

Unit Test One (First Attempt)

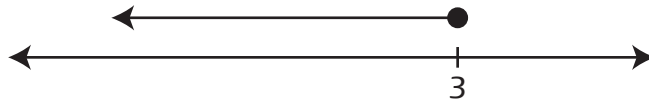
1. What is the difference between a rational and an irrational number?

Irrational numbers cannot be expressed as fractions of integers, while rational numbers can. Also, when written as decimals, rational numbers either repeat or terminate. Irrational numbers go on forever and never repeat.

2. Evaluate: $|3 - 5| - 3$

$$\begin{aligned} &= |-2| - 3 \\ &= 2 - 3 \\ &= -1 \end{aligned}$$

3. Graph on a number line: $x \leq 3$



4. Simplify:

a) $2\sqrt{75} - 3\sqrt{12}$

$$\begin{aligned} &= 2\sqrt{25} \cdot \sqrt{3} - 3\sqrt{4} \cdot \sqrt{3} \\ &= 2 \cdot 5\sqrt{3} - 3 \cdot 2\sqrt{3} \\ &= 10\sqrt{3} - 6\sqrt{3} \\ &= 4\sqrt{3} \end{aligned}$$

b) $\sqrt{3}(\sqrt{5} - 3\sqrt{3})$

$$\begin{aligned} &= \sqrt{15} - 3 \cdot 3 \\ &= \sqrt{15} - 9 \end{aligned}$$

5. Simplify:

a) $3\sqrt{2}(3\sqrt{8} + \sqrt{18})$

$$= 9\sqrt{16} + 3\sqrt{36}$$

$$= 9 \cdot 4 + 3 \cdot 6$$

$$= 36 + 18$$

$$= 54$$

b) $(\sqrt{2} + 1)(\sqrt{3} - \sqrt{2})$

$$= \sqrt{6} + \sqrt{3} - 2 - \sqrt{2}$$

c) $\frac{3}{\sqrt{5}}$

$$\frac{3}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$$

d) $\frac{2\sqrt{2}}{3\sqrt{6}}$

$$= \frac{2}{3\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{9}$$

e) $\frac{1 + \sqrt{3}}{\sqrt{3} - 4\sqrt{2}}$

$$\frac{1 + \sqrt{3}}{\sqrt{3} - 4\sqrt{2}} \times \frac{\sqrt{3} + 4\sqrt{2}}{\sqrt{3} + 4\sqrt{2}} = \frac{\sqrt{3} + 4\sqrt{2} + 3 + 4\sqrt{6}}{3 - 16 \cdot 2}$$

$$= \frac{3 + 4\sqrt{2} + 3\sqrt{3} + 4\sqrt{6}}{-29}$$

6. Write using only positive exponents:

a) $3x^{-2}$

$$= \frac{3}{x^2}$$

b) $\frac{3x^2y^{-3}}{6x^4y^2}$

$$= \frac{x^2}{2x^4y^2y^3}$$

$$= \frac{1}{2x^2y^5}$$

c) $\sqrt{5x^4}$

$$= (5x^4)^{1/2}$$

$$= 5^{1/2}x^2$$

d) $\sqrt[5]{x^{-3/2}}$

$$= \left(x^{-3/2}\right)^{1/5}$$

$$= x^{-3/10}$$

$$= \frac{1}{x^{3/10}}$$

7. Write in radical form: $(5x^2)^{-5/4}$

$$= \sqrt[4]{(5x^2)^{-5}}$$

$$= \frac{1}{\sqrt[4]{5^5x^{10}}} \times \frac{(5^5x^{10})^{3/4}}{(5^5x^{10})^{3/4}}$$

$$= \frac{\sqrt[4]{5^{15}x^{30}}}{5^5x^{10}}$$

NOTE: Rationalization is not necessary. This was not really a great question because it is unclear what form I want the answer in.

8. Evaluate: $16^{5/4}$

$$= (\sqrt[4]{16})^5$$

$$= 2^5$$

$$= 32$$

9. Solve: $4^{x-3} = 8^{4-2x}$

$$(2^2)^{x-3} = (2^3)^{4-2x}$$

$$2^{2x-6} = 2^{12-6x}$$

$$\therefore 2x-6 = 12-6x$$

$$8x = 18$$

$$x = \frac{9}{2}$$