


**Warm Up Grade 8**

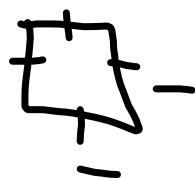
Find the square of 81

$$81^2 \Rightarrow 6561$$

~~Use prime factorization to find the square root of 4356~~

Square $\Rightarrow x^2$ \wedge^2 \square^2
 \Rightarrow Area of square 

Square Root $\Rightarrow \sqrt{\quad}$
 \Rightarrow side length of square



HW Solutions

Estimating Square Roots Section 1.4

We have already learned different ways to calculate square roots of perfect square, now we will estimate square roots of any given number.

When **estimating square roots:**

Step 1) you have to find the perfect square before and after the number you are finding the square root of,

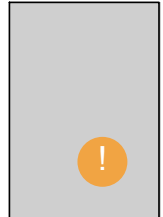
Step 2) then determine which perfect square the number is closer to.
This will help you estimate the square root.

Step 3) Make sure it is square root of perfect squares

Perfect Squares	
1	100
4	121
9	144
16	169
25	196
36	225
49	
64	
81	

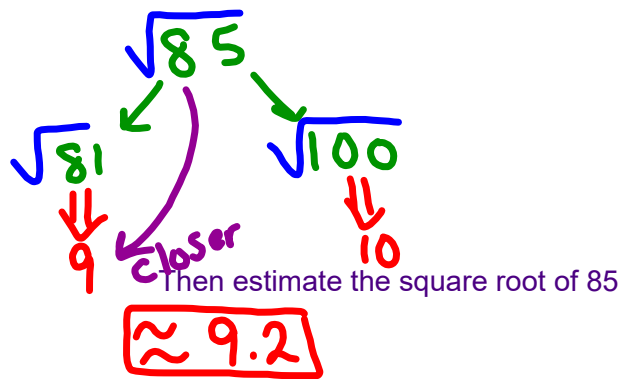


Estimating square roots of non-perfect number.



Estimate the square root of 85.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225



9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

a) Estimate the $\sqrt{20}$

You Try

b) Estimate the $\sqrt{60}$

c) Estimate the $\sqrt{108}$

d) Estimate the $\sqrt{45}$

a) $\sqrt{20}$

$\sqrt{16}$ and $\sqrt{25}$ are shown. Arrows point from 16 and 25 to 20. The number 4 is written below $\sqrt{16}$ and 5 below $\sqrt{25}$. A red arrow points from 4 to 20 with the word "closer" written next to it. The estimate ≈ 4.4 is written below.

4.1, 4.2, 4.3, 4.4

b) $\sqrt{60}$

$\sqrt{49}$ and $\sqrt{64}$ are shown. Arrows point from 49 and 64 to 60. The number 7 is written below $\sqrt{49}$ and 8 below $\sqrt{64}$. A purple arrow points from 8 to 60 with the word "closer" written next to it. The estimate ≈ 7.7 is written below.

7.6
7.8
7.9

c) $\sqrt{108}$

$\sqrt{100}$ and $\sqrt{121}$ are shown. Arrows point from 100 and 121 to 108. The number 10 is written below $\sqrt{100}$ and 11 below $\sqrt{121}$. A purple arrow points from 11 to 108 with the word "closer" written next to it. The estimate ≈ 10.1 is written below.

a) $\sqrt{45}$

$\sqrt{36}$ and $\sqrt{49}$ are shown. Arrows point from 36 and 49 to 45. The number 6 is written below $\sqrt{36}$ and 7 below $\sqrt{49}$. A black arrow points from 7 to 45 with the word "closer" written next to it. The estimate ≈ 6.8 is written in a box below.

a) Estimate $\sqrt{20}$

Solutions

$$\begin{array}{ccc} & \sqrt{20} & \\ \sqrt{16} & & \sqrt{25} \\ 4 & & 5 \end{array}$$

so $\sqrt{20}$ must be between
4 and 5
20 is almost in the middle
between 16 and 25
so $\sqrt{20}$ is in the middle between
4 and 5
Est. $\sqrt{20} \approx 4.5$

$$\begin{array}{ccc} b) & \sqrt{60} & \\ \sqrt{49} & & \sqrt{64} \\ 7 & & 8 \end{array}$$

60 is between 49 and 64
so $\sqrt{64}$ is between 7 and 8
60 is closer to 64,
so $\sqrt{60}$ is closer to 8
Est $\sqrt{60} \approx 7.8$

$$\begin{array}{ccccccc} c) & & \sqrt{108} & & & & \\ & \sqrt{100} & & \sqrt{121} & & \sqrt{108} & \\ & 10 & & 11 & & 10.5 & \\ & & & & & & \sqrt{121} \\ & & & & & & 11 \end{array}$$

108 is a little closer to 100
Est $\sqrt{108} \approx 10.4$

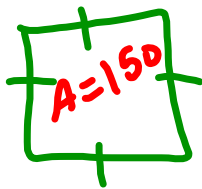
$$\begin{array}{ccc} d) & \sqrt{45} & \\ \sqrt{36} & & \sqrt{49} \\ 6 & & 7 \end{array}$$

Est $\sqrt{45} \approx 6.8$ or 6.9

A square garden has area 150 m².



a) What are the approximate dimensions of the garden to two decimal places?



$$\begin{aligned} \text{Side} &= \sqrt{\text{Area}} \\ &= \sqrt{150} \end{aligned}$$

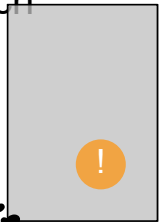
$$\begin{array}{c} \sqrt{144} \quad \sqrt{169} \\ 12 \qquad 13 \end{array}$$

$$\text{Side} \approx 12.10 \text{ m}$$

b) Fencing is needed to keep out the goats. About how much fencing would be needed around the garden?

$$\begin{aligned} \text{Per} &= S + S + S + S \Rightarrow 4 \times \text{Side} \\ &= 4 \times 12.10 \text{ m} \end{aligned}$$

b/c Square



$= 48.40 \text{ m}$
We need about 48.40 m of fence to keep the goats out.

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Quiz Friday Feb 9

$$\begin{array}{c} \sqrt{8} \\ \swarrow \quad \searrow \\ \sqrt{4} \quad \sqrt{9} \end{array}$$

#2, #3, #4, #7 $\sqrt{\quad}$ ← Estimating Red

Quiz → Already list Perfect Square

- 1) & 2) Diff Square a number x^2
 Square root a number $\sqrt{\quad}$
- 3) Estimate $\sqrt{\text{Non Perf}}$ Ex) $\sqrt{45}$

- 4) Odd & Even # of factors
- ↓
 Perfect Square
- ↓
 Not perfect Square

$$\begin{aligned} 4) \quad & \sqrt{15 \times 15} \\ & \sqrt{15^2} \\ & = 15 \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{22 \times 22} \\ & \sqrt{22^2} \\ & = 22 \end{aligned}$$