

Show all your work to get full/ partial credit. Each problem is worth 5 point.

1. Determine whether the statement is true or false.

- a. $-5 \in \mathbb{Z}$ (\mathbb{Z} is the set of all integers)
- b. $\{0, 2, 4, 6\} \subset \{2, 4, 6\}$

True
 False

2. Graph the set $[-1, 1)$ and write the corresponding set-builder notation.



3. Simplify $15 - \{(5 + \sqrt{4^2 + 3^2}) - |2 - 7|\}$.

$$15 - \{(5 + \sqrt{16+9}) - |-5|\}$$

$$15 - \{(5 + \sqrt{25}) - 5\} = 15 - \{5+5-5\} = 15 - 5 = \boxed{10}$$

4. Clear parentheses and combine like terms: $2x^3 - \frac{1}{2}(4x^3 - 2x^2) + 1$.

$$2x^3 - \frac{4x^3}{2} + \frac{2x^2}{2} + 1$$

$$2x^3 - 2x^3 + x^2 + 1 = \boxed{x^2 + 1}$$

5. Use the properties of exponents to simplify: $\left(\frac{25}{4x^4y^5}\right)\left(\frac{5}{2x^3y^2}\right)^{-3}$.

$$\frac{25}{4x^4y^5} \left(\frac{2x^3y^2}{5}\right)^3 = \frac{25}{4x^4y^5} \left(\frac{2^3x^9y^6}{5^3}\right) = \frac{25}{4x^4y^5} \cdot \frac{8x^9y^6}{125}$$

$$= \frac{25 \times 8}{4 \times 125} \cdot \frac{x^9}{x^4} \cdot \frac{y^6}{y^5} = \boxed{\frac{2}{5}x^5y}$$

6. Write the numbers in scientific notation.

a. 223,000

2.23×10^5

b. 0.000526

5.26×10^{-4}

Simplify the radical expressions.

7. $\left(\sqrt[3]{\frac{8x^3}{y^6}}\right)\left(\sqrt{\frac{y^4}{4}}\right) = \sqrt[3]{\frac{2^3x^3}{y^6}} \cdot \sqrt{\frac{y^4}{4}}$

$$= \frac{2x}{y^2} \cdot \frac{y^2}{2} = \boxed{x}$$

8. $(2\sqrt{x} + 5)(3\sqrt{x} - 4)$

$$6x - 8\sqrt{x} + 15\sqrt{x} - 20$$

$$6x + 7\sqrt{x} - 20$$

9. For the polynomial $2x^2 + 3 + 15x^3$, write the

a. Degree?

$\boxed{3}$

b. Leading coefficient?

$\boxed{15}$

10. Multiply and simplify $(5x^2 - 2y)(x^2 + y) = 5x^2 \cdot x^2 + 5x^2y - 2yx^2 - 2y^2$

$\boxed{5x^4 + 3x^2y - 2y^2}$

Completely factor #s 11 and 12:

11. $6ty + 9y + 14t + 21$

$$3y(2t+3) + 7(2t+3)$$

$$(2t+3)(3y+7)$$

12. $25a^2 - 9b^2$

$$5^2a^2 - 3^2b^2$$

$$(5a-3b)(5a+3b)$$

13. Simplify the rational expression $\frac{18-3z}{z^2-6z}$

$$\frac{3(6-z)}{z(z-6)} = \frac{-3(z-6)}{z(z-6)}$$

$$\boxed{\frac{-3}{z}}$$

14. What are the restrictions for $\frac{18-3z}{z^2-6z}$?

$$z \neq 0$$

$$z \neq 6$$

15. Rationalize the denominator and simplify: $\frac{7\sqrt{3}}{\sqrt{x}} + \frac{\sqrt{3x}}{x}$

$$\frac{7\sqrt{3}}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} + \frac{\sqrt{3x}}{x} = \frac{7\sqrt{3x}}{x} + \frac{\sqrt{3x}}{x}$$

$$\boxed{\frac{8\sqrt{3x}}{x}}$$

16. Solve: $\frac{x-2}{3} - \frac{x-1}{2} = \frac{1}{6}$

$$\frac{x-2}{3} \cdot \frac{2}{2} - \frac{x-1}{2} \cdot \frac{3}{3} = \frac{1}{6}$$

$$\frac{2x-4-3x+3}{6} = \frac{1}{6}$$

$$\frac{-x-1}{6} = \frac{1}{6}$$

$$\boxed{x = -2}$$

17. Solve $3x + ay = bx - 2$ for y.

$$ay = bx - 2 - 3x$$

$$ay = x(b-3) - 2$$

$$\boxed{y = \frac{x(b-3) - 2}{a}}$$

Identify #s 18 and 19 as conditional, contradiction or identity.

18. $5(w-1) = 5w$

$$5w - 5 = 5w$$

$$-5 = 0$$

contradiction

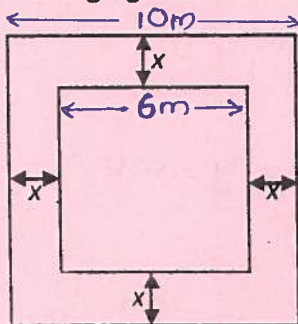
19. $2(2x-1) = 4x-2$

$$4x - 2 = 4x - 2$$

$$0 = 0$$

Identity.

20. The perimeter of the inner square is 24m and the outer square is 40m. Determine the value x from the following figure.



MTD I

$$6 + 2x = 10$$

$$2x = 4$$

$$\boxed{x = 2}$$

MTD II

$$2(6+2x) + 2(6+2x) = 40$$

$$6+2x+6+2x = 20$$

$$12+4x = 20$$

$$4x = 8$$

$$\boxed{x = 2}$$