

# ALEKS® 103 Mock Final #4

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

Student Name/ID:

1. Rewrite as an exponential equation.

$$\log_2 16 = 4$$

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

2. Solve the following inequality.

$$\frac{-x+6}{x-2} > 0$$

Write your answer using interval notation.

3. Solve for  $y$

$$\frac{y-5}{y-1} + 1 = \frac{y-3}{y+2}$$

4. Solve  $w^3 = 3$  where  $w$  is a real number.  
Simplify your answer as much as possible.

5. Solve for  $x$

$$\log(x+6) - \log 8 = \log 14$$

6. The functions  $f$  and  $g$  are defined as follows.

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

Find  $f(6)$  and  $g(-5)$

Simplify your answers as much as possible.

7. Solve.

$$y^4 - 13y^2 = -36$$

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

8. Solve for  $u$

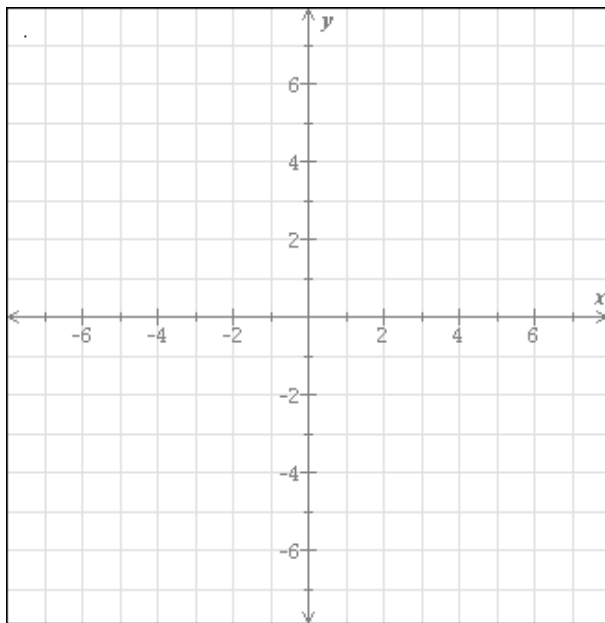
$$8 = \frac{1}{u+6}$$

Simplify your answer as much as possible.

9. Graph the system below and write its solution.

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

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



10. Solve for  $u$  where  $u$  is a real number.

$$\sqrt{-3u + 27} = u - 3$$

11. Consider the line  $-4x - 7y = -7$

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

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

12. Multiply.

$$(w + 1)(w - 6)$$

Simplify your answer.

13. Write the following as an exponential expression.

$$\sqrt[8]{v^3}$$

14. Solve the inequality for  $y$

$$-\frac{5}{4}y - 1 > \frac{7}{6}y + \frac{3}{4}$$

Simplify your answer as much as possible.

15. Simplify the expression.

$$\frac{y^{\frac{1}{3}}}{y^{\frac{1}{4}} y^{-\frac{1}{2}}}$$

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

16. A motorboat takes 5 hours to travel 150 mi going upstream. The return trip takes 3 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:  mi/h

Rate of the current:  mi/h

17. The function  $g$  is defined below.

$$g(x) = \frac{x^2 + 4x - 21}{x^2 - 4}$$

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

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

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

(a)  $\log_2 3 - \log_2 5 = \log_2 \boxed{\phantom{000}}$

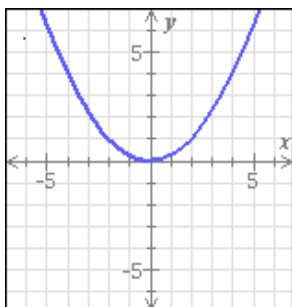
(b)  $\log_7 9 + \log_7 \boxed{\phantom{000}} = \log_7 18$

(c)  $4\log_5 3 = \log_5 \boxed{\phantom{000}}$

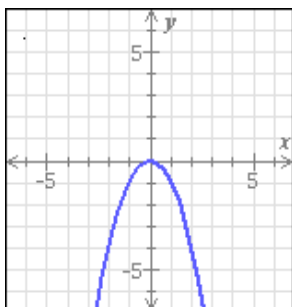
19. Factor completely:

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

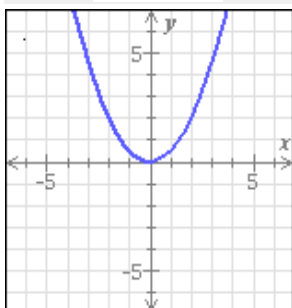
20. Look at the graphs and their equations below. Then fill in the information about the leading coefficients  $A$ ,  $B$ ,  $C$ , and  $D$ .



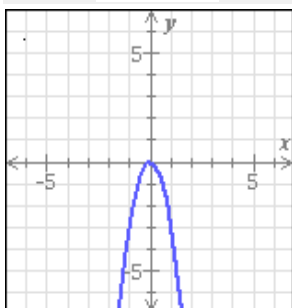
$$y = Ax^2$$



$$y = Bx^2$$



$$y = Cx^2$$



$$y = Dx^2$$

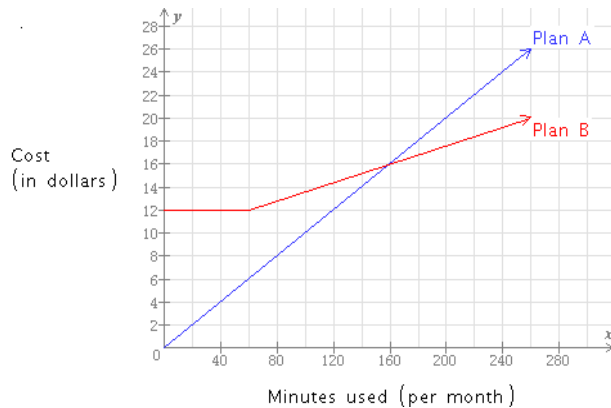
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
(a) For each coefficient, choose whether it is positive or negative	- Positive - Negative	- Positive - Negative	- Positive - Negative	- Positive - Negative
(b) Choose the coefficient closest to 0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(c) Choose the coefficient with the greatest value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. Simplify. Write your answers without exponents.

$$\left(\frac{1}{25}\right)^{-\frac{3}{2}} = \boxed{\phantom{00}}$$

$$8^{-\frac{4}{3}} = \boxed{\phantom{00}}$$

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



- If Rita makes 60 minutes of long distance calls for the month, which plan costs more? How much more does it cost than the other plan?
- 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?

23. Solve for  $y$  where  $y$  is a real number.

$$\sqrt{9y-14} = \sqrt{6y-2}$$

24. Divide.

$$(20x^3 + 17x^2 + 5x + 3) \div (5x - 2)$$

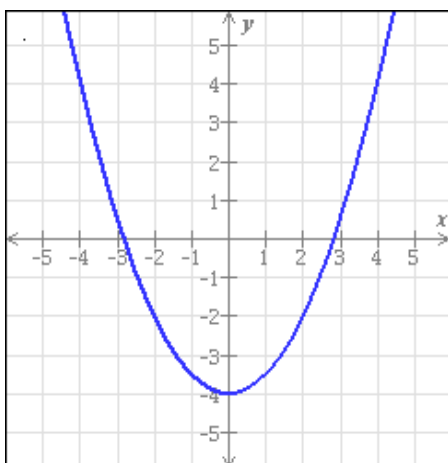
Your answer should give the quotient and the remainder.

Quotient:

Remainder:

25. The graph of a function  $f$  is shown below.

Find  $f(2)$  and find one value of  $x$  for which  $f(x) = -4$



26. Calculate.

$$\frac{6 \times 10^7}{5 \times 10^5}$$

Write your answer in scientific notation.

27. 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.

$$P(t) = \frac{550}{1 + 4e^{-0.2t}}$$

Find the initial population size of the species and the population size after 9 years. Round your answers to the nearest whole number as necessary.

Initial population size:  individuals

Population size after 9 years:  individuals



28. Solve for  $x$

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

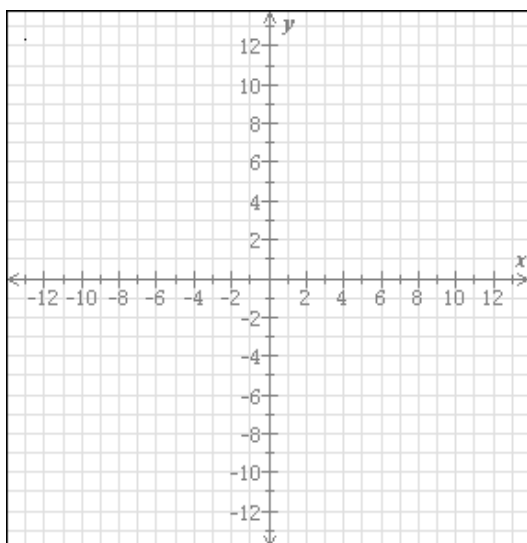
Simplify your answer as much as possible.

29. A swimming pool has to be drained for maintenance. The pool is shaped like a cylinder with a diameter of 8 m and a depth of 2 m. If the water is pumped out of the pool at the rate of  $18 \text{ m}^3$  per hour, how many hours does it take to empty the pool?

Use the value 3.14 for  $\pi$  and round your answer to the nearest hour.

30. Graph the parabola.

$$y = -x^2$$



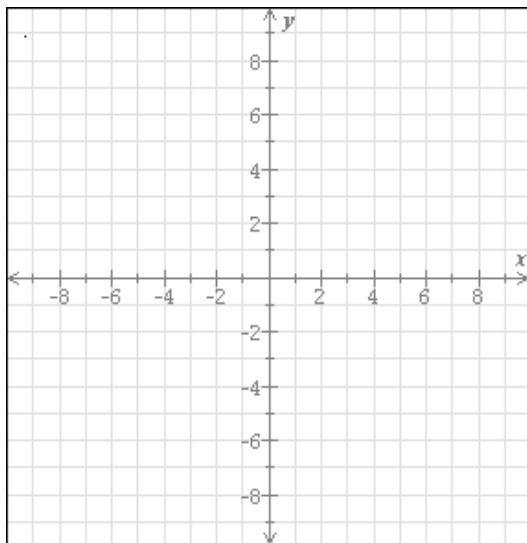
31. Simplify as much as possible.

$$x\sqrt{75u^5} - 2u^2\sqrt{3ux^2}$$

Assume that all variables represent positive real numbers.

32. Graph the parabola.

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



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

<p>Relation 1</p> <table border="0"> <thead> <tr> <th>Domain</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>rock</td> <td>x</td> </tr> <tr> <td>leaf</td> <td>y</td> </tr> <tr> <td>sun</td> <td>s</td> </tr> <tr> <td>pen</td> <td>x</td> </tr> </tbody> </table> <p> <input type="radio"/> Function  <input type="radio"/> Not a Function         </p>	Domain	Range	rock	x	leaf	y	sun	s	pen	x	<p>Relation 2</p> <table border="0"> <thead> <tr> <th>Domain</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>7</td> </tr> <tr> <td>-5</td> <td>7</td> </tr> <tr> <td>7</td> <td>2</td> </tr> <tr> <td>-6</td> <td>2</td> </tr> </tbody> </table> <p> <input type="radio"/> Function  <input type="radio"/> Not a Function         </p>	Domain	Range	0	7	-5	7	7	2	-6	2
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<p>Relation 3</p> <p><math>\{(-4, -7), (-4, -4), (-4, 8), (8, 3)\}</math></p> <p> <input type="radio"/> Function  <input type="radio"/> Not a Function         </p>	<p>Relation 4</p> <p><math>\{(m, -5), (g, -5), (m, -7), (x, -5)\}</math></p> <p> <input type="radio"/> Function  <input type="radio"/> Not a Function         </p>																				

34. Solve for  $x$

$$\log_2(x+5) = 3 - \log_2(x+3)$$

35. Find the  $x$ -intercept(s) and the coordinates of the vertex for the parabola  $y = x^2 - 4x - 5$ . If there is more than one  $x$ -intercept, separate them with commas.

36. An amount of \$39,000 is borrowed for 7 years at 8.25% interest, compounded annually. If the loan is paid in full at the end of that period, how much must be paid back? Round your answer to the nearest dollar.

37. Solve for  $y$

$$\frac{2}{5} = \frac{3}{y} - 2$$

Simplify your answer as much as possible.

38. The gas tank of a truck is a cylinder 4 ft long with a diameter of 2.25 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  $\pi$  and round your answer to the nearest minute.

39. Solve for  $x$

$$\log_2 x = -5$$

Simplify your answer as much as possible.

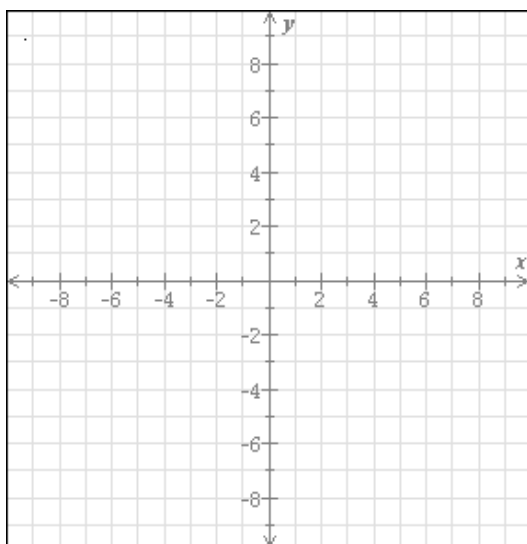
40. Write the following expression in simplified radical form.

$$\sqrt[3]{81y^7z^6}$$

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

41. Graph the parabola.

$$y = (x - 5)^2 - 1$$



42. The sets  $D$  and  $M$  are given below.

$$D = \{ 2, 3, 4, 6, 7 \}$$

$$M = \{ -2, -1, 2, 3, 4, 7 \}$$

Find the union of  $D$  and  $M$

Find the intersection of  $D$  and  $M$

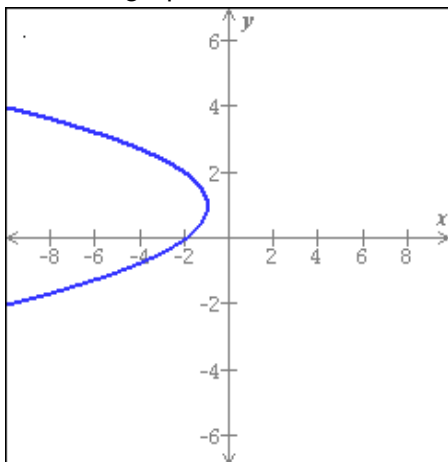
Write your answers using set notation.

43. Divide.

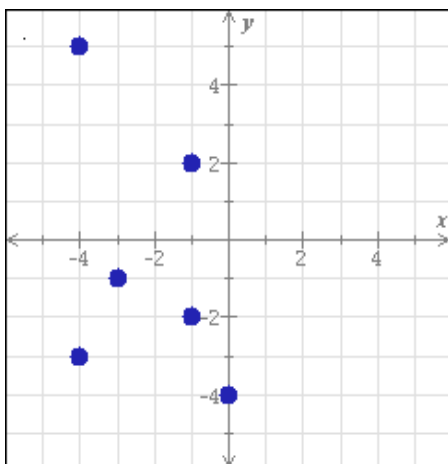
$$\frac{10b^3}{a^5b} \div \frac{4b}{3a^2}$$

Simplify your answer as much as possible.

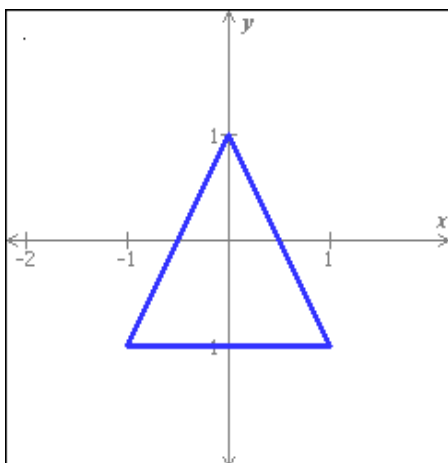
44. For each graph below, state whether it represents a function.



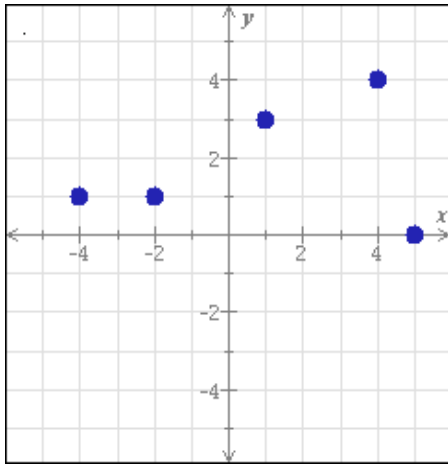
Function?:  
Yes No



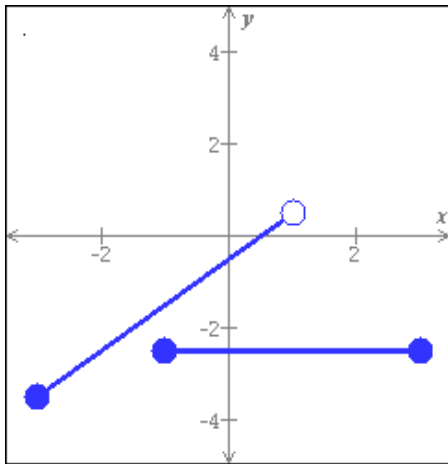
Function?:  
Yes No



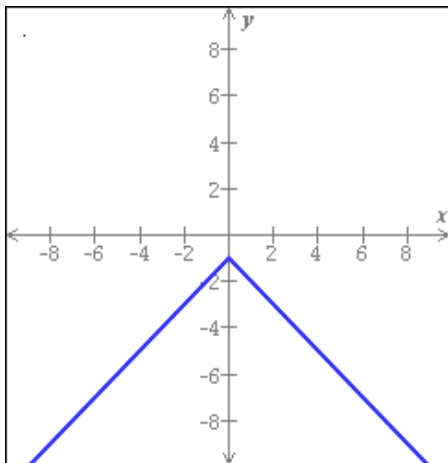
Function?:  
Yes No



Function?:  
Yes No



Function?:  
Yes No



Function?:  
Yes No

45. Solve  $x^2 = 12$  where  $x$  is a real number.  
Simplify your answer as much as possible.

46. Calculate.

$$\frac{5 \times 10^8}{4 \times 10^5}$$

Write your answer in scientific notation.

47. Solve  $w^3 = -29$  where  $w$  is a real number.  
Simplify your answer as much as possible.

48. Fill in the table using this function rule.

$$y = -10x + 2$$

$x$	$y$
-5	
-1	
0	
1	



49. Factor.

$$2z^2 - 13z + 18$$

50. Evaluate.

$$\log_2 32$$

51. Rewrite the expression without using a negative exponent.

$$\frac{1}{3p^{-4}}$$

Simplify your answer as much as possible.

52. Simplify.

$$\frac{\frac{u-3}{4u}}{\frac{u^2-6u+9}{7u^2}}$$

53. Fill in the table using this function rule.

$$y = -3x + 5$$

$x$	$y$
-4	
-2	
0	
2	

54. Simplify.

$$(u^6)^{-7}$$

Write your answer without using negative exponents.

55. Solve for  $y$

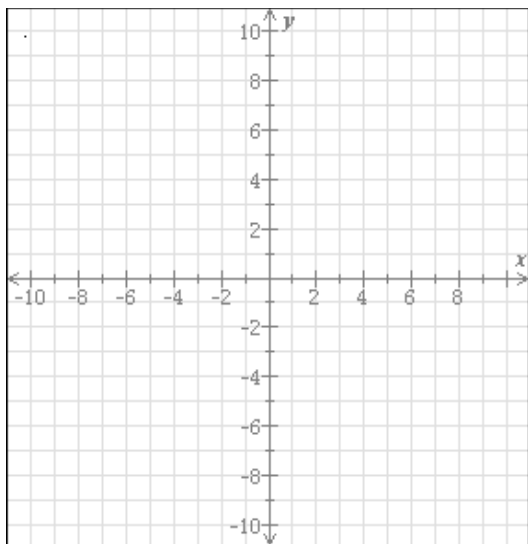
$$(y+5)^2 = 2y^2 + 4y + 30$$

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

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

57. Graph the line.

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



58. Rewrite as a logarithmic equation.

$$3^4 = 81$$

$$\log_{\square} \square = \square$$

59. Solve for  $x$

$$\frac{-28}{x-2} = \frac{-20}{x}$$

60. Simplify.

$$\frac{1 + \frac{7}{4}}{\frac{8}{5} - 2}$$

## 103 Mock Final #4 Answers for class Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504

1.  $2^4 = 16$

2.  $(2, 6)$

3.  $y = 3, -5$

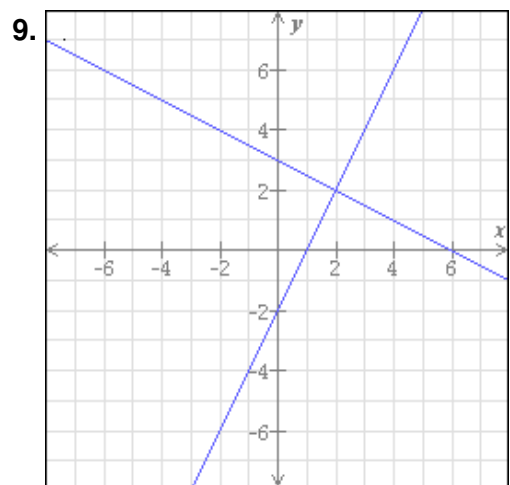
4.  $w = \sqrt[3]{3}$

5.  $x = 106$

6.  $f(6) = -27$   
 $g(-5) = 105$

7.  $y = 2, -2, 3, -3$

8.  $u = -\frac{47}{8}$



**Solution:**  $(2, 2)$

10.  $u = 6$

11. Slope of a parallel line:  $-\frac{4}{7}$

Slope of a perpendicular line:  $\frac{7}{4}$

12.  $w^2 - 5w - 6$

13.  $\frac{3}{v^8}$

14.  $y < -\frac{21}{29}$

15.  $\frac{7}{y^{12}}$

16. Rate of the boat in still water: 40 mi/h  
Rate of the current: 10 mi/h

17.  $x = 2, -2$

- 18.
- (a)  $\log_2 3 - \log_2 5 = \log_2 \frac{3}{5}$
  - (b)  $\log_7 9 + \log_7 2 = \log_7 18$
  - (c)  $4\log_5 3 = \log_5 81$

19.  $2w^2(2-y)(2+y)(4+y^2)$

20.

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
(a) For each coefficient, choose whether it is positive or negative	- <b>Positive</b> - Negative	- Positive - <b>Negative</b>	- <b>Positive</b> - Negative	- Positive - <b>Negative</b>
(b) Choose the coefficient closest to 0	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(c) Choose the coefficient with the greatest value	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

21.

$$\left(\frac{1}{25}\right)^{-\frac{3}{2}} = 125$$

$$8^{-\frac{4}{3}} = \frac{1}{16}$$

22.

(a) If Rita makes 60 minutes of long distance calls for the month, which plan costs more?

Plan B

How much more does it cost than the other plan?

\$6

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

160

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

Plan A

23.  $y = 4$

24. Quotient:  $4x^2 + 5x + 3$

Remainder: 9

25.  $f(2) = -2$

One value of  $x$  for which  $f(x) = -4$ : 0

26.  $1.2 \times 10^2$

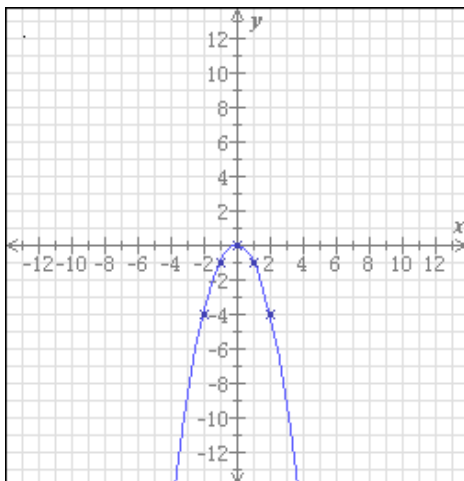
27. Initial population size: 110 individuals

Population size after 9 years: 331 individuals

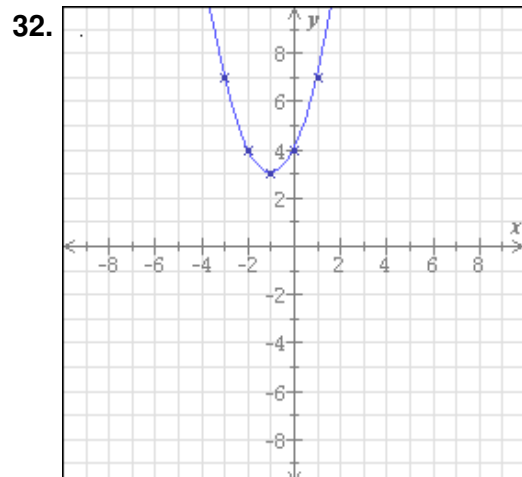
28.  $x = 10$

29. 6 hour(s)

30.



31.  $3u^2 x \sqrt{3u}$



33.

Relation 1		Relation 2	
Domain	Range	Domain	Range
rock		0	7
leaf		-5	
sun		7	2
pen		-6	
<input type="radio"/> Function <input checked="" type="radio"/> Not a Function		<input checked="" type="radio"/> Function <input type="radio"/> Not a Function	

Relation 3		Relation 4	
$\{(-4, -7), (-4, -4), (-4, 8), (8, 3)\}$		$\{(m, -5), (g, -5), (m, -7), (x, -5)\}$	
<input type="radio"/> Function <input checked="" type="radio"/> Not a Function		<input type="radio"/> Function <input checked="" type="radio"/> Not a Function	

34.  $x = -1$

35. x-intercept(s):  $-1, 5$   
vertex:  $(2, -9)$

36. \$67,930

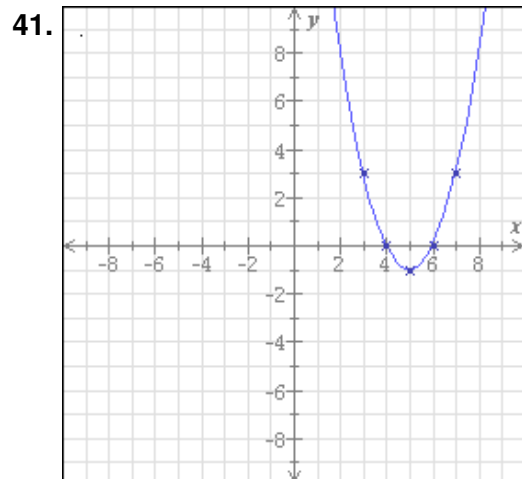
37.  $y = \frac{5}{4}$

38. 5 minute(s)

39.  $x = \frac{1}{32}$

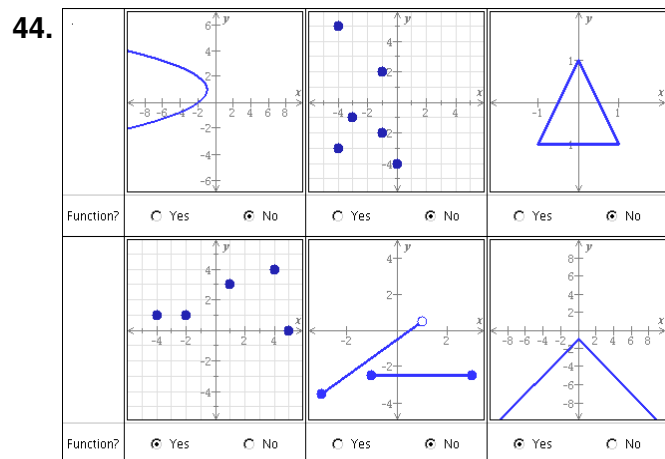
40.  $3y^2 z^2 \sqrt[3]{3y}$





42.  $D \cup M = \{-2, -1, 2, 3, 4, 6, 7\}$   
 $D \cap M = \{2, 3, 4, 7\}$

43.  $\frac{15b}{2a^3}$



45.  $x = 2\sqrt{3} - 2\sqrt{3}$

46.  $1.25 \times 10^3$

47.  $w = -\sqrt[3]{29}$

48. 

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

49.  $(z - 2)(2z - 9)$

50.  $\log_2 32 = 5$

51.  $\frac{p^4}{3}$

52.  $\frac{7u}{4(u-3)}$

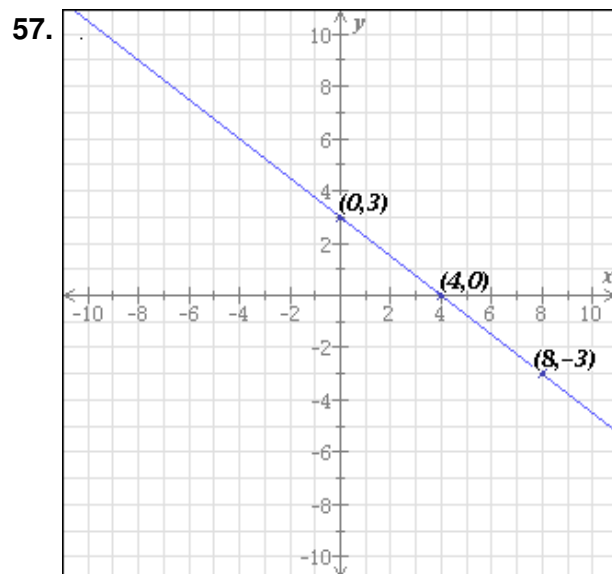
53.

$x$	$y$
-4	17
-2	11
0	5
2	-1

54.  $\frac{1}{u^{42}}$

55.  $y = 1, 5$

56. 3



58.  $\log_3 81 = 4$

59.  $x = -5$

60.  $-\frac{55}{8}$