

Algebra 2 Semester 1 Exam Review #2

NAME Key

Graph the equation.

1. $3x + 4y = 12$

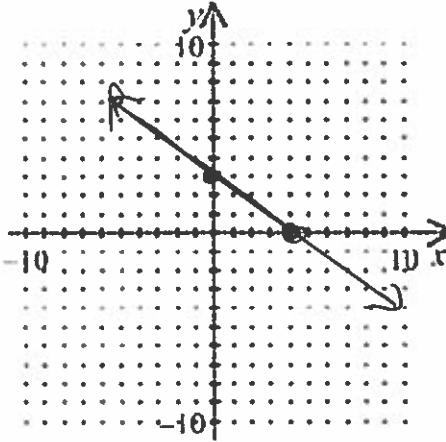
Intercepts

$$3x = 12$$

$$x = 4$$

$$4y = 12$$

$$y = 3$$



2. Write the slope-intercept equation that represent a line that passes through the point $(-3, -4)$ and is parallel to the line $y = 4x + 3$?

$$y = 4(x + 3) - 4$$

3. Which of the following best describes the graphs of the equations below?

$$5y = -10x + 20$$

$$-7y = 14x - 21$$

$$y = \frac{-10}{5}x + \frac{20}{5} \quad y = -2x + 4$$

$$y = \frac{14}{-7}x - \frac{21}{-7} \quad y = -2x - 3$$

- a. The lines are parallel.
- b. The lines are perpendicular.
- c. The lines have the same y-intercept.
- d. The lines have the same x-intercept.

same slope

Solve the linear system.

$$4x + y = -11$$

$$-x - y = 5$$

$$3x = -6$$

$$x = -2$$

$$4(-2) + y = -11$$

$$-8 + y = -11$$

$$+8 \quad +8$$

$$y = -3$$

$$(-2, -3)$$

Solve the system of equations.

ply $5m + 2 \neq 2$

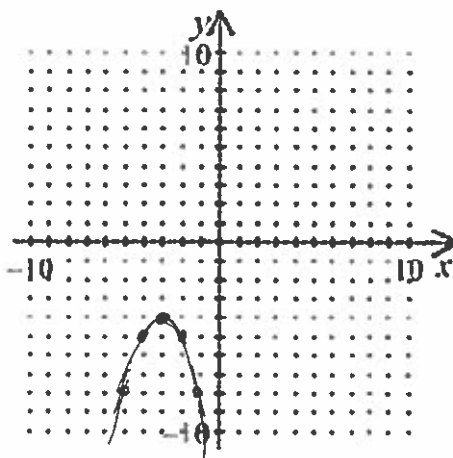
5. $x + y + z = 11$
 $-2x - y + z = -10$
 $x - 2y - z = -11$

$\begin{pmatrix} x & y & z \\ 3 & 6 & 2 \end{pmatrix}$

6. Graph the parabola

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

Vertex $(-3, -4)$



$(-2, -5)$
 $(-1, -8)$

Factor each of the following (7 - 8).

7. $6x^2 + x - 35$
 $\frac{-7}{3} \cdot \frac{3}{2} = \frac{-7}{2}$, $\frac{-14}{6}, \frac{15}{6} \rightarrow \frac{5}{2}$
 $(3x - 7)(2x + 5)$

8. $36x^2 - 4$
 $(6x)^2 - (2)^2 = (6x - 2)(6x + 2)$

Solve.

9. $35x^2 - 11x - 72 = 0$

$x = 8/5$ or $-9/7$

Factor completely.

10. $8u^4 - 26u^3 + 20u^2$

$2u^2(4u^2 - 13u + 10)$
 $2u^2(u - 2)(4u - 5)$

Simplify the expression.

11. $3\sqrt{1014} \cdot \sqrt{78}$

$3 \sqrt{2 \cdot 3 \cdot 13 \cdot 13 \cdot 2 \cdot 3 \cdot 13}$

Solve.

12. $2x^2 - 6 = 92$

$2x^2 = 98$

$x^2 = 49$

$x = \pm 7$

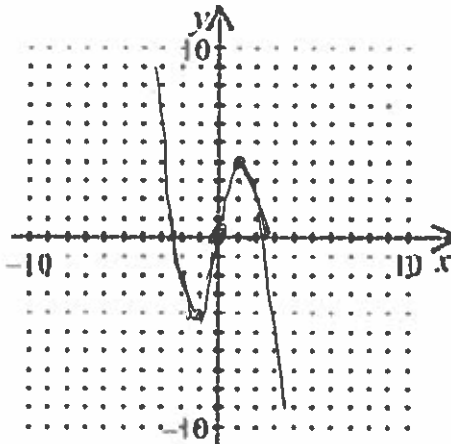
13. Use the quadratic formula to solve: $x^2 + 5x + 1 = 0$

$$x = \frac{-5 \pm \sqrt{25 - 4(1)(1)}}{2} = \frac{-5 \pm \sqrt{21}}{2}$$

Simplify the expression. Give your answer in exponential form.

14. $(5^4 \cdot 9^7)^5 = 5^{20} 9^{35}$

15. Graph the function $f(x) = 5x - x^3$?



Find the sum or difference.

16. $(4i^3 + 9i + 4) - (-5i^3 - i + 2)$
 $5i^3 + i - 2$

$9i^3 + 10i + 2$

$2 \overline{)1014}$
 $3 \overline{)507}$
 $13 \overline{)769}$
 13

$2 \overline{)78}$
 $3 \overline{)39}$
 13

$3 \cdot 2 \cdot 3 \cdot 13 \sqrt{13}$

$234 \sqrt{13}$

Find the real-number solutions of the equation.

17. $p^3 - 6p^2 = 0$

$$p^2(p-6) = 0$$

$$p = 0, p = 6$$

Divide.

18. $(3x^4 - 3x^3 - 6x - 8) \div (x-2)$

$$\begin{array}{r} 2 \overline{) \begin{array}{cccc} 3 & -3 & -6 & -8 \\ \downarrow & 6 & 6 & 0 \\ \hline 3 & 3 & 0 & -8 \end{array}} \end{array}$$

$$3x^2 + 3x + \frac{-8}{x-2}$$

List the possible rational zeros of the function using the rational zeros theorem.

19. $f(x) = x^5 - 6x^3 + 15$ $\pm 1, \pm 3, \pm 5, \pm 15$

20. Find the product: $(x+5)(2x^2+3x-4)$

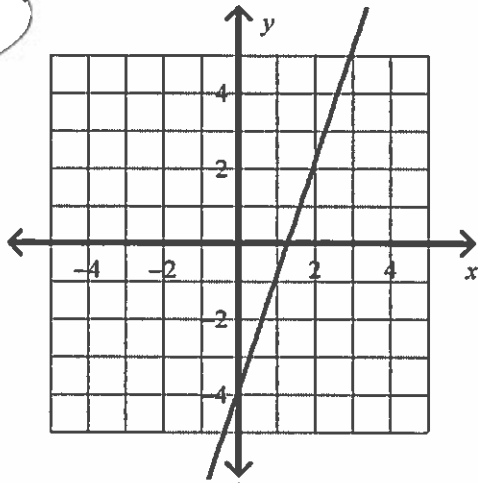
$$2x^3 + 3x^2 - 4x$$

$$10x^2 + 15x - 20$$

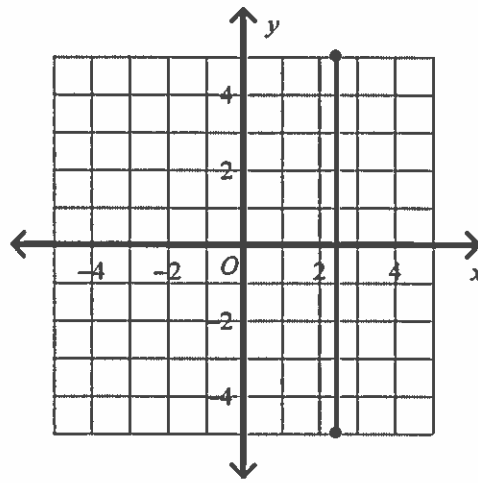
$$2x^3 + 13x^2 + 11x - 20$$

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

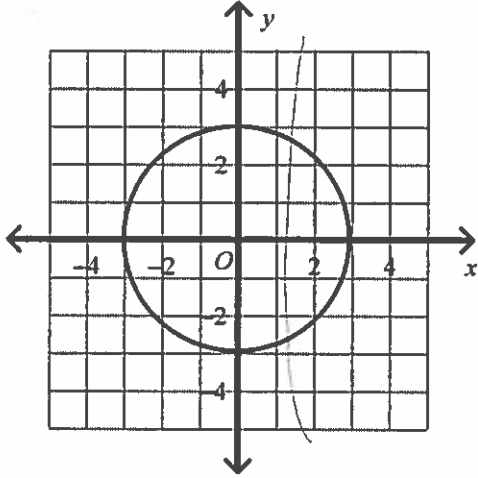
a.



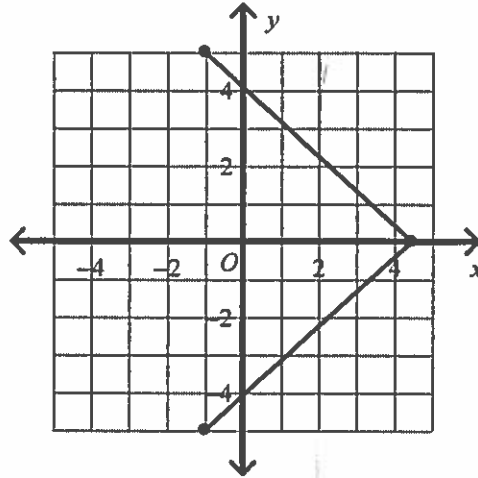
c.



b.



d.



Find the function rule for $g(x)$.

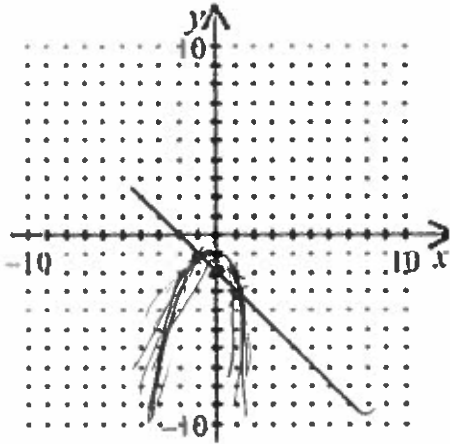
22. The function $f(x) = x^2$. The graph of $g(x)$ is $f(x)$ translated to the left 5 units and up 3 units. What is the function rule for $g(x)$?

$$g(x) = (x + 5)^2 + 3$$

Use graphing to find the solutions to the system of equations.

23.
$$\begin{cases} y_1 = -x^2 - x - 1 \\ y_2 = -x - 2 \end{cases}$$

2nd Calc
intersect



$(1, -3)$
 $(-4, -1)$

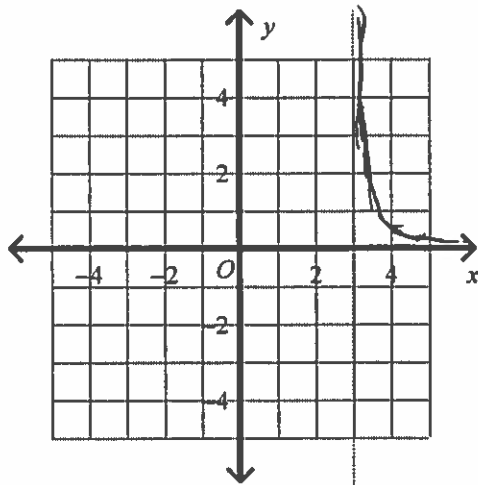
Solve the inequality. Graph the solution on a number line.

24. $|4x + 8| > 28$

$$\begin{aligned} 4x + 8 > 28 & \text{ or } 4x + 8 < -28 \\ 4x > 20 & \text{ or } 4x < -36 \\ x > 5 & \text{ or } x < -9 \end{aligned}$$



25. Find the domain and range of the relation and determine whether it is a function.



$x > 3$
 $y > 0$

26. In 1982 the pollution in a local lake was rated at 1.4 parts per million. By 1987 it had risen to 3.4 parts per million. Which of the following expresses the rate of change in parts per million per year from 1982 to 1987?

$$\frac{3.4 - 1.4}{1987 - 1982} = \frac{2}{5}$$

27. A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground t seconds after it is thrown is given by $d = -16t^2 - 4t + 650$. How long after the rock is thrown is it 300 feet from the ground?

$$300 = -16t^2 - 4t + 650$$

use calculator

$$-16t^2 - 4t + 350 = 0$$

$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$t = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(-16)(350)}}{2(-16)}$

$t = \frac{4 \pm \sqrt{16 + 22400}}{-32}$

$t = \frac{4 \pm \sqrt{22416}}{-32}$

$t = \frac{4 \pm 149.7}{-32}$

$t = \frac{153.7}{-32} \text{ or } \frac{-145.7}{-32}$

$t = -4.8 \text{ or } 4.55$

$t = 4.55$

28. A rectangle has a length of $x - 5$ and a width of $x - 6$. Which equation below describes the perimeter, P , of the rectangle in terms of x ?

$$l = x - 5 \quad w = x - 6$$

$$P = 2l + 2w = 2(x - 5) + 2(x - 6) = 2x - 10 + 2x - 12$$

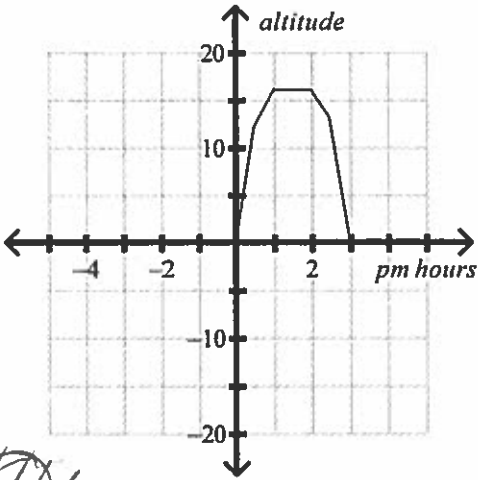
$$P = 4x - 22$$

29. The volume of one of the buildings in the downtown area is 826,200 cubic meters. The building is 17 times as tall as the radio tower on top of the building. The square base has a side that is 30 times 3 meters less than the height of the radio tower. How tall is the radio tower?

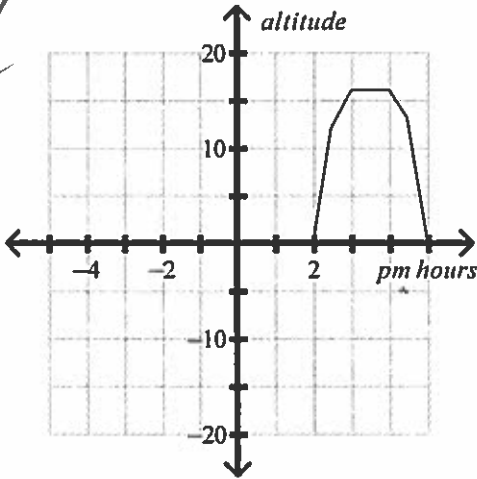
$$V = 17x (30(x - 3))^2$$

$$x = 6$$

30. The graph shows the projected altitude $f(x)$ (in thousands of feet) of an airplane scheduled to depart an airport at noon. If the plane leaves two hour(s) late, what function represents this transformation?

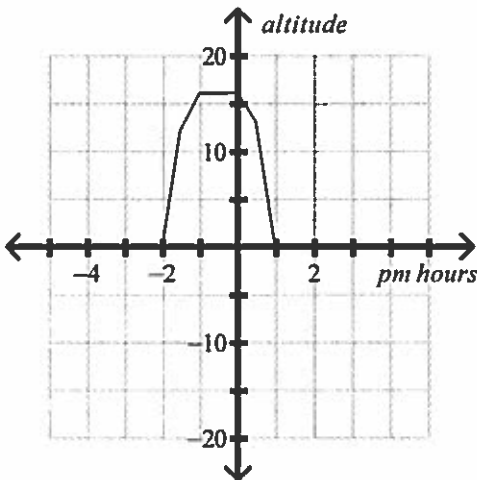


~~a.~~



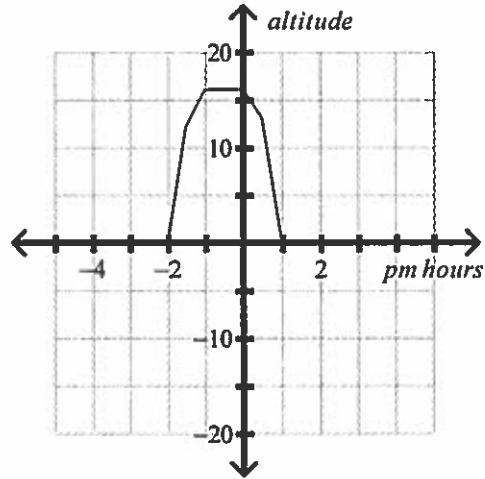
function $y = f(x + 2)$ represents this transformation.

b.



function $y = f(x - 2)$ represents this transformation.

c.

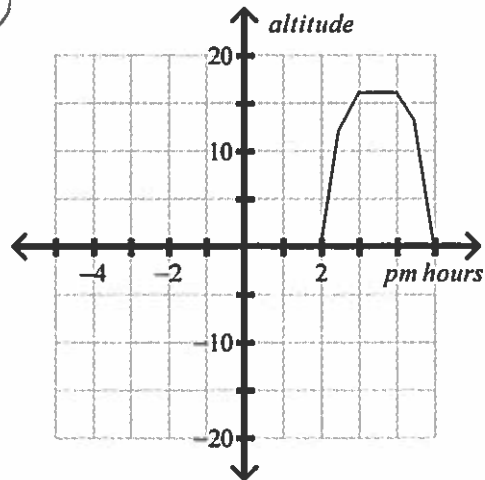


function $y = f(x + 2)$ represents this transformation.

The

The

d.



function $y = f(x - 2)$ represents this transformation.

The

The

31. Your starting salary for a new job is \$40,000 per year. You are offered two options for salary increases:

Plan 1: an annual increase of \$1200 per year or

Plan 2: an annual increase of 5% per year

- a.) Your salary is a function of the number of years of employment at your job. Write an equation to determine the salary, S , after x years on the job using plan 1; using plan 2.

Plan 1

$$S_1 = 40,000 + 1200x$$

$$S_2 = 40,000(1.05)^x$$

- b.) If you plan to be in this job for at least 5 years, which is the better plan for you?

Plan 2

32. Ace Rent a Car charges a flat fee of \$15 and \$0.24 a mile for their cars. Acme Rent a Car charges a flat fee of \$29 and \$0.14 a mile for their cars. Use the following model to find out after how many miles Ace Rent a Car becomes more expensive than Acme Rent a Car.

$$c = 15 + 0.24m \quad \text{Ace}$$

$$c = 29 + 0.14m \quad \text{Acme}$$

$$15 + .24m = 29 + .14m$$

$$.10m = 14$$

$$m = 140$$

33. You live near a bridge that goes over a river. The underneath side of the bridge is an arch that can be modeled with the function $y = -0.000495x^2 + 0.619x$ where x and y are in feet.

How high above the river is the bridge (the top of the arch)?

$$x(-.000495x + .619)$$

$$x=0 \quad x=1250.51$$

Max. on calculator

~~scribble~~

$$y = 193.52$$

How long is the section of bridge above the arch?

$$1250.51$$

34. A biologist took a count of the number of fish in a particular lake, and recounted the lake's population of fish on each of the next six weeks.

Week	0	1	2	3	4	5	6
Population	495	483	481	489	507	535	573

stat edit
stat calca
5. Quad reg

Find a quadratic function that models the data as a function of x , the number of weeks.

$$f(x) = 5x^2 - 17x + 495$$

Use the model to estimate the number of fish at the lake on week 11.

$$f(11) = 913$$

35. The function $y = -0.018t^2 + 0.56t$ models the height y in feet of your pet frog's jump t seconds after it jumps. How far did the frog jump?
long

31.1 sec.

~~4.36~~

How high did it go?

$$y = 4.36$$

36. When Spheres-R-Us ships bags of golf balls, the number of balls in each bag must be within 6 balls of 300. Write a compound inequality and an absolute value inequality for an acceptable number of golf balls b in each bag.

$$294 \leq b \leq 306$$

37. A group of 52 people attended a ball game. There were three times as many children as adults in the group. Set up a system of equations that represents the numbers of adults and children who attended the game and solve the system to find the number of children who were in the group.

A. 3A
adults children 3 × Adults

$$A + \text{Children} = 52$$

$$A + 3A = 52$$

$$4A = 52$$

$$A = 13$$

$$C = 3(13) = 39$$

38. Viola makes gift baskets for Valentine's Day. She has 13 baskets left over from last year, and she plans to make 12 more each day. If there are 15 work days until the day she begins to sell the baskets, how many baskets will she have to sell?

$$\begin{aligned} \text{Baskets} &= 13 + 12 \cdot \text{days} \\ B &= 13 + 12(15) \\ B &= 196 \end{aligned}$$

39. A candle is 18 in. tall after burning for 4 hours. After 6 hours, it is 14.5 in. tall. Write a linear equation to model the relationship between height h of the candle and time t . Predict how tall the candle will be after burning 8 hours.

$$m = \frac{\text{height}}{\text{time}} = \frac{14.5 - 18}{6 - 4} = -1.75$$

$(x_1, y_1) = (4, 18)$
 $y = m(x - x_1) + y_1$

$$\begin{aligned} y &= -1.75(x - 4) + 18 \\ f(8) &= -1.75(8 - 4) + 18 = 11 \end{aligned}$$

40. The student council orders some T-shirts to sell at the school store. The number of school T-shirts available at the store can be modeled by the function $y = -3x + 180$, where x is the number of days the T-shirts have been on sale.

- a. Explain how to find the zero of the function.

$$\text{set } y = 0 \quad 0 = -3x + 180$$

- b. Explain what the zero means in this situation.

When all T-shirts are sold.