Math 109 P Section 2 Quiz 9 B

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Solutions

(1) Perform the multiplication and simplify.

(a) $\sqrt[3]{2} \cdot \sqrt[3]{12}$ (b) $\sqrt[3]{3x^4y} \cdot \sqrt[3]{18x}$

Solutions.

Recall the formulas

$$\sqrt[3]{a \cdot b} = \sqrt[3]{a} \cdot \sqrt[3]{b} \quad , \quad \sqrt[3]{a^3} = (\sqrt[3]{a})^3 = a \quad . \tag{1}$$

(a) Use (1), to simplify $\sqrt[3]{2} \cdot \sqrt[3]{12}$:

$$\sqrt[3]{2} \cdot \sqrt[3]{12} = \sqrt[3]{2 \cdot 12} = \sqrt[3]{2 \cdot 4 \cdot 3} = \sqrt[3]{8 \cdot 3} = \sqrt[3]{8} \cdot \sqrt[3]{3} = 2\sqrt[3]{3} \quad . \quad \blacksquare$$

(b) Use (1), to simplify $\sqrt[3]{3x^4y} \cdot \sqrt[3]{18x}$:

$$\sqrt[3]{3x^4y} \cdot \sqrt[3]{18x} = \sqrt[3]{3x^4y \cdot 18x} = \sqrt[3]{54x^5y} = \sqrt[3]{\underline{27} \cdot 2 \cdot \underline{x^3} \cdot x^2 \cdot y} = \sqrt[3]{27 \cdot x^3 \cdot 2x^2y} =$$

$$= \sqrt[3]{27} \cdot \sqrt[3]{x^3} \cdot \sqrt[3]{2x^2y} = 3x\sqrt[3]{2x^2y} \ . \ \blacksquare$$

(2) Perform the operations and simplify.

$$(7\sqrt{x} + 2)(3\sqrt{x} - 5)$$

Solutions.

Distribute (perform the multiplication, foil):

$$(7\sqrt{x}+2)(3\sqrt{x}-5) = 7\sqrt{x} \cdot 3\sqrt{x} - 7\sqrt{x} \cdot 5 + 2 \cdot 3\sqrt{x} - 2 \cdot 5 = 21(\sqrt{x})^2 - 35\sqrt{x} + 6\sqrt{x} - 10 =$$

$$= 21\underbrace{(\sqrt{x})^2}_{=x} - \underline{35\sqrt{x}} + \underline{6\sqrt{x}} - 10 = 21x - 29\sqrt{x} - 10 \quad . \quad \blacksquare$$

(3) Rationalize the denominator. Simplify first.

$$\frac{\sqrt{10xy^2}}{\sqrt{2xy^3}}$$

Solutions.

We can use the following formula first:

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}} \quad . \tag{2}$$

Then, by (2):

$$\frac{\sqrt{10xy^2}}{\sqrt{2xy^3}} = \sqrt{\frac{10xy^2}{2xy^3}} = \sqrt{\frac{\cancel{10}^{\,5} \cdot \cancel{x} \cdot \cancel{y^2}}{\cancel{2} \cdot \cancel{x} \cdot y^{\cancel{3}}}} = \sqrt{\frac{5}{y}} \overset{(2)}{=} \frac{\sqrt{5}}{\sqrt{y}} = \frac{\sqrt{5}}{\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}} = \frac{\sqrt{5} \cdot \sqrt{y}}{\sqrt{y} \cdot \sqrt{y}} = \frac{\sqrt{5y}}{y} \quad . \quad \blacksquare$$

(4) Solve and check the solution.

$$\sqrt{6x+13} - 2 = 5$$

Solutions.

Isolate the square root first : $\underbrace{\sqrt{6x+13} - 2}_{+2} = \underbrace{5}_{+2} \Rightarrow \sqrt{6x+13} = 7$.

Then, raise both sides to power two, and solve:

$$\left(\sqrt{6x+13}\right)^2 = 7^2 \Rightarrow 6x+13 = 49 \Rightarrow \underbrace{6x+13}_{-13} = \underbrace{49}_{-13} \Rightarrow 6x = 36 \Rightarrow \frac{6x}{6} = \frac{36}{6} \Rightarrow x = 6 \quad .$$

Check the solution :

$6 \rightarrow \sqrt{6x+13} - 2 = 5 \Rightarrow \sqrt{6 \cdot 6 + 13} - 2 = 5 \Rightarrow \sqrt{49} - 2 = 5 \Rightarrow 7 - 2 = 5 \Rightarrow$ TRUE .

Therefore, $x = 6$ is the solution to the given equation . ■