ALEKS® 103 Mock Final #3

Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504 (Prof. Miller)

Student Name/ID:

1. Solve for v where v is a real number.

$$\sqrt{3v+14} = \sqrt{7v-14}$$

2. Simplify the expression.

$$\frac{a^{\frac{5}{2}} a^{-\frac{1}{2}}}{a^{\frac{1}{3}}}$$

Write your answer using only positive exponents.
Assume that all variables are positive real numbers.

3. Solve for u where u is a real number.

$$\sqrt{40-6u} = u-4$$

4. Find the x-intercept(s) and the coordinates of the vertex for the parabola $y = x^2-8x+12$ If there is more than one x-intercept, separate them with commas.

5. Multiply.

$$(y+1)(y-6)$$

Simplify your answer.

6. A motorboat takes 3 hours to travel 144 km going upstream. The return trip takes 2 hours going downstream. What is the rate of the boat in still water and what is the rate of the current?

Rate of the boat in still water: ☐ km/h
Rate of the current: ☐ km/h

7. Rewrite the expression without using a negative exponent.

$$2n^{-4}$$

Simplify your answer as much as possible.

8. Solve the inequality for ν

$$2-\frac{9}{2}\nu > \frac{7}{2}-\frac{5}{6}\nu$$

Simplify your answer as much as possible.

9. Solve the following inequality.

$$\frac{x-1}{x+5} \leq 0$$

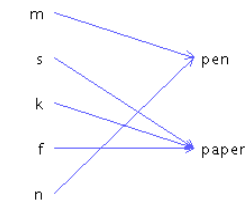
Write your answer using interval notation.

10. Solve for x

$$\frac{22}{x-4}=\frac{11}{x}$$

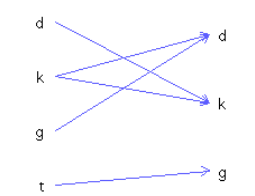
11. For each relation, decide whether or not it is a function.

Relation 1



○ Function
○ Not a Function

Relation 2



○ Function
○ Not a Function

Relation 3

$\{(0,n),(0,t),(0,d),(0,x)\}$

○ Function
○ Not a Function

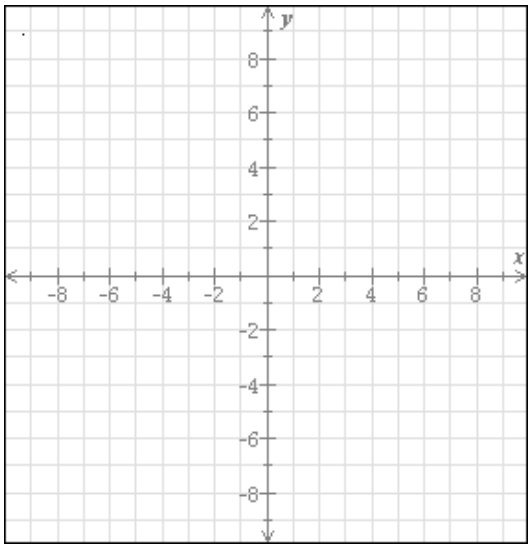
Relation 4

$\{(-3,3),(-2,-3),(-3,2),(-2,2)\}$

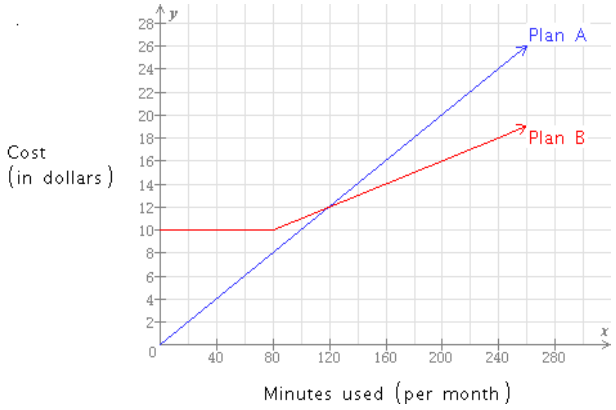
○ Function
○ Not a Function

12. Graph the parabola.

$$y=(x-1)^2-3$$



13. Sam can choose Plan A or Plan B for his long distance charges. For each plan, cost (in dollars) depends on minutes used (per month) as shown below.



a. If Sam makes 160 minutes of long distance calls for the month, which plan costs less? How much less does it cost than the other plan?
b. For what number of long distance minutes do the two plans cost the same? If the time spent on long distance calls is less than this amount, which plan costs less?

14. Factor completely:

$$32y^2 - 2w^4y^2$$

15. Solve for x

$$\log_5(x-7) = 1 - \log_5(x-3)$$

16. Solve for v

$$(v+4)^2 = 2v^2 + 4v + 11$$

If there is more than one solution, separate them with commas.

17. Rewrite as an exponential equation.

$$\log_3 \frac{1}{81} = -4$$

$\square^{\square} = \square$

18. Fill in the missing values to make the equations true.

(a) $\log_2 5 + \log_2 7 = \log_2 \square$

(b) $\log_7 \square - \log_7 11 = \log_7 \frac{3}{11}$

(c) $\log_5 81 = \square \log_5 3$

19. The sets H and D are given below.

$H = \{-1, 0, 4, 5, 8\}$
$D = \{-2, -1, 4, 8\}$

Find the union of H and D
Find the intersection of H and D
Write your answers using set notation.

20. A swimming pool has to be drained for maintenance. The pool is shaped like a cylinder with a diameter of $9\ \mathrm{m}$ and a depth of $2\ \mathrm{m}$ If the water is pumped out of the pool at the rate of $14\ \mathrm{m}^3$ per hour, how many hours does it take to empty the pool?

Use the value 3.14 for π and round your answer to the nearest hour.

21. Factor.

$14z^2 + 11z - 3$

22. Divide.

$$\frac{3c^3}{2bc} \div \frac{9c}{10b}$$

Simplify your answer as much as possible.

23. Fill in the table using this function rule.

$$y = -4x + 2$$

x	y
-1	
0	
1	
2	

24. Solve for x

$$\ln(x+8) - \ln 19 = \ln 12$$

25. A certain forest covers an area of 1800km^2 Suppose that each year this area decreases by 5% What will the area be after 11 years? Round your answer to the nearest square kilometer.

26. Write the following expression in simplified radical form.

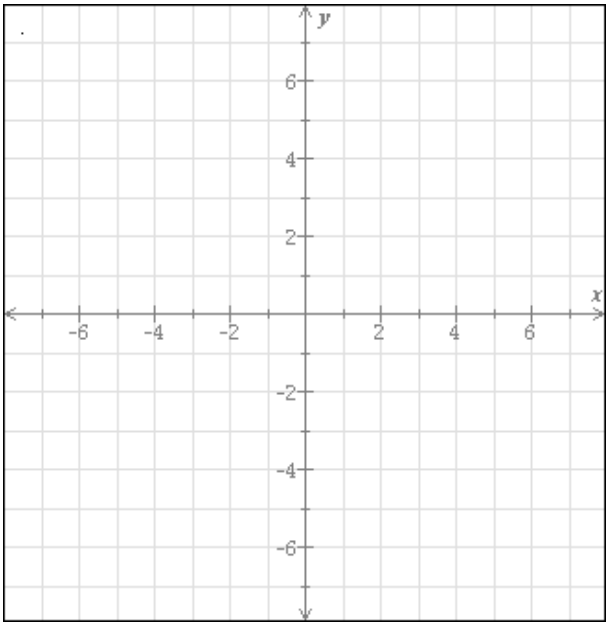
$$\sqrt[3]{32x^8w^{12}}$$

Assume that all of the variables in the expression represent positive real numbers.

27. Graph the system below and write its solution.

$$\begin{cases} y = \frac{1}{2}x + 3 \\ -2x + y = 6 \end{cases}$$

Note that you can also answer "No solution" or "Infinitely many" solutions.



28. Solve for x

$$\log_8 x = -2$$

Simplify your answer as much as possible.

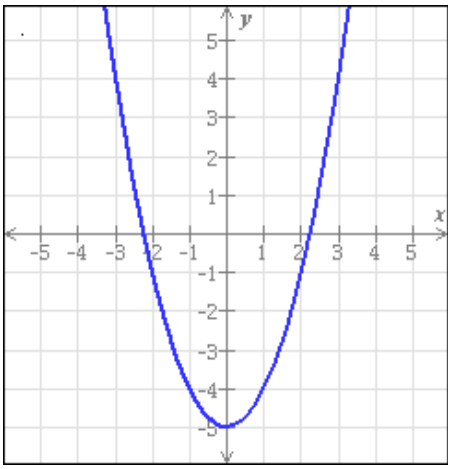
29. Fill in the table using this function rule.

$$y = -10x + 2$$

x	y
-5	
-1	
0	
1	

30. The graph of a function f is shown below.

Find $f(1)$ and find one value of x for which $f(x) = -1$



31. Solve for v

$$\frac{v+4}{v+2} = \frac{v+3}{v+5} + 1$$

32. Simplify.

$$\frac{\frac{5}{3}-3}{\frac{5}{6}+2}$$

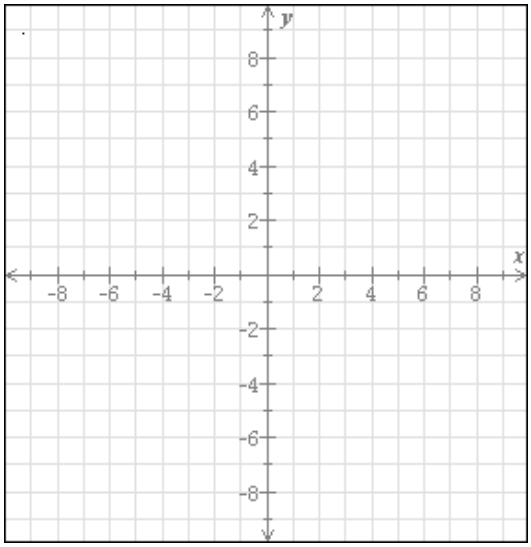
33. Simplify as much as possible.

$$6u\sqrt{63ux^2}-x\sqrt{7u^3}$$

Assume that all variables represent positive real numbers.

34. Graph the parabola.

$$y=(x+2)^2-5$$



35. Simplify. Write your answers without exponents.

$\left(\frac{1}{8}\right)^{\frac{4}{3}} =$ ☐

$125^{-\frac{2}{3}} =$ ☐

36. A species of animal is discovered on an island. Suppose that the population size $P(t)$ of the species can be modeled by the following exponential function, where time t is measured in years.

$$P(t) = \frac{340}{1+9e^{-0.31t}}$$

Find the initial population size of the species and the population size after 8 years.
Round your answers to the nearest whole number as necessary.

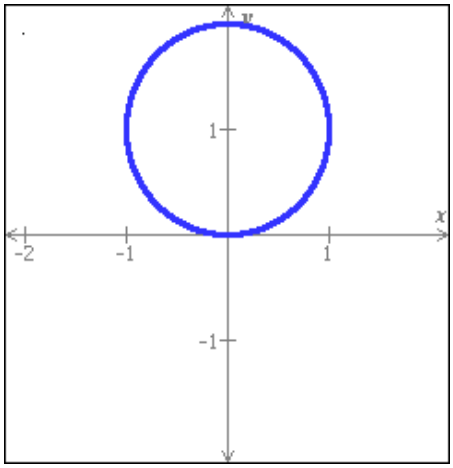
Initial population size: ☐ individuals

Population size after 8 years: ☐ individuals

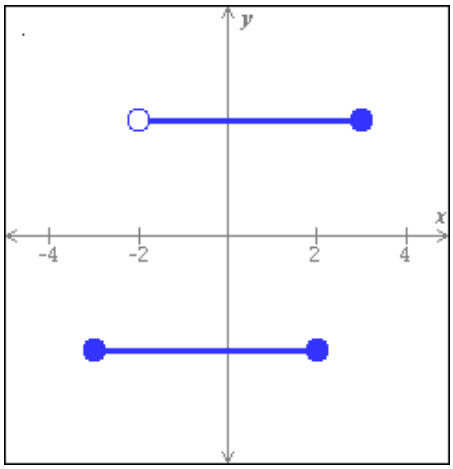
37. The gas tank of a truck is a cylinder 5 ft long with a diameter of 1.75 ft At the gas station, a pump pours gas at the rate of $3\ \text{ft}^3$ per minute. How many minutes does it take to fill the empty tank with that pump?

Use the value 3.14 for π and round your answer to the nearest minute.

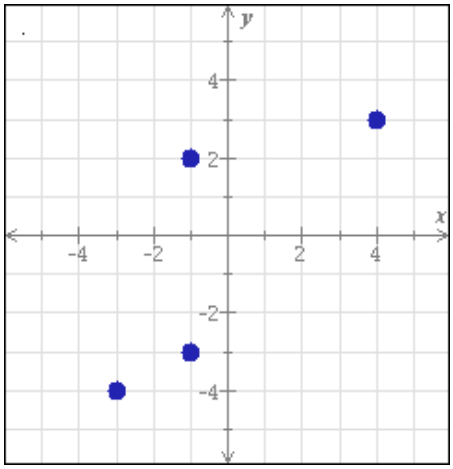
38. For each graph below, state whether it represents a function.



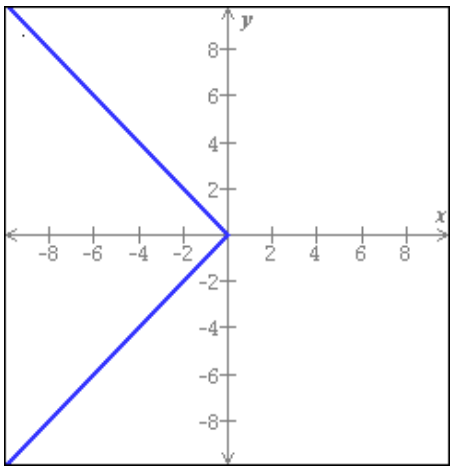
Function?:
Yes No



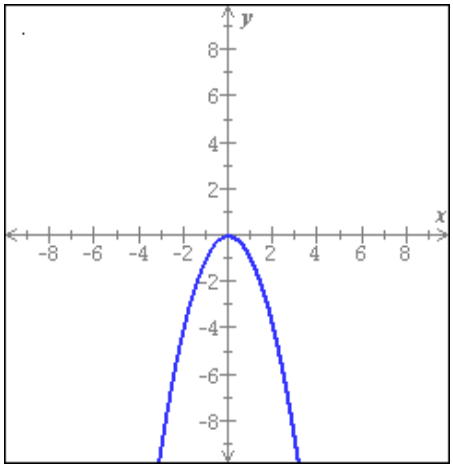
Function?:
Yes No



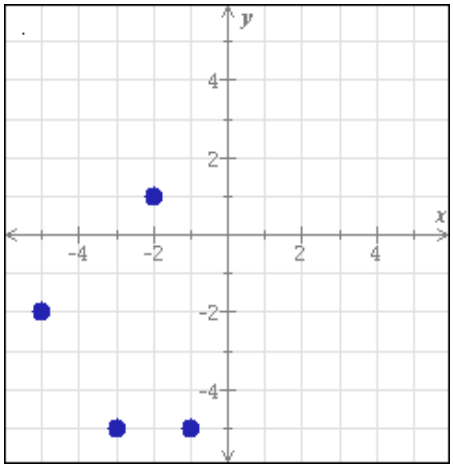
Function?:
Yes No



Function?:
Yes No



Function?:
Yes No



Function?:
Yes No

39. Divide.

$$\left(18x^3+33x^2+18x+2\right)\div\left(6x-1\right)$$

Your answer should give the quotient and the remainder.

Quotient:

Remainder:

40. Calculate.

$$\frac{6\times10^8}{5\times10^5}$$

Write your answer in scientific notation.

41. Solve $x^2=45$ where x is a real number.
Simplify your answer as much as possible.

42. Calculate.

$$\frac{6\times10^7}{5\times10^5}$$

Write your answer in scientific notation.

43. The functions f and g are defined as follows.

$$f(x) = 3x^2 - 3x \qquad g(x) = -3x + 4$$

Find $f(-3)$ and $g(5)$

Simplify your answers as much as possible.

44. Solve.

$$x^4 - 17x^2 + 16 = 0$$

If there is more than one solution, separate them with commas.

45. Consider the line $-5x - 7y = 4$

What is the slope of a line perpendicular to this line?

What is the slope of a line parallel to this line?

46. Write the following as an exponential expression.

$$\sqrt[6]{u^5}$$

47. Solve for x

$$\frac{7}{4} = \frac{6}{x} - 2$$

Simplify your answer as much as possible.

48. Simplify.

$$\frac{\frac{4}{v+6}}{\frac{12v}{v^2+12v+36}}$$

49. Simplify.

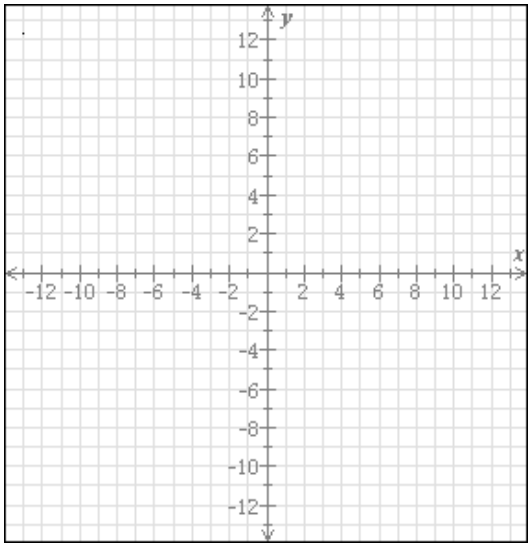
$$\left(u^6\right)^{-4}$$

Write your answer without using negative exponents.

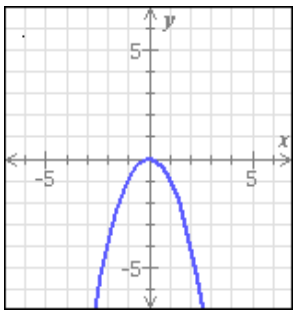
50. What number is equal to $\sqrt{9}$?

51. Graph the parabola.

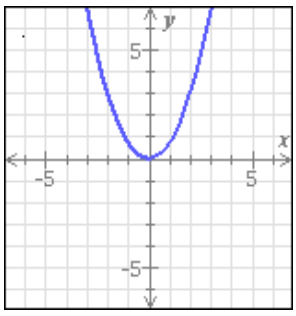
$$y = -x^2$$



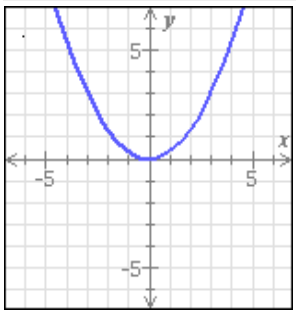
52. Look at the graphs and their equations below. Then fill in the information about the leading coefficients A, B, C, and D.



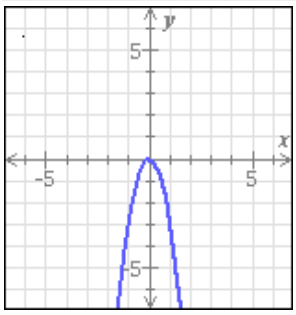
$y = Ax^2$



$y = Bx^2$



$y = Cx^2$



$y = Dx^2$

	A	***B***	***C***	***D***
(a) For each coefficient, choose whether it is positive or negative	- Positive - Negative	- Positive - Negative	- Positive - Negative	- Positive - Negative
(b) Choose the coefficient closest to 0	○	○	○	○
(c) Choose the coefficient with the greatest value	○	○	○	○

53. Solve $y^3 = 5$ where y is a real number.
Simplify your answer as much as possible.

54. Evaluate.

$\log_3 81$

55. Solve for y

$$\frac{4}{y+4} = 3$$

Simplify your answer as much as possible.

56. Solve $v^3 = -14$ where v is a real number.
Simplify your answer as much as possible.

57. The function g is defined below.

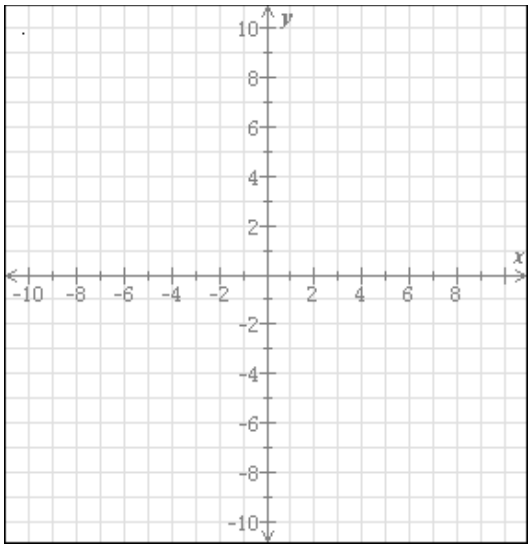
$$g(x) = \frac{x^2 + 2x - 24}{x^2 - 9}$$

Find all values of x that are NOT in the domain of g

If there is more than one value, separate them with commas.

58. Graph the line.

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



59. Solve for x

$$\log_{100} x = \frac{1}{2}$$

Simplify your answer as much as possible.

60. Rewrite as an exponential equation.

$$\log_2 16 = 4$$

$$\square^{\square} = \square$$

103 Mock Final #3 Answers for class Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504

1. $v = 7$

2. $a^{\frac{5}{3}}$

3. $u = 6$

4. x-intercept(s): 2 , 6
vertex: $(4, -4)$

5. $y^2 - 5y - 6$

6. Rate of the boat in still water: 60 km/h
Rate of the current: 12 km/h

7. $\frac{2}{n^4}$

8. $v < -\frac{9}{22}$

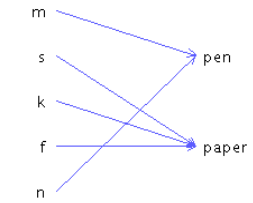
9. $(-5, 1]$

10. $x = -4$

11.

Relation 1

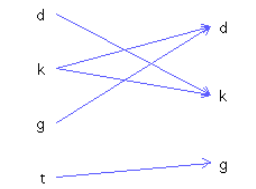
Domain Range



○ Function
◉ Not a Function

Relation 2

Domain Range



○ Function
◉ Not a Function

Relation 3

$\{(0,n),(0,t),(0,d),(0,x)\}$

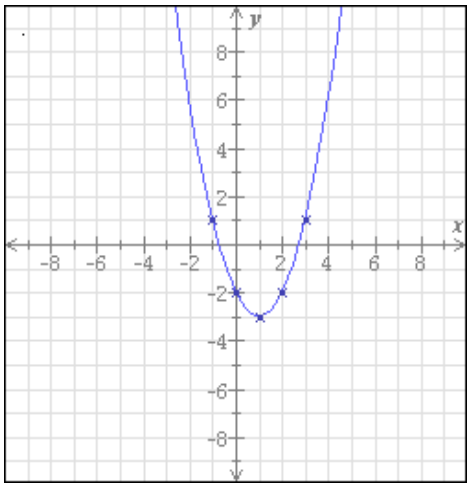
○ Function
◉ Not a Function

Relation 4

$\{(-3,3),(-2,-3),(-3,2),(-2,2)\}$

○ Function
◉ Not a Function

12.



13.

(a)If Sam makes 160 minutes of long distance calls for the month, which plan costs less?

Plan B

How much less does it cost than the other plan?

$2

(b)For what number of long distance minutes do the two plans cost the same?

120

If the time spent on long distance calls is less than this amount, which plan costs less?

Plan A

14. $2y^2(2-w)(2+w)\left(4+w^2\right)$

15. $x = 8$

16. $v = -1, 5$

17. $3^{-4} = \frac{1}{81}$

18. (a) $\log_2 5 + \log_2 7 = \log_2 35$

(b) $\log_7 3 - \log_7 11 = \log_7 \frac{3}{11}$

(c) $\log_5 81 = 4\log_5 3$

19. $H \cup D = \{-2, -1, 0, 4, 5, 8\}$

$H \cap D = \{-1, 4, 8\}$

20. 9 hour(s)

21. $(z+1)(14z-3)$

22. $\frac{5c}{3}$

23.

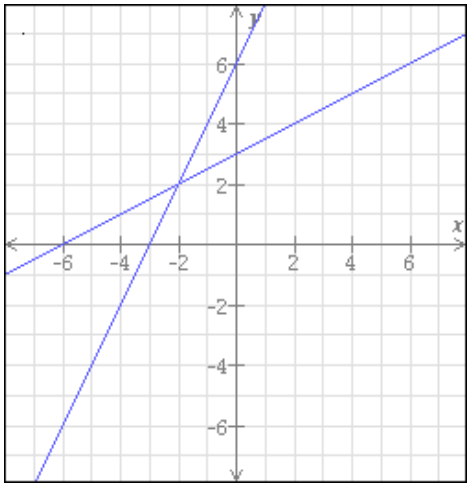
x	y
-1	6
0	2
1	-2
2	-6

24. $x = 220$

25. $1024\,\text{km}^2$

26. $2x^2w^4\sqrt[3]{4x^2}$

27.



Solution: $(-2, 2)$

28. $x = \frac{1}{64}$

29.

x	y
-5	52
-1	12
0	2
1	-8

30. $f(1) = -4$

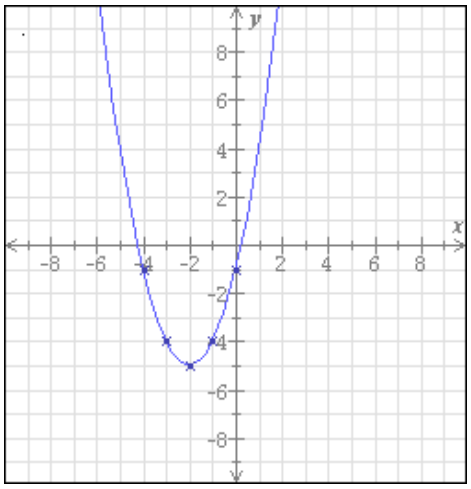
One value of x for which $f(x) = -1 : -2$

31. $v = 1, -4$

32. $-\frac{8}{17}$

33. $17ux\sqrt{7u}$

34.



35.

$$\left(\frac{1}{8}\right)^{\frac{4}{3}} = \frac{1}{16}$$

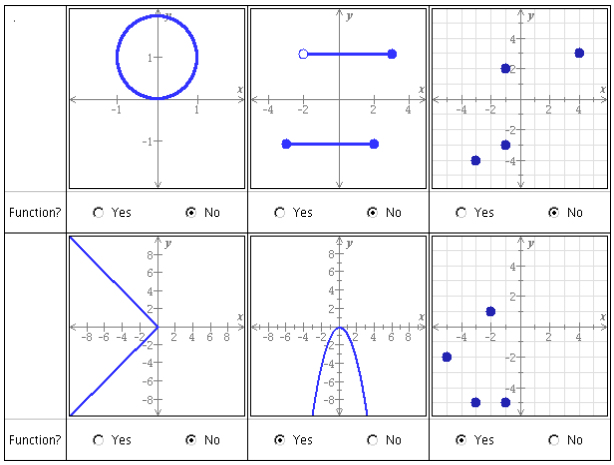
$$125^{-\frac{2}{3}} = \frac{1}{25}$$

36. Initial population size: 34 individuals

Population size after 8 years: 194 individuals

37. 4 minute(s)

38.



39. Quotient: $3x^2+6x+4$

Remainder: 6

40. 1.2×10^3

41. $x=3\sqrt{5}-3\sqrt{5}$

42. 1.2×10^2

43. $f(-3)=36$

$g(5)=-11$

44. $x=1,-1,4,-4$

45. Slope of a perpendicular line: $\frac{7}{5}$

Slope of a parallel line: $-\frac{5}{7}$

46. $u^{\frac{5}{6}}$

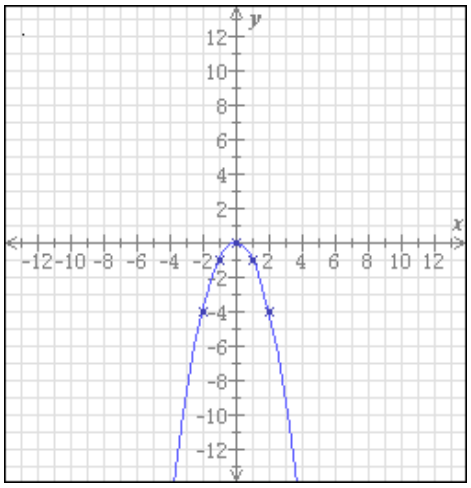
47. $x=\frac{8}{5}$

48. $\frac{v+6}{3v}$

49. $\frac{1}{u^{24}}$

50. 3

51.



52.

	A	*B*	*C*	*D*
(a) For each coefficient, choose whether it is positive or negative	- Positive **- Negative**	**- Positive** - Negative	**- Positive** - Negative	- Positive **- Negative**
(b) Choose the coefficient closest to 0	○	○	◉	○
(c) Choose the coefficient with the greatest value	○	◉	○	○

53. $y = \sqrt[3]{5}$

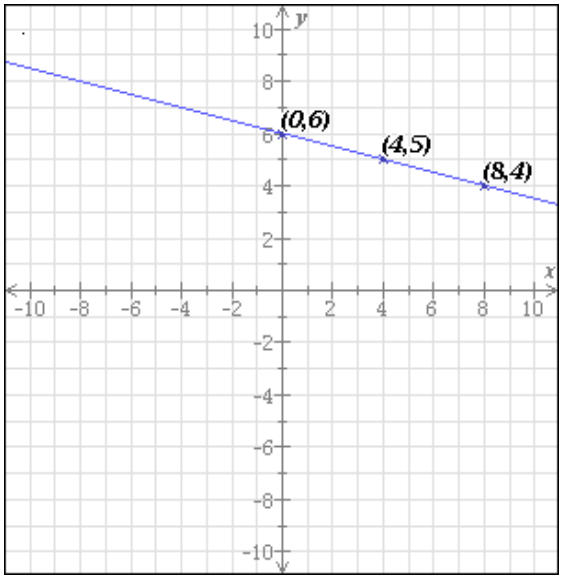
54. $\log_3 81 = 4$

55. $y = -\frac{8}{3}$

56. $\nu = -\sqrt[3]{14}$

57. $x = -3, 3$

58.



59. $x = 10$

60. $2^4 = 16$