Algebra II A Final Exam

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Evaluate the expression for the given value of the variable(s).

1. $-2x^2 - 5x + 3$; $x = 4$
   a. –34 b. –25 c. –49 d. –52

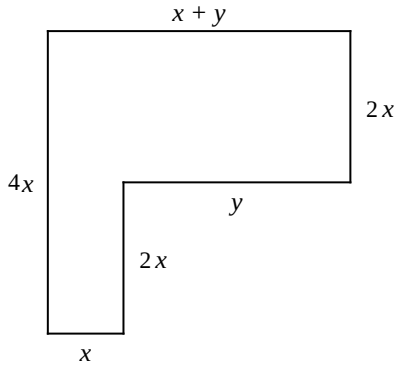
2. $-2x^3 + 2x^2 - x - 3$; $x = 2$
   a. –10 b. –13 c. 19 d. –9

Simplify by combining like terms.

3. $2(-3y - 6) - 8y$
   a. $-14y - 12$ b. $-26y$ c. $14y - 6$ d. $14y - 12$

4. $\frac{x}{2} + \frac{x^2}{3} - \frac{x}{5} - \frac{x^2}{4}$
   a. $-x^2 - \frac{x}{3}$ b. $\frac{x^2}{12} + \frac{3x}{10}$ c. $\frac{2x}{3} + \frac{4x}{7}$ d. $\frac{x}{3} - 1$

5. Find the perimeter of the figure. Simplify the answer.



   a. $9x + 2y$ b. $10x + y$ c. $10x + 2y$ d. $9x + 3y$

Simplify.

6. $20^{\frac{1}{2}} \cdot 20^{\frac{1}{2}}$
   a. 1 b. $\sqrt{20}$ c. $20^{\frac{1}{4}}$ d. 20

7. $5^{\frac{1}{3}} \cdot 25^{\frac{1}{3}}$
   a. $\sqrt[3]{5}$ b. 5 c. 25 d. $\sqrt{5}$

8. $8^{\frac{2}{3}}$

a. 512 b. 4 c. 64 d. $\sqrt[3]{8^2}$

Determine whether the function is linear or quadratic. Identify the quadratic, linear, and constant terms.

9. $y = (x + 4)(6x + 3) - 6x^2$

a. quadratic function
quadratic term: $-6x^2$
linear term: $27x$
constant term: 12

b. linear function
linear term: $27x$
constant term: 12

c. linear function
linear term: $22x$
constant term: 24

d. quadratic function
quadratic term: $6x^2$
linear term: $22x$
constant term: 24

10. $f(x) = (3x - 5)(3x + 6)$

a. linear function
linear term: $3x$
constant term: –30

b. quadratic function
quadratic term: $9x^2$
linear term: $3x$
constant term: –30

c. linear function
linear term: $9x^2$
constant term: –30

d. quadratic function
quadratic term: $-15x^2$
linear term: $3x$
constant term: –30

11. Classify $-3x^5 - 2x^3$ by degree and by number of terms.

a. quintic binomial
b. quartic binomial
c. quintic trinomial
d. quartic trinomial

12. Classify $-2x^5 + 6x^4 - x^2 + 8$ by degree and by number of terms.

a. cubic binomial
b. quartic polynomial of 4 terms
c. quintic polynomial of 4 terms
d. quadratic binomial

13. Zach wrote the formula $w(w - 1)(4w + 3)$ for the volume of a rectangular prism he is designing, with width w, which is always has a positive value greater than 1. Find the product and then classify this polynomial by degree and by number of terms.

a. $4w^5 - w^4 - 3w^3$; quintic trinomial
b. $4w^4 - w^3 - 3w^2$; quartic trinomial
c. $4w^3 - w^2 - 3w$; cubic trinomial
d. $12w^2$; quadratic monomial

14. Write the polynomial $\frac{6x^2 - 9x^3 + 3}{3}$ in standard form.

a. $-3x^3 + 2x^2 + 1$
b. $2x^2 - 3x^3 + 1$
c. $-3x^3 + 2x^2$
d. $2x^2 - 3x^3$

15. Write $2x^2(-3x^2 + 3x^3)$ in standard form. Then classify it by degree and number of terms.
    a. $6x^5 - 9x^4$; quartic binomial
    b. $-x + 5x^4$; quintic binomial
    c. $6x^5 - 6x^4$; quintic binomial
    d. $-x^5 - 6x^4$; quintic trinomial

16. Write the expression $(x + 2)(x + 4)$ as a polynomial in standard form.
    a. $x^2 - 2x + 2$
    b. $x^2 + 6x + 8$
    c. $x^2 - 2x + 8$
    d. $x^2 + 2x + 6$

Use Pascal's Triangle to expand the binomial.

17. $(s - 4v)^5$
    a. $s^5 - 20s^4v + 160s^3v^2 - 640s^2v^3 + 1280sv^4 - 1024v^5$
    b. $s^5 - 5s^4v + 10s^3v^2 - 10s^2v^3 + 5sv^4 - v^5$
    c. $s^5 - 20s^4 + 160s^3 - 640s^2 + 1280s - 1024$
    d. $s^5 + 80s^4v - 640s^3v^2 + 2560s^2v^3 - 5120sv^4 + 4096v^5$

Factor the expression.

18. $x^3 + 8$
    a. $(x - 2)(x^2 - 2x + 4)$
    b. $(x + 2)(x^2 - 2x + 4)$
    c. $(x + 2)(x^2 + 2x + 8)$
    d. $(x - 2)(x^2 + 2x + 4)$

19. Write $2x^3 + 0x^2 - 50x$ in factored form.
    a. $2x(x - 5)(x + 5)$
    b. $5x(x + 2)(x - 5)$
    c. $-5x(x + 5)(x + 2)$
    d. $2x(x + 5)(x + 5)$

20. Divide $3x^3 - 2x^2 + 2x - 2$ by $x - 4$.
    a. $3x^2 + 10x + 42$
    b. $3x^2 - 14x - 38$, R -170
    c. $3x^2 - 14x - 38$
    d. $3x^2 + 10x + 42$, R 166

21. Determine which binomial is *not* a factor of $4x^4 - 21x^3 - 46x^2 + 219x + 180$.
    a. $x + 4$
    b. $x + 3$
    c. $x - 5$
    d. $4x + 3$

22. Determine which binomial is a factor of $-2x^3 - 8x^2 + 13x + 15$.
    a. $x - 5$
    b. $x + 15$
    c. $x + 13$
    d. $x + 5$

Solve the equation.

23. $5y + 3 = -(y + 5)$
    a. $\frac{1}{3}$
    b. 3
    c. $-1\frac{1}{3}$
    d. $-\frac{3}{4}$

24. $|3x + 1| = 5$
    a. $x = 2$ or $x = 1\frac{1}{3}$
    b. $x = 1\frac{1}{3}$ or $x = -2$
    c. $x = 2$ or $x = -2$
    d. $x = 2$ or $x = 4$

25. $2|3x + 5| + 1 = 9$

a. $x = \frac{1}{2}$ or $x = -\frac{1}{3}$

b. $x = -\frac{1}{3}$ or $x = -3$

c. $x = \frac{1}{2}$ or $x = -2\frac{1}{2}$

d. $x = \frac{1}{2}$ or $x = -3$

Solve the equation or formula for the indicated variable.

26. $S = 5r^4t$, for t

a. $t = r^4 - 5S$

b. $t = \frac{625r}{S}$

c. $t = \frac{S}{5} - r$

d. $t = \frac{S}{5r^4}$

27. $T = \frac{2U}{E}$, for U

a. $U = \frac{T - E}{2}$

b. $U = T + \frac{E}{2}$

c. $U = 2T - E$

d. $U = \frac{TE}{2}$

28. For $f(x) = -2x + 5$, find $f(3)$.

a. –1

b. –11

c. 13

d. 11

29. Suppose $f(x) = 4x - 2$ and $g(x) = -2x + 1$.

Find the value of $\frac{f(-3)}{g(-5)}$.

a. –2

b. $-3\frac{1}{7}$

c. 2

d. $-1\frac{3}{11}$

Find the slope of the line.

30. $-5x - 4y = 11$

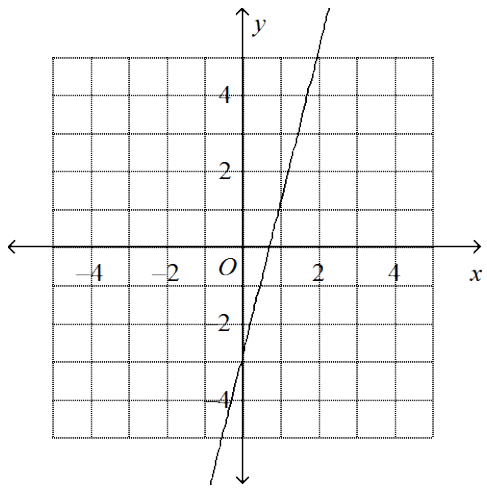
a. $-\frac{4}{5}$

b. $\frac{4}{5}$

c. $-\frac{5}{4}$

d. $\frac{5}{4}$

31.



a. 4

b. 0

c. –4

d. 1

Determine whether *y* varies directly with *x*. If so, find the constant of variation *k* and write the equation.

32.

x	*y*
3	21
12	84
48	336
192	1344

a. yes; $k = 7$; $y = 7x$
b. yes; $k = 4$; $y = 4x$
c. yes; $k = 3$; $y = 3x$
d. no

Determine whether *y* varies directly with *x*. If so, find the constant of variation *k*.

33. $6y = -3x$
a. yes; $-\frac{1}{2}$
b. yes; -2
c. yes; -3
d. no

Find the value of *y* for a given value of *x*, if *y* varies directly with *x*.

34. If $y = 12$ when $x = -36$, what is y when $x = -90$?
a. 30
b. –30
c. –270
d. 270

35. A manufacturer determines that the number of drills it can sell is given by the formula $D = -3p^2 + 174p - 325$, where p is the price of the drills in dollars.
a. At what price will the manufacturer sell the maximum number of drills?
b. What is the maximum number of drills that can be sold?

a. \$87; 7,894 drills
b. \$29; 2,198 drills
c. \$58; 325 drills
d. \$31; 2,205 drills

36. Dalco Manufacturing estimates that its weekly profit, P, in hundreds of dollars, can be approximated by the formula $P = -5x^2 + 10x + 9$, where x is the number of units produced per week, in thousands.
a. How many units should the company produce per week to earn the maximum profit?
b. Find the maximum weekly profit.

a. 2,000 units; \$1000
b. 1,000 units; \$900
c. 1,000 units; \$1400
d. 5,000 units; \$6600

37. Find the missing value to complete the square.
$x^2 + 8x + \_\_\_\_$
a. 8
b. 256
c. 64
d. 16

Solve the quadratic equation by using the quadradic formula

38. $x^2 + 16x + 74 = 0$

a. $256 \pm i\sqrt{10}$
c. $-8 \pm i\sqrt{10}$
b. $8 \pm i\sqrt{54}$
d. $-16 \pm 3\sqrt{6}$

Use the Quadratic Formula to solve the equation.

39. $-5x^2 + 5x + 3 = 0$

a. $\frac{1}{2} \pm \frac{\sqrt{42}}{2}$
c. $1 \pm \frac{\sqrt{85}}{5}$
b. $\frac{1}{2} \pm \frac{\sqrt{85}}{10}$
d. $2 \pm \frac{\sqrt{170}}{10}$

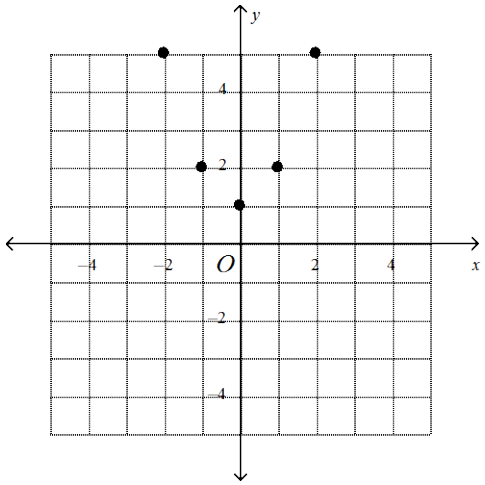
40. $2x^2 - 5x + 10 = 0$

a. $\frac{5}{2} \pm \frac{i\sqrt{55}}{2}$
c. $\frac{5}{4} \pm \frac{\sqrt{55}}{4}$
b. $\frac{5}{4} \pm \frac{i\sqrt{55}}{4}$
d. $\frac{4}{5} \pm \frac{i\sqrt{110}}{4}$

41. Solve $125x^3 + 343 = 0$. Find all complex roots.

a. $-\frac{7}{5}, \frac{35 \pm 35i\sqrt{3}}{50}$
c. $\frac{7}{5}, \frac{35 \pm 35\sqrt{3}}{50}$
b. no solution
d. $-\frac{7}{5}, \frac{7}{5}$

42. Write the ordered pairs for the relation. Find the domain and range.

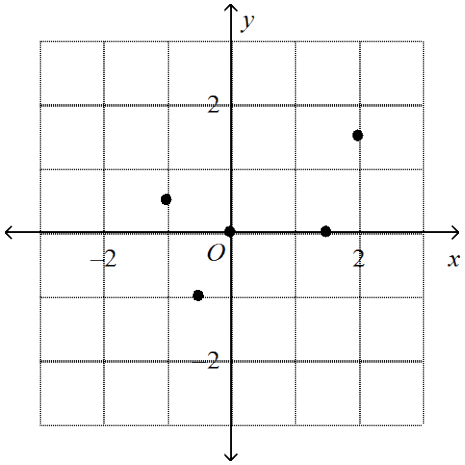


a. {(–2, 5), (–1, 2), (0, 1), (1, 2), (2, 5)}; domain: {–2, –1, 0, 1, 2}; range: {1, 2, 5}
b. {(5, –2), (2, –1), (1, 0), (2, 1), (5, 2)}; domain: {–2, –1, 0, 1, 2}; range: {1, 2, 5}
c. {(–2, 5), (–1, 2), (0, 1), (1, 2), (2, 5)}; domain: {1, 2, 5}; range: {–2, –1, 0, 1, 2}
d. {(5, –2), (2, –1), (1, 0), (2, 1), (5, 2)}; domain: {1, 2, 5}; range: {–2, –1, 0, 1, 2}

43. Graph the relation. Find the domain and range.

$\left\{\left(-1, \frac{1}{2}\right), \left(-\frac{1}{2}, -1\right), \left(\frac{3}{2}, 0\right), \left(2, \frac{3}{2}\right)\right\}$

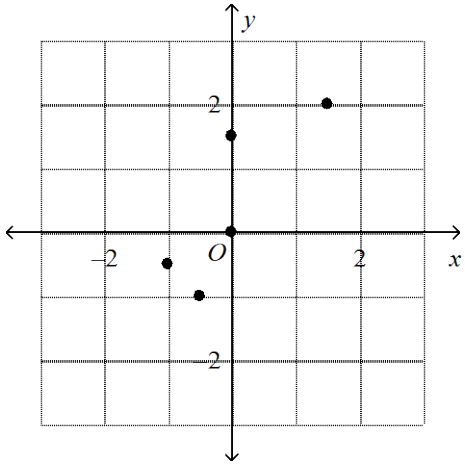
a.



domain: $\left\{-1, -\frac{1}{2}, \frac{3}{2}, 2\right\}$

range: $\left\{-1, 0, \frac{1}{2}, \frac{3}{2}\right\}$

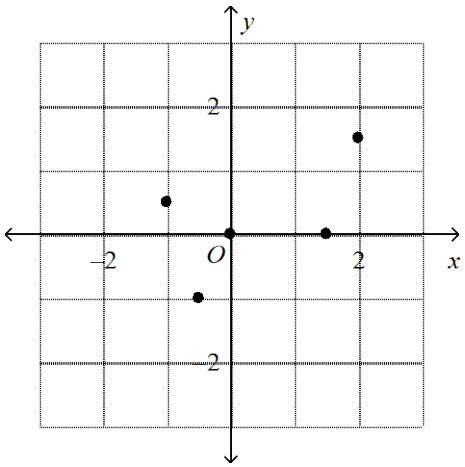
c.



domain: $\left\{-1, -\frac{1}{2}, 2, \frac{3}{2}\right\}$

range: $\left\{-1, 0, \frac{1}{2}, \frac{3}{2}\right\}$

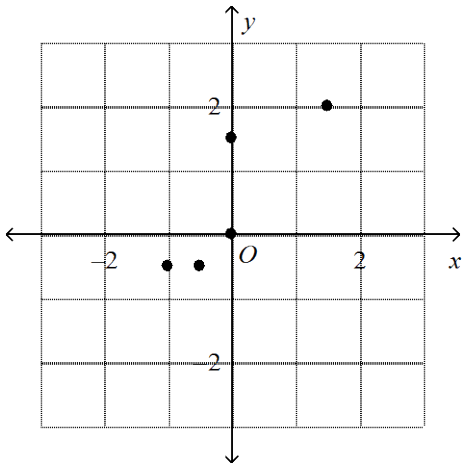
b.



domain: $\left\{-1, 0, \frac{1}{2}, \frac{3}{2}\right\}$

range: $\left\{-1, -\frac{1}{2}, 2, \frac{3}{2}\right\}$

d.



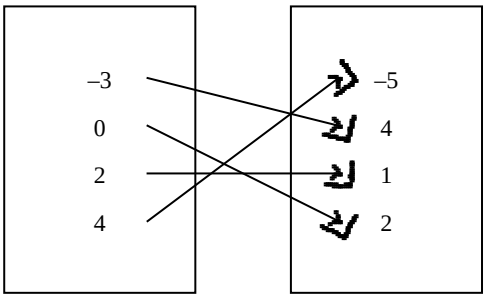
domain: $\left\{-1, 0, \frac{1}{2}, \frac{3}{2}\right\}$

range: $\left\{-1, -\frac{1}{2}, 2, \frac{3}{2}\right\}$

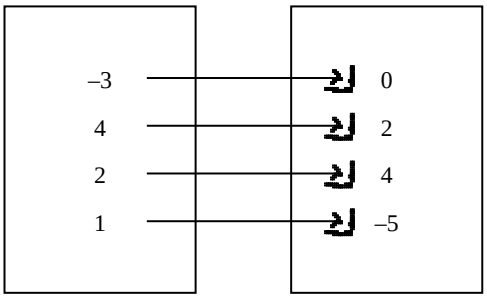
44. Make a mapping diagram for the relation.

$\{(-3, 4), (0, 2), (2, 1), (4, -5)\}$

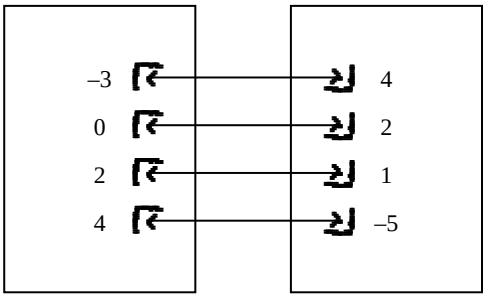
a.



c.



b.



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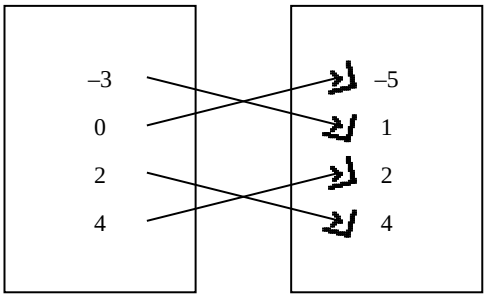
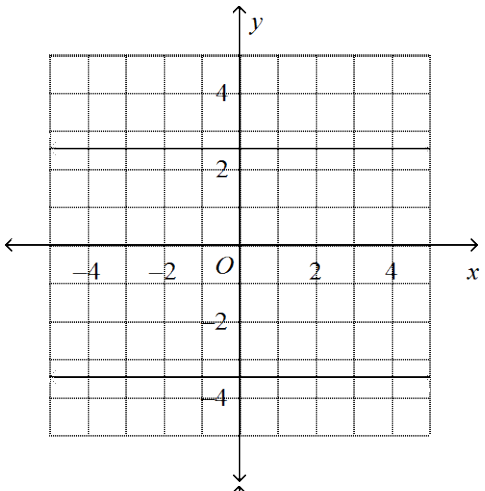


45. Use the vertical-line test to determine which graph represents a function.

a.



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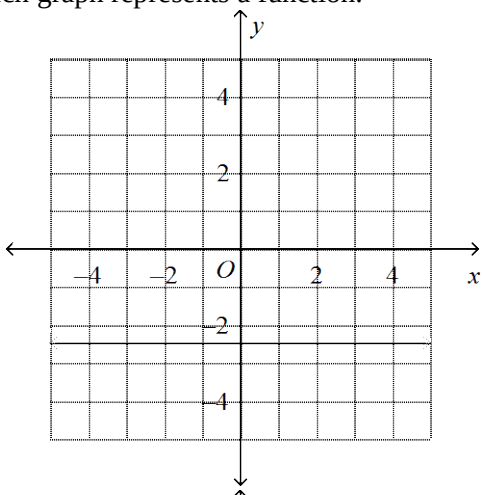

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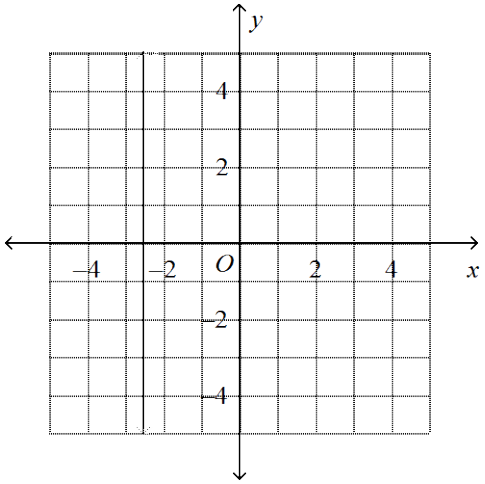

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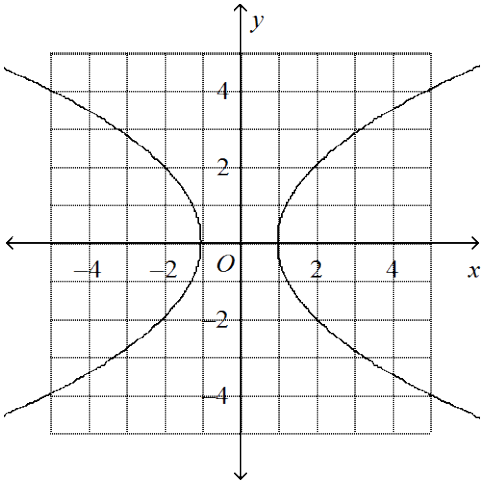
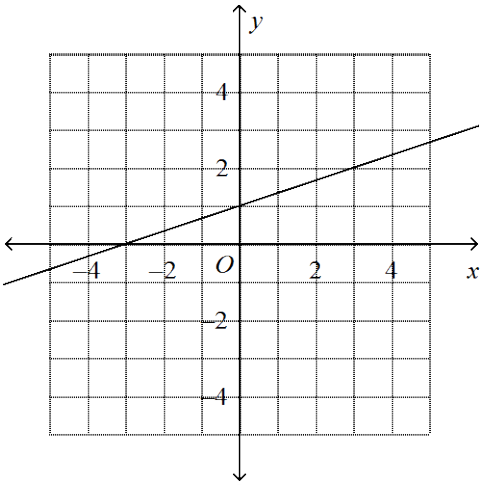


46. Graph the equation $y = -\frac{1}{3}x + 1$.

a.



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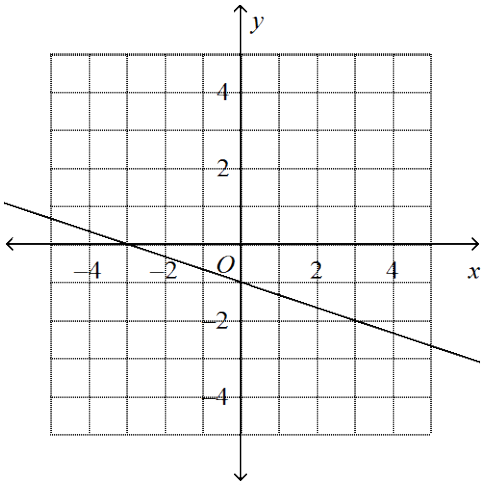

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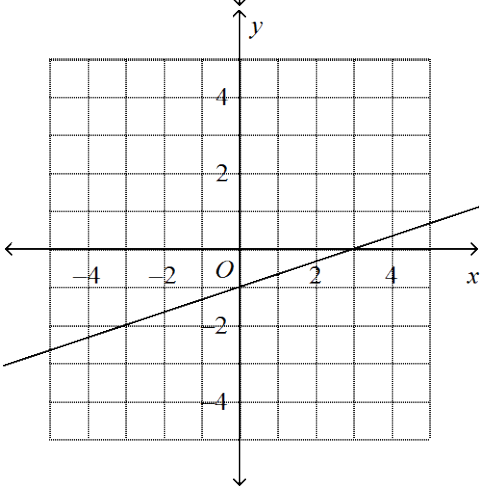
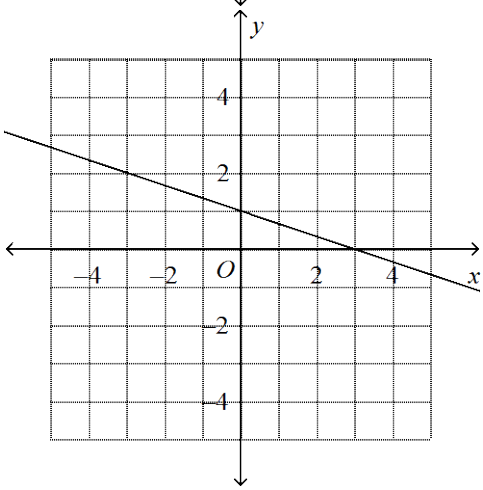
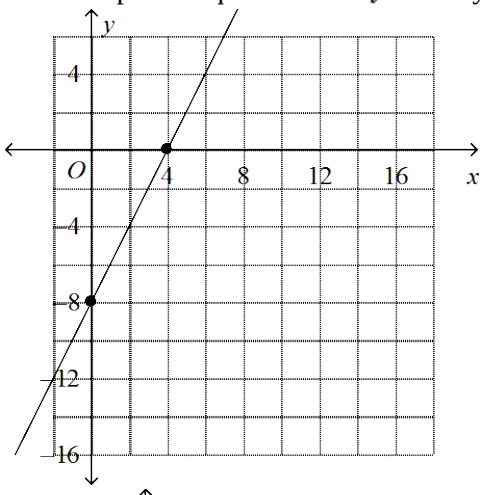


d.

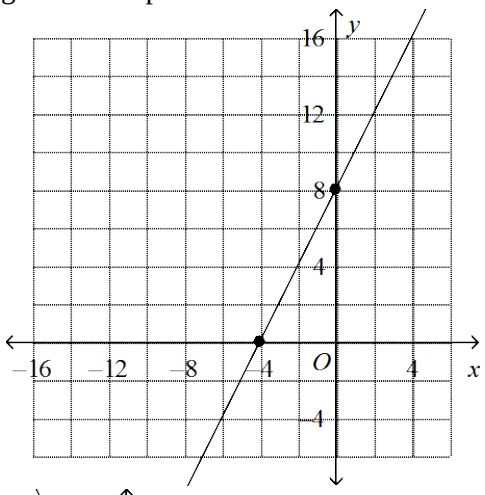


47. Graph the equation $2x + y = 8$ by finding the intercepts.

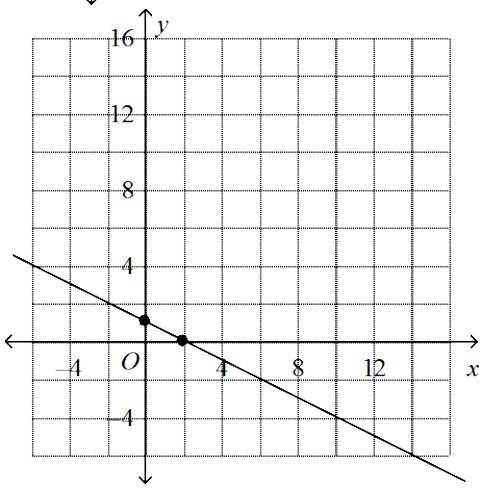
a.



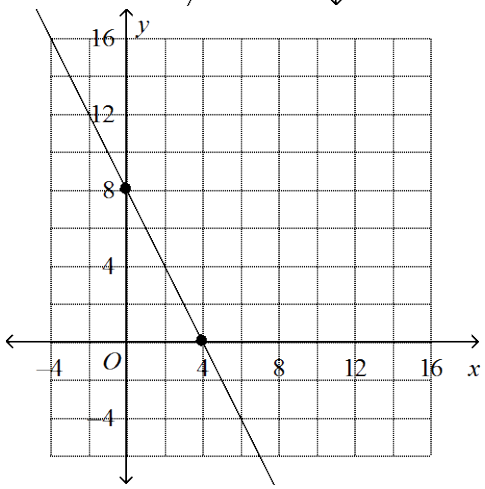
c.



b.

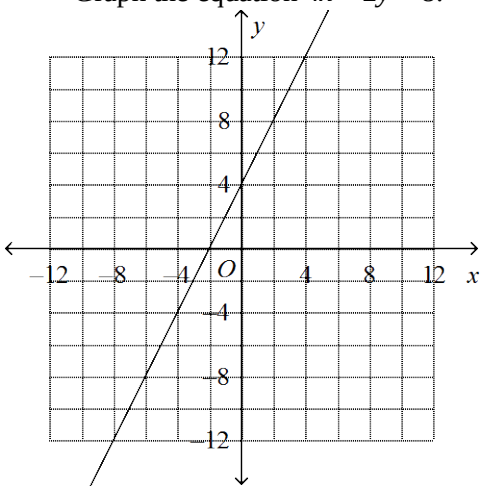


d.

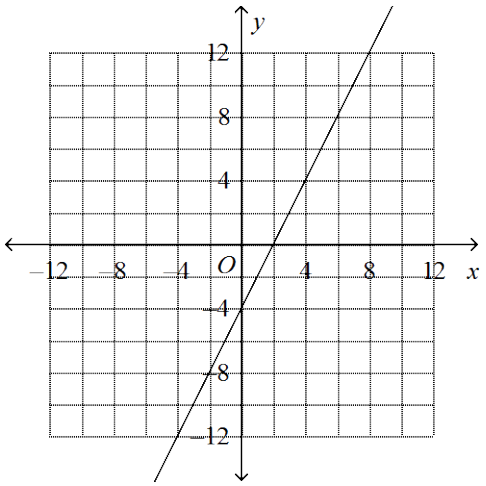


48. Graph the equation $4x - 2y = 8$.

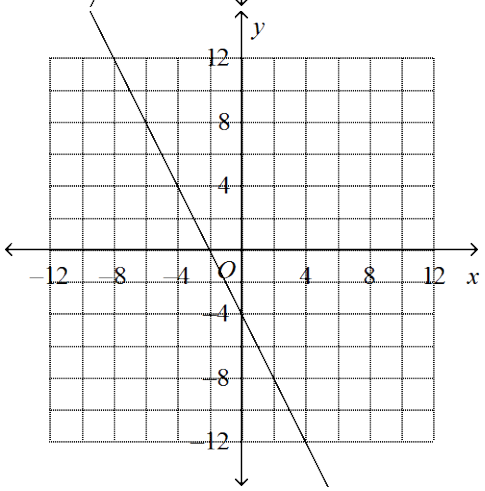
a.



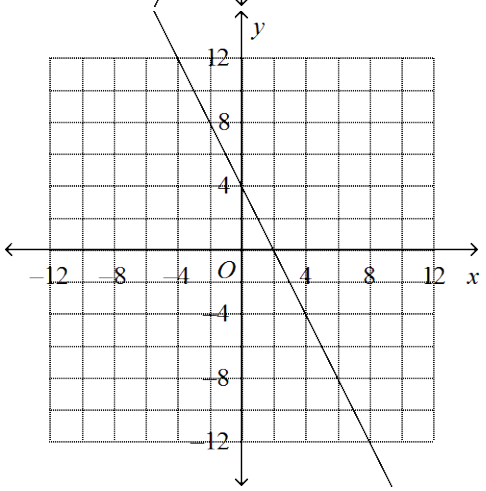
c.



b.

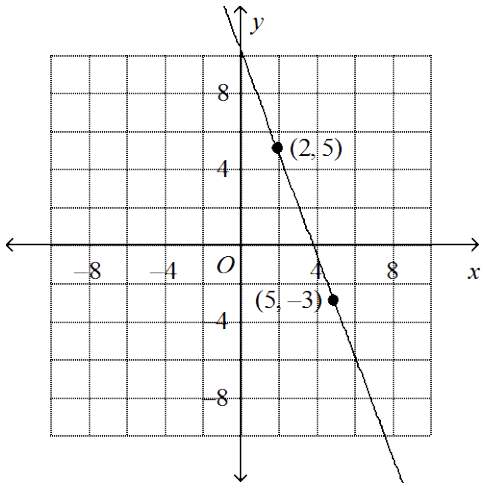


d.



Find the slope of the line through the pair of points.

49.



a. $-\frac{3}{8}$

b. $\frac{8}{3}$

c. $-\frac{8}{3}$

d. $\frac{3}{8}$

Write in standard form an equation of the line passing through the given point with the given slope.

50. slope = 1; (–1, 3)
    a. $x + y = 4$
    b. $-x + y = 4$
    c. $-x - y = 4$
    d. $-x + y = -4$

51. slope = $\frac{-5}{3}$; (–3, –2)
    a. $\frac{5}{3}x - y = -7$
    b. $\frac{5}{3}x + y = -7$
    c. $\frac{5}{3}x + y = 7$
    d. $-\frac{5}{3}x + y = -7$

Find an equation for the line:

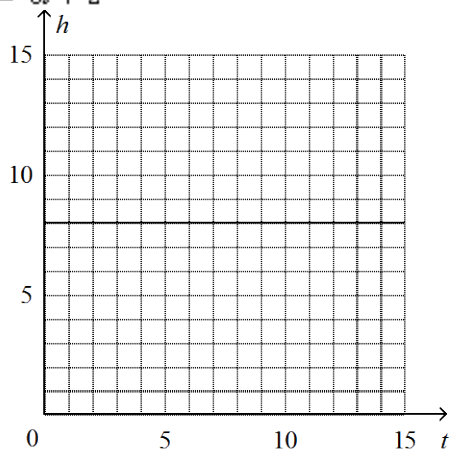
52. through (–7, 7) and parallel to $y = 2x - 3$.
    a. $y = -\frac{1}{2}x + \frac{7}{2}$
    b. $y = 2x + 21$
    c. $y = -2x - 7$
    d. $y = \frac{1}{2}x + \frac{21}{2}$

53. A new candle is 8 inches tall and burns at a rate of 2 inches per hour.

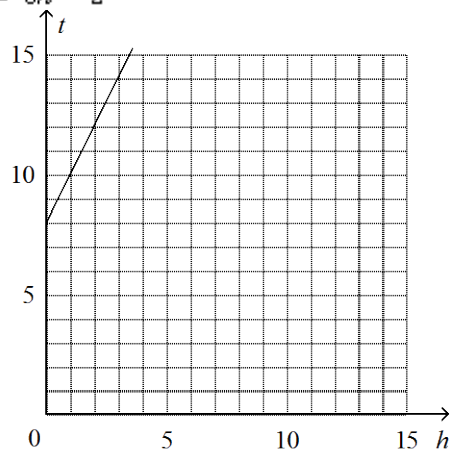
a. Write an equation that models the height h after t hours.

b. Sketch the graph of the equation.

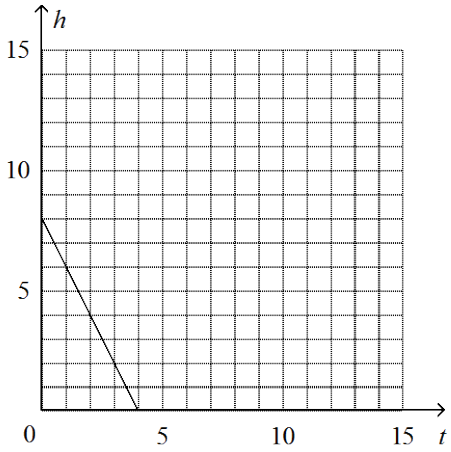
a. $h = 8t + 2$



c. $t = 8h - 2$

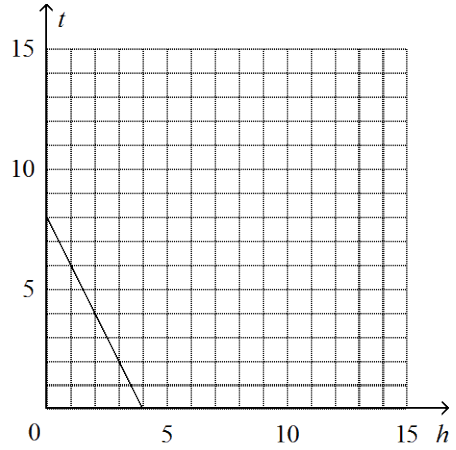


b.



$h = -2t + 8$

d. $t = -2h + 8$



54. Compare the graphs of the pair of functions. Describe how the graph of the second function relates to the graph of the first function.

$y = -2|x|$ and $y = -2|x| - 3$

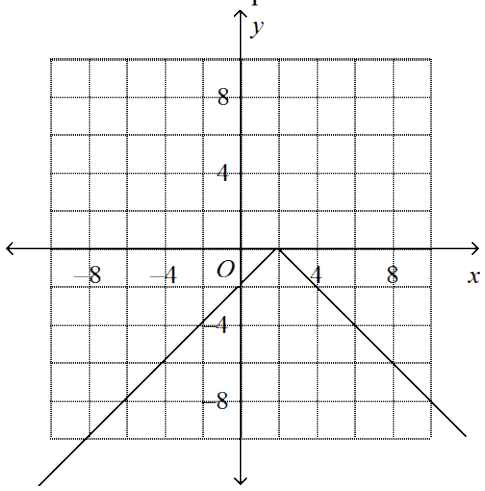
a. The second function is the graph of $y = -2|x|$ moved to the right 3 units.

b. The second function is the graph of $y = -2|x|$ moved up 3 units.

c. The second function is the graph of $y = -2|x|$ moved to the left 3 units.

d. The second function is the graph of $y = -2|x|$ moved down 3 units.

55. Write an equation for the horizontal translation of $y = -|x|$.



a. $y = |x + 2|$ b. $y = -|x - 2|$ c. $y = |x - 2|$ d. $y = -|x + 2|$

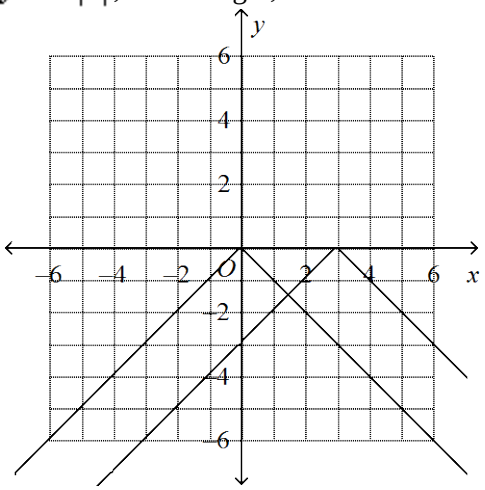
56. The equation $y = |x - 3|$ describes a function that is translated from a parent function.

a. Write the equation of the parent function.

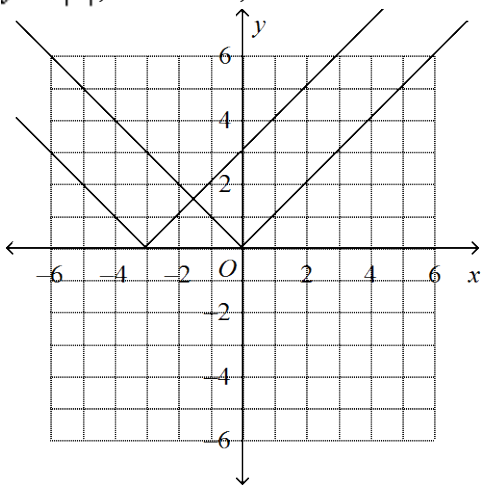
b. Find the number of units and the direction of translation.

c. Sketch the graphs of the two functions.

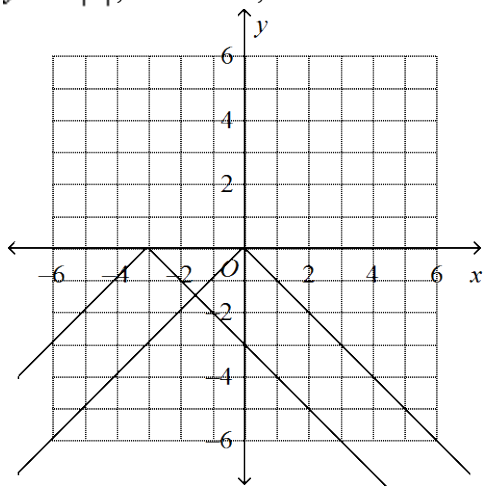
a. $y = -|x|$; 3 units right;



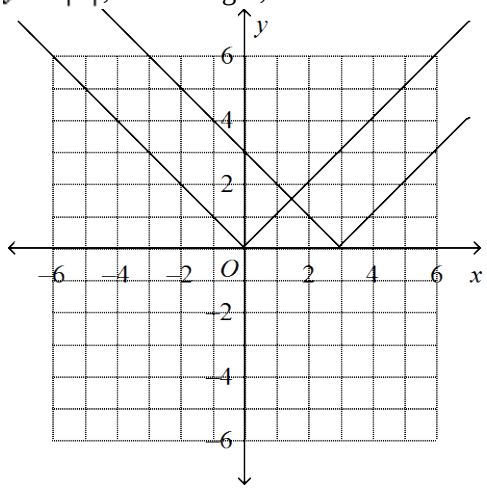
c. $y = |x|$; 3 units left;



b. $y = -|x|$; 3 units left;



d. $y = |x|$; 3 units right;



57. Write the equation that is the translation of $y = |x|$ left 10 units and down 5 units.

a. $y = |x - 10| - 5$

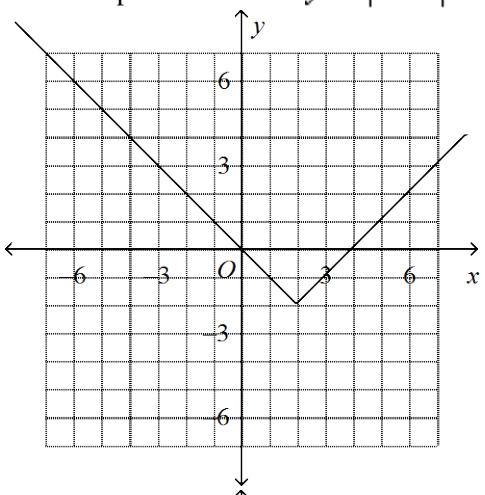
b. $y = |x + 5| - 10$

c. $y = |x - 5| - 10$

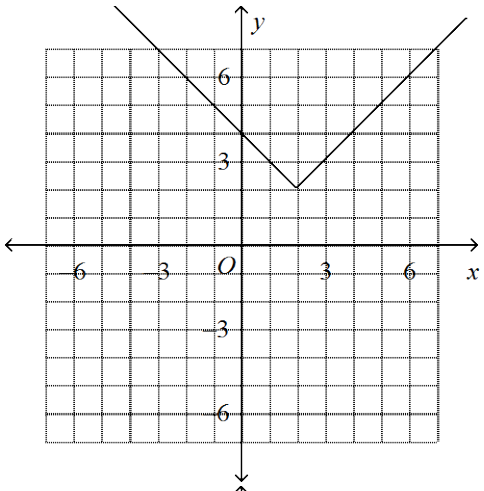
d. $y = |x + 10| - 5$

58. Graph the function $y = |x + 2| - 2$.

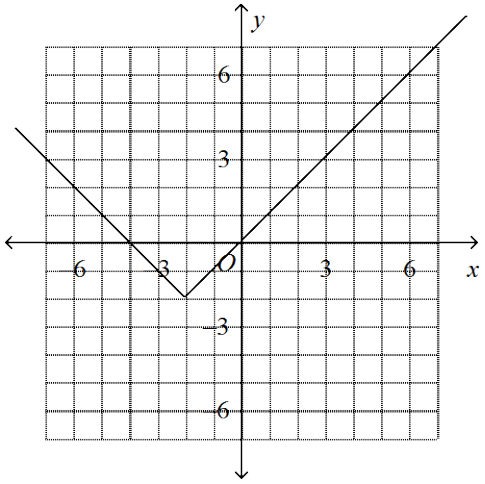
a.



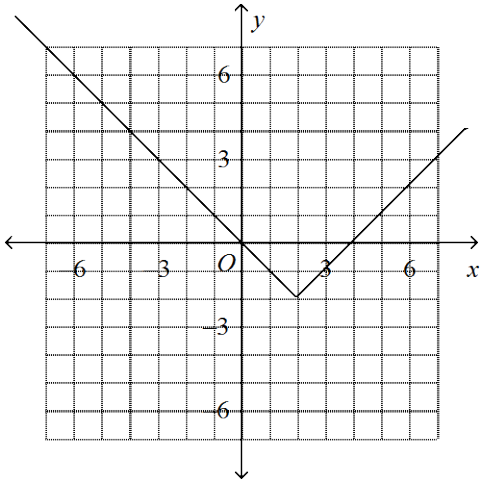
c.



b.

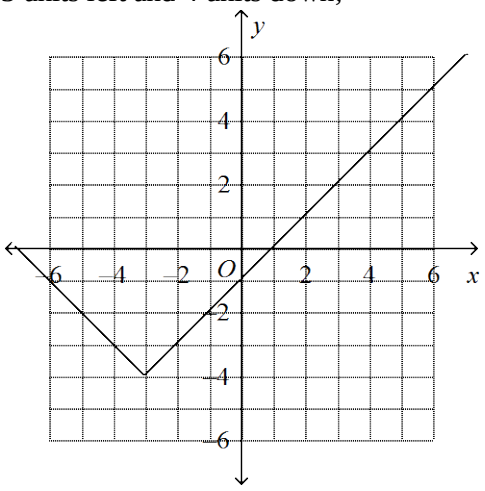


d.

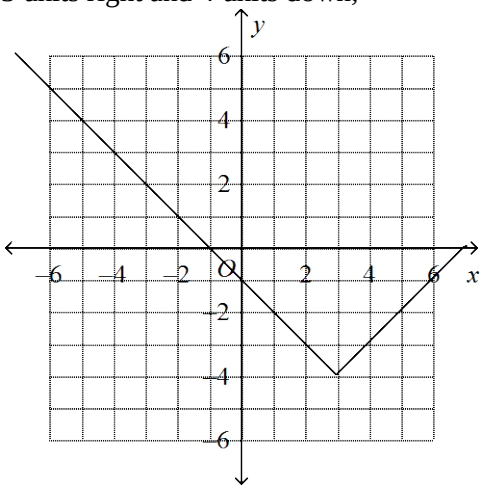


59. Describe the relationship between the graph of $y = |x + 3| - 4$ in terms of a vertical and a horizontal translation of the graph of $y = |x|$. Then graph $y = |x + 3| - 4$.

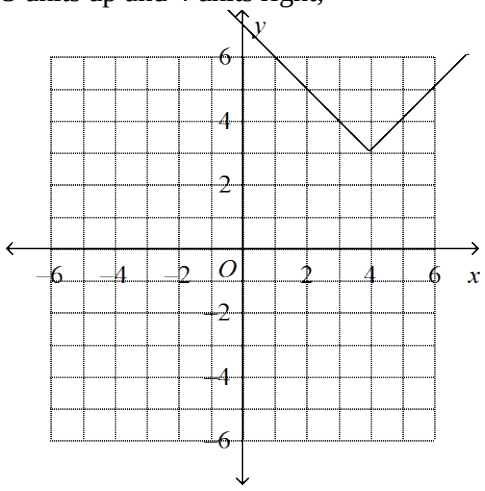
a. 3 units left and 4 units down;



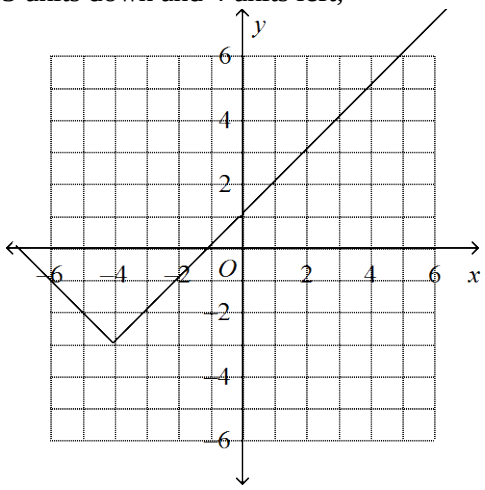
b. 3 units right and 4 units down;



c. 3 units up and 4 units right;

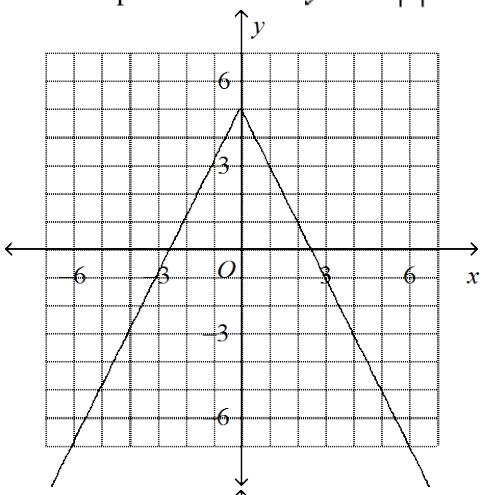


d. 3 units down and 4 units left;

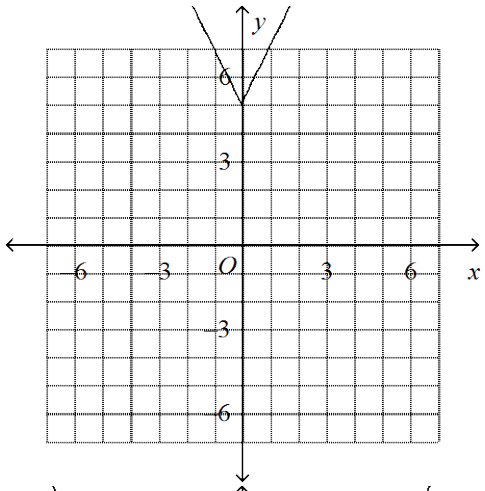


60. Graph the function $y = -2|x| + 5$.

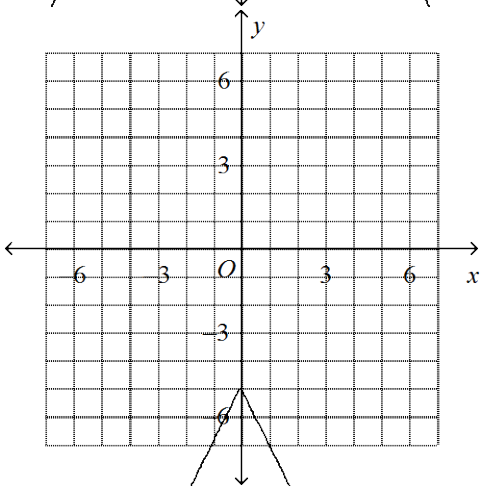
a.



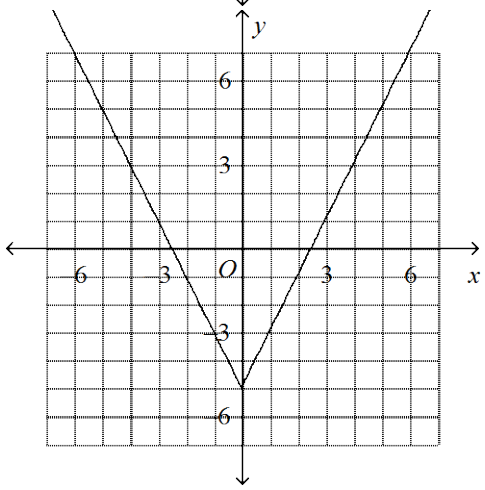
c.



b.

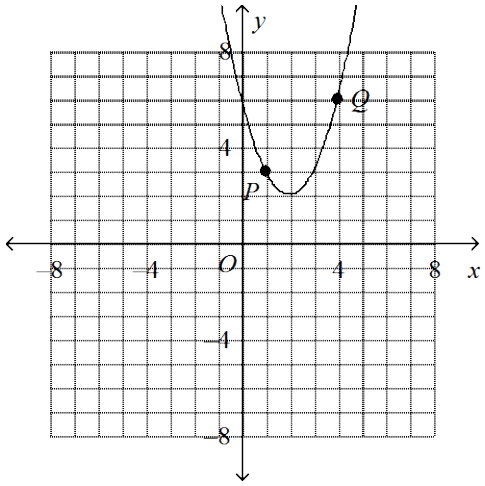


d.



Identify the vertex and the axis of symmetry of the parabola. Identify points corresponding to *P* and *Q*.

61.



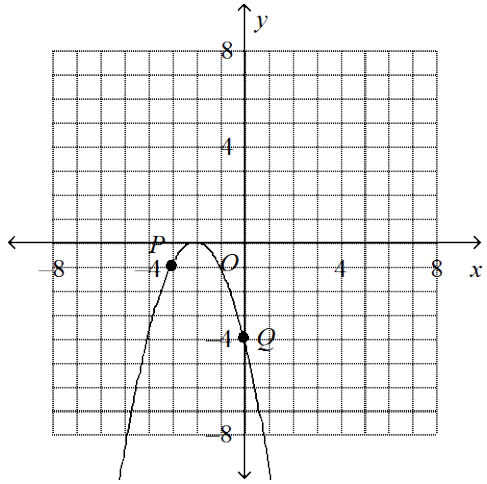
a. (2, 2), $x = 2$
$P'(3, 3)$, $Q'(0, 6)$

b. (2, 2), $x = 2$
$P'(1, 3)$, $Q'(3, -1)$

c. (2, 2), $x = 2$
$P'(3, 3)$, $Q'(0, 6)$

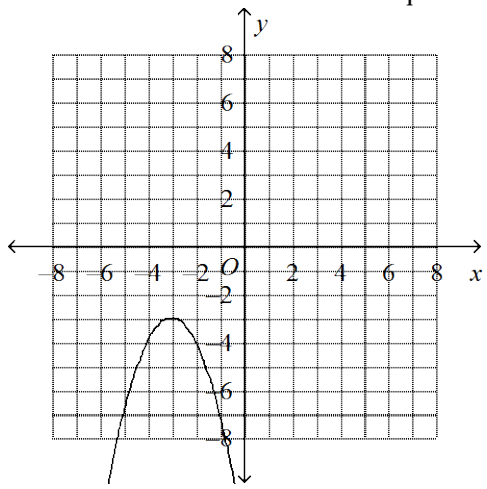
d. (2, 2), $x = 2$
$P'(1, 3)$, $Q'(3, -1)$

62.



a. (0, –2), $x = 0$; $P'(-3, -1)$, $Q'(0, -4)$
b. (0, –2), $x = 0$; $P'(-1, -1)$, $Q'(-4, -4)$
c. (–2, 0), $x = -2$; $P'(-3, -1)$, $Q'(0, -4)$
d. (–2, 0), $x = -2$; $P'(-1, -1)$, $Q'(-4, -4)$

63. Use the vertex form to write the equation of the parabola.



a. $y = -(x - 3)^2 + 3$
b. $y = (x + 3)^2 - 3$
c. $y = -(x - 3)^2 - 3$
d. $y = -(x + 3)^2 - 3$

64. Use a graphing calculator to determine which type of model best fits the values in the table.

x	–6	–2	0	2	6
y	1050	38	0	–46	–1122

a. quadratic model
b. linear model
c. cubic model
d. none of these

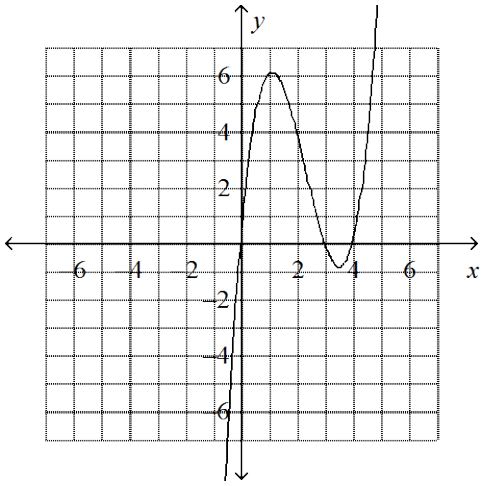
65. Use a graphing calculator to find a polynomial function to model the data.

x	1	2	3	4	5	6	7	8	9	10
$f(x)$	12	4	5	13	9	16	19	16	24	43

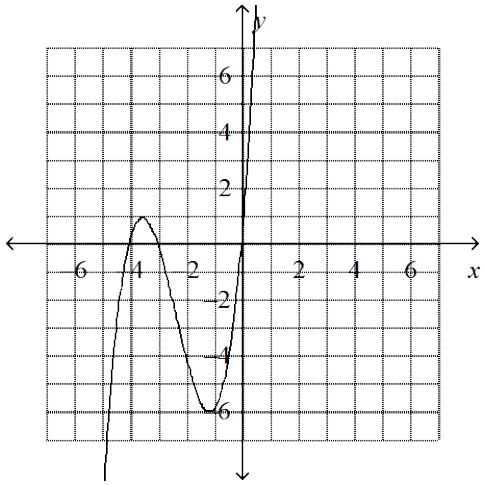
a. $f(x) = 0.8x^4 - 1.73x^3 + 12.67x^2 - 34.68x + 35.58$
b. $f(x) = 0.08x^3 - 1.73x^2 + 12.67x + 35.58$
c. $f(x) = 0.08x^4 + 1.73x^3 - 12.67x^2 + 34.68x - 35.58$
d. $f(x) = 0.08x^4 - 1.73x^3 + 12.67x^2 - 34.68x + 35.58$

66. Find the zeros of $y = x(x - 3)(x - 4)$. Then graph the equation.

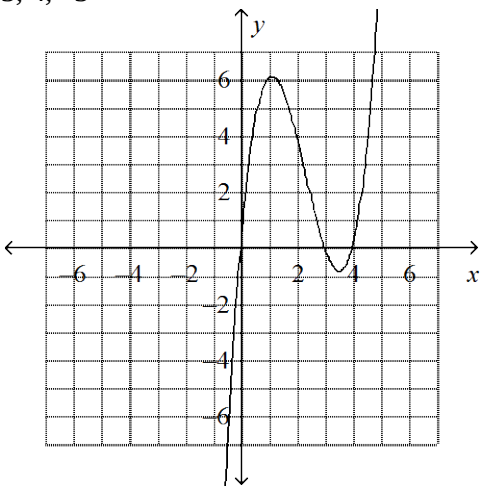
a. 0, 3, 4



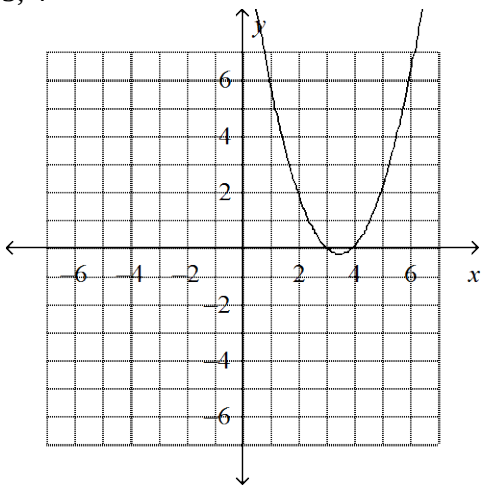
c. 0, –3, –4



b. 3, 4, –3



d. 3, 4



67. Find the zeros of $f(x) = (x - 2)^5(x + 4)^4$ and state the multiplicity.

a. 5, multiplicity 2; 4, multiplicity –4
b. 5, multiplicity 2; –4, multiplicity 4
c. 2, multiplicity 5; 4, multiplicity –4
d. 2, multiplicity 5; –4, multiplicity 4

Solve the equation by graphing.

68. $x^2 + 5x + 27 = 0$

a. $x = 27$ b. $x = 25$ c. $x = 22$ d. no solution

69. $x^3 + 10x^2 - 16x = 0$

a. 0, –1.4, 11.4
b. 0, 1.4, –11.4
c. no solution
d. 1.4, –11.4

70. $6x = 9 + x^2$

a. 3 b. –3 c. –3, 3 d. no solution

Algebra II A Final Exam
Answer Section

MULTIPLE CHOICE

1. C
2. B
3. A
4. B
5. C
6. D
7. B
8. B
9. B
10. B
11. A
12. C
13. C
14. A
15. C
16. B
17. A
18. B
19. A
20. D
21. A
22. D
23. C
24. B
25. B
26. D
27. D
28. A
29. D
30. C
31. A
32. A
33. A
34. A
35. B
36. C
37. D
38. C
39. B
40. B
41. A

42. A
43. A
44. A
45. C
46. D
47. D
48. C
49. C
50. B
51. B
52. B
53. D
54. D
55. B
56. D
57. D
58. B
59. A
60. A
61. C
62. D
63. D
64. C
65. D
66. A
67. D
68. D
69. B
70. A