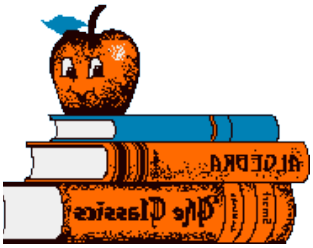
Curriculum Outcome

(N5) Determine the square root of positive rational numbers that are perfect squares.

(N6) Determine an approximate square root of positive rational numbers that are non-perfect squares.

(SS2) Determine the surface area of composite 3-D objects to solve problems

(N4) **Explain and apply the order of operations, including exponents, with and without technology.**

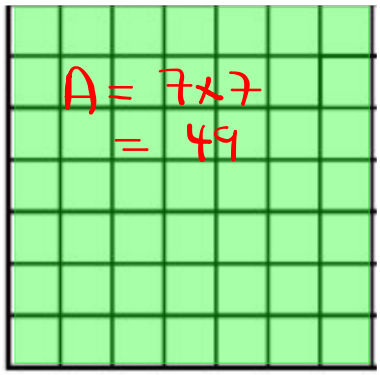


WARM UP

Without Calculators

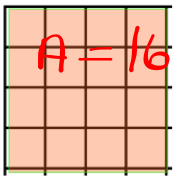
i) Determine the Area of the Shaded Squares
ii) Determine the perimeter

a)



P= 7+7+7+7
= 28

b)



P= 4+4+4+4
P = 16

Find the square root of the following:

a) $\sqrt{\frac{1}{144}} = \frac{1}{12}$

b) $\sqrt{\frac{121}{81}} = \frac{11}{9}$

c) $\sqrt{36} = 6$

If the side length is 9
what is the area ?

To Determine if a Fraction is a Perfect Square

BOTH Numerator and Denominator MUST be Perfect Square Numbers

***Simplify fractions first ***

- $\frac{18 \div 2}{32 \div 2} = \sqrt{\frac{9}{16}} = \frac{3}{4}$

Is each fraction a perfect square? Explain

b) $\frac{4}{3}$

Not P.S

c) $\frac{300 \div 3}{108 \div 3} = \sqrt{\frac{100}{36}} = \frac{10}{6}$

P.S

Identifying Decimals that are Perfect Squares

$1.\underline{44}$

Method 1

Write the decimal as a fraction

$\sqrt{\frac{144}{100}} = \frac{12}{10}$

$= 1.2$

$= \frac{6}{5} \times \frac{6}{5}$

THUS 1.44 is a perfect square

Method 2

Use a Calculator.

Use the square root button $\sqrt{\ }$

$\sqrt{1.44} = 1.2$

Since the sqaure root is a terminating decimal then 1.44 is a perfect square.

Without a calculator

Determine if the decimal is a perfect square?

1.69

$\sqrt{\frac{169}{100}}$

$\frac{13}{10}$

P.S

0.016

$\sqrt{\frac{16}{1000}}$

$= \frac{4}{?}$

Not P.S

$10^0 = 1$ Yes

$10^1 = 10$ No

$10^2 = 100$ Yes

$10^3 = 1000$ No

$10^4 = 10000$ Yes

Calculate the number whose square root is $\frac{4}{7}$

$(\sqrt{n})^2 = (\frac{4}{7})^2$

$n = \frac{16}{49}$

Basically what is the area????

You Try!!!

Calculate the number whose square root is .

1) $\frac{7}{11}$

$\sqrt{n} = \frac{7}{11}$

$n = \frac{49}{121}$

2) $\frac{3}{5}$

$n = \frac{9}{25}$

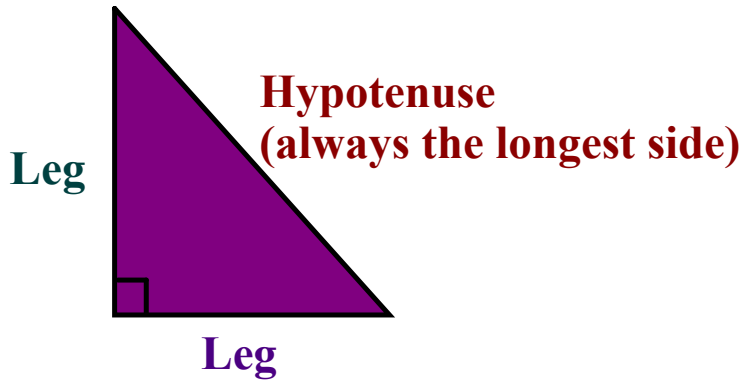
3) 1.5

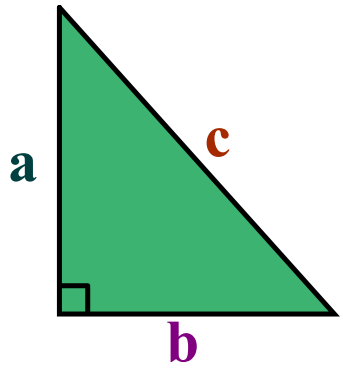
$\sqrt{n} = \frac{15}{10}$

$n = \frac{225}{100}$

PYTHAGOREAN THEOREM:

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





Hypotenuse

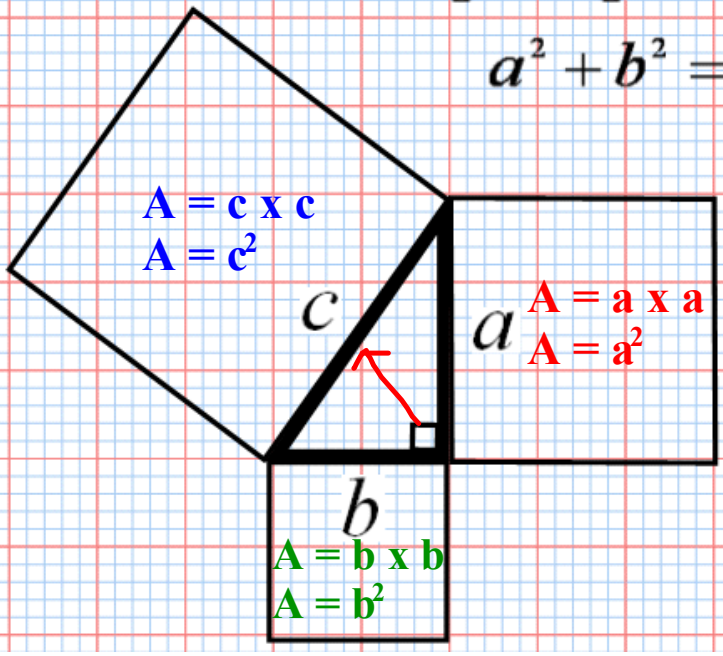
$$c^2 = a^2 + b^2$$

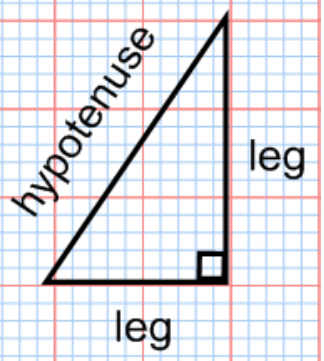
Leg

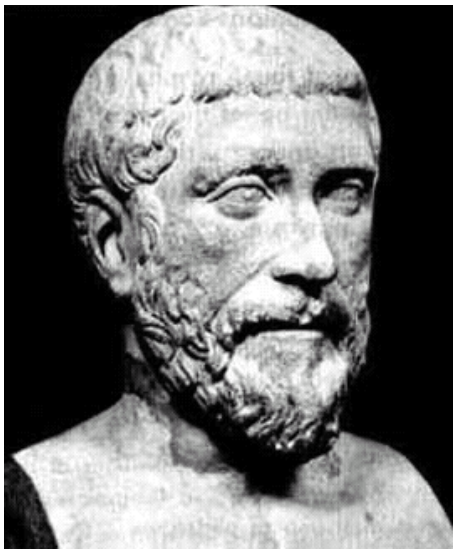
$$b^2 = c^2 - a^2$$

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

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



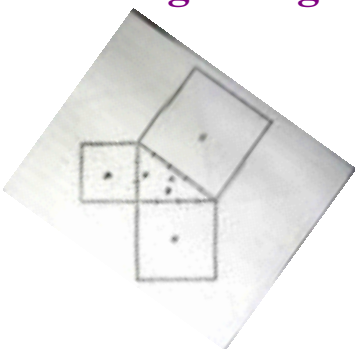


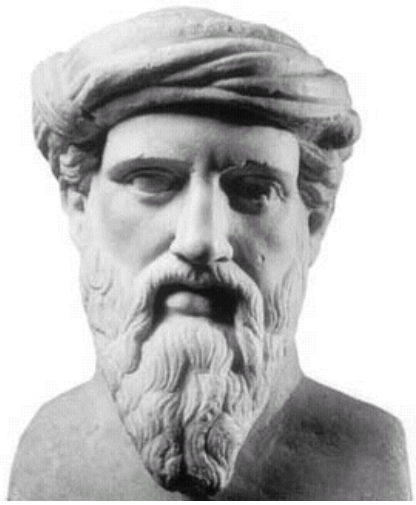


Pythagoras of Samos
(about 569 BC - about 475 BC)

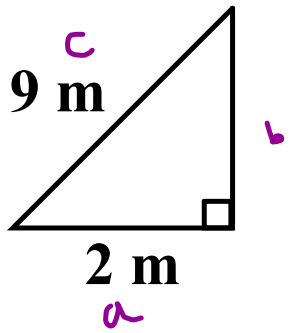
Pythagoras was a Greek philosopher who made important developments in mathematics, astronomy and the theory of music. The theorem now known as Pythagoras' theorem was known to the Babylonians 1000 years earlier, but he may have been the first to prove it.

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





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



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

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

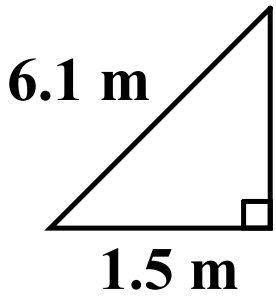
$b^2 = 9^2 - 2^2$

$b^2 = 81 - 4$

$\sqrt{b^2} = \sqrt{77}$

$b = 8.8$

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

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

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

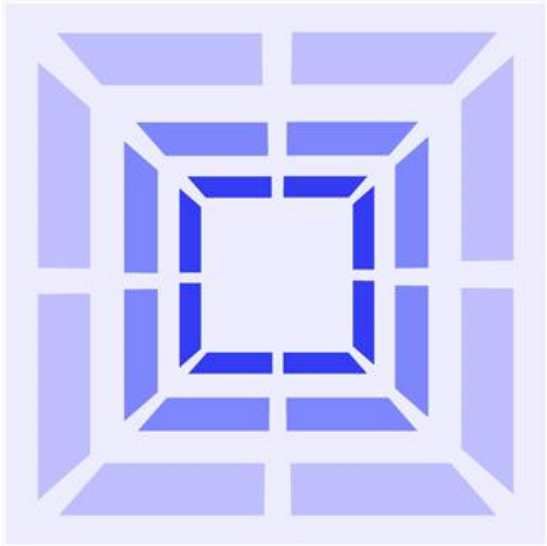
$b^2 = 37.21 - 2.25$

$b^2 = 34.96$

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

$b \doteq 5.9$ 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:
$\sqrt{7.5} =$ 2.739...	Determine what two perfect squares 7.5 is between.

$\sqrt{7.5}$ = closer

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

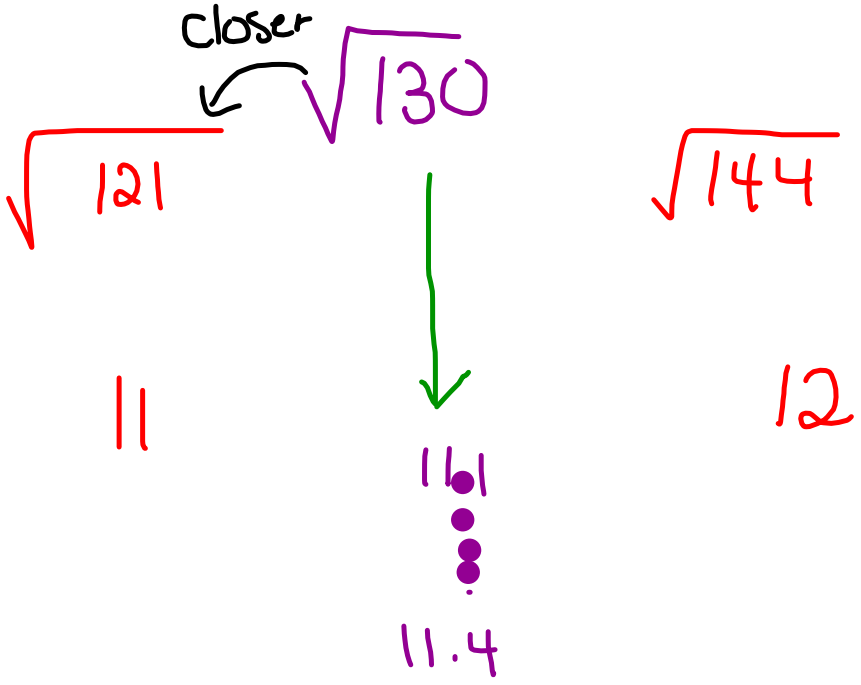
2 3

2.6

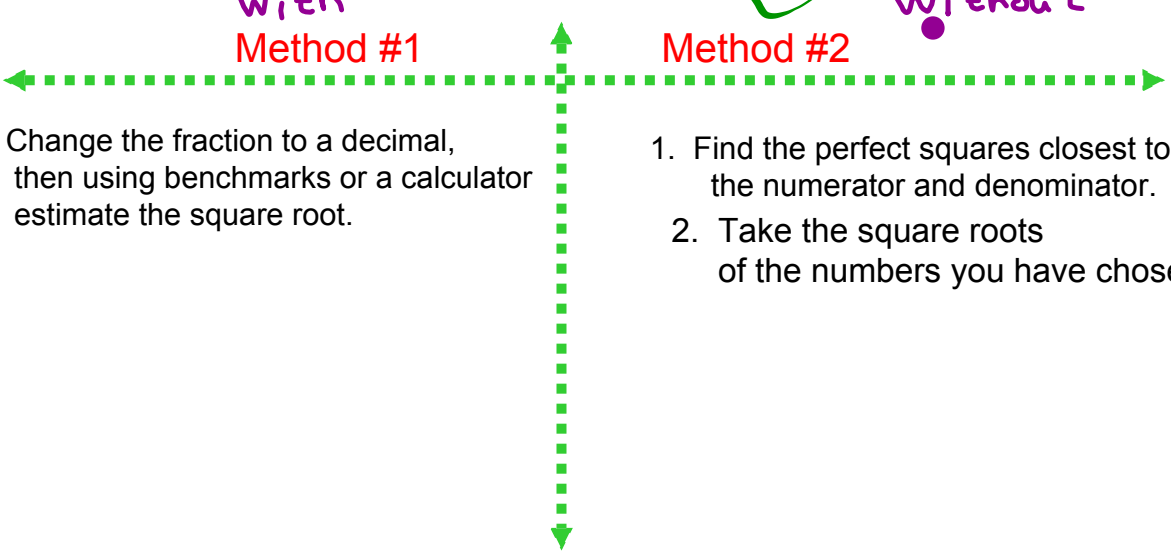
2.9

Use benchmarks

Estimate the square root of 130



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



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

1. Find the perfect squares closest to the numerator and denominator.
2. Take the square roots of the numbers you have chosen.

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

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

With calculator

Method #1

without a calculator

Method #2

t.