

$$\text{Pineapple} + \text{Pineapple} + \text{Pineapple} = \text{Strawberry}$$

$$\text{Strawberry} \times 1 = \text{Grapes}$$

$$\text{Grapes} + \text{Grapes} = 24$$

$$\text{Watermelon} + \text{Pineapple} = 6$$

$$\text{Grapes} + \text{Strawberry} + \text{Watermelon} = ?$$

Divisibility Rules

\div by	Rule	Example	Non - Example
2	If the last digit is even, (2, 4, 6, 8, or 0)	<u>724</u>	<u>423</u>
3	If the sum of the digits is divisible by 3	<u>345</u>	<u>317</u>
4	If the last 2 digits are divisible by 4	<u>712</u>	<u>710</u>
5	If the number ends with 5 or 0	<u>45</u>	<u>92</u>
6	If the number is divisible by BOTH 2 and 3	<u>144</u>	<u>517</u>
7	No Rule	n/a	n/a
8	If the last 3 digits are divisible by 8	<u>3,840</u>	<u>6,428</u>
9	If the sum of the digits is divisible by 9	<u>6,939</u>	<u>6,923</u>
10	If the number ends in 0	<u>7,200</u>	<u>4,258</u>



Divisibility Puzzle

Name _____ Date _____

Use each number 0-9 only once to complete the puzzle.

Divisible by 3 and 9

	0	
--	----------	--

Divisible by 4 and 6

6		
----------	--	--

Divisible by 2 and 5

	7	
--	----------	--

Divisible by 4 and 9

9		6
----------	--	----------

Divisible by 3 and 5

9	1	
----------	----------	--

Divisible by 2 and 9

5		4
----------	--	----------

Divisible by 6 and 5

3		0
----------	--	----------

Factors are the **FACTS** that make up a number.

Think:

- Simple
- Small
- Few

<u>FACTORS</u>	<u>MULTIPLES</u>
<p>Two factors are multiplied together to get a product.</p> <div style="text-align: center;">$\begin{array}{r l} & 32 \text{ ← Product} \\ \hline \text{Factors } 1 & 32 \\ & 2 \quad 16 \\ & 4 \quad 8 \end{array}$</div>	<p>The product of a given number and another factor multiplied together.</p> <div style="text-align: center;">$4 \times 9 = \underline{36}$ Multiple ↗</div>
<p>Two ways to think about this...</p> <p>*What can I multiply together (factors) to get my number (product)?</p> $\begin{aligned} 1 \times 32 &= 32 \\ 2 \times 16 &= 32 \\ 4 \times 8 &= 32 \end{aligned}$ <p>So the numbers 1, 2, 4, 8, 16 & 32 are factors of 32.</p> <p>*What numbers can I divide evenly into my number?</p>	<p>Find the multiples of 4...</p> $\begin{aligned} 4 \times 1 &= 4 \\ 4 \times 2 &= 8 \\ 4 \times 3 &= 12 \\ 4 \times 4 &= 16 \\ 4 \times 5 &= 20 \\ 4 \times 6 &= 24 \\ 4 \times 7 &= 28 \\ 4 \times 8 &= 32 \\ 4 \times 9 &= 36 \end{aligned}$ <p>4, 8, 12, 16, 20, 24, 28, 32, 36 and so on are multiples of 4.</p> <p>Skip counting by 4 also will give you the multiples!</p>

©TheGreeneHouse2015

Multiples are achieved through **MULTIPLICATION.**

Think:

- Larger
- Many

1

I am a number less than 40. One of my factors is 7. The sum of my digits is 8.

What number am I? _____



2

I am a number less than 100. Two of my factors are 3 and 5. My digits are 1 apart.

What number am I? _____

3

I am a number less than 60. Two of my factors are 2 and 7. I am a common multiple of 8 and 14.

What number am I? _____

4

I am a common multiple of 2 and 5. I am also a factor of 100. The sum of my digits is 5.

What number am I? _____

5

I am a factor of 120, and a common multiple of 3, 4, and 10. The sum of my digits is 6.

What number am I? _____

6

I am a 2-digit number greater than 50. One of my factors is 8 and I, myself, am a factor of 360. The difference between my digits is 5.

What number am I? _____

Do Now!

If I borrow \$50 from my mom and \$50 from my dad, that's \$100. I buy a shirt that's \$97. I have \$3 change, I give \$1 to my mom, \$1 to my dad, and keep \$1. I owe my mom \$49 and my dad \$49, together that's \$98. Plus the \$1 I kept is \$99. Where's the other dollar?!





There is no missing dollar! You started with \$100, you spent \$97. With the \$3 leftover, you gave \$1 to mom and dad and kept one. You owe them \$98 and you have \$1, which you can count towards what you owe them. So, you need \$97 more to pay them back which is what you spent!

Do Now!

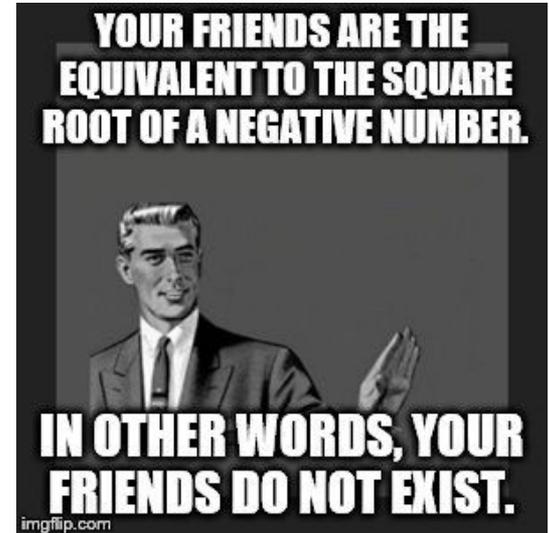
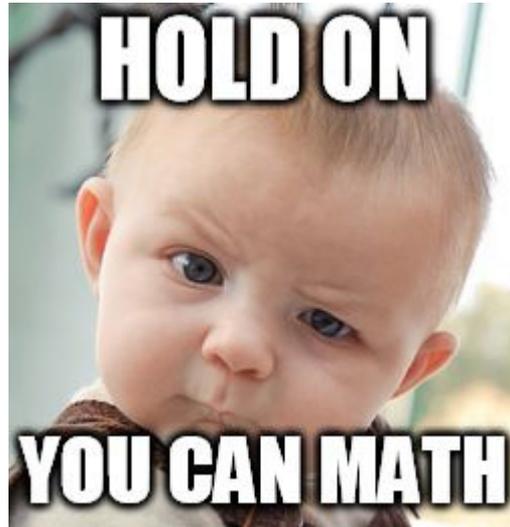
What Do You Notice?

1	3	3
1	4	4
2	2	4
5	1	5
3	2	6
3	3	9
4	3	12
2	6	12

Unit 1

Number Relationships

$$\frac{\sqrt{2}}{2} = \sqrt{\frac{1}{2}}$$



Review

What is the formula for the area of a rectangle or square?

What units do we measure the area in?

What does this mean?

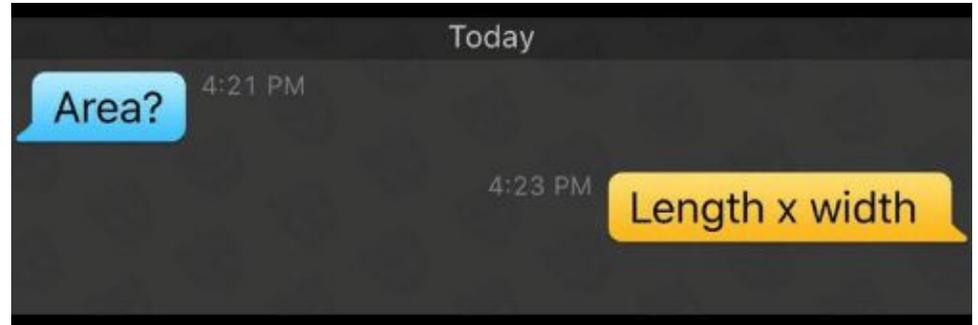
Area

Area is the amount of space a two dimensional object takes up. The area of a rectangle or square is found by using a formula such as;

$$A = \text{base} \times \text{height}$$

or

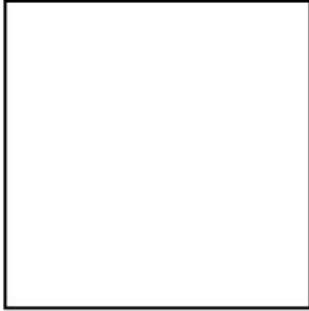
$$A = \text{length} \times \text{width}.$$



Find the area of the following shapes

a)

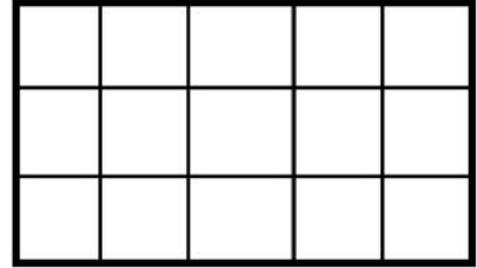
5 cm



5 cm

b)

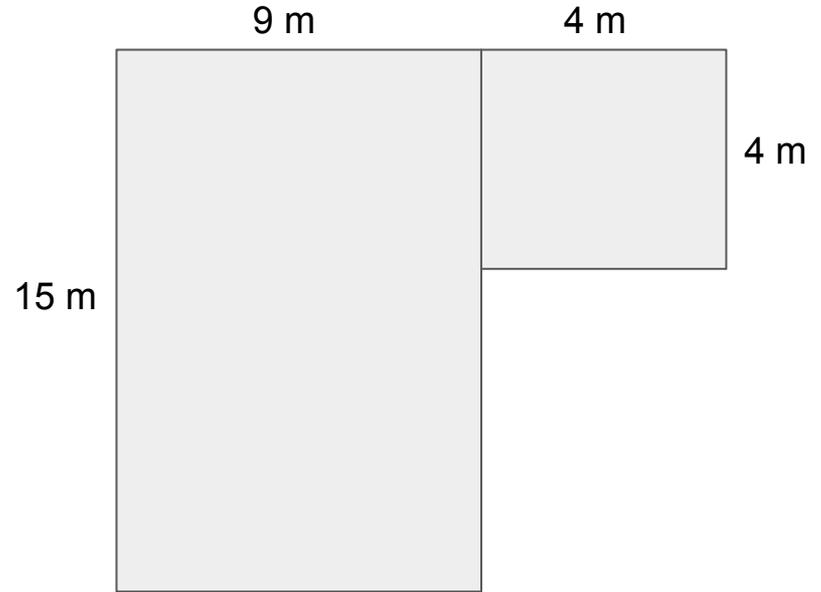
3



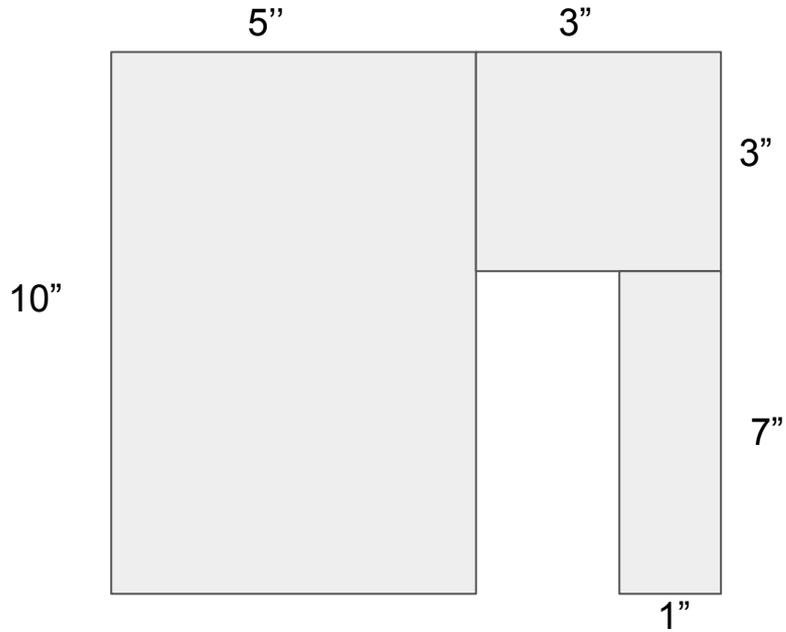
5

For composite shapes

- 1) Calculate the area of the two spaces then add them together.
- 2) The sum is your total area of the space.

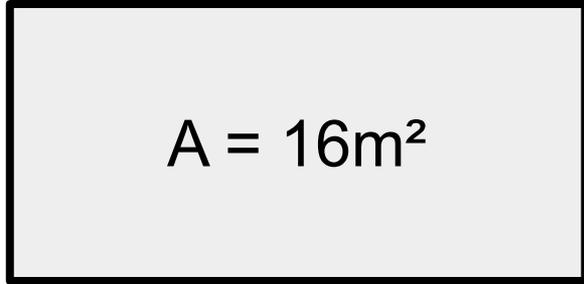


Calculate the area of the following composite shape



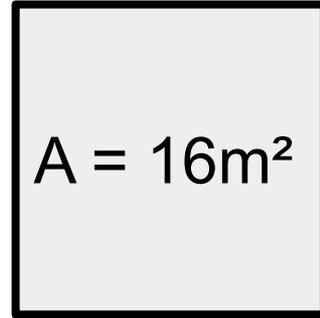
Find the side length of the following shapes

a)



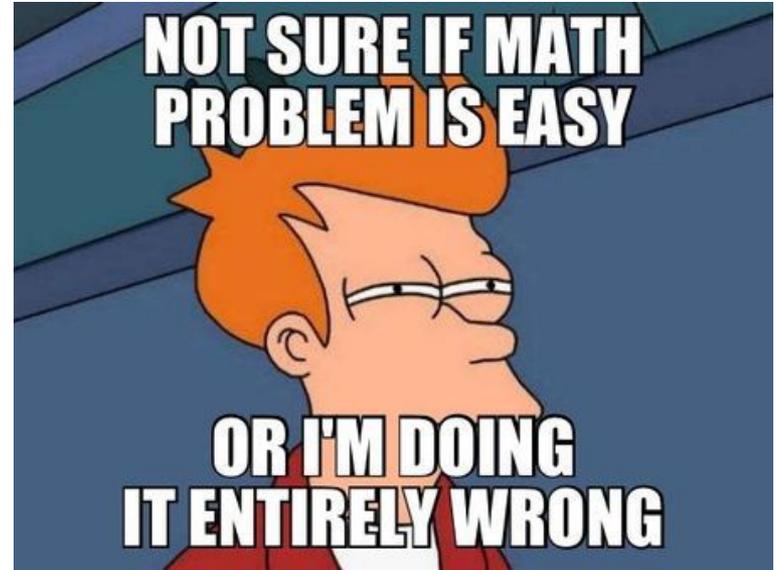
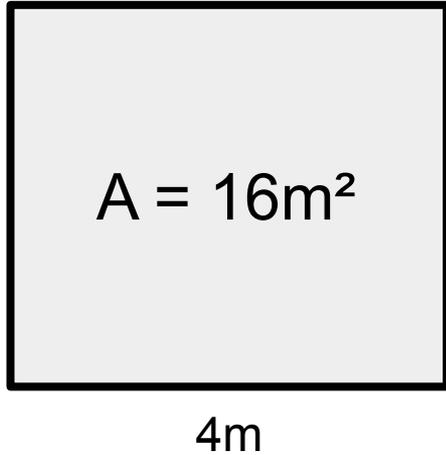
8m

b)



4m

What do you notice about the side length of the square?



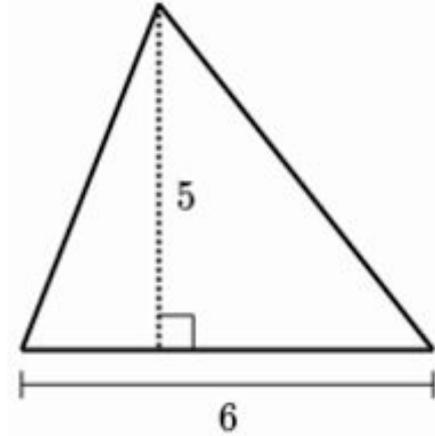
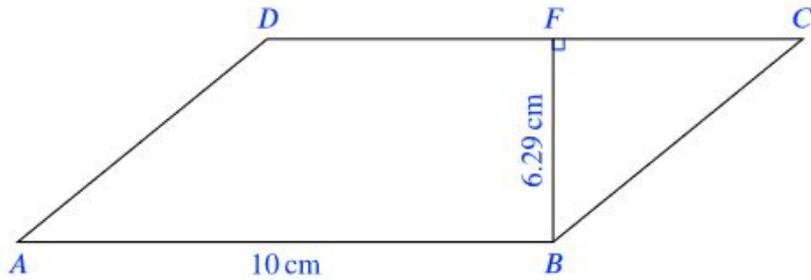
Area - Parallelograms and Triangles

What is the formula for the area of a parallelogram?

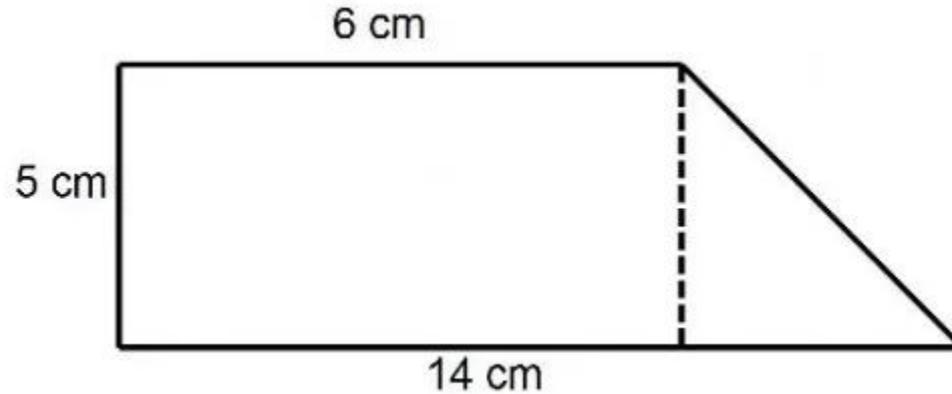
What is the formula for the area of a triangle?

How are they related?

Find the area of the following shapes.



Find the area of the composite shape.



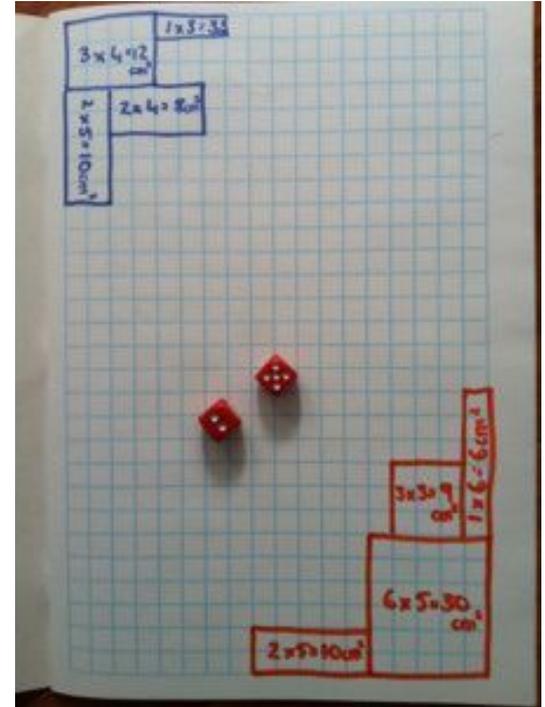
Area Game

With a partner you need two dice and two different colours.

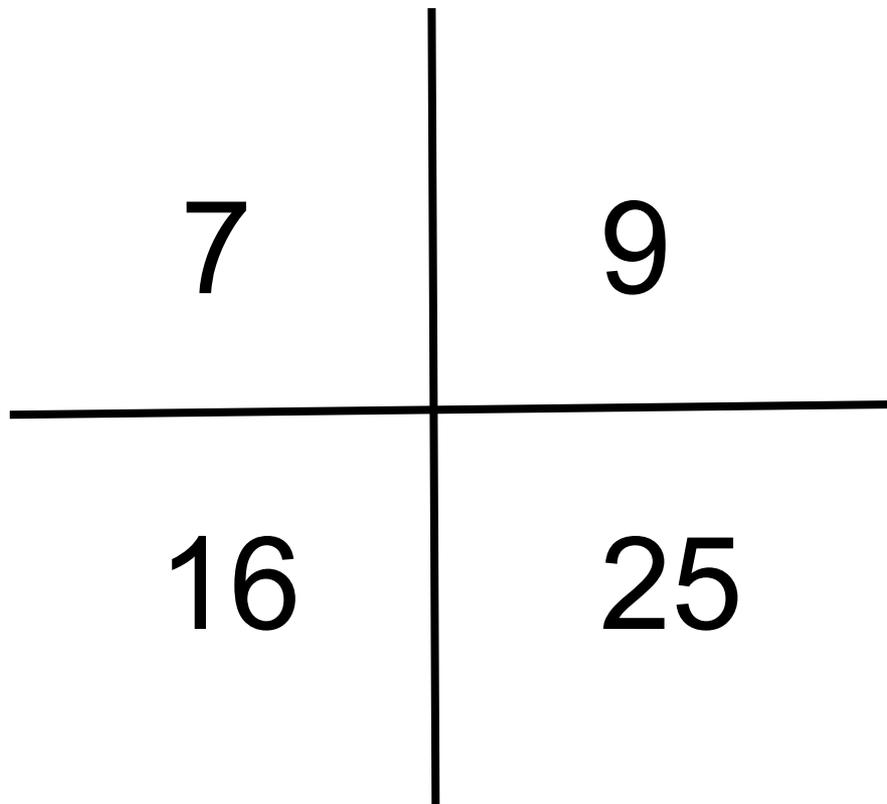
1. Roll the dice
2. Calculate the area
3. Fill in on your graph sheet your square/rectangle
4. MODIFICATION: If you want to change your side lengths you can, however the area has to stay the same!

EX// You roll a 3 and 4. Area = 12 u^2

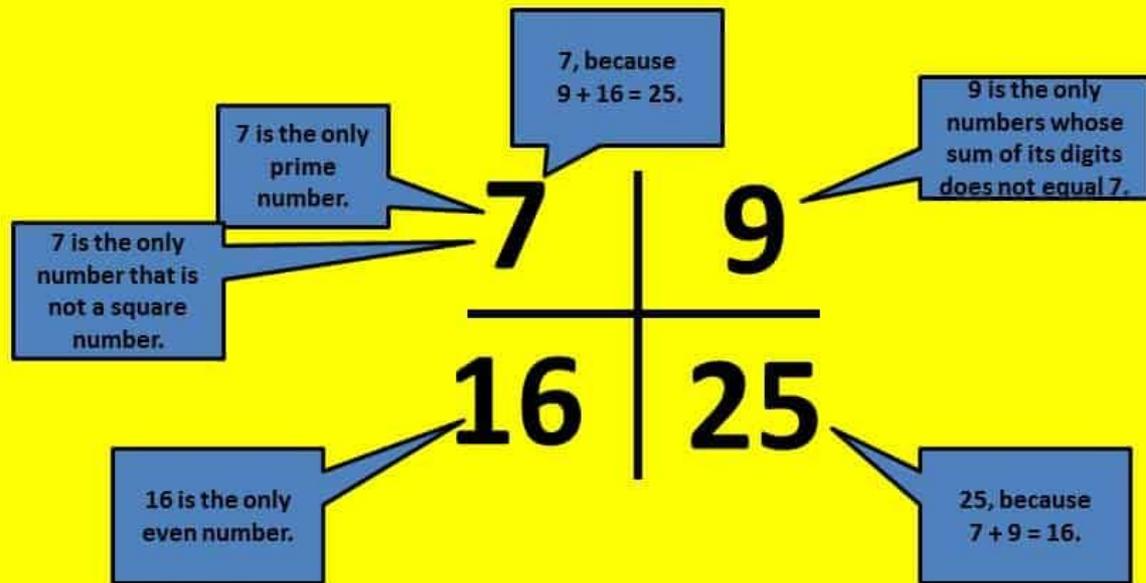
You can choose to draw a 6×2 rectangle if that fits better for you.



Do NOW! Which number does not belong? WHY?



Which one is the imposter?



Squares

Squares are special shapes because both side lengths are the exact same.

This means when finding the area of a square we only need to know the length of **one** side.

Additionally, when finding the area of a square we only need to find one number that when multiplied by itself is equal to the area we are trying to find.

This is where the term square number comes from

$$3^2$$

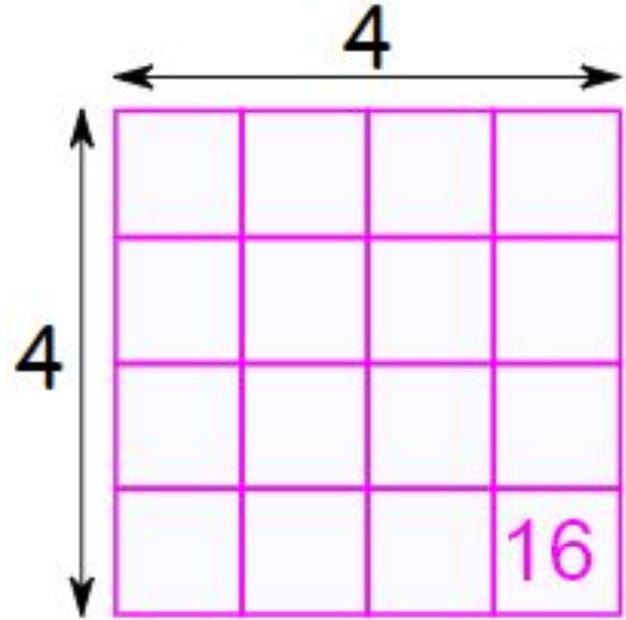
1	2	3
4	5	6
7	8	9

$$3 \times 3 = 9$$

What is a square number?

The number we get after multiplying an integer (not a fraction) by itself.

$4 \times 4 = 16$, so 16 is a square number.



Review

What is the formula for area of a rectangle or square?

What is so special about a square?

What is a square number?



Discovering Square Numbers

- 1) With a partner grab one sheet of paper and one pencil
- 2) With the manipulatives you are given, create as many squares as possible
- 3) Write down the area of the squares you create as well as the side length of each.



What did you find?

First ten square numbers

The first ten square numbers are;

1, 4, 9, 16, 25, 36, 49, 64, 81 and 100

These square numbers are created by the integers;

1, 2, 3, 4, 5, 6, 7, 8, 9, and 10

$$1^2 = 1$$

$$2^2 = 4$$

$$3^2 = 9$$

$$4^2 = 16$$

$$5^2 = 25$$

$$6^2 = 36$$

$$7^2 = 49$$

$$8^2 = 64$$

$$9^2 = 81$$

$$10^2 = 100$$

Fun Fact!

Perfect square numbers only end in **0,1,4,5,6** or **9**. If a number does not end in one of these digits it is not a perfect square.

However, just because a number ends in **0,1,4,5,6** or **9** does not mean it is a perfect square.



Which numbers are perfect squares?

a) 100

e) 74

b) 72

f) 101

c) 64

g) 1

d) 81

h) 42

Find the solution to each

a) 11^2

b) 12^2

c) 14^2

d) 21^2

e) 32^2

f) 45^2

g) 58^2

h) 8.6^2

i) 20.42^2

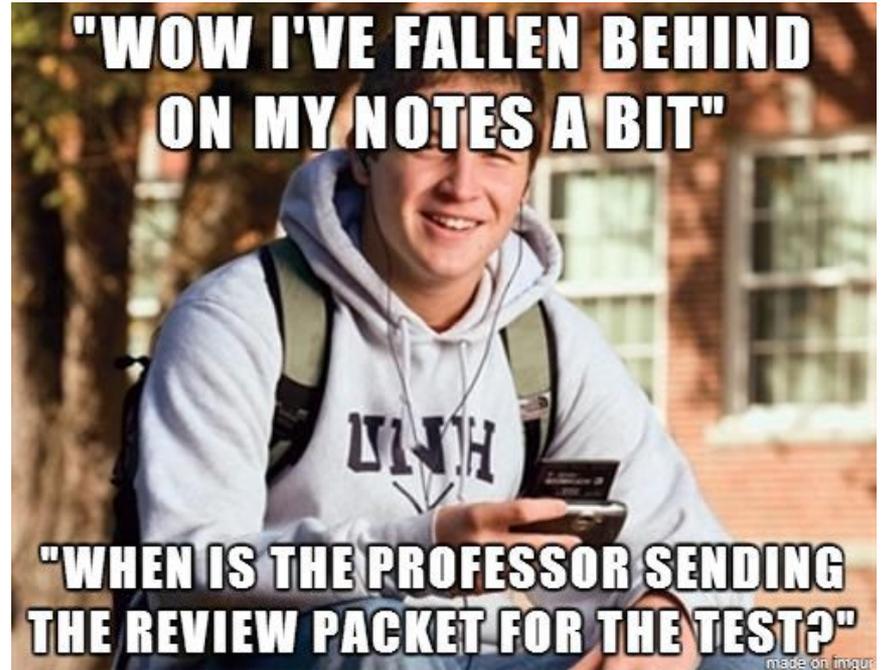
j) 45.2^2

Review

What is a square number?

What makes that number a square?

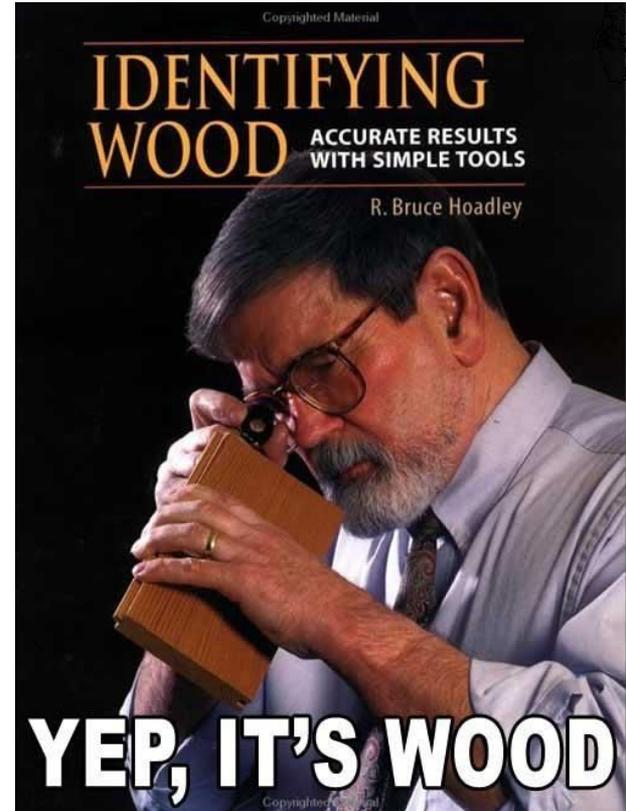
Can you square any number?



Identifying perfect squares

There are two methods we will use to identify if a number is a perfect square;

- 1) Identify using the square root
- 2) Prime factorization

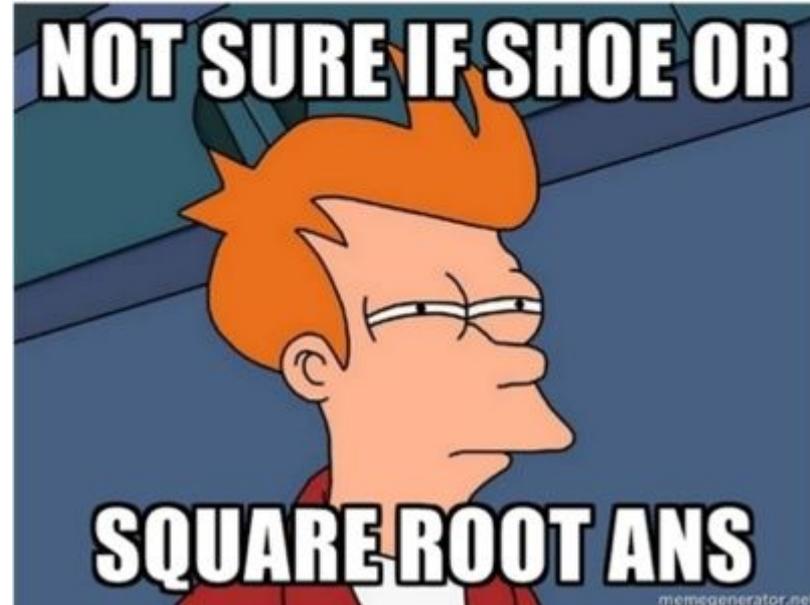


The square root

The square root of a number is a value that, when multiplied by itself, gives the number.

Example: $4 \times 4 = 16$, so a square root of 16 is 4.

Note that $(-4) \times (-4) = 16$ too, so -4 is also a square root of 16, but because we will be using the square roots for measurement we will disregard the negative answers.

The logo for the brand Vans, featuring the word "VANS" in a bold, black, sans-serif font with a registered trademark symbol (®) to the upper right.

What is the square root of each number?

Round to the nearest hundredth if necessary

a) 100

b) 121

c) 56

d) 62

e) 64

f) 25

g) 37

h) 400

Prime numbers

A prime number is a whole number that can not be made by multiplying other whole numbers. The only factors of a prime number are 1 and itself.

For example, 2 is a prime number because it's' only factors are 1 and 2.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Prime factorization

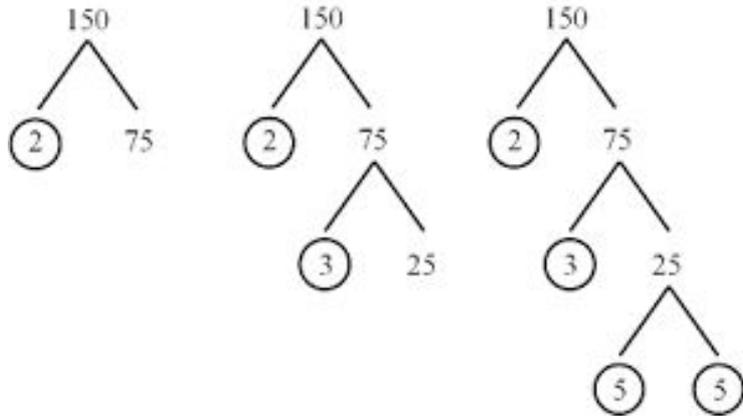
Prime factorization is finding the factors of a number that are all prime. Each of these prime numbers can be multiplied to create the original number. A number is considered square if it has an even amount of the same prime factor. To complete prime factorization;

- 1) Find two factors of your number.
- 2) Look at your two factors and determine if one or both of them is not prime.
- 3) If it is not a prime factor it.
- 4) Repeat this process until all your factors are prime.

Prime Factorization

<https://www.flocabulary.com/unit/prime-factorization/>

Prime Factors



Find the prime factorization of 24

24

- 1) Find two factors of your number.
- 2) Look at your two factors and determine if one or both of them is not prime.
- 3) If it is not a prime factor it.
- 4) Repeat this process until all your factors are prime.

Find the prime factorization of 81

81

- 1) Find two factors of your number.
- 2) Look at your two factors and determine if one or both of them is not prime.
- 3) If it is not a prime factor it.
- 4) Repeat this process until all your factors are prime.

Find the prime factorization of 36

36

- 1) Find two factors of your number.
- 2) Look at your two factors and determine if one or both of them is not prime.
- 3) If it is not a prime factor it.
- 4) Repeat this process until all your factors are prime.

Find the prime factorization of 400.

Review

42

- a) What are two ways to tell if a number is a perfect square?

- b) How many answers does the square root of a number give?

- c) What is the prime factorization of 42?

Textbook Practice

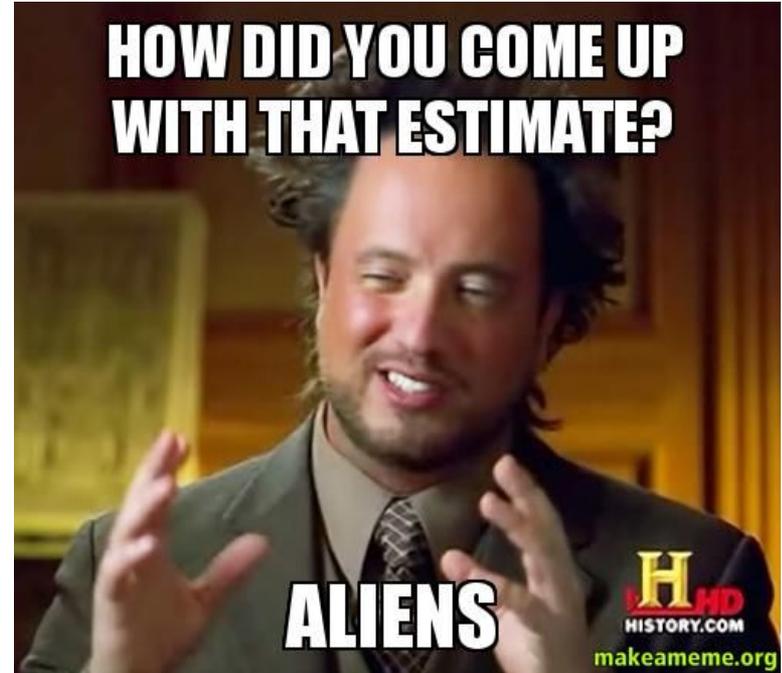
Pages 8-9 Questions #1, 2, 6

Pages 13-14 Questions # 2, 4, 7, 10

Estimating square roots

It is important to be able to estimate the square root of a number. To estimate the square root of a number;

- 1) Write out the first few perfect squares.
- 2) Find out which two squares the number is between.
- 3) Take the square roots of the perfect squares.
- 4) Pick a decimal number between the two perfect squares that you believe is close to the answer.



<https://virtualnerd.com/algebra-1/algebra-foundations/powers-square-roots/square-roots/square-root-estimation>

What is $\sqrt{55}$ when estimating?

- 1) Write out the first few perfect squares.
- 2) Find out which two squares the number is between.
- 3) Take the square roots of the perfect squares.
- 4) Pick a decimal number between the two perfect squares that you believe is close to the answer.

What is $\sqrt{76}$ when estimating?

- 1) Write out the first few perfect squares.
- 2) Find out which two squares the number is between.
- 3) Take the square roots of the perfect squares.
- 4) Pick a decimal number between the two perfect squares that you believe is close to the answer.

What is $\sqrt{38}$ when estimating?

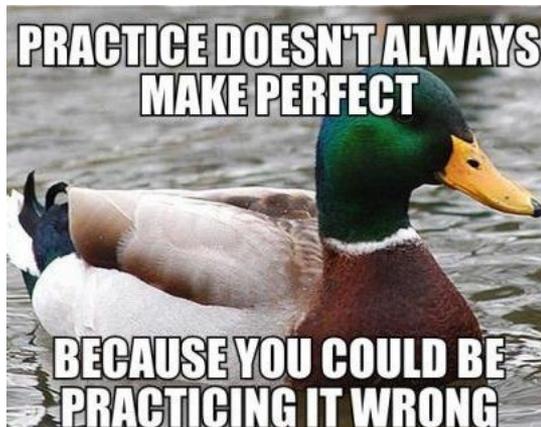
- 1) Write out the first few perfect squares.
- 2) Find out which two squares the number is between.
- 3) Take the square roots of the perfect squares.
- 4) Pick a decimal number between the two perfect squares that you believe is close to the answer.

Practice

Page 18 #1, 2, 4, 5, 13, 14

Extra Practice (Mid-Unit Review)

Page 23 Questions # 1 - 9



Review

- a) What is a square root?
- b) What is a perfect square?
- c) What makes a square so special?



Which of the following numbers are perfect squares? 10, 100, 1000, 10 000, 100 000.

At the 2006 Winter Olympics in Turin, Italy, 196 Canadian athletes were at the opening ceremonies. Would they have been able to arrange themselves in a square? Prove your answer.

A fridge magnet has an area of 54 mm^2 . Is 54 a perfect square? If not, what perfect square number is closest?

A square floor mat used for gymnastics has a side length of 17m. What is the area of the mat in meters?

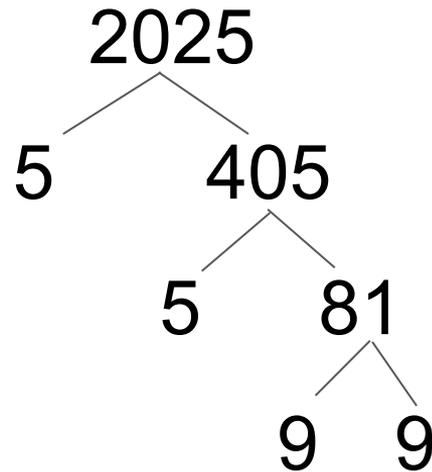
The area of a square is 24.0 cm^2 . What is its width?

A square grid contains 400 cells. What is its width?

What is the perimeter of a square parking lot with an area of 1600 m^2 ?

Maddy started to draw a tree diagram to determine whether 2025 is a square number.

How can Maddy use what she has done so far to determine that 2025 is a square number?



Mrs. Dewacht told her students' to run around the perimeter of the school field. The area of the square field is $28\,900\text{ m}^2$. What distance did the students run?

Review

- a) What is the formula for the area of a square?

- b) How do I find the length of a square given the area?

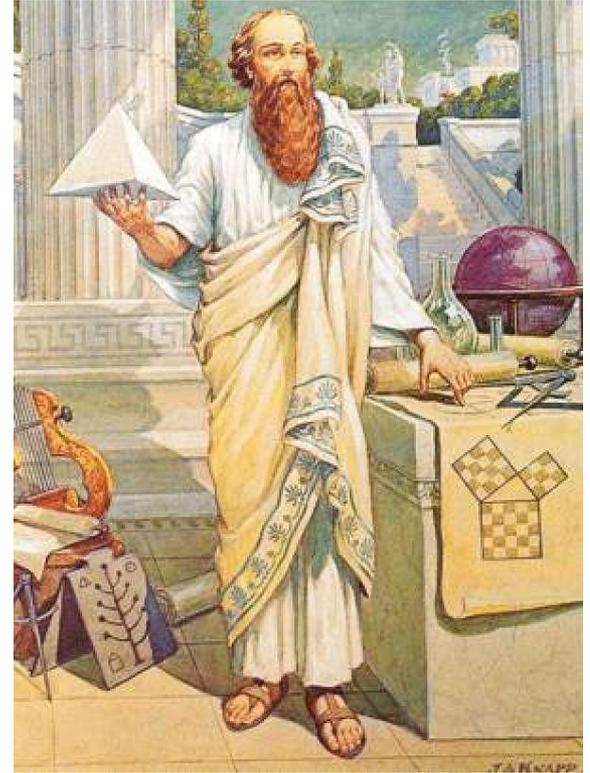
- c) What is a right angle?



DO NOW!

Pythagoras

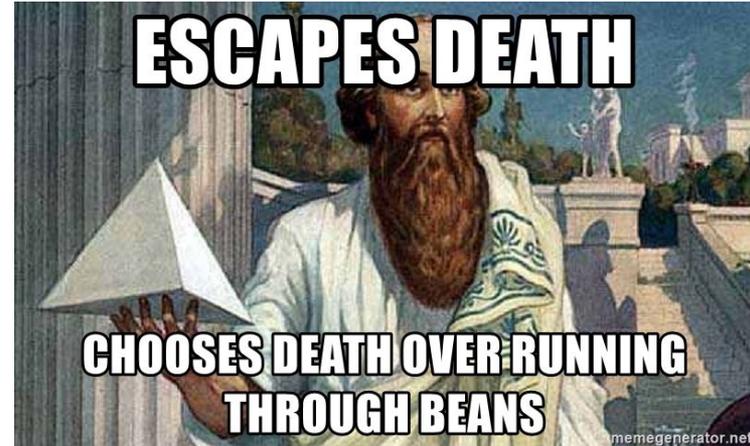
Pythagoras was a greek philosopher and mathematician. He is credited with proving the theorem for finding the hypotenuse of a right triangle aptly named **Pythagorean Theorem**.



Fun fact!

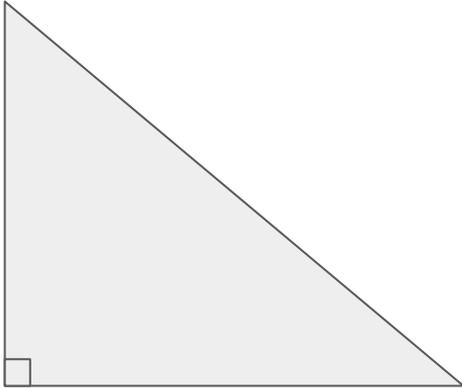
Pythagoras had a Brotherhood of mathematicians in Croton. It is there that nobleman named Kylon who was rejected by Pythagoras influenced many local people to create mobs. These mobs went to burn the houses of the Pythagorean Brotherhood.

Pythagoras was among the few lucky ones who escaped the fires. But while trying to escape, the mob that was following him Pythagoras ran out of energy in a bean field. As a life-long vegetarian, he didn't eat meat but he didn't eat beans, either, because he considered them our siblings. Pythagoras exclaimed that he would rather die than enter field. The mob then proceeded to stab him to death.



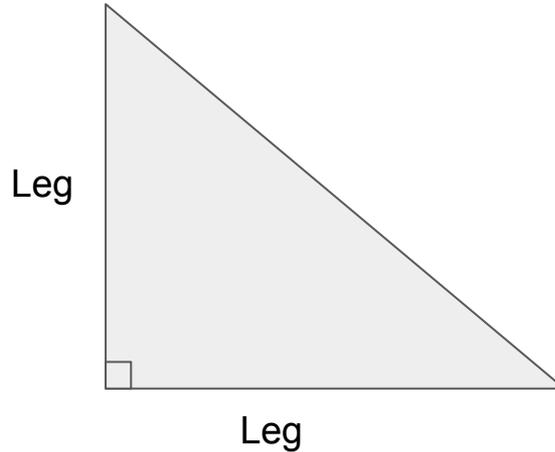
Right Triangle

Right Triangle: a triangle that includes one right angle (90°)



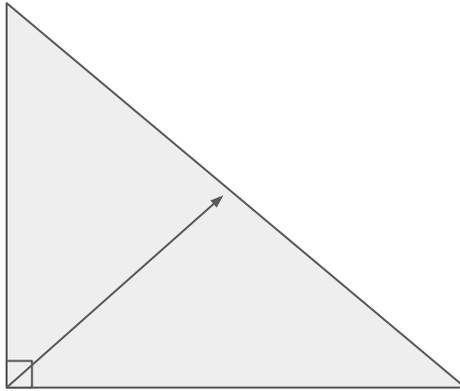
Legs of a Right Triangle

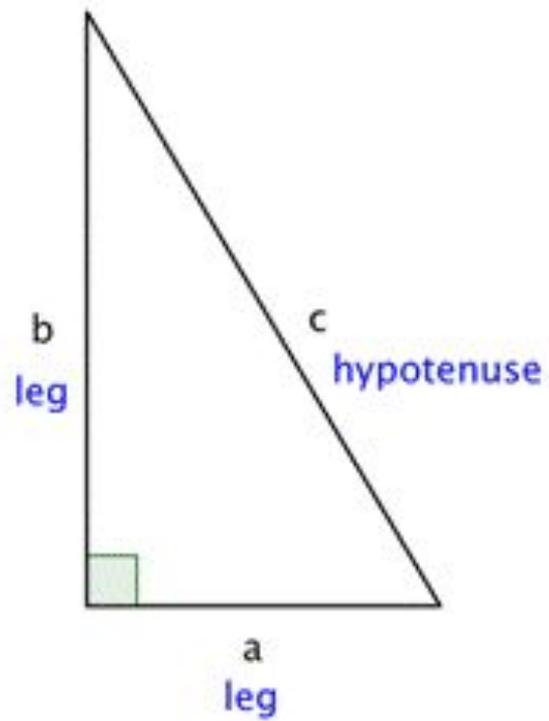
Leg of a Right **Triangle**: the sides in a right **triangle** opposite an acute angle. The **legs** are the two shorter sides of the **triangle**.



Hypotenuse

Hypotenuse: the longest side of a right triangle, opposite the right angle.





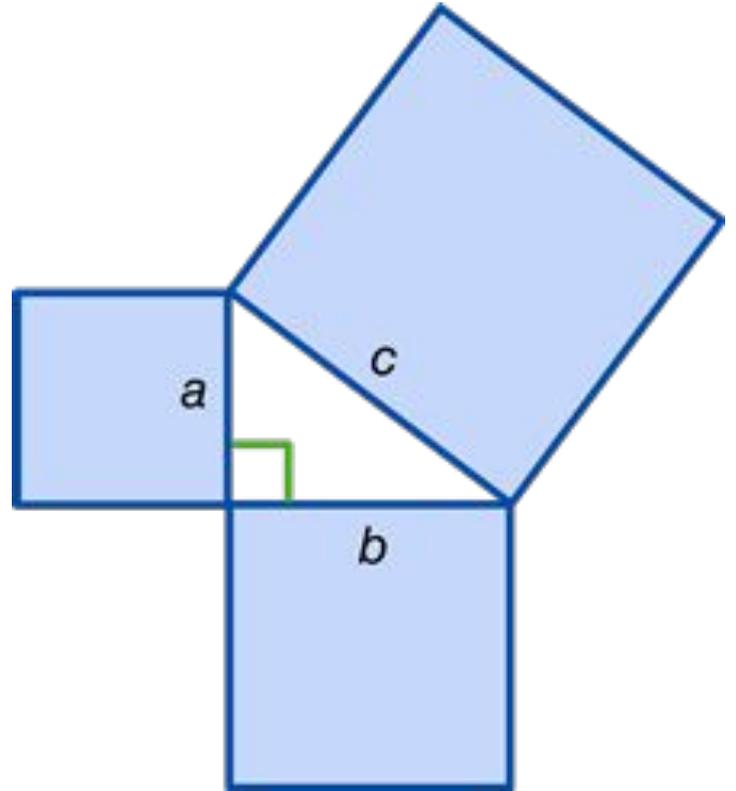
The Pythagorean Theorem

The Pythagorean Theorem: the sum of the squares of the legs of a **right triangle** is equal to the square of the **hypotenuse**.

The Pythagorean Theorem

OR

When a triangle has a right angle and squares are made on each of the three sides, then the biggest square has the exact same area as the other two squares put together!



The Pythagorean Theorem

The Pythagorean theorem is often written as the algebraic formula;

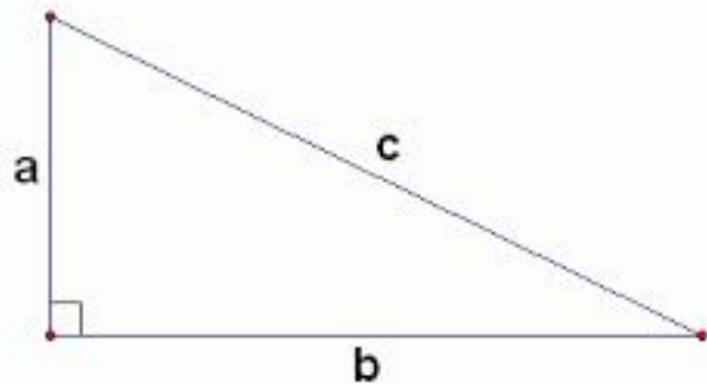
$$a^2 + b^2 = c^2$$

Where 'a' and 'b' are the legs of the triangle and 'c' is the hypotenuse.

The formula only works with **right triangles!**

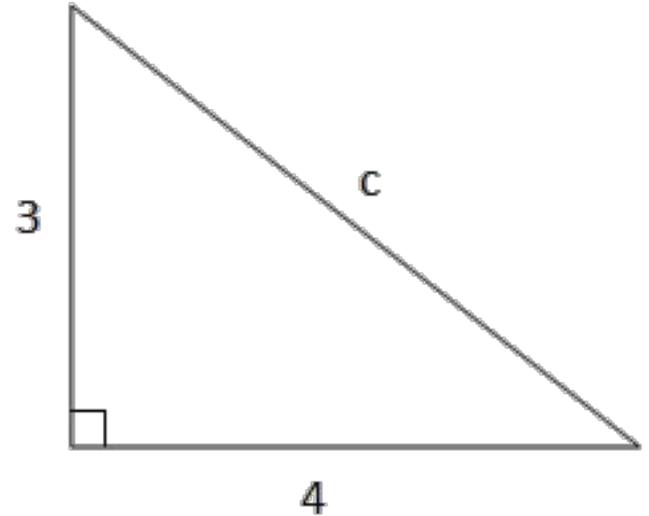
The biggest square has the exact same area as the other two squares put together!

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



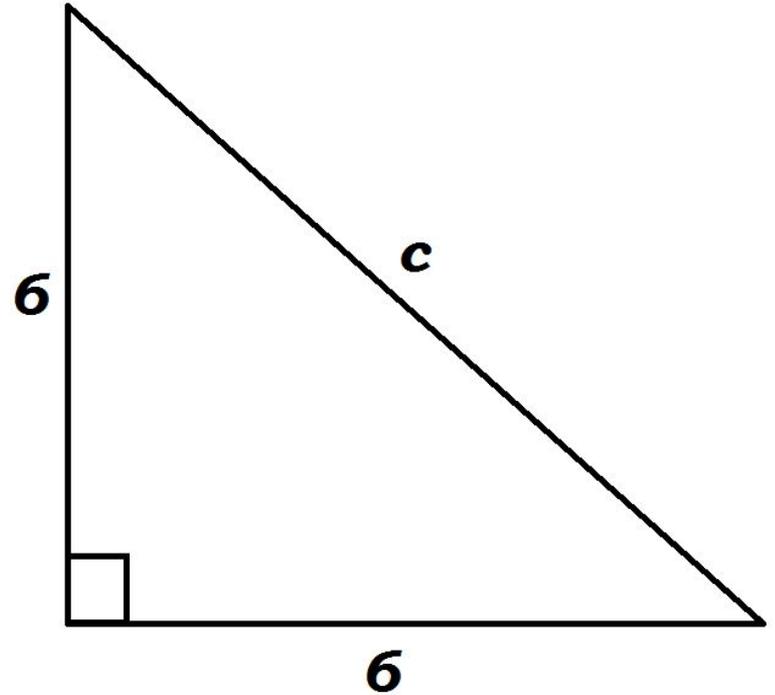
$$a^2 + b^2 = c^2$$

A triangle has legs of 3 units and 4 units. What is the length of the hypotenuse?

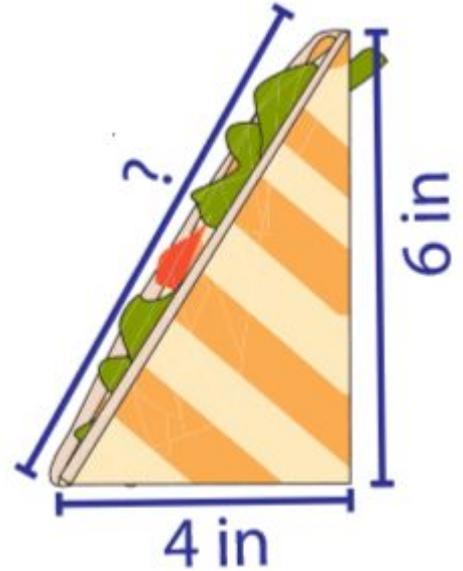




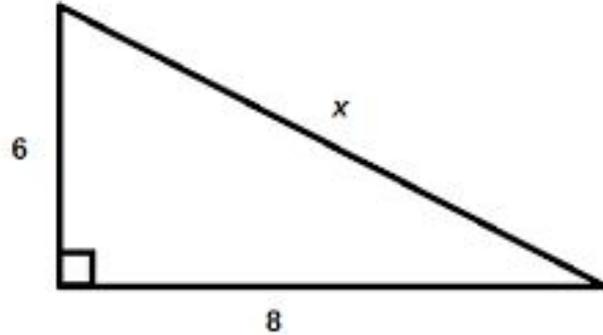
A right isosceles triangle has legs of 6 metres each. What is the length of the hypotenuse to the nearest tenth of a meter?



Joey made a sandwich that was 4 inches long and 6 inches high. What is the diagonal length of the sandwich?

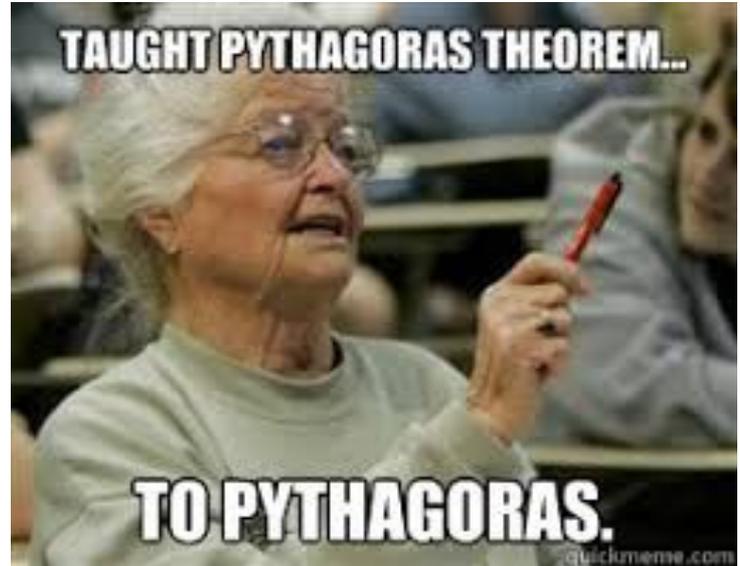


What is the length of the hypotenuse?



Review

- a) What is a hypotenuse?
- b) What is the Pythagorean Theorem?
- c) What kind of triangles does the Pythagorean Theorem work for?



Practice

Page 29 - #2, 5, 7

DO NOW!

Logic Puzzle - on front table

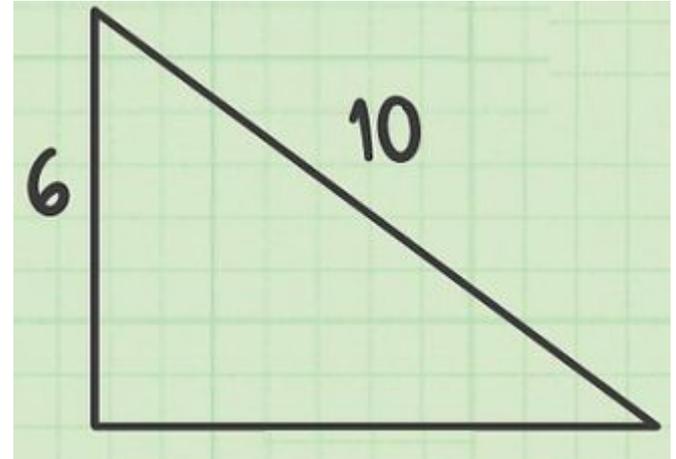
The Pythagorean Theorem

The Pythagorean Theorem is not only used to find the hypotenuse of a right triangle.

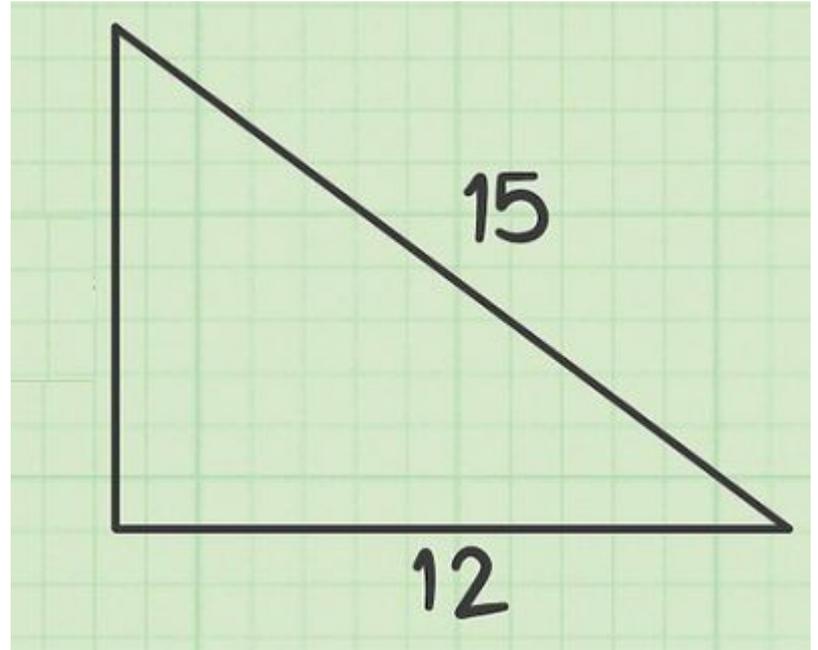
It can also be used to find the legs as long as one of the legs and hypotenuse is known.

Or in other terms you can use the Theorem to find 'a' as long as you know 'b' and 'c'.

A triangle with hypotenuse of length 10 cm and one leg length of 6 cm is drawn. What is the length of the second leg?



A triangle with hypotenuse of length 15 cm and one leg length of 12 cm is drawn. What is the length of the second leg?

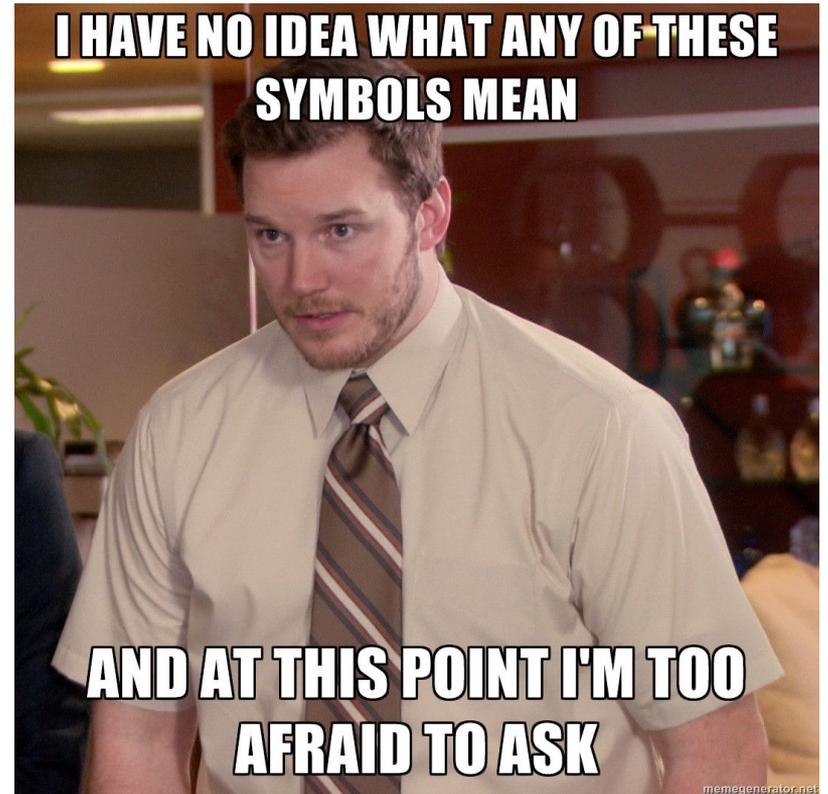


A triangle with hypotenuse of length 13 ft and one leg length of 8 ft is drawn. What is the length of the second leg to the nearest tenth?

Pythagorean Theorem

One of the best parts of the Pythagorean Theorem is that it works both ways!

This means that if a triangle is a right triangle $a^2 + b^2 = c^2$, and if $a^2 + b^2 = c^2$ then the triangle is a right triangle.



A triangle has measures of 8cm, 10cm and 16cm. Is it a right triangle?

Review

- a) What is the Pythagorean Theorem?

- b) What kind of triangles does the Pythagorean Theorem work for?

- c) Can the Theorem also help to find right angle triangles?



Practice

Page 30-31
#8, 9, 10, 11

DO NOW!

Draw two lines that are perpendicular to one another.



Make one line 6 cm and the other 4 cm.

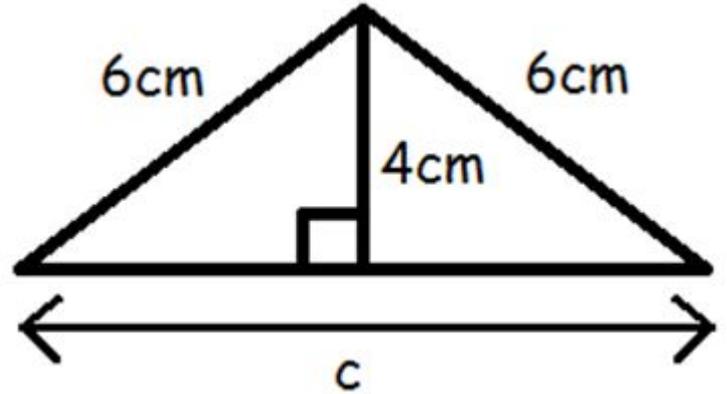
Calculate what the hypotenuse SHOULD be.

Connect and measure your line to see if it is accurate.

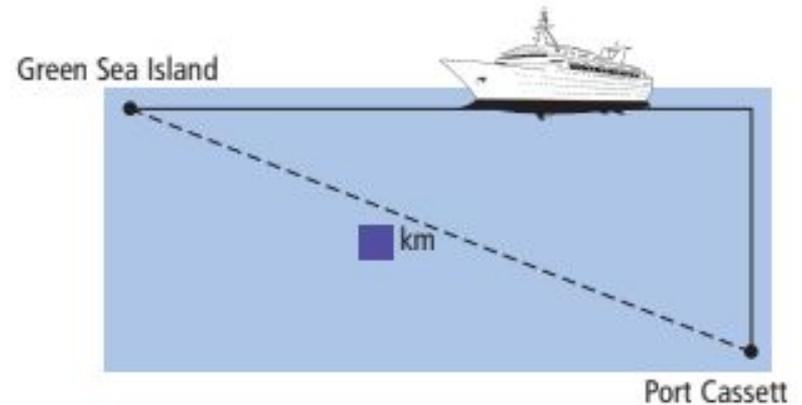
The height of a triangle is 4cm and the base of the same triangle is 10 cm. What is the length of the hypotenuse to the nearest tenth?

The hypotenuse of a right triangle is 14.0 cm and the base of the triangle is 8.0 cm. What is the height of the triangle to the nearest hundredth?

Using the congruent triangles below find the length of side c to the nearest tenth.



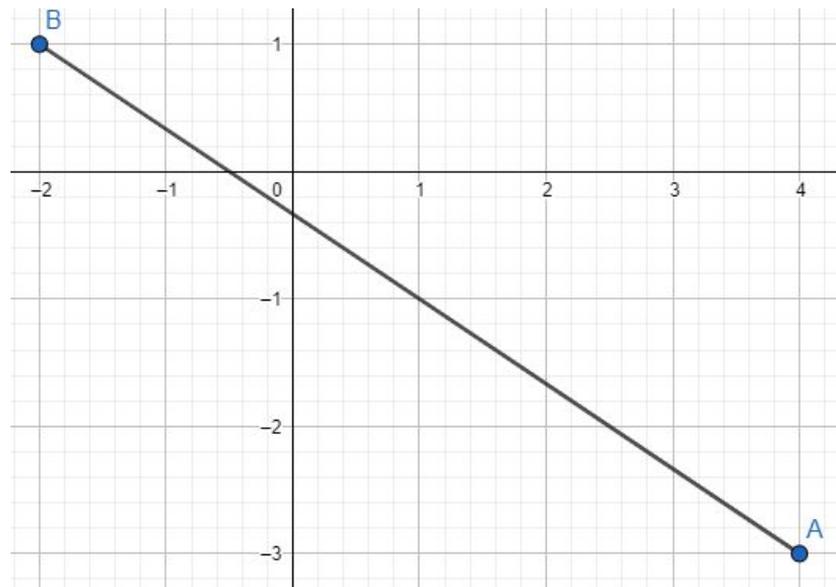
A cruise ship travels from Port Cassett north for 34 km. Then it turns 90° and travels west for 60 km. When it reaches Green Sea Island, how far is the ship from Port Cassett. Express your answer to the nearest kilometer.



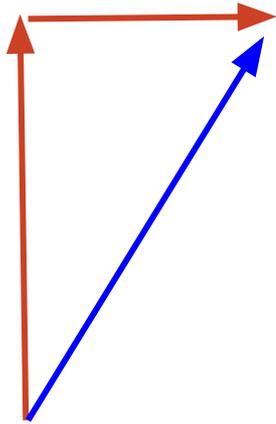
The right triangle below has a square attached to its hypotenuse. What is the perimeter of the triangle? Give your answer to the nearest tenth of a centimeter.



Find the distance between the points $(4,-3)$ and $(-2,1)$.



Mr. Hirsche challenges Mr. Turnbull to a race across the Wilson soccer field measuring 100 yards long and 50 yards wide. Mr. Hirsche runs down the perimeter of the field to the opposite corner, and Mr. Turnbull runs diagonally straight across. Who should win the race?



Practice!

Page 35 all questions

Chapter Review pg. 39

