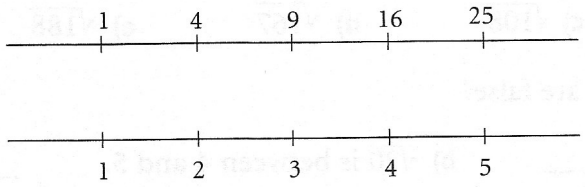
1.4 Estimating Square Roots

Quick Review

At Home
At School

➤ To estimate the square root of a number that is not a perfect square, you can use a number line.

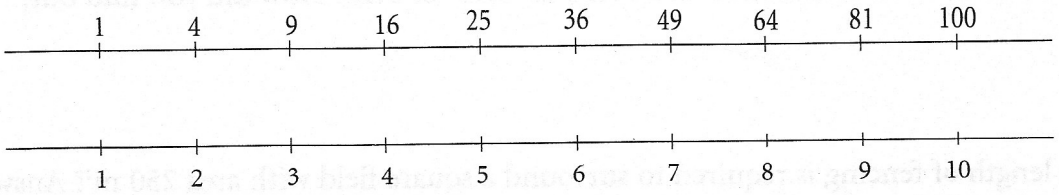


To estimate $\sqrt{10}$: Note that $\sqrt{10}$ lies between $\sqrt{9}$ and $\sqrt{16}$. So, $\sqrt{10}$ must have a value between 3 and 4, but closer to 3. Use trial and error and a calculator to get a closer approximation. Round to 2 decimal places.

Try 3.3: $3.3 \times 3.3 = 10.89$ too big
Try 3.2: $3.2 \times 3.2 = 10.24$ too big
Try 3.1: $3.1 \times 3.1 = 9.61$ too small
Try 3.16: $3.16 \times 3.16 = 9.99$ very close
$\sqrt{10}$ is approximately 3.16.

Practice

1. Use the number lines to complete each statement with whole numbers. The first one is done for you.

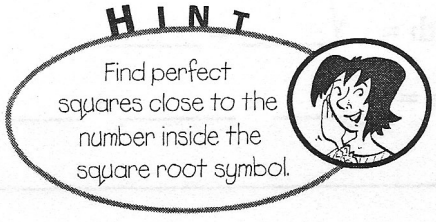


a) $\sqrt{5}$ lies between _____ and _____

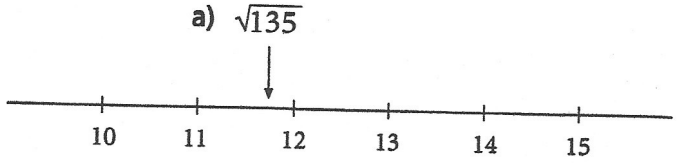
b) $\sqrt{20}$ lies between _____ and _____

c) $\sqrt{55}$ lies between _____ and _____

d) $\sqrt{2}$ lies between _____ and _____



2. Place the letter of the question on the number line below. The first one is done for you.



a) $\sqrt{135}$ b) $\sqrt{201}$ c) $\sqrt{108}$ d) $\sqrt{167}$ e) $\sqrt{188}$

3. Which statements are true, and which are false?

a) $\sqrt{20}$ is between 19 and 21. _____ b) $\sqrt{20}$ is between 4 and 5. _____

c) $\sqrt{20}$ is closer to 4 than 5. _____ d) $\sqrt{20}$ is between $\sqrt{19}$ and $\sqrt{21}$. _____

4. Which are good estimates of the square roots?

a) $\sqrt{19} = 4.75$ _____ b) $\sqrt{220} = 14.83$ _____

5. Use a calculator and the trial and error method to approximate each square root to 1 decimal place. Record each trial.

a) $\sqrt{20} =$ _____ b) $\sqrt{57} =$ _____ c) $\sqrt{115} =$ _____ d) $\sqrt{175} =$ _____

6. Find the approximate side length of the square with each area. Answer to 1 decimal place.

a) $A = 50\ cm^2$ $s =$ _____ b) $A = 125\ cm^2$ $s =$ _____ c) $A = 18\ cm^2$ $s =$ _____

7. Which is the closest estimate of $\sqrt{99}$: 9.94 or 9.95 or 9.96? How did you find out?

8. What length of fencing is required to surround a square field with area 250 m^2? Answer to 2 decimal places.

Side length = $\sqrt{\text{_____}}$ = _____

Perimeter = _____ + _____ + _____ + _____ = _____