Estimating Non-Perfect Square Roots

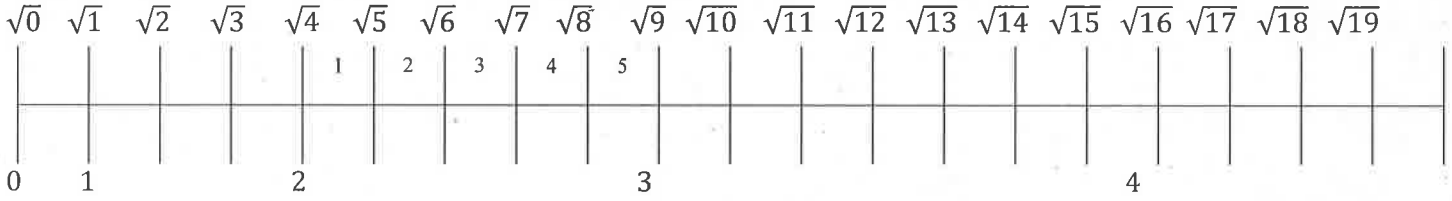
Name: _____ Div.: _____ Date: _____

- Not all squares have a side length that is a whole number. We can estimate the length of the sides of these squares through our understanding of fractions and our perfect squares!

$3cm^2$

← 3 is between the perfect squares of 1 and 4. Since the square roots of 1 and 4 are 1 and 2, respectively, then the square root of 3 is between 1 and 2.

- **Option 1:** Use a number line to find which two perfect squares the non-perfect square root sits between. Then determine what fraction of the way it is from the first to the next perfect square.



Therefore $\sqrt{7}$ is going to be 2 ($\sqrt{4}$) because it is beyond that point, and a fraction of the way to 3 ($\sqrt{9}$).

$$\sqrt{7} = 2\frac{3}{5} \approx 2.6$$

- **Option 2:** Find which two perfect squares the non-perfect square root sits between. Then find what fraction of the way from the first perfect square to the second perfect square the non-perfect square is by the following means:

$$\frac{(Non-Perfect\ Square)-(First\ Perfect\ Square)}{(Second\ Perfect\ Square)-(First\ Perfect\ Square)}$$

E.G. $\sqrt{7} = \frac{7-4}{9-4} = \frac{3}{5}$ So, $\sqrt{7} = 2\frac{3}{5} \approx 2.6$

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Use a number line, or a diagram to determine which two consecutive whole numbers the following square roots sit between.

1) $\sqrt{3}$ _____ 2) $\sqrt{8}$ _____ 3) $\sqrt{10}$ _____

4) $\sqrt{20}$ _____ 5) $\sqrt{30}$ _____ 6) $\sqrt{40}$ _____

7) $\sqrt{60}$ _____ 8) $\sqrt{90}$ _____ 9) $\sqrt{112}$ _____

Without using a calculator estimate the following square roots to the tenths decimal place (fraction to decimal). Check your answer with a calculator.

10) $\sqrt{3}$ _____ 11) $\sqrt{8}$ _____ 12) $\sqrt{10}$ _____

13) $\sqrt{20}$ _____ 14) $\sqrt{30}$ _____ 15) $\sqrt{40}$ _____

16) $\sqrt{60}$ _____ 17) $\sqrt{90}$ _____ 18) $\sqrt{112}$ _____