

ALEKS® 103 Mock Final #2

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

Student Name/ID:

1. Solve for w

$$\frac{w-1}{w-4} + 1 = \frac{w-4}{w-6}$$

2. Solve for x

$$\log 6 + \log(x-1) = \log x$$

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

$$f(x) = 2x^3 + 6 \qquad g(x) = -5x - 1$$

Find $f(-3)$ and $g(4)$

Simplify your answers as much as possible.

4. Solve the inequality for x

$$-\frac{5}{9}x - 2 \leq \frac{7}{6}x + \frac{4}{9}$$

Simplify your answer as much as possible.

5. Factor.

$$9y^2 - 18y - 7$$

6. Solve for x

$$\log_{36} x = \frac{1}{2}$$

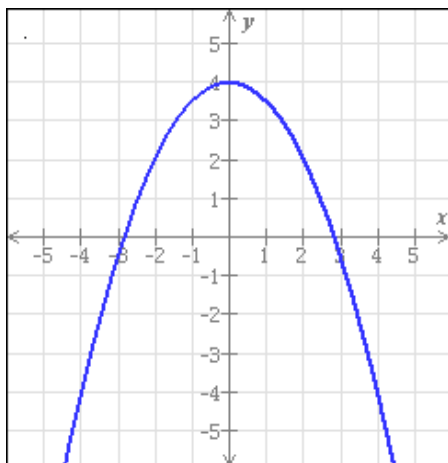
Simplify your answer as much as possible.

7. Simplify.

$$\frac{\frac{x-8}{2x^4}}{\frac{x^2-64}{10x^5}}$$

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

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



9. Solve $x^2 = 98$ where x is a real number.
Simplify your answer as much as possible.

10. Multiply.

$$(v - 3)(v + 4)$$

Simplify your answer.

11. Divide.

$$(15x^3 + 27x^2 + 4x + 3) \div (5x - 1)$$

Your answer should give the quotient and the remainder.

Quotient:

Remainder:

12. Simplify the expression.

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

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

13. Fill in the table using this function rule.

$$y = -5x + 3$$

| x | y |
|-----|-----|
| -2 | |
| 0 | |
| 2 | |
| 4 | |

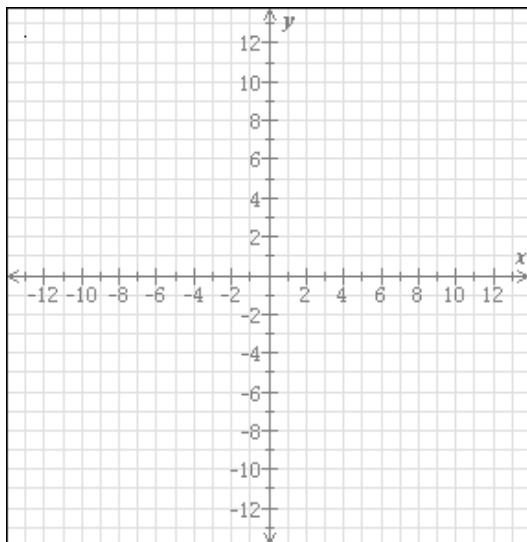
14. An airplane travels 4858 km against the wind in 7 hours and 5628 km with the wind in the same amount of time. What is the rate of the plane in still air and what is the rate of the wind?

Rate of the plane in still air: km/h

Rate of the wind: km/h

15. Graph the parabola.

$$y = 3x^2$$



16. Rewrite the expression without using a negative exponent.

$$6v^{-5}$$

Simplify your answer as much as possible.

17. 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.

$$P(t) = \frac{2000}{1 + 2e^{-0.15t}}$$

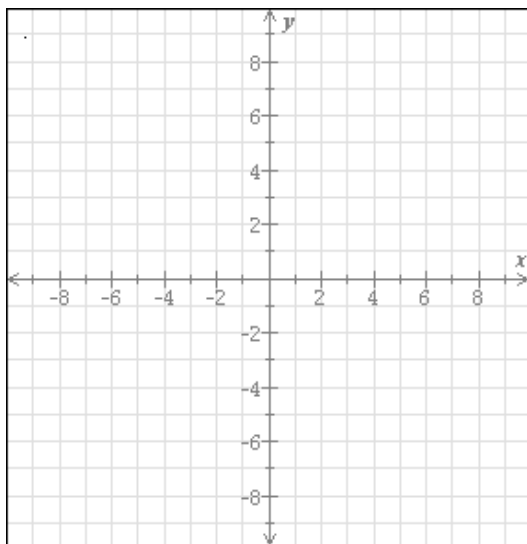
Find the initial population size of the species and the population size after 7 years.
Round your answers to the nearest whole number as necessary.

Initial population size: fish

Population size after 7 years: fish

18. Graph the parabola.

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



19. Simplify.

$$\frac{\frac{7}{6} + 2}{1 - \frac{10}{7}}$$

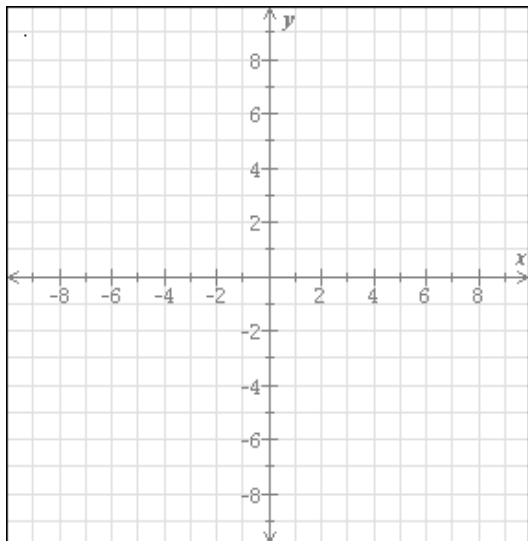
20. Rewrite as a logarithmic equation.

$$7^2 = 49$$

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

21. Graph the parabola.

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



22. Evaluate.

$$\log_7 \frac{1}{49}$$

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

24. 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 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.

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

$$v - 5 = \sqrt{-6v + 37}$$

26. Calculate.

$$\frac{9 \times 10^6}{2 \times 10^4}$$

Write your answer in scientific notation.

27. 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.

28. Solve for x

$$\log_8 x = -2$$

Simplify your answer as much as possible.

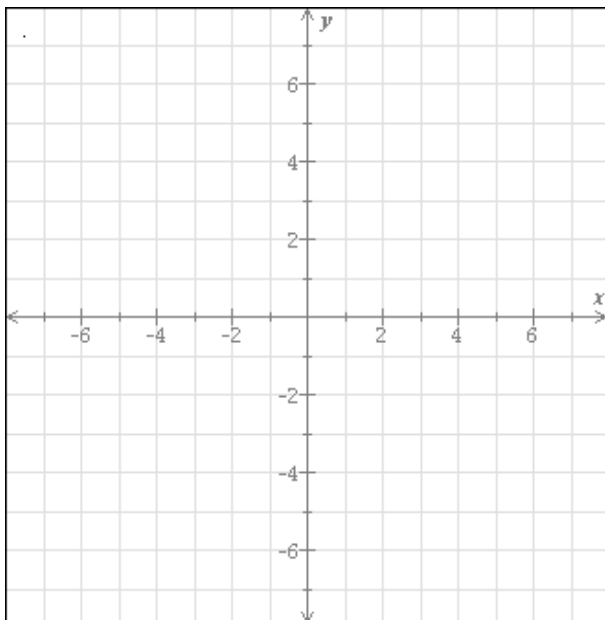
29. Solve for w where w is a real number.

$$\sqrt{5w - 11} = \sqrt{2w + 10}$$

30. Graph the system below and write its solution.

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

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



31. Solve for w

$$2w^2 - 13w + 37 = (w - 7)^2$$

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

32. Calculate.

$$\frac{6 \times 10^8}{5 \times 10^5}$$

Write your answer in scientific notation.

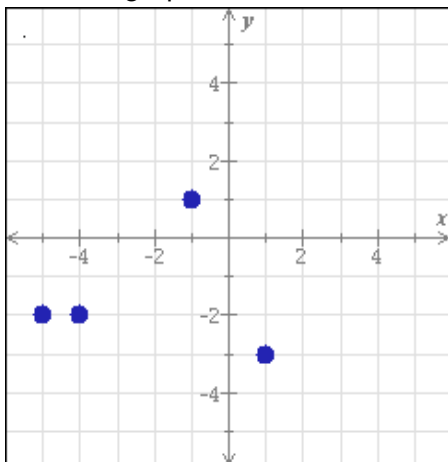
33. Solve $y^3 = 5$ where y is a real number.
Simplify your answer as much as possible.

34. Write the following expression in simplified radical form.

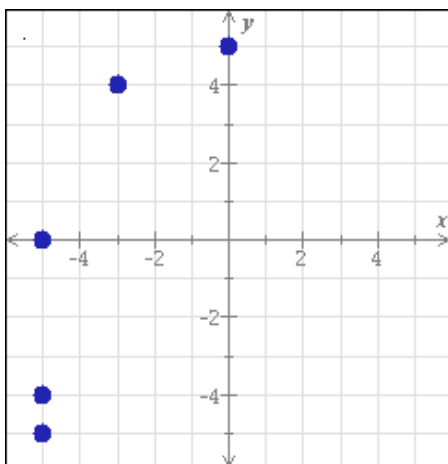
$$\sqrt[4]{80x^{20}w^{18}}$$

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

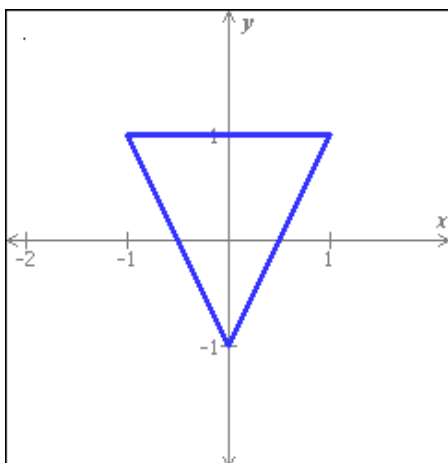
35. For each graph below, state whether it represents a function.



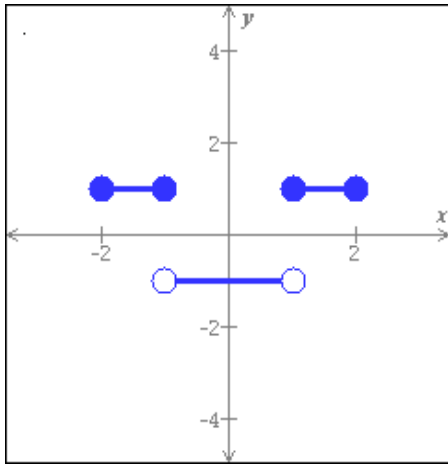
Function?:
Yes No



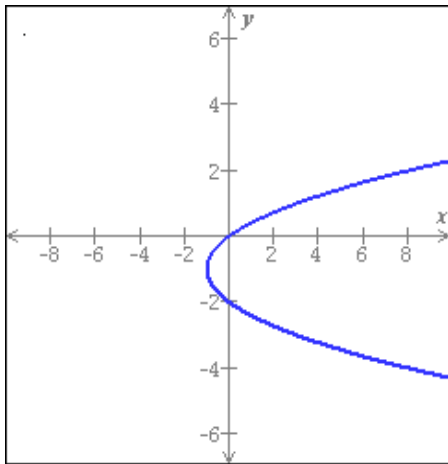
Function?:
Yes No



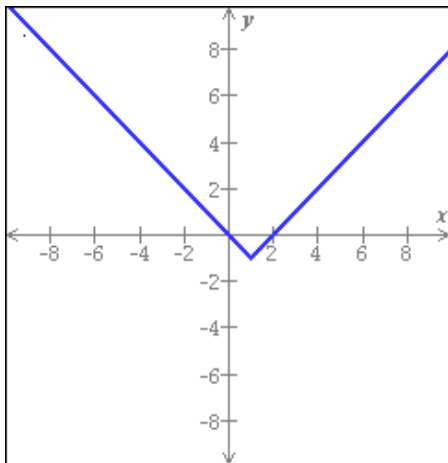
Function?:
Yes No



Function?:
Yes No



Function?:
Yes No



Function?:
Yes No

36. Write the following as an exponential expression.

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

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

(a) $\log_4 9 - \log_4 5 = \log_4 \boxed{}$

(b) $\log_9 8 + \log_9 \boxed{} = \log_9 88$

(c) $3\log_9 2 = \log_9 \boxed{}$

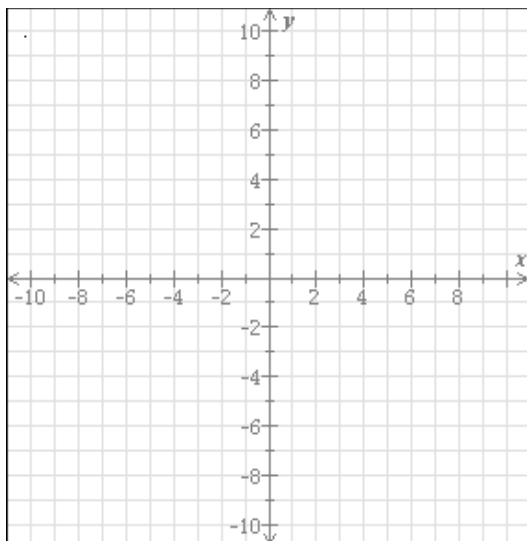
38. Divide.

$$\frac{2y}{5b} \div \frac{4y}{15b^2y^4}$$

Simplify your answer as much as possible.

39. Graph the line.

$$y = -\frac{4}{3}x + 8$$



40. Consider the line $8x + 7y = -8$

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

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

41. Solve for z

$$\frac{2}{3} = \frac{7}{z} - 4$$

Simplify your answer as much as possible.

42. Solve for x

$$\log_2(x+5) = 3 - \log_2(x+7)$$

43. Factor completely:

$$u^4 v^3 - 16 v^3$$

44. Simplify. Write your answers without exponents.

$$81^{-\frac{3}{4}} = \boxed{}$$

$$\left(\frac{1}{32}\right)^{-\frac{3}{5}} = \boxed{}$$

45. 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>sun</td> <td rowspan="2">-9</td> </tr> <tr> <td>rock</td> </tr> <tr> <td>desk</td> <td rowspan="3">2</td> </tr> <tr> <td>star</td> </tr> <tr> <td>pen</td> </tr> </tbody> </table> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p> | Domain | Range | sun | -9 | rock | desk | 2 | star | pen | <p>Relation 2</p> <table border="0"> <thead> <tr> <th>Domain</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>moon</td> <td rowspan="5">m</td> </tr> <tr> <td>tree</td> </tr> <tr> <td>door</td> </tr> <tr> <td>sky</td> </tr> <tr> <td>lake</td> </tr> </tbody> </table> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p> | Domain | Range | moon | m | tree | door | sky | lake |
|---|--|-------|-----|----|------|------|---|------|-----|--|--------|-------|------|---|------|------|-----|------|
| Domain | Range | | | | | | | | | | | | | | | | | |
| sun | -9 | | | | | | | | | | | | | | | | | |
| rock | | | | | | | | | | | | | | | | | | |
| desk | 2 | | | | | | | | | | | | | | | | | |
| star | | | | | | | | | | | | | | | | | | |
| pen | | | | | | | | | | | | | | | | | | |
| Domain | Range | | | | | | | | | | | | | | | | | |
| moon | m | | | | | | | | | | | | | | | | | |
| tree | | | | | | | | | | | | | | | | | | |
| door | | | | | | | | | | | | | | | | | | |
| sky | | | | | | | | | | | | | | | | | | |
| lake | | | | | | | | | | | | | | | | | | |
| <p>Relation 3</p> <p>$\{(2, -1), (-8, -1), (6, 2), (-2, 2)\}$</p> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p> | <p>Relation 4</p> <p>$\{(r, y), (s, y), (m, y), (y, y)\}$</p> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p> | | | | | | | | | | | | | | | | | |

46. A car is purchased for \$27,500. After each year, the resale value decreases by 35%. What will the resale value be after 5 years? Round your answer to the nearest dollar.

47. What is the value of $\sqrt{25}$?

48. Solve for x

$$\frac{12}{x} = \frac{22}{x-5}$$

49. Fill in the table using this function rule.

$$y = -3x + 3$$

| x | y |
|-----|-----|
| -4 | |
| -2 | |
| 0 | |
| 2 | |

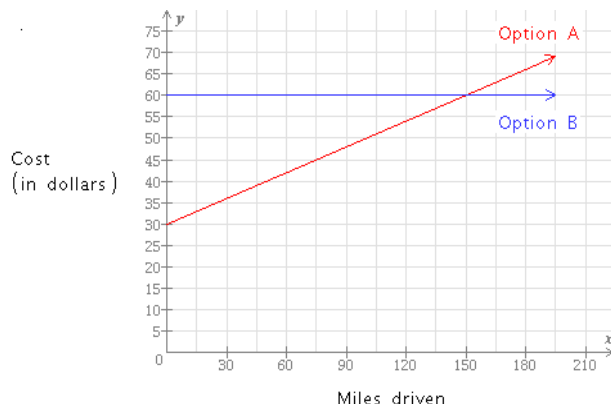
50. The function f is defined below.

$$f(x) = \frac{x+9}{x^2-6x-16}$$

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

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

51. Dan 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.



- If Dan drives the rental car 75 miles, which option costs more? How much more does it cost than the other option?
- For what number of miles driven do the two options cost the same? If Dan drives more than this amount, which option costs less?

52. Simplify as much as possible.

$$8w^2\sqrt{50wy^2} - y\sqrt{32w^5}$$

Assume that all variables represent positive real numbers.

53. Solve for w

$$-3 = -\frac{8}{w+7}$$

Simplify your answer as much as possible.

54. Simplify.

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

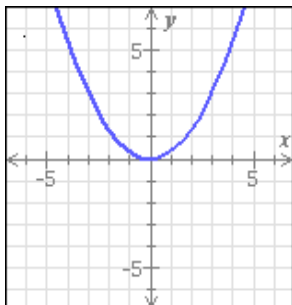
Write your answer without using negative exponents.

55. Solve the following inequality.

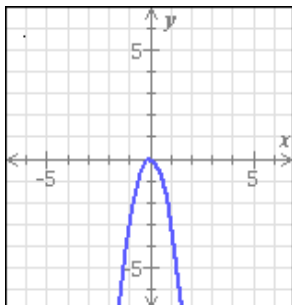
$$\frac{-x+5}{x-2} > 0$$

Write your answer using interval notation.

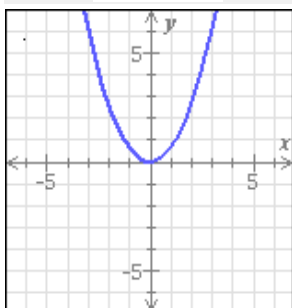
56. Look at the graphs and their equations below. Then fill in the information about the leading coefficients A , B , C , and D .



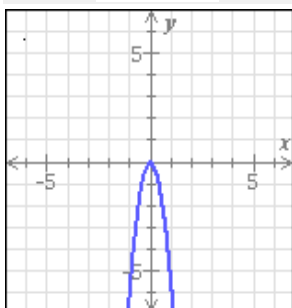
$$y = Ax^2$$



$$y = Bx^2$$



$$y = Cx^2$$



$$y = Dx^2$$

| | 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 | <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"/> |

57. The sets L and J are given below.

$$L = \{-1, 1, 5, 6\}$$

$$J = \{-2, 0, 1, 3, 5\}$$

Find the intersection of L and J

Find the union of L and J

Write your answers using set notation.

58. A swimming pool has to be drained for maintenance. The pool is shaped like a cylinder with a diameter of 9 m and a depth of 2 m. If the water is pumped out of the pool at the rate of 14 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.

59. Solve.

$$y^4 - 17y^2 = -16$$

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

60. Rewrite as an exponential equation.

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

$$\boxed{}^{\boxed{}} = \boxed{}$$

103 Mock Final #2 Answers for class Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504

1. $w = 7, 2$

2. $x = \frac{6}{5}$

3. $f(-3) = -48$
 $g(4) = -21$

4. $x \geq -\frac{44}{31}$

5. $(3y+1)(3y-7)$

6. $x = 6$

7. $\frac{5x}{x+8}$

8. One value of x for which $f(x) = 4$: 0
 $f(-2) = 2$

9. $x = 7\sqrt{2} - 7\sqrt{2}$

10. $v^2 + v - 12$

11. Quotient: $3x^2 + 6x + 2$
Remainder: 5

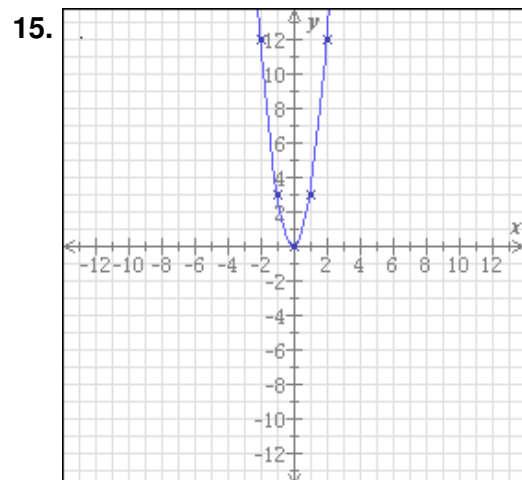
12. $\frac{5}{y^6}$

13.

| x | y |
|-----|-----|
| -2 | 13 |
| 0 | 3 |
| 2 | -7 |
| 4 | -17 |

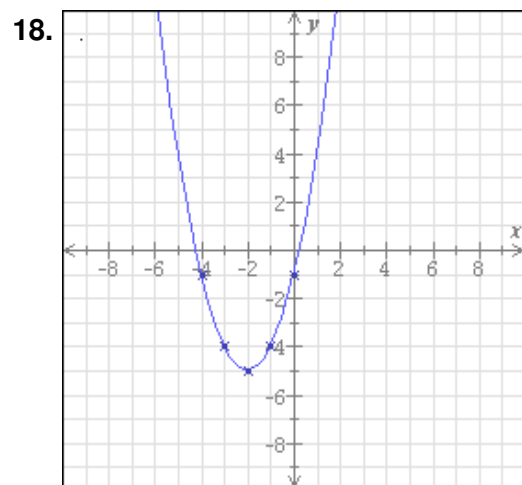
14. Rate of the plane in still air: 749 km/h

Rate of the wind: 55 km/h



16. $\frac{6}{v^5}$

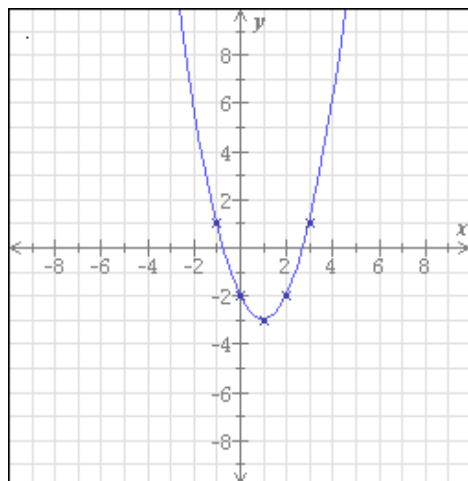
17. Initial population size: 667 fish
Population size after 7 years: 1177 fish



19. $-\frac{133}{18}$

20. $\log_7 49 = 2$

21.



22. $\log_7 \frac{1}{49} = -2$

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

24. 3 minute(s)

25. $v = 6$

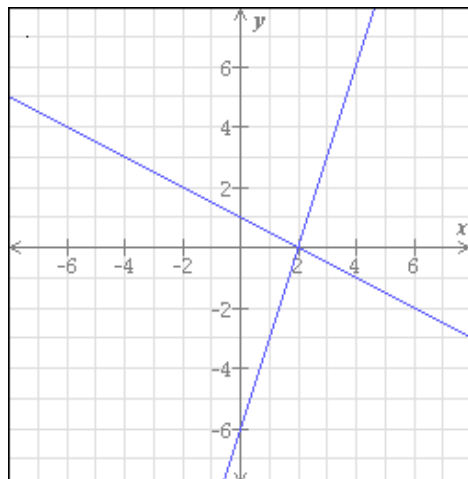
26. 4.5×10^2

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

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

29. $w = 7$

30.



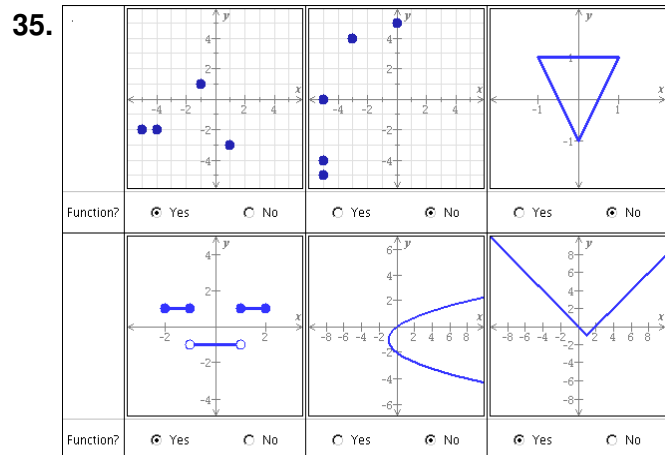
Solution: $(2, 0)$

31. $w = 3, -4$

32. 1.2×10^3

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

34. $2x^5 w^4 \sqrt[4]{5w^2}$



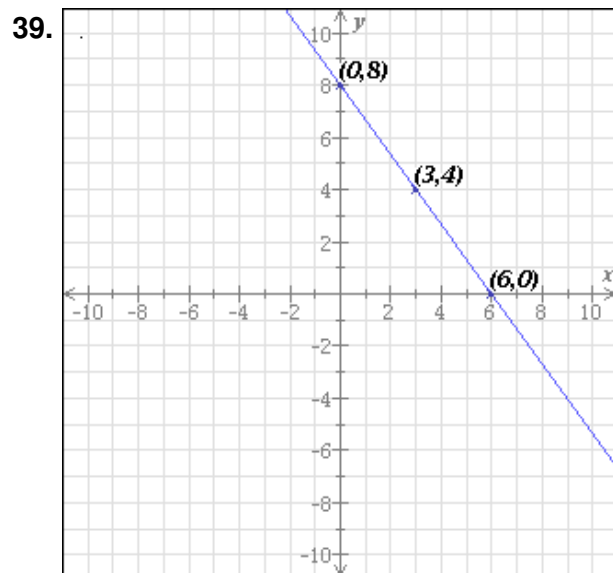
36. $\frac{5}{b^6}$

37. (a) $\log_4 9 - \log_4 5 = \log_4 \frac{9}{5}$

(b) $\log_9 8 + \log_9 11 = \log_9 88$

(c) $3\log_9 2 = \log_9 8$

38. $\frac{3by^4}{2}$



40. Slope of a parallel line: $-\frac{8}{7}$

Slope of a perpendicular line: $\frac{7}{8}$

41. $z = \frac{3}{2}$

42. $x = -3$

43. $v^3(u-2)(u+2)(u^2+4)$

44. $81^{-\frac{3}{4}} = \frac{1}{27}$

$\left(\frac{1}{32}\right)^{-\frac{3}{5}} = 8$

45.

| Relation 1 | | Relation 2 | |
|---|-------|---|-------|
| Domain | Range | Domain | Range |
| sun | -9 | moon | m |
| rock | | tree | |
| desk | | door | |
| star | | sky | |
| pen | | lake | |
| <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 | |
| $\{(2,-1),(-8,-1),(6,2),(-2,2)\}$ | | $\{(r,y),(s,y),(m,y),(y,y)\}$ | |
| <input checked="" type="radio"/> Function <input type="radio"/> Not a Function | | <input checked="" type="radio"/> Function <input type="radio"/> Not a Function | |

46. \$3191

47. 5

48. $x = -6$

49.

| | |
|-----|-----|
| x | y |
| -4 | 15 |
| -2 | 9 |
| 0 | 3 |
| 2 | -3 |

50. $x = 8, -2$

51. (a) If Dan 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 Dan drives more than this amount, which option costs less?

Option B

52. $36w^2y\sqrt{2w}$

53. $w = -\frac{13}{3}$

54. $\frac{1}{u^{20}}$

55. $(2, 5)$

56.

| | 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 | <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 checked="" type="radio"/> | <input type="radio"/> |

57. $L \cap J = \{ 1, 5 \}$
 $L \cup J = \{ -2, -1, 0, 1, 3, 5, 6 \}$

58. 9 hour(s)

59. $y = 1, -1, 4, -4$

60. $3^{-4} = \frac{1}{81}$