Absolute Value and Radicals

Absolute Value and Radicals

1) **Arrange from least to Greatest**

   a) **$-|4-7|, |-(4-7)|, -|5-(-3)|, -|4|-|-7|$**

2) Evaluate each expression without a calculator

   (a) $\sqrt[3]{\frac{27}{8}}$

   (b) $36^{3/2}$

   (c) $\sqrt[4]{(x-4)^4}$

Absolute Value and Radicals

Answers

Absolute Value and Radicals

1) **Arrange from least to Greatest**

   a) **$-|4-7|, |-(4-7)|, -|5-(-3)|, -|4|-|-7|$**

-3 (3), 3 (4), -8 (2), -11 (1)

(1) $-|4|-|-7|$, (2) $-|5-(-3)|$, (3) $-|4-7|$, (4) $|-(4-7)|$

2) Evaluate each expression without a calculator

(a) $\sqrt[3]{\frac{27}{8}} = \frac{3}{2}$

(b) $36^{3/2} = \sqrt[2]{36^3} = 6^3 = 216$

(c) $\sqrt[4]{(x-4)^4} = |x-4|$

↑ absolute value!
(this is because we can only have a positive square root)

Absolute Value and Radicals

3) Simplify each radical expression

a) $-3\sqrt{48x^2} + 7\sqrt{75x^2}$

b) $\frac{1}{\sqrt{3}}$

c) $\frac{1}{\sqrt{14}-2}$

d) $\sqrt{x^2+4x+4} - \sqrt{x^2+12x-36}$

e) $\frac{2}{3}\sqrt[3]{54x} + \frac{1}{4}\sqrt[3]{128x}$

Absolute Value and Radicals

Answers

3) Simplify each radical expression

a) $-3\sqrt{48x^2} + 7\sqrt{75x^2}$

$-3(4x)\sqrt{3} + 7(5x)\sqrt{3}$

$= -12x\sqrt{3} + 35x\sqrt{3} = \boxed{23x\sqrt{3}}$

b) $\frac{1}{\sqrt{3}}$

$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \rightsquigarrow \boxed{= \frac{\sqrt{3}}{3}}$

c) $\frac{1}{\sqrt{14}-2} \times \frac{(\sqrt{14}+2)}{(\sqrt{14}+2)}$ → multiply by difference of squares

$= \frac{\sqrt{14}-2}{14-4} \quad \boxed{= \frac{\sqrt{14}-2}{10}}$

d) $\sqrt{x^2+4x+4} - \sqrt{x^2+12x-36}$

$\sqrt{(x+2)^2} - \sqrt{(x-6)^2}$

$= |x+2| - |x-6| = x-2-x+6 = 8$

$\boxed{= 8}$

e) $\frac{2}{3}\sqrt[3]{54x} + \frac{1}{4}\sqrt[3]{128x} \rightarrow \frac{2}{3}\sqrt[3]{27 \cdot 2x} + \frac{1}{4}\sqrt[3]{64 \cdot 2x}$

$\frac{2}{3}(3)\sqrt[3]{2x} + \frac{1}{4}(4)\sqrt[3]{2x}$

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

$\boxed{= 3\sqrt[3]{2x}} \quad x \geq 0$

4) Find the Product and Simplify:

(a) $(\sqrt{x+2}+3)^2$

(b) $(\frac{4-\sqrt{32}}{4})^2$

5) Determine the restrictions, solve, and check solutions for extraneous roots.

a. $\sqrt{10-3x}=\sqrt{2x+20}$

b. $-\sqrt{x+2}=2$

c. $\sqrt{x+9}=\sqrt{1-x}$

Absolute Value and Radicals

Answers

4) Find the Product and Simplify:

(a) $(\sqrt{x+2}+3)^2$

$(\sqrt{x+2}+3)(\sqrt{x+2}+3)$

$= x+2+6\sqrt{x+2}+9$

$= x+6\sqrt{x+2}+11$

$x \geq -2$ ← otherwise the solution is NOT real

(b) $\left(\frac{4-\sqrt{32}}{4}\right)^2$

$\left(\frac{4-4\sqrt{2}}{4}\right)^2 = (1-\sqrt{2})^2 = (1-\sqrt{2})(1-\sqrt{2})$

$= 1-2\sqrt{2}+2$

$= 3-2\sqrt{2}$

5) Determine the restrictions, solve, and check solutions for extraneous roots.

Restrictions

$10-3x \geq 0$ $\quad -3x \geq -10$ $\quad x \leq 10/3$

$2x+20 \geq 0$ $\quad 2x \geq -20$ $\quad x \geq -10$

a. $(\sqrt{10-3x})^2 = (\sqrt{2x+20})^2$

$10-3x = 2x+20$

$-10 = 5x$

$x = -2$ ✓ okay as it meets restrictions (not extraneous)

b. $(-\sqrt{x+2})^2 = (2)^2$

$x+2 = 4$

$x = 2$ → extraneous

$x+2 \geq 0$

$x \geq -2$

c. $(\sqrt{x+9})^2 = (\sqrt{1-x})^2$

$x \geq -9, x \leq 1$

$x+9 = 1-x$

$2x = -8$

$x = -4$ → ✓ not extraneous

because $-\sqrt{4} \neq 2$ → no solution