Complex Numbers and Rational Exponents: Check Your Readiness

Do not use a calculator.

1. Select **all** the solutions to $x^2 = 16$.

   A. 256

   B. 8

   C. 4

   D. -256

   E. -8

   F. -4

2. Find the value of each variable that makes the equation true.

   a. $3^4 \cdot 3^2 = 3^a$

   b. $\frac{5^4}{5^3} = 5^b$

   c. $4^c = 1$

   d. $2^6 \cdot d^6 = 14^6$

   e. $6^f = \frac{1}{6}$

3. Evaluate each expression.

    a. $\frac{1}{5} \cdot 20$

    b. $\frac{5}{3} \cdot 6$

    c. $\frac{3}{4} \cdot 9 \cdot \frac{4}{3}$

    d. $\frac{2}{3} \cdot \frac{1}{2} \cdot 3$

4. $p = 2x - 3$ and $q = -3x + 5$

    For each expression, write an equivalent expression in standard form.

    a. $p + q$

    b. $p - q$

    c. pq

5. Solve these equations.

    a. $\sqrt{x} = 5$

    b. $\sqrt[3]{x} = 3$

    c. $\sqrt{x - 3} = 9$

6. Order these expressions from least to greatest:

- $\sqrt[3]{-1}$

- 0

- 5

- 6

- $\sqrt[3]{8}$

- $\sqrt{14}$

- $\sqrt[3]{27}$

- $\sqrt{30}$

7. Priya and Lin tried to solve the equation $3x^2 - 2x - 5 = 0$.

Priya wrote:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-2 \pm \sqrt{2^2 - 4(3)(-5)}}{2(3)}$$
$$x = \frac{-2 \pm \sqrt{4 - (-60)}}{6}$$
$$x = \frac{-2 \pm \sqrt{64}}{6}$$
$$x = 1 \quad \text{and} \quad x = -\frac{5}{3}$$

Lin wrote:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-(-2) \pm \sqrt{-2^2 - 4(3)(-5)}}{2(3)}$$
$$x = \frac{2 \pm \sqrt{-4 - (-60)}}{6}$$
$$x = \frac{2 \pm \sqrt{56}}{6}$$

Do you agree with either of them? Explain your reasoning.

8. Han was solving the equation $x^2 + 6x - 10 = 0$ by completing the square, and he wrote:

$x^2 + 6x - 10 = 0$
$x^2 + 6x = 10$
$x^2 + 6x + 36 = 46$
$(x + 3)^2 = 46$
$x + 3 = \pm\sqrt{46}$
$x = \text{-}3 \pm \sqrt{46}$

    a. Han made a mistake. What was it?

    b. Show how to solve the problem correctly.