

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,

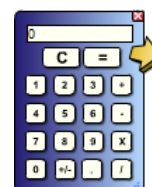
Step 2) then determine which perfect square the number is closer to.
This will help you estimate the square root.

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.

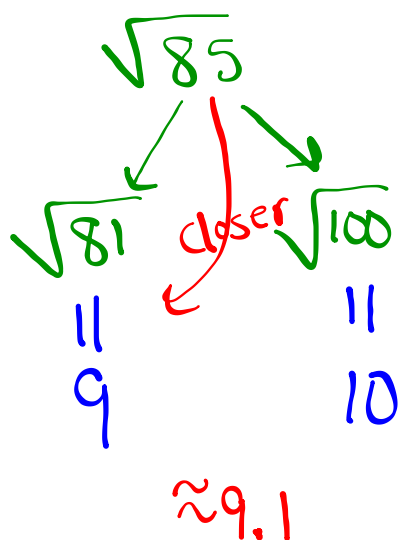


Estimate the square root of 85.


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



↓
85



Then estimate the square root of 85

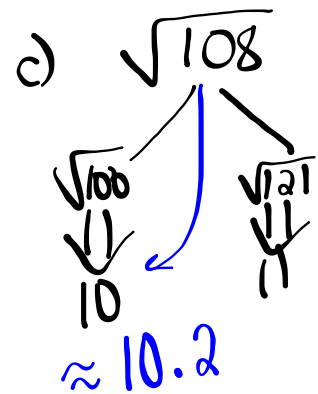
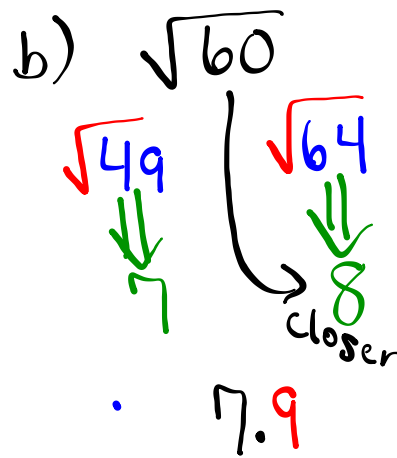
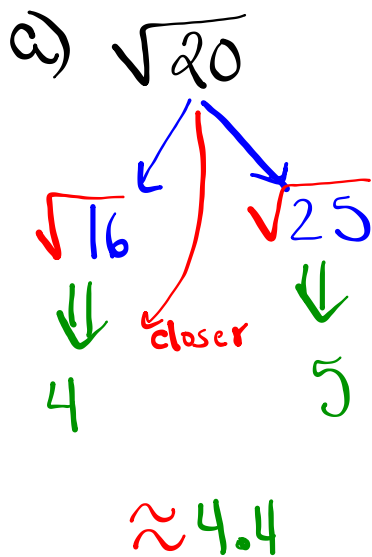

 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225
 ↑
 You Try

a) Estimate the $\sqrt{20}$

b) Estimate the $\sqrt{60}$

c) Estimate the $\sqrt{108}$

d) Estimate the $\sqrt{45}$



a) Estimate $\sqrt{20}$

Solutions

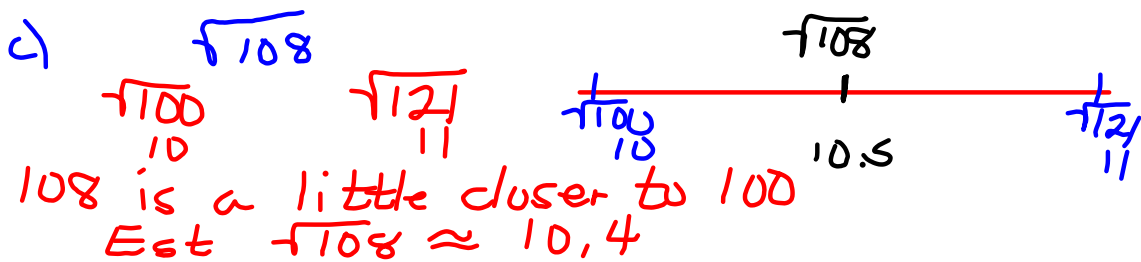
$$\begin{array}{ccc} & \sqrt{20} & \\ \sqrt{16} & & \sqrt{25} \\ 4 & & 5 \end{array}$$

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. $\sqrt{20} \approx 4.5$

b)

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

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 $\sqrt{60} \approx 7.8$



d)

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

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

$$\sqrt{150}$$

A square garden has area 150 m^2 .



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

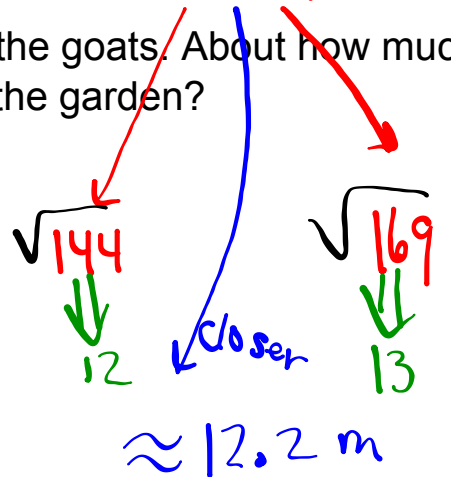
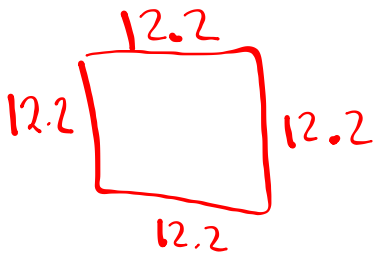
$$\text{Area of square} = \text{side}^2$$

$$A = 150 \text{ m}^2$$

$$\text{Side} = \sqrt{\text{Area}}$$

$$= \sqrt{150 \text{ m}^2}$$

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



$$\approx 12.2 \text{ m}$$

$$\text{Perimeter} = \text{side} + \text{side} + \text{side} + \text{side}$$

$$= 12.2 + 12.2 + 12.2 + 12.2$$

$$= 48.8 \text{ m}$$

About 48.8 m of fence is needed

Homework pg. 25

Quiz Tuesday
Nov 15

#4, #7

Rule

$$\sqrt{x^2} = \sqrt{x \cdot x} = x$$

Ex) $\sqrt{9^2} = 9$
 $\sqrt{4 \times 4} = 4$

4a) $\sqrt{15 \times 15} = 15$
 $\sqrt{225}$

7a) $\sqrt{23}$
 $\sqrt{16}$ $\sqrt{25}$
4 5
 ≈ 4.9