

1. Which expression is equal to  $x^2 + 12x + 31$ ? **HINT:** Complete the square.

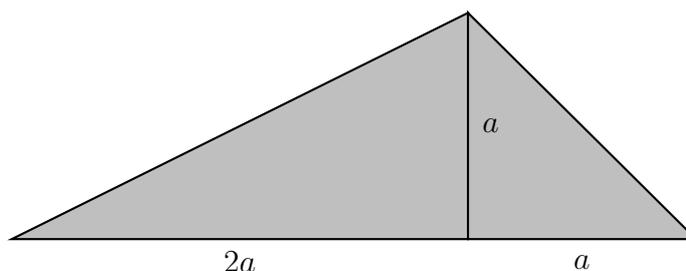
**Possibilities:**

- (a)  $(x + 6)^2 - 5$
  - (b)  $(x + 6)^2$
  - (c)  $(x + 12)^2$
  - (d)  $(x + 12)^2 + 31$
  - (e)  $(x + 6)^2 + 5$
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2. The area of the shaded region is 216 square feet. Find  $a$ .

**Possibilities:**

- (a)  $6\sqrt{6}$  feet
- (b) 12 feet
- (c) 24 feet
- (d)  $6\sqrt{2}$  feet
- (e) 18 feet



3. Which of the following ALWAYS produces an equivalent equation?

**Possibilities:**

- (a) Multiplying both sides of an equation by 9.
  - (b) Dividing both sides of the equation by  $x$ .
  - (c) Squaring both sides of an equation.
  - (d) Multiplying both sides of an equation by  $x + 9$ .
  - (e) Taking the absolute value of both sides of an equation.
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4. Find all real solutions or state that there are NONE.

$$\sqrt{x+2} = x+5.$$

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5. Find all real solutions or state that there are NONE.

$$(x+2)^4 + 10 = -6$$

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6. Solve the equation for a.

$$-7x - 49 = 2 + a.$$

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7. Find the slope of the line through the points  $(-1, 4)$  and  $(11, -6)$ .

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8. The endpoints of a diameter of a circle are  $A(8, -9)$  and  $B(-5, 7)$ . Find the center of the circle.

**Possibilities:**

- (a)  $(0, 5\sqrt{17})$
- (b)  $(13/2, -8)$
- (c)  $(-13/2, 8)$
- (d)  $(5\sqrt{17}, 0)$
- (e)  $(3/2, -1)$

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9. Find all real solutions or state that there are NONE.

$$x^3 + 5 = 13$$

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10. Find all real solutions or state that there are NONE.

$$\frac{x-6}{4} = -9.$$

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11. Find all real solutions.

$$x^3 + 12x^2 + 25x + 200 = 4x^2$$

**Possibilities:**

- (a)  $x = -8$
- (b)  $x = 5$  and  $x = 8$
- (c)  $x = 5$  and  $x = -5$
- (d)  $x = 8$
- (e)  $x = 5, x = -5,$  and  $-x = 8$

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12. How many solutions are there for each equation?

$$\text{(I)} (x - 2)^3 = 3$$

$$\text{(II)} (x + 5)^2 = 1$$

**Possibilities:**

- (a) Equation **(I)** has 3 solutions, and equation **(II)** has 2 solutions.
  - (b) Equation **(I)** has no solutions, and equation **(II)** has no solutions.
  - (c) Equation **(I)** has 3 solutions, and equation **(II)** has 1 solution.
  - (d) Equation **(I)** has 1 solution, and equation **(II)** has 2 solutions.
  - (e) Equation **(I)** has 1 solution, and equation **(II)** has no solutions.
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13. Find the perimeter of the parallelogram ABCD with vertices A(1, 4), B(18, 4), C(21, 8), and D(4, 8).

**Possibilities:**

- (a) 44 units
  - (b) 34 units
  - (c) 68 units
  - (d) 42 units
  - (e) 378 units
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14. A circle has a diameter with endpoints (16,2) and (4,-8). Find an equation for the circle.

**Possibilities:**

- (a)  $(x - 10)^2 + (y + 3)^2 = \sqrt{61}$
  - (b)  $(x - 6)^2 + (y - 5)^2 = 61$
  - (c)  $(x + 10)^2 - (y - 3)^2 = 61$
  - (d)  $(x - 6)^2 + (y - 5)^2 = \sqrt{61}$
  - (e)  $(x - 10)^2 + (y + 3)^2 = 61$
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15. Find all real solutions or state that there are NONE.

$$-4x + 16 = -5x + 3.$$

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16. Find the  $y$ -intercept of the graph of  $y = 2x^7 - 493x^5 + 969$ .

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17. Solve the equation for  $a$ .

$$P = 4a + 5b.$$

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18. Find all the solutions of the equation.

$$|x + 4| = 8$$

**Possibilities:**

- (a) The only solution is  $x = 4$ .
  - (b) There are exactly two solutions:  $x = 4$  and  $x = -4$ .
  - (c) The only solution is  $x = -12$ .
  - (d) There are exactly two solutions:  $x = 4$  and  $x = -12$ .
  - (e) The equation does not have any solutions.
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19. Find the area of the triangle with vertices  $A(-2, 3)$ ,  $B(15, 3)$ , and  $C(3, 6)$ .

**Possibilities:**

- (a) 51 square units
  - (b) 54 square units
  - (c)  $51/2$  square units
  - (d)  $17 + 3\sqrt{17} + \sqrt{34}$  square units
  - (e) 90 square units
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20. Find all real solutions or state that there are NONE.

$$x^2 + 18x + 63 = 2x.$$

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21. **TRUE or FALSE:** The line through the points  $(1, 1)$  and  $(4, -5)$  is perpendicular to the line through the points  $(-9, -1)$  and  $(-15, -4)$ .

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22. Find an equation for the line through the points  $(-2, 2)$  and  $(7, 11)$ .

**Possibilities:**

(a)  $y - 2 = -\frac{9}{9}(x - 2)$

(b)  $y - 2 = \frac{9}{9}(x + 2)$

(c)  $y + 2 = \frac{9}{9}(x - 2)$

(d)  $y - 11 = -\frac{9}{9}(x - 7)$

(e)  $y - 7 = \frac{9}{9}(x - 11)$

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23. Find all real solutions or state that there are NONE.

$$x^4 - 10x^2 + 9 = 0.$$

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24. Simplify.

$$(5x + 6)(2x - 5) - 16x - 56$$

**Possibilities:**

(a)  $10x^2 - 13x - 22$

(b)  $17x + 3$

(c)  $10x^2 - 29x - 86$

(d)  $10x - 38$

(e)  $10x^2 - 29x + 26$

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25. Find all real solutions or state that there are NONE.

$$x^2 + 3x - 20 = 8.$$

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26. Find all real solutions or state that there are NONE.

$$\frac{2}{x + 8} + \frac{5}{x - 9} = \frac{3}{x^2 - x - 72}.$$

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27. Find all real solutions or state that there are NONE.

$$x^3 + x + 1 = x + 28.$$

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28. Solve.

$$\frac{2}{x} + \frac{7}{x-8} = 0$$

**Possibilities:**

- (a)  $-8/5$
  - (b)  $-16/5$
  - (c)  $8/9$
  - (d)  $56/9$
  - (e)  $16/9$
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29. Which of the following equations are linear equations?

**(I)**  $y = \frac{7}{x+2}$

**(II)**  $y - 3 = 9(x - 2)$

**(III)**  $y = \pi x - 2$

**Possibilities:**

- (a) Only equation **(II)** is linear.
  - (b) None of the equations are linear.
  - (c) Only equations **(I)** and **(II)** are linear
  - (d) All of the equations are linear.
  - (e) Only equations **(II)** and **(III)** are linear
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30. The distance from  $x$  to 6 is 4. Which of the following equations represents this fact?

**Possibilities:**

- (a)  $|x - 6| = 4$
  - (b)  $|x + 6| = 4$
  - (c)  $|x + 4| = 6$
  - (d)  $|x - 4| = 6$
  - (e)  $|x| = 10$
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31. Find all real solutions or state that there are NONE.

$$(x - 1)^2 - 6x = (x - 7)^2 + 3$$

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32. Find all real solutions.

$$x^3 + 6x^2 + x - 6 = 2x$$

**Possibilities:**

- (a)  $x = 1$  and  $x = 6$
  - (b)  $x = 1$  and  $x = -6$
  - (c)  $x = -6$
  - (d)  $x = 1, x = -1,$  and  $x = -6$
  - (e)  $x = 1, x = -1,$  and  $x = 6$
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33. Find an equation for the line that is perpendicular to  $y = \frac{5}{6}x + 6$  and contains the point  $(0,12)$ .

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34. How many solutions does the equation have?

$$-3x^2 + 12x = -3$$

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35. Find all real solutions.

$$x = 2x^2$$

**Possibilities:**

- (a)  $x = 0$  and  $x = \frac{1}{2}$
  - (b)  $x = 0$  and  $x = 2$
  - (c)  $x = 0$
  - (d)  $x = \frac{1}{2}$
  - (e)  $x = 2$
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36. Find all the solutions of the equation.

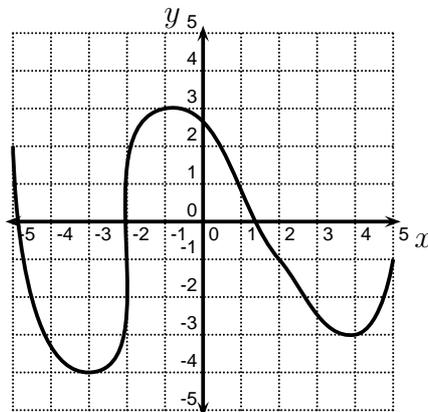
$$|2x + 18| + 1 = 11$$

**Possibilities:**

- (a) There are exactly two solutions:  $x = -4$  and  $x = 4$ .
- (b) The only solution is  $x = -4$ .
- (c) The only solution is  $x = -14$ .
- (d) There are exactly two solutions:  $x = -4$  and  $x = -14$ .
- (e) The equation does not have any solutions.

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37. In the picture below, the graph of an equation involving  $x$  and  $y$  is shown. Find the true statement.



**Possibilities:**

- (a)  $(-3, -4)$  is a solution to the equation.
- (b)  $(4, 5)$  is a solution to the equation.
- (c)  $(2, -1)$  is a NOT solution to the equation.
- (d)  $(-3, -4)$  is a NOT solution to the equation.
- (e)  $(-4, -3)$  is a solution to the equation.