rules for your game.

The design of your board or the way you play your game needs to cover the following concepts:

- calculating the square of a number
- calculating the square root of a perfect square
- estimating the square root of a non-perfect square
- using the Pythagorean relationship to determine if a triangle is a right triangle
- determining the missing side length of a right triangle

Show how you have covered the concepts.

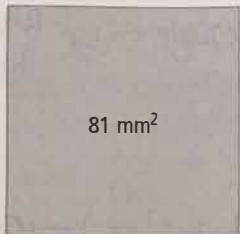


For #1 to #5, choose the best answer.

1. Which number is a perfect square?

- A 10 B 20
 C 50 **D 100** $10 \times 10 = 100$

2. What is the side length of the square in the diagram?



$\sqrt{81} = 9$

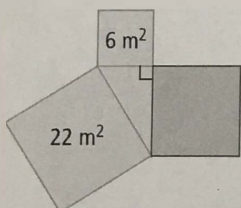
- A 6 mm **B 9 mm**
 C 12 mm D 18 mm

3. A square has a side length of 7 cm. What is the area of the square?

- A 14 cm² B 21 cm²
 C 28 cm² **D 49 cm²**

$7 \times 7 = 49$

4. A right triangle has squares on each of its sides. What is the area of the blue square?

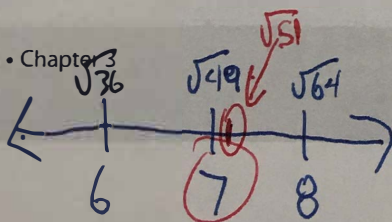


$b^2 = c^2 - a^2$
 $b^2 = 22 - 6$
 $b^2 = 16 m^2$

- A 4 m² B 14 m²
C 16 m² D 28 m²

5. The value of $\sqrt{51}$ is closest to which whole number?

- A 7** B 8
 C 49 D 51



Complete the statements in #6 and #7.

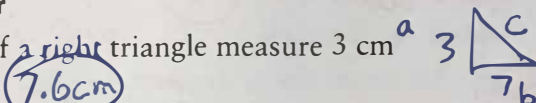
6. For a right triangle with sides a , b , and c , the Pythagorean relationship is $c^2 = a^2 + b^2$. The variable that represents the length of the hypotenuse is c .

7. A square has an area of 53 cm². When you calculate the side length of the square, to the nearest tenth, the answer is 7.3.

$\sqrt{53} = 7.3$

Short Answer

8. The legs of a right triangle measure 3 cm and 7 cm.



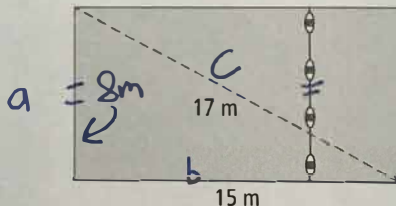
a) Use a calculator to determine the approximate length of the hypotenuse, to the nearest tenth of a centimetre.

$c^2 = a^2 + b^2$
 $c^2 = 3^2 + 7^2$

b) Explain why the length is an approximation both before and after you round the answer.

$c^2 = 9 + 49$
 $\sqrt{c^2} = \sqrt{58}$
 $c = 7.6 \text{ cm}$

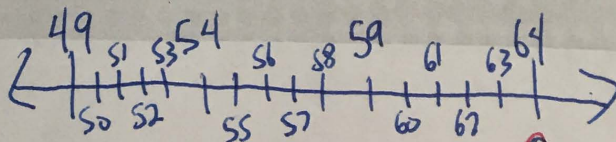
9. The rectangular pool at Wild Water World has a length that measures 15 m and a diagonal that measures 17 m. A float line divides the shallow end and deep end. What is the length of the float line?



$a^2 = c^2 - b^2$
 $a^2 = 17^2 - 15^2$
 $a^2 = 289 - 225$
 $\sqrt{a^2} = \sqrt{64}$
 $a = 8 \text{ m}$

10. a) Identify a whole number that has its square root between 7 and 8. *Pick from below*
 b) How many whole numbers have a square root between 7 and 8? Identify these whole numbers.

$7^2 = 49$ $8^2 = 64$



10b) 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63

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

11. Use the Pythagorean relationship to determine whether a triangle with sides of 14 mm, 48 mm, and 50 mm is a right triangle. Show your work.

$$14^2 + 48^2 = 50^2$$

$$196 + 2304 = 2500$$

$$2500 = 2500$$

yes!

$$a^2 = c^2 - b^2$$

$$a^2 = 25^2 - 20^2$$

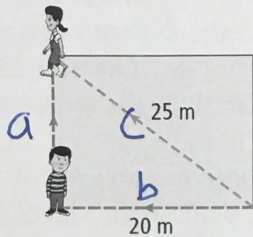
$$a^2 = 625 - 400$$

$$a^2 = 225$$

$$a = \sqrt{225}$$

$$a = 15 \text{ m}$$

12. Josie skated diagonally across a rectangular ice rink. Han is skating along two sides of the rink and has just reached the first corner. How much farther does he have to skate to meet up with Josie?



Han: $20 \text{ m} + 15 \text{ m} = 35 \text{ m}$, or 10 m further than Josie

Extended Response

Bottom Triangle

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

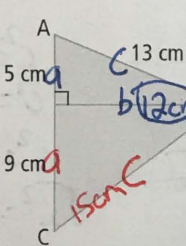
$$c^2 = 9^2 + 12^2$$

$$c^2 = 81 + 144$$

$$c^2 = 225$$

$$c = 15 \text{ cm}$$

13. Determine the perimeter of $\triangle ABC$.



$$b^2 = c^2 - a^2$$

$$b^2 = 13^2 - 5^2$$

$$b^2 = 169 - 25$$

$$\sqrt{b^2} = \sqrt{144}$$

$$b = 12 \text{ cm}$$

Top triangle

$$P = 13 + 15 + 5 + 9$$

$$P = 42 \text{ m}$$

WRAP IT UP!

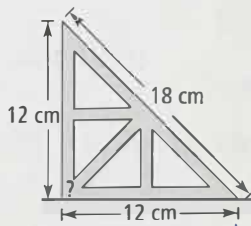
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- using the Pythagorean relationship to determine if a triangle is a right triangle
- determining the missing side length of a right triangle

Show how you have covered the concepts.

14. A carpenter's square is a tool in the shape of a right triangle. Joe thinks there may be something wrong with the one he bought. Determine whether the carpenter's square shown is a right triangle. Explain your reasoning.



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

$$12^2 + 12^2 = 18^2$$

$$144 + 144 = 324$$

$$288 = 324$$

Joe is correct, the triangle is not Right Angled.

15. The prime factorization of 15 876 is

$$2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 7 \times 7$$

a) How can you use prime factorization to determine that 15 876 is a perfect square?

$$(2 \times 3 \times 3 \times 7) (2 \times 3 \times 3 \times 7) = 15876$$

b) Use a calculator to check that 15 876 is a perfect square. Show your work.

$$\sqrt{15876} = 126$$

c) Explain how you can calculate $\sqrt{15\ 876}$ using its prime factors.

Multiply one equal group out:

$$2 \times 3 \times 3 \times 7 = 15876$$

