Imperfect Square Roots

Perfect square roots only have whole numbers in their answers (not decimals)

Ex. $\sqrt{25} = 5$ and $\sqrt{49} = 7$.

Imperfect square roots have decimal answers.

Ex. $\sqrt{20}$ = approximately 4.5

Determining imperfect square roots is a process of educated guesswork. Use your knowledge of perfect square roots – and perhaps the midpoint between them – to guess the answer with remarkable accuracy.

Example 1

- $\sqrt{50}$ is really close to $\sqrt{49}$, which is 7
- Therefore a reasonable guess for $\sqrt{50} = 7.1$

Example 2

- $\sqrt{40}$ is in between the perfect square roots $\sqrt{36} = 6$ and $\sqrt{49} = 7$
- The halfway point between $\sqrt{36}$ and $\sqrt{49}$ is 42.5, so $\sqrt{40}$ is less than halfway
- Therefore a reasonable guess for $\sqrt{40} = 6.3$

Example 2 Alternative Logic

- $\sqrt{40}$ is in between the perfect square roots $\sqrt{36} = 6$ and $\sqrt{49} = 7$
- 40 is just 4 steps away from 36 but 9 steps away from 49, so $\sqrt{40}$ is closer to $\sqrt{36}$ than $\sqrt{49}$
- Therefore a reasonable guess for $\sqrt{40} = 6.3$

Flip over the page and give it a try.

1) Question: Solve $\sqrt{80}$

To Answer:

- $\sqrt{80}$ just one step away from a square root you already know $(\sqrt{81})$
- Therefore go ahead and approximate the answer now.

2) Question: Solve $\sqrt{65}$

To Answer:

- $\sqrt{65}$ just one step away from a perfect square root you already know $(\sqrt{64})$
- Therefore go ahead and approximate the answer now.

3) Question: Solve $\sqrt{12}$

To Answer:

- $\sqrt{12}$ is more than just one step away from a perfect square root you already know
- So we need to figure out what $\sqrt{12}$ is closest to and use it to guess the answer

- Step 1: What 2 perfect square roots is $\sqrt{12}$ in between?
  (Spoiler alert, it's in between $\sqrt{9} = 3$ *and* $\sqrt{16} = 4$ *)*

- Step 2: What is halfway between $\sqrt{9}$ and $\sqrt{16}$?
  Figure that out now by adding 9 + 16 and dividing the answer by 2

- Step 3: Is $\sqrt{12}$ higher or lower than the halfway point?
  Use this fact to make an educated guess about what the answer is

4) Answer the following questions that are just 1 step away from a perfect square root.

a) $\sqrt{17}$ b) $\sqrt{35}$ c) $\sqrt{99}$ d) $\sqrt{82}$ e) $\sqrt{48}$

5) Answer the following by finding the midway point between the 2 closest perfect square roots.

a) $\sqrt{21}$ b) $\sqrt{43}$ c) $\sqrt{59}$ d) $\sqrt{70}$ e) $\sqrt{116}$