

ALEKS® 103 Mock Final #5

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

Student Name/ID:

1. Rewrite as a logarithmic equation.

$$3^4 = 81$$

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

2. Fill in the table using this function rule.

$$y = -10x + 2$$

x	y
-1	
0	
1	
5	

3. What is the value of $\sqrt{100}$?

4. Solve for y

$$\frac{y-2}{y+6} + 1 = \frac{y+6}{y+3}$$

5. 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 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.

6. Simplify.

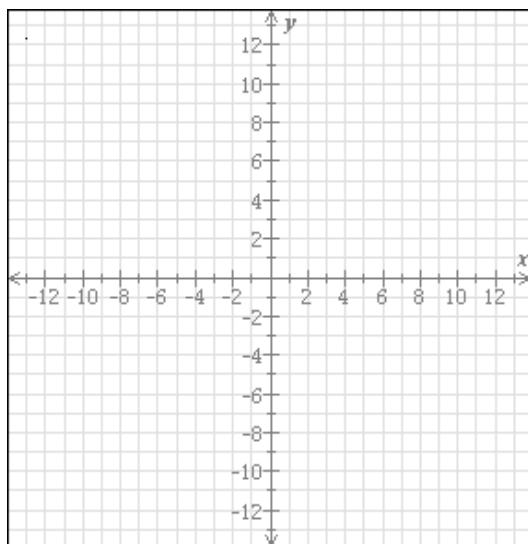
$$\frac{\frac{6w}{w^2 + w - 20}}{\frac{3}{w-4}}$$

7. Evaluate.

$$\log_3 \frac{1}{81}$$

8. Graph the parabola.

$$y = 2x^2$$



9. 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 1.9 m. If the water is pumped out of the pool at the rate of 15 m³ 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.

10. Solve the inequality for w

$$2 - \frac{5}{6}w < w + \frac{3}{8}$$

Simplify your answer as much as possible.

11. Flying against the wind, a jet travels 9270 mi in 9 hours. Flying with the wind, the same jet travels 10,640 mi in 8 hours. 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

12. Factor.

$$3x^2 - 23x + 30$$

13. Solve for x

$$\log_2(x+6) = 2 - \log_2(x+3)$$

14. Solve for x

$$\log_{10} x = -2$$

Simplify your answer as much as possible.

15. Divide.

$$(20x^3 + 16x^2 + 6x + 6) \div (5x - 1)$$

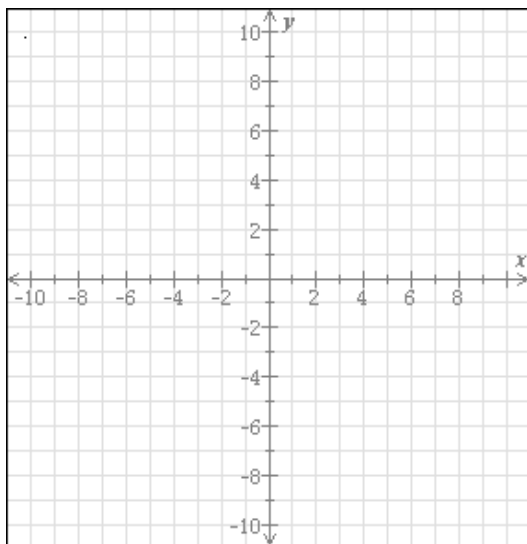
Your answer should give the quotient and the remainder.

Quotient:

Remainder:

16. Graph the line.

$$y = -\frac{3}{2}x + 3$$



17. Solve.

$$x^4 - 36x^2 = -35$$

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

18. Calculate.

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

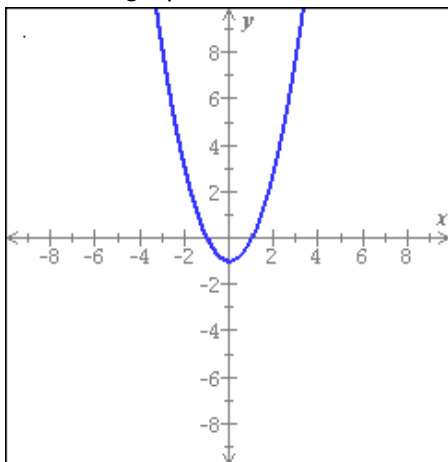
Write your answer in scientific notation.

19. Divide.

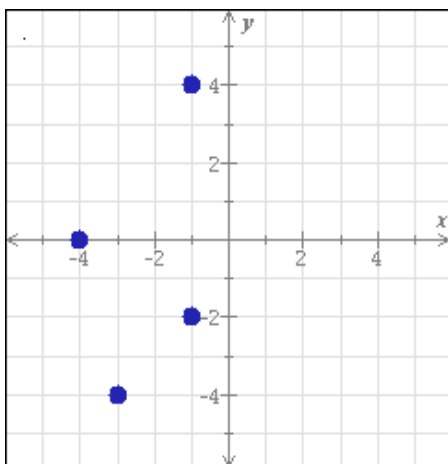
$$\frac{5y}{4a^3} \div \frac{y^5}{8a^4y}$$

Simplify your answer as much as possible.

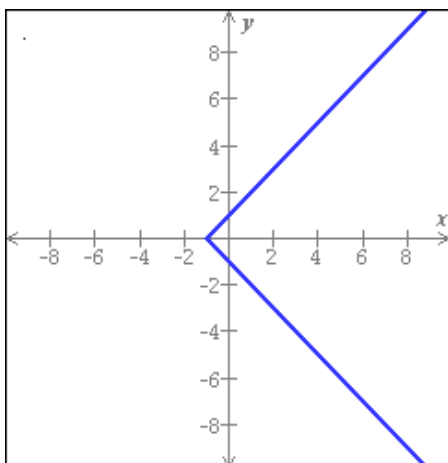
20. For each graph below, state whether it represents a function.



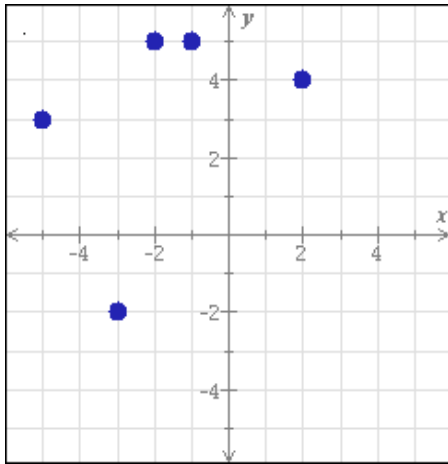
Function?:
Yes No



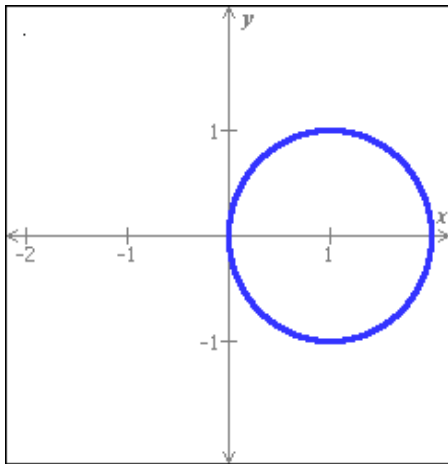
Function?:
Yes No



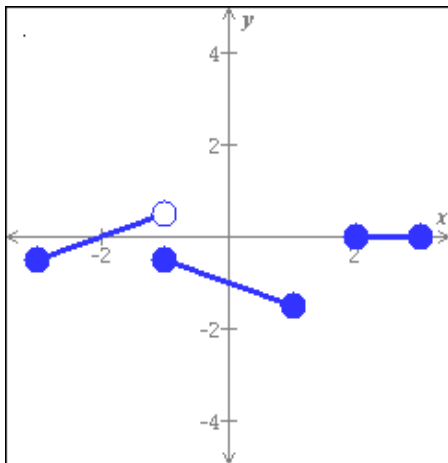
Function?:
Yes No



Function?:
Yes No



Function?:
Yes No



Function?:
Yes No

21. Calculate.

$$\frac{7 \times 10^8}{2 \times 10^5}$$

Write your answer in scientific notation.

22. Solve $x^2 = 54$ where x is a real number.
Simplify your answer as much as possible.

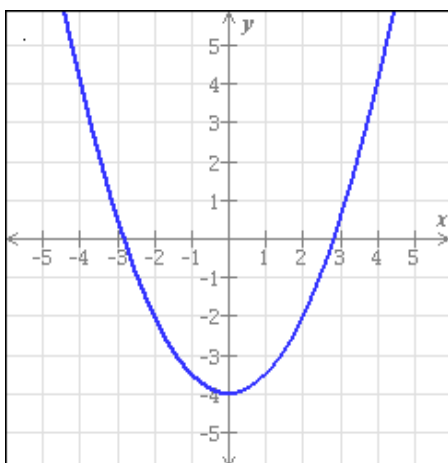
23. Simplify the expression.

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

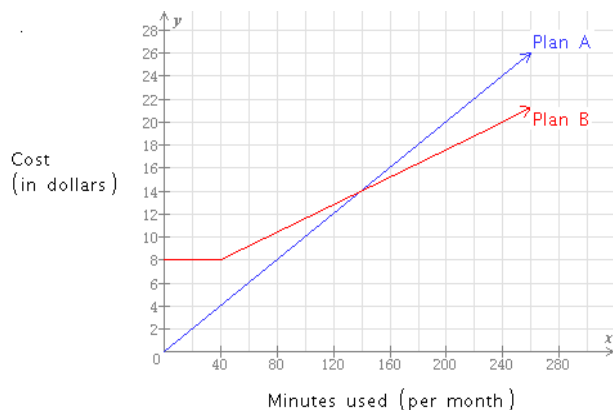
Write your answer using only positive exponents.
Assume that all variables are positive real numbers.

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

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



25. Kareem 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.

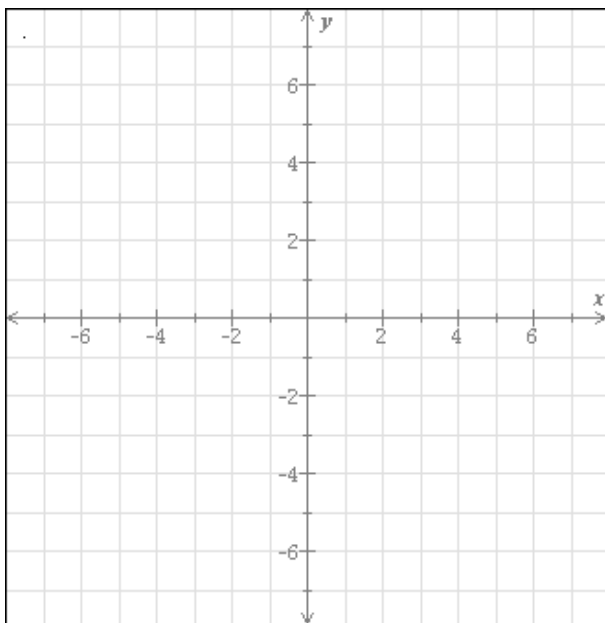


- If Kareem makes 40 minutes of long distance calls for the month, which plan costs less? How much less does it cost than the other plan?
- For what number of long distance minutes do the two plans cost the same? If the time spent on long distance calls is more than this amount, which plan costs more?

26. Graph the system below and write its solution.

$$\begin{cases} -2x + y = 4 \\ y = -\frac{1}{3}x - 3 \end{cases}$$

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



27. Factor completely:

$$2v^4w^4 - 2w^4$$

28. Solve for x

$$3 = \frac{1}{4} - \frac{5}{x}$$

Simplify your answer as much as possible.

29. Write the following expression in simplified radical form.

$$\sqrt[5]{192s^{10}t^{14}}$$

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

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

31. Multiply.

$$(w - 8)(w + 2)$$

Simplify your answer.

32. A can of soda is placed inside a cooler. As the soda cools, its temperature $T(x)$ in degrees Celsius is given by the following exponential function, where x is the number of minutes since the can was placed in the cooler.

$$T(x) = -12 + 32e^{-0.04x}$$

Find the initial temperature of the soda and its temperature after 15 minutes.
Round your answers to the nearest degree as necessary.

Initial temperature: °C

Temperature after 15 minutes: °C

33. Solve the following inequality.

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

Write your answer using interval notation.

34. Solve for x

$$\frac{-8}{x} = \frac{-14}{x-3}$$

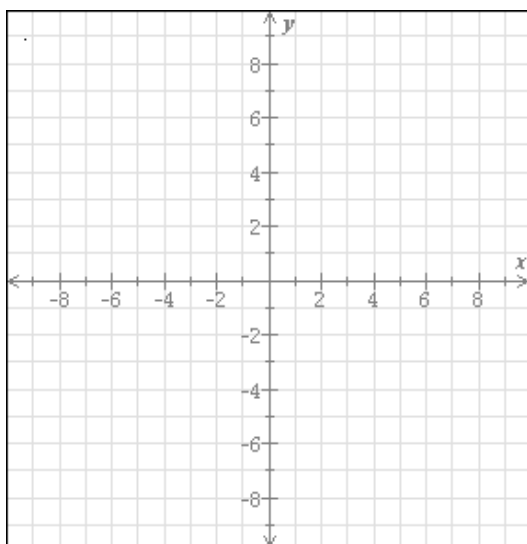
35. Consider the line $8x + 3y = -4$

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

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

36. Graph the parabola.

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



37. Solve for y

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

Simplify your answer as much as possible.

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

<p>Relation 1</p> <p>$\{(7,7),(5,5),(0,-7),(-7,-7)\}$</p> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p>	<p>Relation 2</p> <p>$\{(0,-3),(9,-3),(3,-9),(-9,-3)\}$</p> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p>																
<p>Relation 3</p> <table border="0"> <thead> <tr> <th>Domain</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>star</td> <td> <div> <div></div> <div>-1</div> </div> <div> <div></div> <div>-4</div> </div> </td> </tr> <tr> <td>paper</td> <td> <div> <div></div> <div>2</div> </div> <div> <div></div> <div>-2</div> </div> </td> </tr> </tbody> </table> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p>	Domain	Range	star	<div> <div></div> <div>-1</div> </div> <div> <div></div> <div>-4</div> </div>	paper	<div> <div></div> <div>2</div> </div> <div> <div></div> <div>-2</div> </div>	<p>Relation 4</p> <table border="0"> <thead> <tr> <th>Domain</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>n</td> <td> <div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div> </td> </tr> <tr> <td>f</td> <td> <div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div> </td> </tr> <tr> <td>t</td> <td> <div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div> </td> </tr> <tr> <td>s</td> <td> <div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div> </td> </tr> </tbody> </table> <p> <input type="radio"/> Function <input type="radio"/> Not a Function </p>	Domain	Range	n	<div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div>	f	<div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div>	t	<div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div>	s	<div> <div></div> <div>-2</div> </div> <div> <div></div> <div>0</div> </div>
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39. Find the x -intercept(s) and the coordinates of the vertex for the parabola $y = x^2 + 2x - 24$. If there is more than one x -intercept, separate them with commas.

40. Simplify.

$$\frac{\frac{1}{4} - \frac{1}{2}}{\frac{1}{5} - \frac{1}{3}}$$

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

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

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

(a) $\log_9 5 - \log_9 4 = \log_9 \boxed{}$

(b) $\log_3 7 + \log_3 \boxed{} = \log_3 14$

(c) $\log_8 25 = \boxed{} \log_8 5$

43. Fill in the table using this function rule.

$$y = -5x + 2$$

x	y
-1	
0	
1	
2	

44. Solve for y where y is a real number.

$$\sqrt{6y-3} = \sqrt{8y-15}$$

45. Simplify. Write your answers without exponents.

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

$$4^{-\frac{5}{2}} = \boxed{}$$

46. Rewrite the expression without using a negative exponent.

$$6y^{-2}$$

Simplify your answer as much as possible.

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

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

Find $f(-3)$ and $g(2)$

Simplify your answers as much as possible.

48. Solve for x

$$\ln(x-4) + \ln 4 = \ln 17$$

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

50. Write the following as a radical expression.

$$t^{\frac{7}{8}}$$

51. Solve for x

$$\log_7 x = -2$$

Simplify your answer as much as possible.

52. Simplify as much as possible.

$$w\sqrt{18x^3} - x\sqrt{50xw^2}$$

Assume that all variables represent positive real numbers.

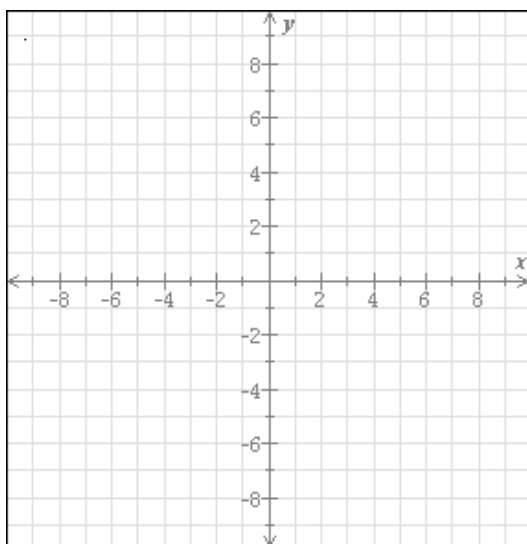
53. Simplify.

$$\left(v^{-3}\right)^7$$

Write your answer without using negative exponents.

54. Graph the parabola.

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



55. A car is purchased for \$20,500. After each year, the resale value decreases by 30%. What will the resale value be after 4 years? Round your answer to the nearest dollar.

56. Rewrite as an exponential equation.

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

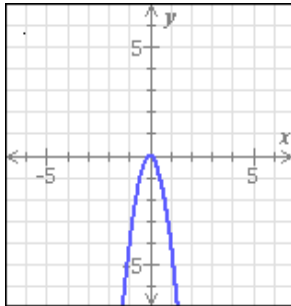
$$\boxed{}^{\boxed{}} = \boxed{}$$

57. Solve for y

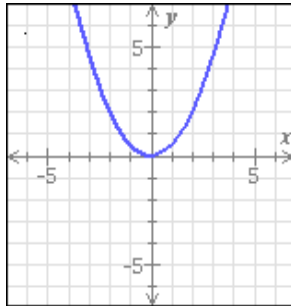
$$2y^2 - 14y + 16 = (y - 3)^2$$

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

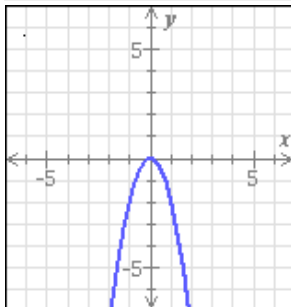
58. Look at the graphs and their equations below. Then fill in the information about the leading coefficients A , B , C , and D .



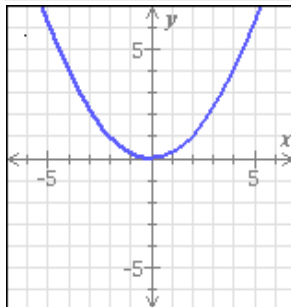
$$y = Ax^2$$



$$y = Bx^2$$



$$y = Cx^2$$



$$y = Dx^2$$

	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"/>

59. The sets E and H are given below.

$$E = \{ b, f, g \}$$

$$H = \{ a, c, h \}$$

Find the intersection of E and H

Find the union of E and H

Write your answers using set notation.

60. The function h is defined below.

$$h(x) = \frac{x - 4}{x^2 - 14x + 48}$$

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

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

103 Mock Final #5 Answers for class Beginning and Intermediate Algebra Combined / MATH 103 - Fall 2014 – 504

1. $\log_3 81 = 4$

2.

x	y
-1	12
0	2
1	-8
5	-48

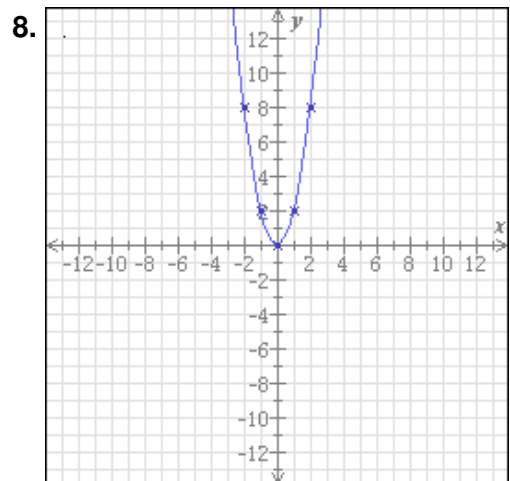
3. 10

4. $y = 6, -4$

5. 5 minute(s)

6. $\frac{2w}{w+5}$

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



9. 8 hour(s)

10. $w > \frac{39}{44}$

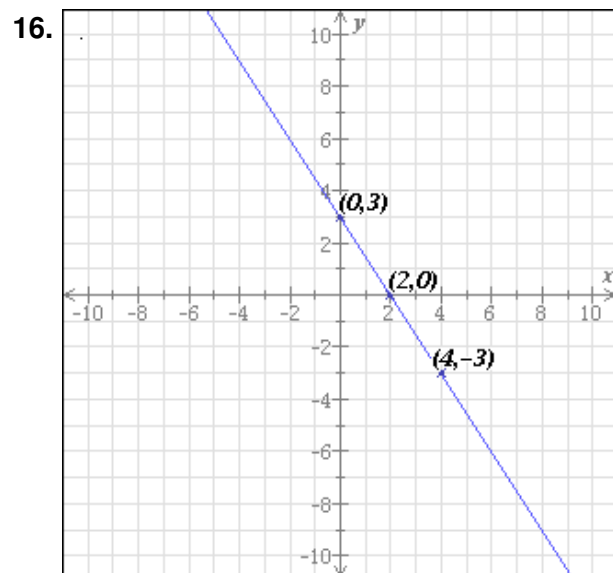
11. Rate of the jet in still air: 1180 mi/h
Rate of the wind: 150 mi/h

12. $(x-6)(3x-5)$

13. $x = -2$

14. $x = \frac{1}{100}$

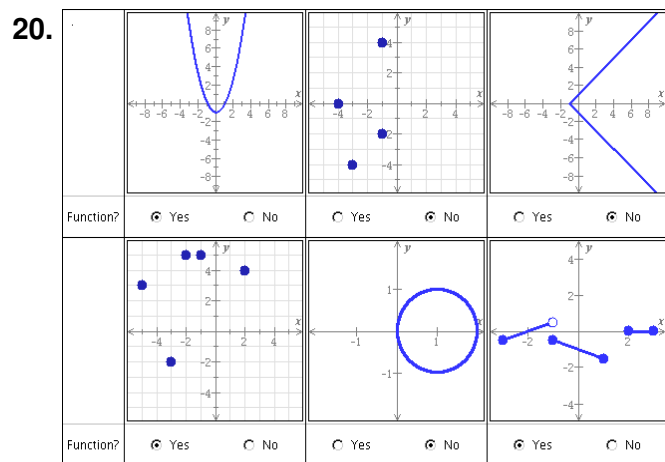
15. Quotient: $4x^2 + 4x + 2$
Remainder: 8



17. $x = 1, -1, \sqrt{35}, -\sqrt{35}$

18. 1.25×10^3

19. $\frac{10a}{y^3}$



21. 3.5×10^3

22. $x = 3\sqrt{6} - 3\sqrt{6}$

23. $\frac{11}{z^{12}}$

24. $f(2) = -2$

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

25.

(a) If Kareem makes 40 minutes of long distance calls for the month, which plan costs less?

Plan A

How much less does it cost than the other plan?

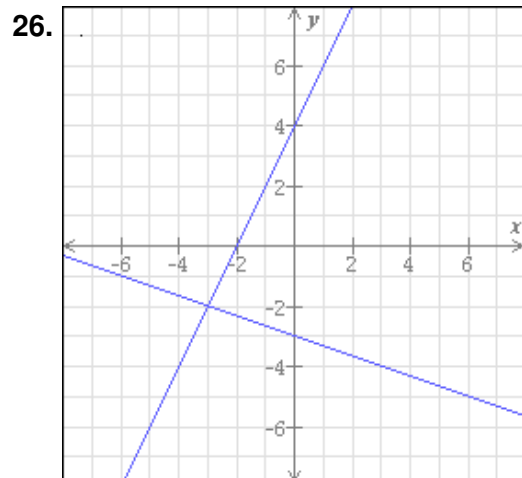
\$4

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

140

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

Plan A



Solution: $(-3, -2)$

27. $2w^4(v-1)(v+1)(v^2+1)$

28. $x = -\frac{20}{11}$

29. $2s^2t^2\sqrt[5]{6t^4}$

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

31. $w^2 - 6w - 16$

32. Initial temperature: 20°C

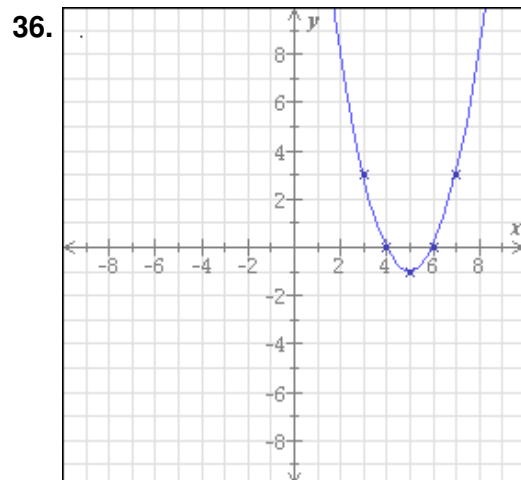
Temperature after 15 minutes: 6°C

33. $[-6, 2)$

34. $x = -4$

35. Slope of a parallel line: $-\frac{8}{3}$

Slope of a perpendicular line: $\frac{3}{8}$



37. $y = -\frac{16}{3}$

38.

<p>Relation 1</p> $\{(7,7),(5,5),(0,-7),(-7,-7)\}$ <p> <input checked="" type="radio"/> Function <input type="radio"/> Not a Function </p>	<p>Relation 2</p> $\{(0,-3),(9,-3),(3,-9),(-9,-3)\}$ <p> <input checked="" type="radio"/> Function <input type="radio"/> Not a Function </p>																				
<p>Relation 3</p> <table> <tr> <th>Domain</th><th>Range</th></tr> <tr> <td>star</td><td>-1</td></tr> <tr> <td>star</td><td>-4</td></tr> <tr> <td>paper</td><td>2</td></tr> <tr> <td>paper</td><td>-2</td></tr> </table> <p> <input type="radio"/> Function <input checked="" type="radio"/> Not a Function </p>	Domain	Range	star	-1	star	-4	paper	2	paper	-2	<p>Relation 4</p> <table> <tr> <th>Domain</th><th>Range</th></tr> <tr> <td>n</td><td>-2</td></tr> <tr> <td>f</td><td>-2</td></tr> <tr> <td>t</td><td>0</td></tr> <tr> <td>s</td><td>0</td></tr> </table> <p> <input type="radio"/> Function <input checked="" type="radio"/> Not a Function </p>	Domain	Range	n	-2	f	-2	t	0	s	0
Domain	Range																				
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paper	-2																				
Domain	Range																				
n	-2																				
f	-2																				
t	0																				
s	0																				

39. x-intercept(s): 4 , -6
vertex: $(-1, -25)$

40. $\frac{15}{8}$

41. $u = 6$

42.

(a) $\log_9 5 - \log_9 4 = \log_9 \frac{5}{4}$

(b) $\log_3 7 + \log_3 2 = \log_3 14$

(c) $\log_8 25 = 2\log_8 5$

43.

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

44. $y = 6$

45.

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

$$4^{-\frac{5}{2}} = \frac{1}{32}$$

46. $\frac{6}{y^2}$

47. $f(-3) = 49$
 $g(2) = -9$

48. $x = \frac{33}{4}$

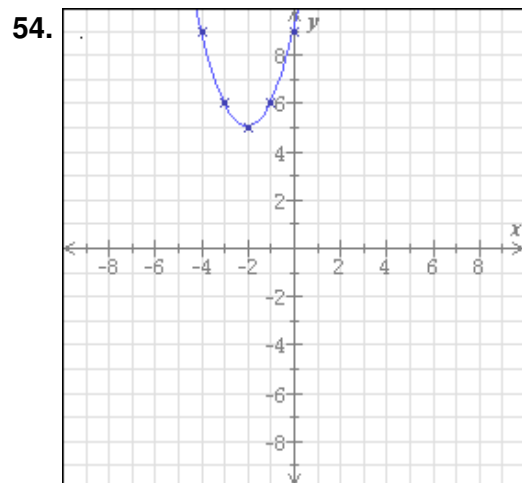
49. $u = \sqrt[3]{4}$

50. $\sqrt[8]{t^7}$

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

52. $-2xw\sqrt{2x}$

53. $\frac{1}{v^{21}}$



55. \$4922

56. $3^{-4} = \frac{1}{81}$

57. $y = 7, 1$

58.

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
(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 checked="" type="radio"/>
(c) Choose the coefficient with the greatest value	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

59. $E \cap H = \emptyset$

$$E \cup H = \{ a, b, c, f, g, h \}$$

60. $x = 6, 8$