

Exponents and Radicals Lesson #5: Applications of Radicals

Application - Ordering a Set of Irrational Numbers

Class Ex. #1



Without using a calculator, arrange the following mixed radicals in order from greatest to least.

i) $3\sqrt{5}$ (3) ii) $5\sqrt{3}$ (2) iii) $\sqrt{15}$ (5) iv) $2\sqrt{8}$ (4) v) $8\sqrt{2}$ (1)

$\sqrt{45}$ $\sqrt{75}$ $\sqrt{15}$ $\sqrt{32}$ $\sqrt{128}$

$8\sqrt{2}, 5\sqrt{3}, 3\sqrt{5}, 2\sqrt{8}, \sqrt{15}$

Complete Assignment Questions #1 - #3

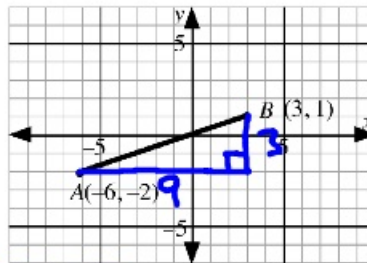
Application - Pythagorean Theorem

Class Ex. #2



Consider line segment AB shown on the grid.

Determine the exact length of the line segment in simplest mixed radical form, using



a) the Pythagorean Theorem $c^2 = a^2 + b^2$

$$AB^2 = 9^2 + 3^2$$

$$AB^2 = 81 + 9$$

$$AB^2 = 90$$

$$\rightarrow AB = \sqrt{90} = \sqrt{9 \cdot 10} = \boxed{3\sqrt{10}}$$

b) the Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$d = \sqrt{(3 - (-6))^2 + (1 - (-2))^2}$$

$$d = \sqrt{9^2 + 3^2}$$

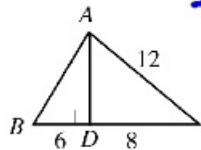
$$d = \sqrt{90}$$

$$d = \sqrt{9 \times 10} = \boxed{3\sqrt{10}}$$

Class Ex. #3

Use the Pythagorean Theorem to determine the exact length of AB . Express the answer as

- a) an exact value in simplest mixed radical form
b) as a decimal to the nearest hundredth



from $\triangle ACD$, $AD^2 = 12^2 - 8^2$
 $AD^2 = 80$

in $\triangle ADB$,
 $AB^2 = BD^2 + AD^2$
 $= 6^2 + 80$
 $= 116$

$$AB = \sqrt{116} = \sqrt{4 \times 29} = 2\sqrt{29}$$

b. $AB = \sqrt{116} = 10.770\dots$
 $= 10.77$

Complete Assignment Questions #4 - #7

Other Applications

Class Ex. #4

Given that $\sqrt{5}$ is approximately equal to 2.24, and $\sqrt{50}$ is approximately equal to 7.07, then find the approximate value of

a) $\sqrt{500}$

b) $\sqrt{5000}$

c) $\sqrt{20}$

d) $\sqrt{0.05}$

e) $\sqrt{0.5}$

$$\begin{aligned} &= 10\sqrt{5} \\ &= 10(2.24) \\ &= 22.4 \end{aligned}$$

$$\begin{aligned} &= 10\sqrt{50} \\ &= 10(7.07) \\ &= 70.7 \end{aligned}$$

$$\begin{aligned} &= \sqrt{\frac{5}{100}} \\ &= \frac{1}{10}\sqrt{5} \\ &= \frac{1}{10}(2.24) \\ &= 0.224 \end{aligned}$$

$$\begin{aligned} &= \sqrt{\frac{50}{100}} \\ &= \frac{1}{10}\sqrt{50} \\ &= \frac{1}{10}(7.07) \\ &= 0.707 \end{aligned}$$

Complete Assignment Questions #8 - #12

Assignment

1. Without using a calculator, arrange the following radicals in order from greatest to least.

$$3\sqrt{7}, 5\sqrt{3}, \sqrt{60}, 2\sqrt{11}, \frac{1}{2}\sqrt{200}$$

Do #1-11 (not 3)