Warm Up Math 9

1) Find the perfect square whose square root is a) 0.6 b) $\frac{3}{5}$

0.36 $\frac{9}{25}$

2) Is the following fractions or decimals perfect squares? Explain

a) 0.64 b) 62.5 c) $\frac{49}{144}$ d) $\frac{13}{25}$

$\frac{64}{100}$ yes $\frac{625}{10}$ N y N

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N

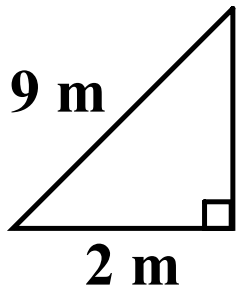
Y

N

THE FIRST 20 PERFECT SQUARES:

1^2	=	1 x 1	=	1	11^2 =	11 x 11 =	121
2^2	=	2 x 2	=	4	12^2 =	12 x 12 =	144
3^2	=	3 x 3	=	9	13^2 =	13 x 13 =	169
4^2	=	4 x 4	=	16	14^2 =	14 x 14 =	196
5^2	=	5 x 5	=	25	15^2 =	15 x 15 =	225
6^2	=	6 x 6	=	36	16^2 =	16 x 16 =	256
7^2	=	7 x 7	=	49	17^2 =	17 x 17 =	289
8^2	=	8 x 8	=	64	18^2 =	18 x 18 =	324
9^2	=	9 x 9	=	81	19^2 =	19 x 19 =	361
10^2	=	10 x 10	=	100	20^2 =	20 x 20 =	400

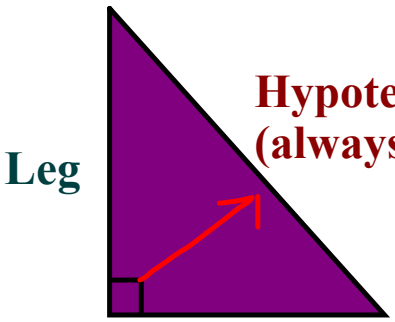
How could you check if the ladder is safe?
Try to do this without a calculator.

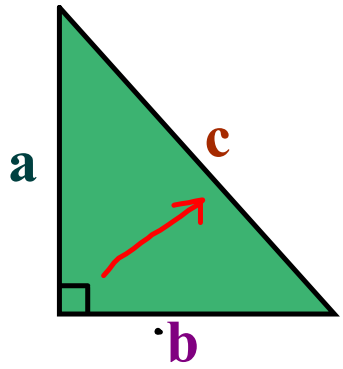


$$a^2 + b^2 = c^2$$
$$2^2 + b^2 = 9^2$$
$$4 + b^2 = 81$$
$$b^2 = 81 - 4$$
$$b^2 = 77$$
$$\sqrt{b^2} = \sqrt{77}$$
$$b \doteq 8.8 \text{ m}$$

PYTHAGOREAN THEOREM:

We know that a right triangle is a triangle containing a 90° angle.





Hypotenuse

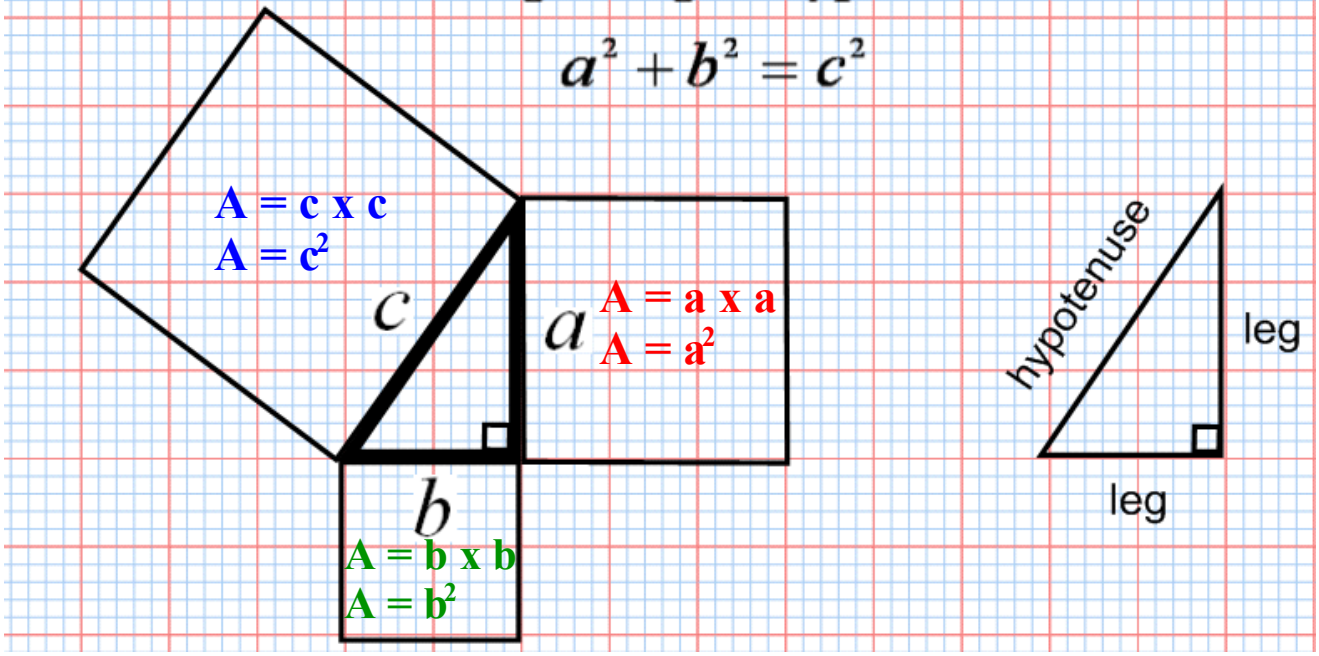
$$c^2 = a^2 + b^2$$

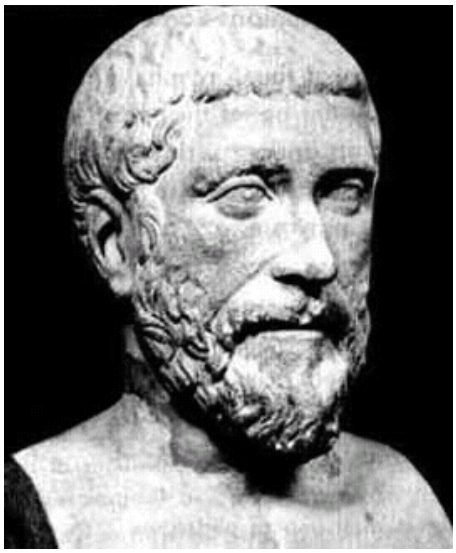
Leg

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

Pythagoras found out that when you have a right triangle, $leg^2 + leg^2 = hypotenuse^2$

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

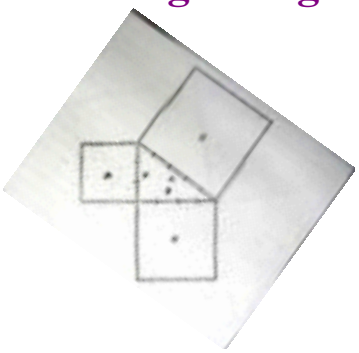


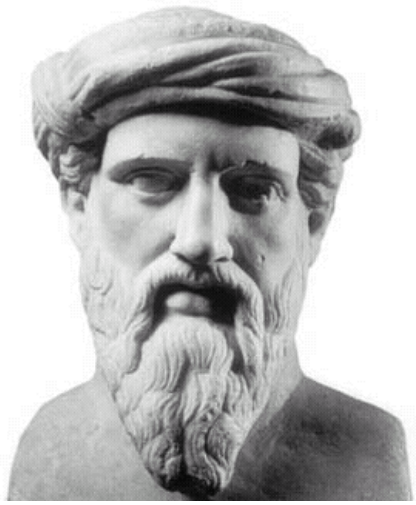


Pythagoras of Samos
(about 569 BC - about 475 BC)

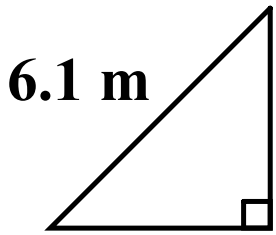
Pythagoras was a Greek philosopher who made important developments in mathematics, astronomy and the theory of music. The theorem now known as Pythagoras' theorem was known to the Babylonians 1000 years earlier, but he may have been the first to prove it.

Pythagoras discovered a relationship between the areas of the squares drawn on the sides of a right-angled triangle.





Calculate how far up a wall a 6.1 m long ladder will reach if its base is 1.5 m from the wall.



Leg

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

$b^2 = 6.1^2 - 1.5^2$

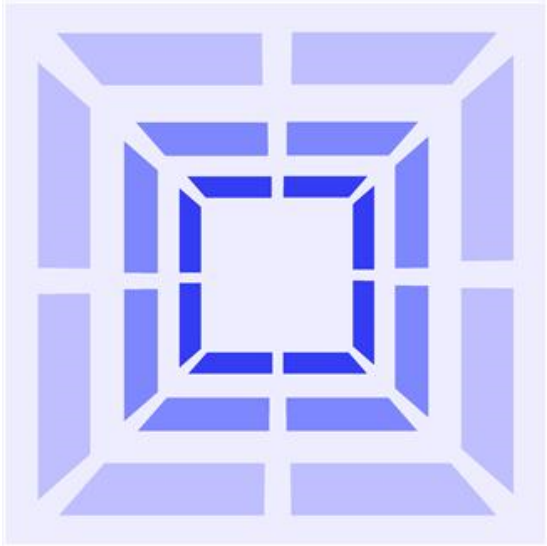
$b^2 = 37.21 - 2.25$

$b^2 = 34.96$

$\sqrt{b^2} = \sqrt{34.96}$

$b \doteq 5.9$ m

Square Roots of Non-Perfect Squares



Perfect Squares...

16

25

9

1

4

144

256

Non-Perfect Squares...

15

8

2

11

20

167

19

$\sqrt{16} = 4$

$\sqrt{8} = 2.8284271\ldots$

Non- perfect Squares cannot be written as a product of two equal numbers

Estimating square roots of non-perfect squares.

Estimate the square root of 7.5.

Method #1	Method #2
Using a Calculator:	Using Benchmarks:
	Determine what two perfect squares 7.5 is between.
	$\sqrt{7.5} =$

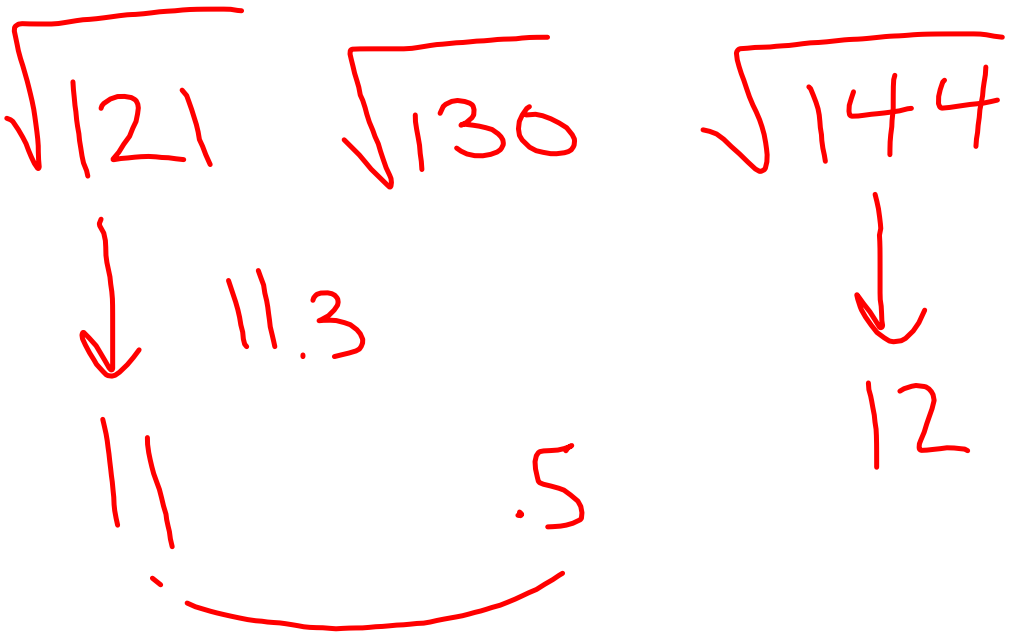
$\sqrt{7.5}$

2.74....

$\sqrt{4}$ $\sqrt{7.5}$ $\sqrt{9}$

2 .5 3

Estimate the square root of 130



Estimate the square root of $\frac{3}{7}$.

with
Method #1

1. Change the fraction to a decimal, then using benchmarks or a calculator estimate the square root.

0.655 . . .

without
Method #2

1. Find the perfect squares closest to the numerator and denominator.

$\frac{\sqrt{4}}{\sqrt{9}}$

2. Take the square roots of the numbers you have chosen.

$\frac{2}{0.\overline{6}}$

Without Calculator

Estimate the square root of $\frac{17}{63}$.

$$\frac{\sqrt{16}}{\sqrt{64}} = \frac{4}{8} = 0.5$$

Finding a Number with a Square Root between Two Given Numbers.

Find a decimal
that has a square root
between 10 and 11.

Method #1

Identify any decimal first.

10 11

10.4

Now square the number.

$(10.4)^2=108.16$

Method #2

Identify the perfect squares first.

10 11

100 121

Choose
any number
between them...
and find
the square root.

$\sqrt{115}\doteq 10.7$