ALEKS® 103 Mock Final #1

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

Student Name/ID:

1. Solve for x

$$\frac{30}{x-2} = \frac{20}{x}$$

2. Rewrite as an exponential equation.

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

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

3. Factor completely:

$$32u^2 - 2u^2v^4$$

4. Solve for x

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

5. Simplify the expression.

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

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

6. Solve for x

$$2 = \frac{4}{3} - \frac{5}{x}$$

Simplify your answer as much as possible.

7. A species of fish was added to a lake. The population size $P(t)$ of this species can be modeled by the following exponential function, where t is the number of years from the time the species was added to the lake.

$$P(t) = \frac{1000}{1 + 7e^{-0.3t}}$$

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: ☐ fish

Population size after 8 years: ☐ fish

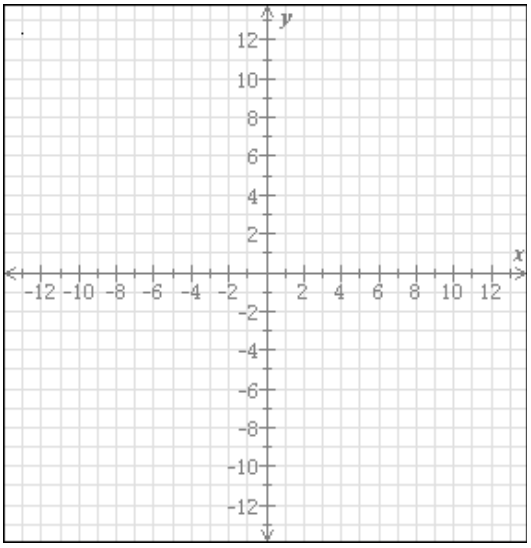
8. Fill in the table using this function rule.

$$y = -5x + 2$$

x	y
-1	
0	
1	
2	

9. Graph the parabola.

$$y = -3x^2$$



10. Solve for x

$$\log_7 x = -2$$

Simplify your answer as much as possible.

11. Rewrite the expression without using a negative exponent.

$$4v^{-4}$$

Simplify your answer as much as possible.

12. 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 $1.9\ \mathrm{m}$ If the water is pumped out of the pool at the rate of $15\ \mathrm{m}^3$ 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.

13. Simplify.

$$\frac{\frac{3}{w+2}}{\frac{18w}{w^2-4}}$$

14. Solve the inequality for y

$$\frac{5}{8}y-1>6y-\frac{3}{2}$$

Simplify your answer as much as possible.

15. Divide.

$$\frac{2y}{3a}\div\frac{10y^5}{9ay}$$

Simplify your answer as much as possible.

16. Solve for x

$$\ln(x+4) - \ln 18 = \ln 5$$

17. Find the x-intercept(s) and the coordinates of the vertex for the parabola $y = x^2 - 6x - 7$ If there is more than one x-intercept, separate them with commas.

18. Simplify as much as possible.

$$4x\sqrt{27u^3} - u\sqrt{75ux^2}$$

Assume that all variables represent positive real numbers.

19. Factor.

$$3y^2 - 4y - 20$$

20. Consider the line $-9x - 6y = -4$

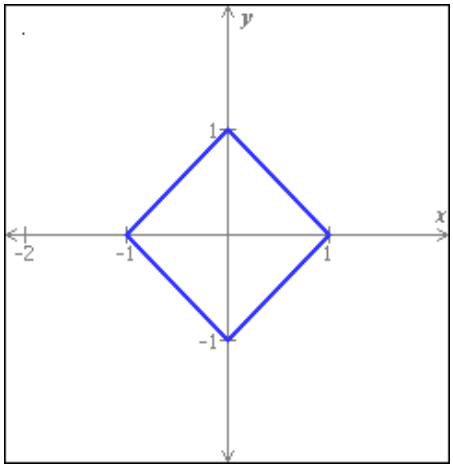
What is the slope of a line perpendicular to this line?

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

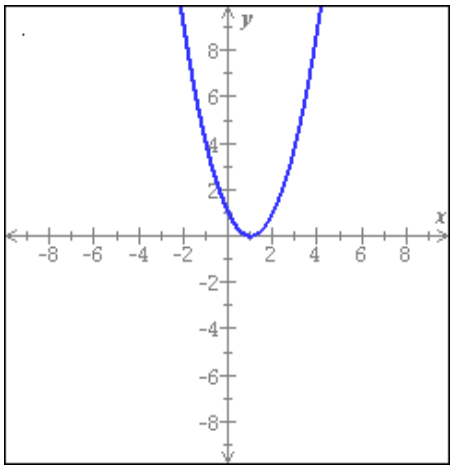
21. The gas tank of a truck is a cylinder 5 ft long with a diameter of 2 ft At the gas station, a pump pours gas at the rate of $5\ \text{ft}^3$ per minute. How many minutes does it take to fill the empty tank with that pump?

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

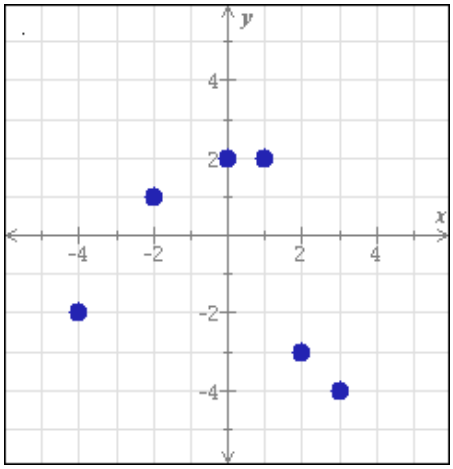
22. For each graph below, state whether it represents a function.



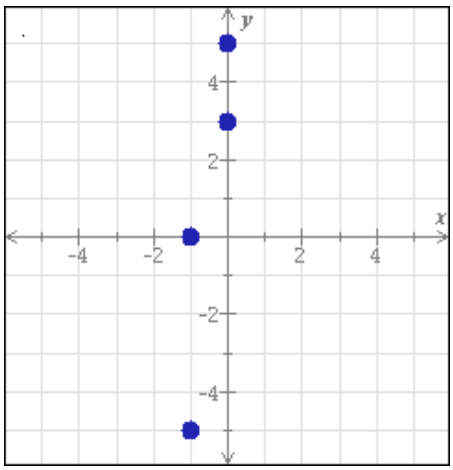
Function?:
Yes No



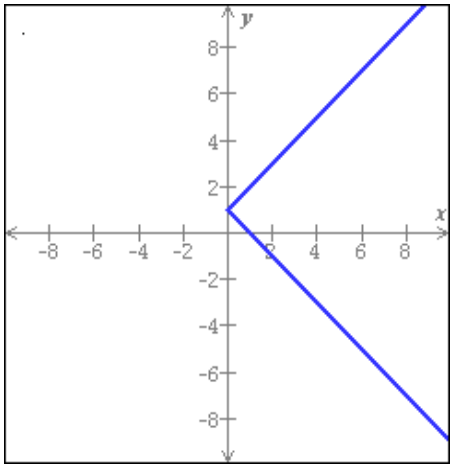
Function?:
Yes No



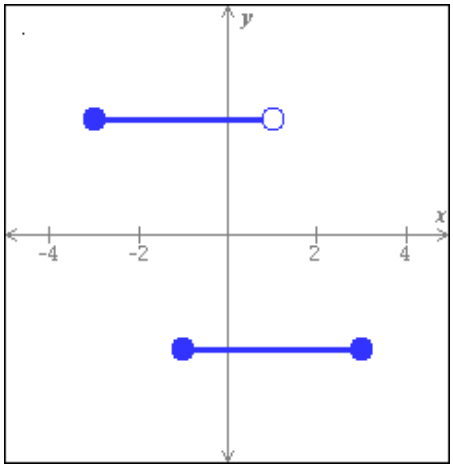
Function?:
Yes No



Function?:
Yes No

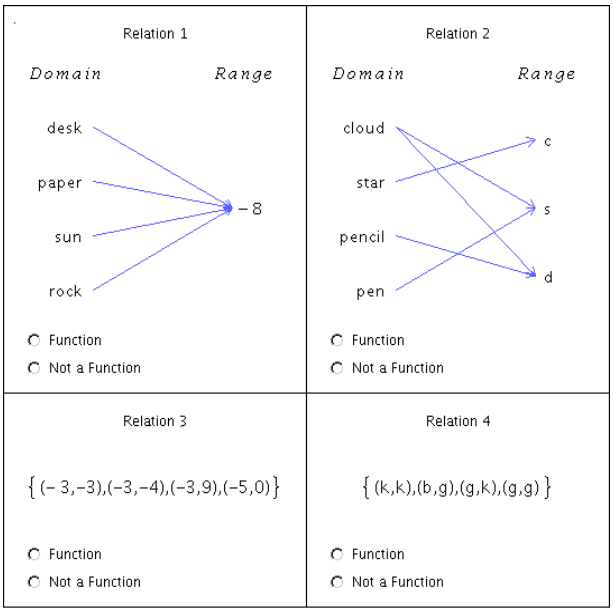


Function?:
Yes No



Function?:
Yes No

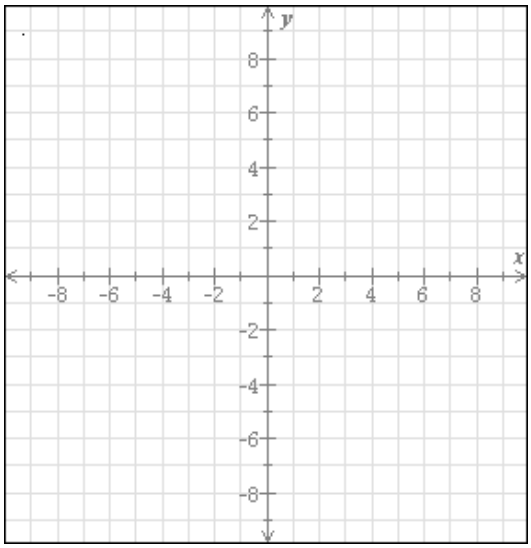
23. For each relation, decide whether or not it is a function.



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

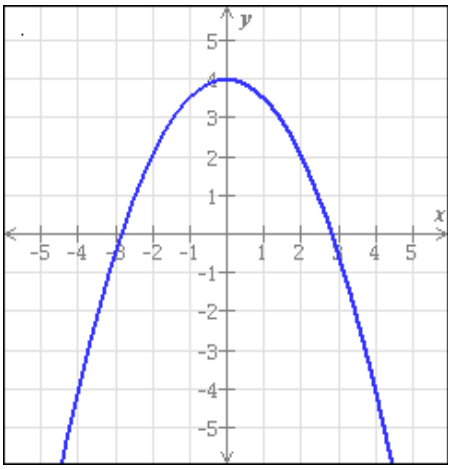
25. Graph the parabola.

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



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

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



27. Simplify. Write your answers without exponents.

$\left(\frac{1}{9}\right)^{\frac{3}{2}} =$ ☐

$32^{-\frac{4}{5}} =$ ☐

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

$$f(x) = -3x + 2 \qquad g(x) = 3x^3 + 5$$

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

Simplify your answers as much as possible.

29. Solve for x

$$(x-3)^2 = 2x^2 - 10x + 4$$

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

30. Multiply.

$$(u+1)(u-5)$$

Simplify your answer.

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

32. Calculate.

$$\frac{7\times10^{8}}{2\times10^{5}}$$

Write your answer in scientific notation.

33. Solve for w

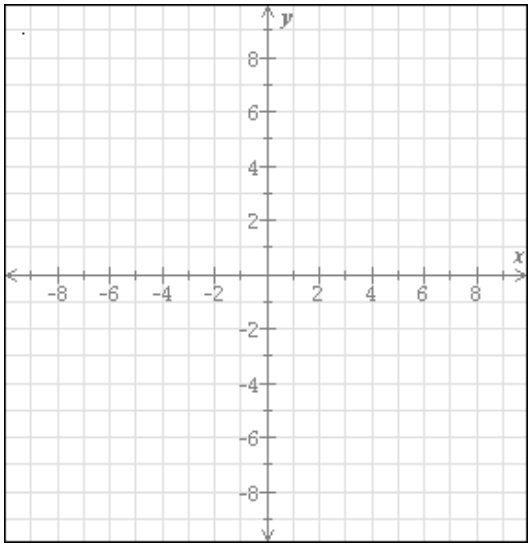
$$-5=\frac{1}{w-5}$$

Simplify your answer as much as possible.

34. A car is purchased for $\$28{,}500$ After each year, the resale value decreases by 35% What will the resale value be after 4 years? Round your answer to the nearest dollar.

35. Graph the parabola.

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



36. Divide.

$$\left(24x^3+4x^2+14x+3\right)\div\left(6x-2\right)$$

Your answer should give the quotient and the remainder.

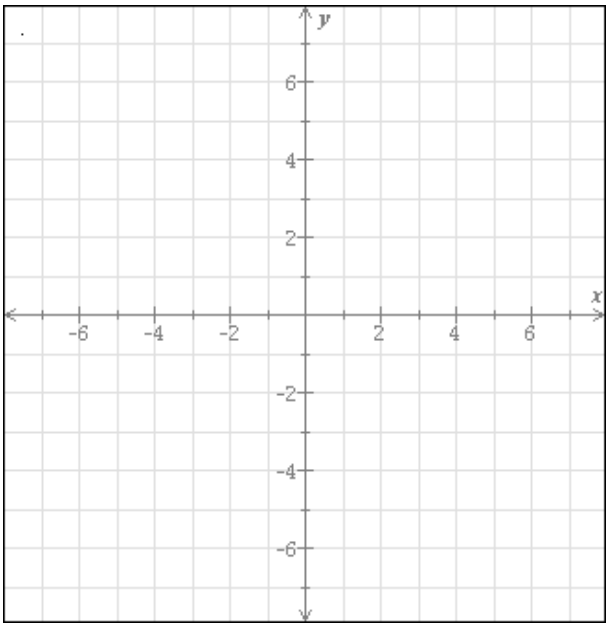
Quotient:

Remainder:

37. Graph the system below and write its solution.

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

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



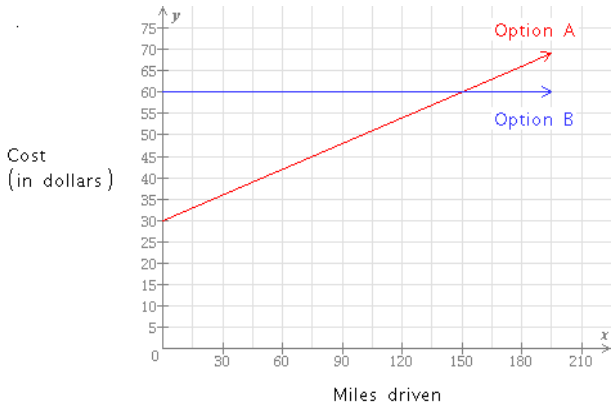
38. Fill in the missing values to make the equations true.

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

(b) $\log_5 \square + \log_5 11 = \log_5 99$

(c) $2\log_9 5 = \log_9 \square$

39. Pablo will rent a car for a day. The rental company offers two pricing options: Option A and Option B. For each pricing option, cost (in dollars) depends on miles driven, as shown below.



a. If Pablo drives the rental car 75 miles, which option costs more? How much more does it cost than the other option?

b. For what number of miles driven do the two options cost the same? If Pablo drives less than this amount, which option costs less?

40. Evaluate.

$\log_3 27$

41. Solve for x

$$\log_{1000} x = \frac{1}{3}$$

Simplify your answer as much as possible.

42. Solve $v^3 = -12$ where v is a real number.
Simplify your answer as much as possible.

43. A jet travels 1464 mi against the wind in 2 hours and 1704 mi with the wind in the same amount of time. What is the rate of the jet in still air and what is the rate of the wind?

Rate of the jet in still air: [ ] mi/h
Rate of the wind: [ ] mi/h

44. Solve for x

$$\frac{x+7}{x+4} = \frac{x-3}{x+1} + 1$$

45. Simplify.

$$\left(w^5\right)^{-4}$$

Write your answer without using negative exponents.

46. Simplify.

$$\frac{\frac{3}{8}-1}{\frac{7}{4}+1}$$

47. The sets A and E are given below.

$$A = \{\, 1, 2, 3, 4, 6 \,\}$$
$$E = \{\, 0, 2, 3, 8 \,\}$$

Find the union of A and E
Find the intersection of A and E
Write your answers using set notation.

48. Write the following expression in simplified radical form.

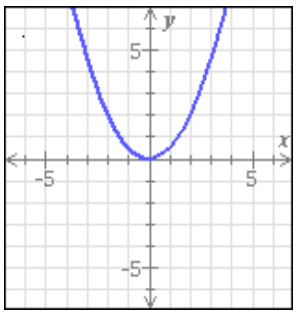
$$\sqrt[3]{40t^8w^3}$$

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

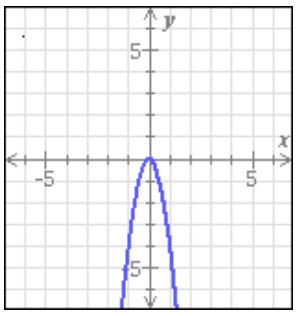
49. Solve for x where x is a real number.

$$\sqrt{5x+10} = \sqrt{7x-12}$$

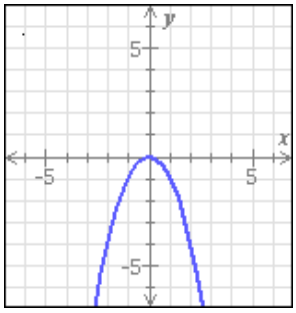
50. Look at the graphs and their equations below. Then fill in the information about the leading coefficients A, B, C, and D.



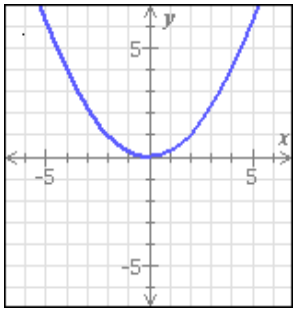
$y = Ax^2$



$y = Bx^2$



$y = Cx^2$



$y = Dx^2$

	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	○	○	○	○

51. Solve the following inequality.

$$\frac{x-1}{-x+6} > 0$$

Write your answer using interval notation.

52. Solve.

$$x^4 - 37x^2 + 36 = 0$$

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

53. The function h is defined below.

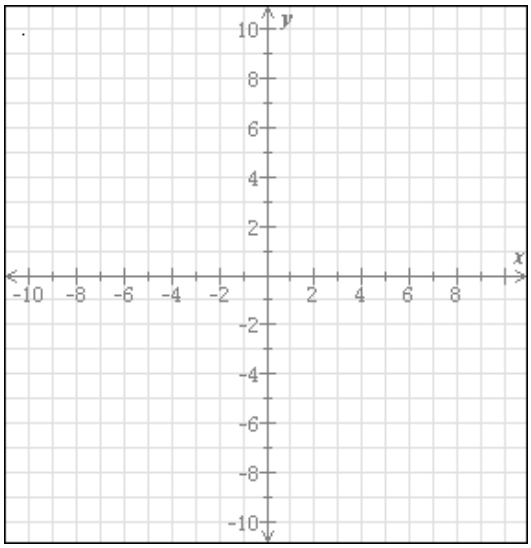
$$h(x) = \frac{x^2 + 2x - 63}{x^2 - 64}$$

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

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

54. Graph the line.

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



55. Solve $x^2 = 63$ where x is a real number.
Simplify your answer as much as possible.

56. Fill in the table using this function rule.

$$y = -6x + 2$$

x	y
-1	
0	
1	
5	

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

$$u - 5 = \sqrt{49 - 8u}$$

58. Write the following as an exponential expression.

$$\sqrt[5]{t^4}$$

59. Calculate.

$$\frac{5 \times 10^6}{2 \times 10^4}$$

Write your answer in scientific notation.

60. Rewrite as a logarithmic equation.

$7^2 = 49$

$\log_{\square}(\square) = \square$

103 Mock Final #1 Answers for class Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504

1. $x = -4$

2. $3^{-4} = \frac{1}{81}$

3. $2u^2(2-v)(2+v)\left(4+v^2\right)$

4. $x = 8$

5. $a^{\frac{11}{12}}$

6. $x = -\frac{15}{2}$

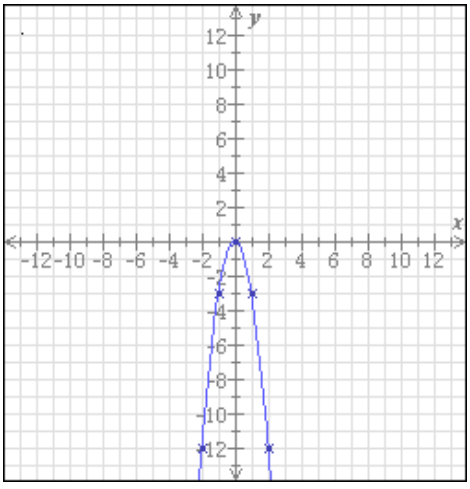
7. Initial population size: 125 fish

Population size after 8 years: 612 fish

8.

x	y
-1	7
0	2
1	-3
2	-8

9.



10. $x = \frac{1}{49}$

11. $\frac{4}{v^4}$

12. 8 hour(s)

13. $\frac{w-2}{6w}$

14. $y < \frac{4}{43}$

15. $\frac{3}{5y^3}$

16. $x = 86$

17. x-intercept(s): 7 , -1
vertex: $(3, -16)$

18. $7ux\sqrt{3u}$

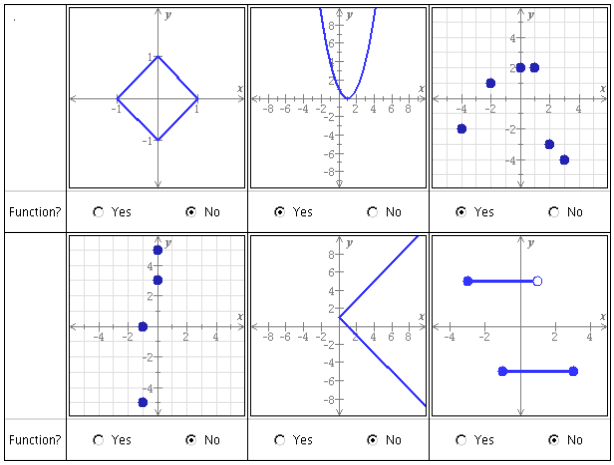
19. $(y+2)(3y-10)$

20.
Slope of a perpendicular line: $\frac{2}{3}$

Slope of a parallel line: $-\frac{3}{2}$

21. 3 minute(s)

22.

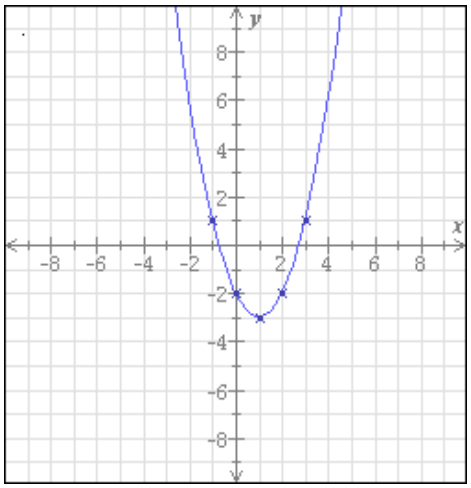


23.

Relation 1	Relation 2
Domain Range desk paper sun rock −8 ◉ Function ○ Not a Function	Domain Range cloud star pencil pen c s d ○ Function ◉ Not a Function
Relation 3	**Relation 4**
$\{(-3,-3),(-3,-4),(-3,9),(-5,0)\}$ ○ Function ◉ Not a Function	$\{(k,k),(b,g),(g,k),(g,g)\}$ ○ Function ◉ Not a Function

24. 3

25.



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

$f(-2)=2$

27.

$$\left(\frac{1}{9}\right)^{\frac{3}{2}} = \frac{1}{27}$$

$$32^{-\frac{4}{5}} = \frac{1}{16}$$

28.

$$f(3) = -7$$

$$g(-3) = -76$$

29. $x = -1, 5$

30. $u^2 - 4u - 5$

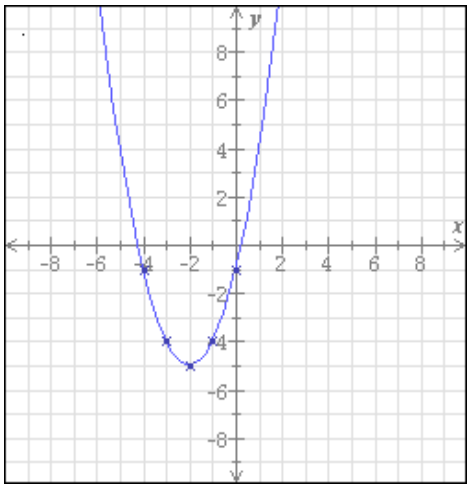
31. $u = \sqrt[3]{4}$

32. 3.5×10^3

33. $w = \frac{24}{5}$

34. $5087

35.

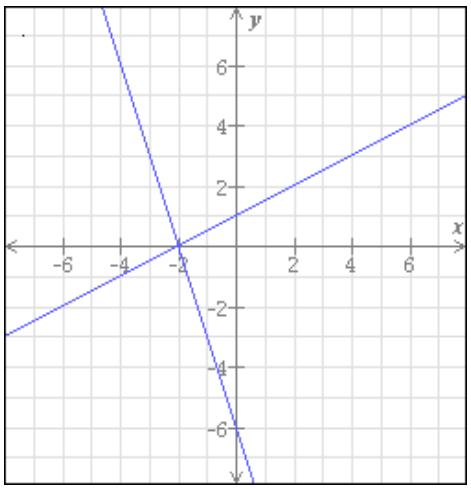


36.

Quotient: $4x^2 + 2x + 3$

Remainder: 9

37.



Solution: $(-2, 0)$

38.

(a) $\log_2 5 - \log_2 7 = \log_2 \frac{5}{7}$

(b) $\log_5 9 + \log_5 11 = \log_5 99$

(c) $2\log_9 5 = \log_9 25$

39.

(a)If Pablo drives the rental car 75 miles, which option costs more?

Option B

How much more does it cost than the other option?
$\$15$

(b)For what number of miles driven do the two options cost the same?

150

If Pablo drives less than this amount, which option costs less?
Option A

40. $\log_3 27 = 3$

41. $x = 10$

42. $v = -\sqrt[3]{12}$

43. Rate of the jet in still air: 792 mi/h
Rate of the wind: 60 mi/h

44. $x = 5, -3$

45. $\frac{1}{w^{20}}$

46. $-\frac{5}{22}$

47. $A \cup E = \{0, 1, 2, 3, 4, 6, 8\}$
$A \cap E = \{2, 3\}$

48. $2t^2 w \sqrt[3]{5t^2}$

49. $x = 11$

50.

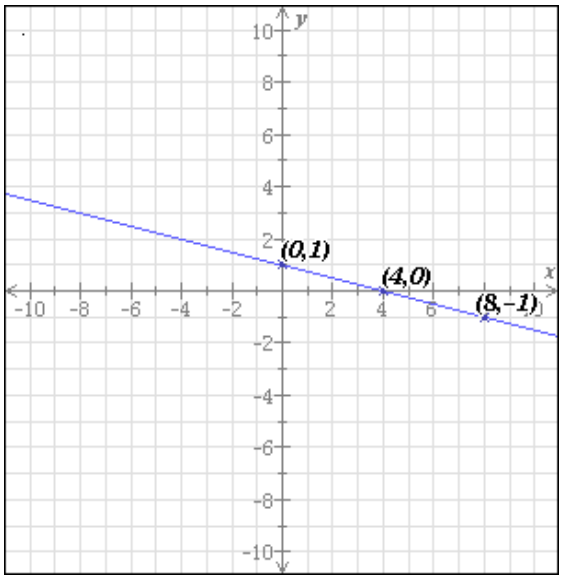
	A	*B*	*C*	*D*
(a) For each coefficient, choose whether it is positive or negative	**- Positive** - Negative	- Positive **- Negative**	- Positive **- Negative**	**- Positive** - Negative
(b) Choose the coefficient closest to 0	○	○	○	◉
(c) Choose the coefficient with the greatest value	◉	○	○	○

51. $(1,6)$

52. $x = 1, -1, 6, -6$

53. $x = 8, -8$

54.



55. $x = 3\sqrt{7} - 3\sqrt{7}$

56.

x	y
-1	8
0	2
1	-4
5	-28

57. $u = 6$

58. $\frac{4}{t^5}$

59. 2.5×10^2

60. $\log_7 49 = 2$