

NOVEMBER 6, 2015

**UNIT 3: SQUARE ROOTS AND
SURFACE AREA**

**SECTION 1.2:
SQUARE ROOTS OF
NON-PERFECT SQUARES**

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MATH 9



WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Numbers 4" OR N4 and begin working on "Numbers 6" OR "N6" which state:

N4: "Explain and apply the order of operations, including exponents, with and without technology."

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



What does **THAT** mean???

For this unit, **SCO N4** means that we will learn how to find the square root (the number that was multiplied by itself) of numbers both with and without a calculator.

SCO N6 means that we will use calculators and "benchmarking" to estimate the square root (the number that was multiplied by itself) of non-perfect squares like 15, 7.5 and 19.

6



WARM-UP:

A student has a **rectangular** piece of paper **7.2 cm** by **1.8 cm**. She cuts the paper into parts that can be rearranged to form a **square**.

- a) What is the side length of the **square**?

$$\sqrt{12.96} = 3.6 \text{ cm}$$

- b) What are the fewest cuts the student could have made? Explain.

$$1 \text{ cut ; } 7.2 \div 2 = 3.6 \text{ cm and } 1.8 \times 2 = 3.6 \text{ cm}$$

$$\begin{aligned} A &= bh \\ &= 1.8(7.2) \\ &= 12.96 \text{ cm}^2 \end{aligned}$$



HOMEWORK QUESTIONS? $10 \times 10 = 100$
(pages 11 / 12 / 13, #8 TO #15) $100 \times 100 = 10000$

$$\sqrt{0.0025}$$
$$= 0.05$$

$$\sqrt{0.0025}$$
$$= \sqrt{\frac{25}{10000}}$$
$$= \frac{5}{100}$$

THE FIRST 20 PERFECT SQUARES:

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

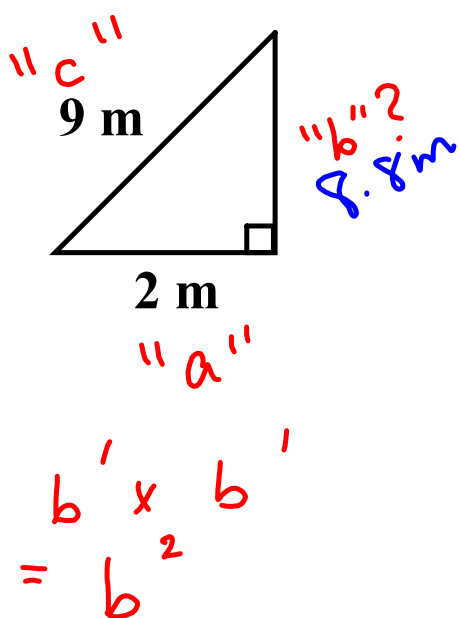
Which numbers are between the perfect squares 1 and 4?
9 and 16? What do you think their square roots will be?

WARM UP:

Please turn to **page 14** in *MMS9*.

What is the safe height up the wall for the ladder?

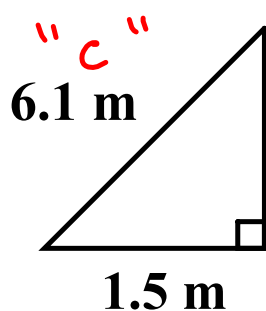
**How could you check if the ladder is safe?
Try to do this without a calculator.**



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

$$\begin{aligned}
 &8.8 \\
 &\hline
 &4 \\
 &= 2.2 \text{ m}
 \end{aligned}$$

Estimate how far up a wall a 6.1 m long ladder will reach if its base is 1.5 m from the wall. (nearest tenth)



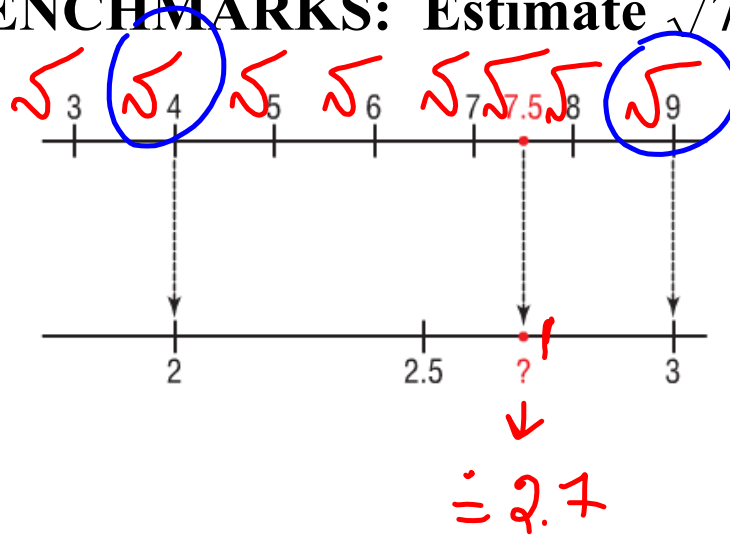
$$\begin{aligned}a^2 + b^2 &= c^2 \\1.5^2 + b^2 &= 6.1^2 \\2.25 + b^2 &= 37.21 \\b^2 &= 37.21 - 2.25 \\b^2 &= 34.96 \\\sqrt{b^2} &= \sqrt{34.96} \\b &\doteq 5.9 \text{ m}\end{aligned}$$

We will learn two strategies for estimating the square root of a decimal number that is not a perfect square:

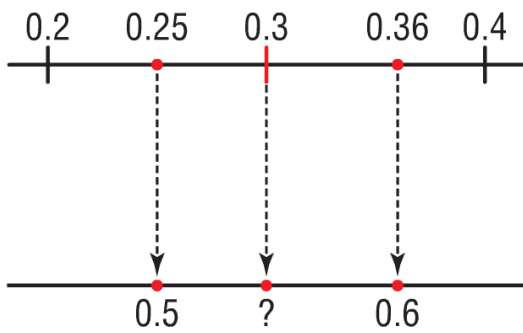
1) benchmarks

2) using a calculator

BENCHMARKS: Estimate $\sqrt{7.5}$.

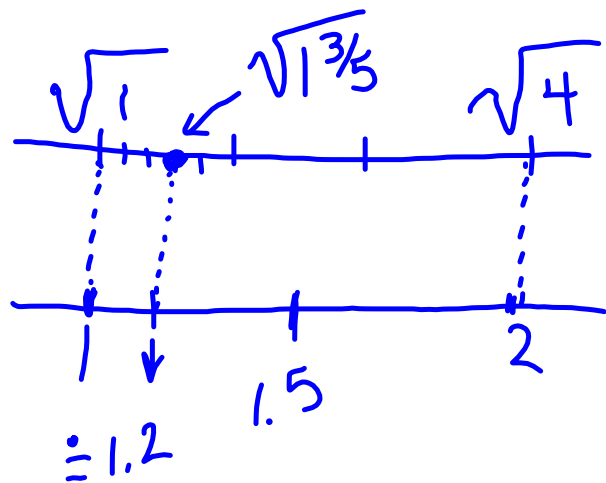


a) $\sqrt{3/10}$



b) $\sqrt{8/5} \approx 1.2$

$= \sqrt{1\frac{3}{5}}$



CONCEPT REINFORCEMENT:

MMS9

Page 18: #4 and #7

Page 19: #13