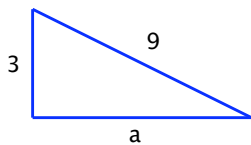


Math 99 Worksheet #5 Solutions

Simplify your answers as much as possible.

1. Find the length of the unknown side of the following right triangle.



Pythagorean Formula: $a^2 + 3^2 = 9^2$

$$a^2 + 9 = 81$$

$$a^2 = 72$$

$$a = \sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2}$$

2. Simplify the following.

(a) $1 + \sqrt[4]{3} - 4\sqrt[4]{3} = 1 - 3\sqrt[4]{3}$

(b) $3\sqrt{2t} + \sqrt{8t} = 3\sqrt{2t} + \sqrt{4 \cdot 2t}$
 $= 3\sqrt{2t} + 2\sqrt{2t}$
 $= 5\sqrt{2t}$

(c) $4\sqrt{5}(3 + \sqrt{2}) = 4\sqrt{5} \cdot 3 + 2\sqrt{5} \cdot \sqrt{2}$
 $= 12\sqrt{5} + 4\sqrt{10}$

(d) $(1 - 3\sqrt{7})(1 + 3\sqrt{7}) = 1 - (3\sqrt{7})(3\sqrt{7})$
 $= 1 - 9 \cdot 7$
 $= 1 - 63$
 $= -62$

(e) $\sqrt{\frac{8}{9}} + \frac{\sqrt{2}}{\sqrt{36}} = \frac{2\sqrt{2}}{3} + \frac{\sqrt{2}}{6}$
 $= \frac{4\sqrt{2}}{6} + \frac{\sqrt{2}}{6}$
 $= \frac{4\sqrt{2} + \sqrt{2}}{6}$
 $= \frac{5\sqrt{2}}{6}$

3. Rationalize the denominator in each expression.

(a) $\frac{-6}{\sqrt{18}} = \frac{-6}{\sqrt{18}} \cdot \frac{\sqrt{18}}{\sqrt{18}} = \frac{-6\sqrt{18}}{18} = \frac{-6\sqrt{9 \cdot 2}}{18} = \frac{-18\sqrt{2}}{18} = -\sqrt{2}$

(b) $\frac{4}{3+\sqrt{7}} = \frac{4}{3+\sqrt{7}} \cdot \frac{3-\sqrt{7}}{3-\sqrt{7}} = \frac{4(3-\sqrt{7})}{9-7} = \frac{4(3-\sqrt{7})}{2} = 2(3-\sqrt{7}) = 6 - 2\sqrt{7}$

(c) $\frac{2}{\sqrt[3]{5}} = \frac{2}{\sqrt[3]{5}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} = \frac{2\sqrt[3]{25}}{5}$

4. Solve each equation.

(a) $\sqrt[3]{2x+1} = 3$

Cubing both sides: $2x + 1 = 27$
 $2x = 26 \Rightarrow x = 13$

Checking $x = 13$: $\sqrt[3]{2(13)+1} = \sqrt[3]{27} = 3 \checkmark$

(b) $2\sqrt{m} = \sqrt{m^2 - 3m - 8}$

Squaring both sides: $4m = m^2 - 3m - 8$
 $0 = m^2 - 7m - 8$
 $0 = (m - 8)(m + 1)$

The possible solutions are $m = -1$ and $m = 8$.

Checking $m = -1$: $2\sqrt{-1} = \sqrt{(-1)^2 - 3(-1) - 8}$ The left side of this equation is not real. $\Rightarrow m = -1$ is not a solution.

Checking $m = 8$: $2\sqrt{8} = \sqrt{8^2 - 3(8) - 8} = \sqrt{32} \checkmark$ (The left and right side are equal.)

5. Find the distance between the points $(3\sqrt{5}, 2\sqrt{3})$ and $(\sqrt{5}, 4\sqrt{3})$.

$$\begin{aligned} \text{Distance} &= \sqrt{(\sqrt{5} - 3\sqrt{5})^2 + (4\sqrt{3} - 2\sqrt{5})^2} = \sqrt{(-2\sqrt{5})^2 + (2\sqrt{3})^2} \\ &= \sqrt{4 \cdot 5 + 4 \cdot 3} \\ &= \sqrt{20 + 12} \\ &= \sqrt{32} \\ &= 4\sqrt{2} \end{aligned}$$

6. Solve for x : $\sqrt{4x-1} = \sqrt{4x+7} - 4$

Squaring both sides: $4x - 1 = 4x + 7 - 8\sqrt{4x+7} + 16$

Isolating the radical: $-24 = -8\sqrt{4x+7} \Rightarrow 3 = \sqrt{4x+7}$

Squaring both sides: $9 = 4x + 7$

Solving for x : $2 = 4x \Rightarrow x = \frac{1}{2}$

Checking $x = \frac{1}{2}$: Left-side $\rightarrow \sqrt{4(\frac{1}{2}) - 1} = \sqrt{1} = 1$
Right-side $\rightarrow \sqrt{4(\frac{1}{2}) + 7} - 4 = \sqrt{9} - 4 = -1$

Since the left and right side do not match, there are no solutions to this equation.