ALGEBRA 1

1. Given $7^x = 343$, find the value of x.

a. 49
b. 3
c. 336
d. 4

2. In the following equations, t represents time in hours and m represents mass in mg. Which of them (if any) would have a mass less than 50mg after 2 hours? Select all that apply.

a. $y = 100(0.5)^x$
b. $y = 500(0.3)^x$
c. $y = 80(2)^x$
d. $y = 10(1.2)^x$
e. $y = 30(1.5)^x$
f. $y = 80(0.2)^x$
g. $y = 100(2)^x$

3. In the equation $y = 20(4^x)$, what value does the 20 represent? Select all that apply.

a. y −intercept
b. starting value
c. growth factor
d. growth rate

4. Given the equation $y = 3(2^x)$ if $x = 6$, what is the value of y?

5. A function is modeled by the following data. What is the y −intercept of the relationship?

$\boldsymbol{x}$	1	2	3	4	5
$\boldsymbol{y}$	15	45	135	405	1215

a. 3
b. 15
c. 0
d. 5

6. A function is modeled by the following data. What is the y −intercept of the relationship?

x	1	2	3	4	5
y	60	120	240	480	960

7. What is the growth factor in the following relationship?

x	2	3	4	5	6
y	7.29	19.68	53.14	143.49	387.42

a. 2.6
b. 3
c. 2.7
d. 12.39

8. Rearrange the boxes below to represent a model for the following situation: The population of a city with an initial amount of 20000 people decreases yearly at a rate of 8% if P represents the population after t years.

P = _____ (_____) ————

20000	8	0.92	0.08	x	t

9. Which of the following equation(s) show exponential growth? Select all that apply.
a. $y = 3^x$
b. $y = 5x + 2$
c. $y = x^4 + 1$
d. $y = 2^3 + x$

10. If the growth rate is 8%, what is the growth factor?
a. 8
b. 1.08
c. 1.8
d. 80

11. If the growth factor is 1.9, what is the growth rate?
a. 9%
b. 90%
c. 19%
d. 190%

12. What are the solutions of $|n| - 4 = 14$?

a. $n = 10$

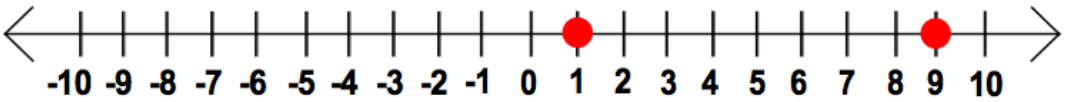
b. $n = -18$ or $n = 18$

c. $n = 10$ or $n = 18$

d. No Solution

e. All Real Numbers

13. Choose all equation(s) that could have the following solutions. There may be more than one answer.



a. $|x + 5| = 4$

b. $|x - 5| = 4$

c. $2|x - 4| = 10$

d. $|x + 4| = 5$

e. $2|x - 5| = 8$

f. $|x - 4| = 5$

14. Solve the equation: $2(5k - 13) = 5(2k - 5)$

a. $k = -8$

b. $k = -1$

c. $k = 1$

d. No solution

e. Infinitely many solutions (identity)

15. Solve the equation: $3(4j + 1) = 3(3j - 1) + j$

a. $j = -6$

b. $j = -3$

c. $j = -2$

d. No solution

e. Infinitely many solutions (identity)

16. Solve the equation: $2(7r + 5) = 6(2r + 5) + 2r - 20$

a. $r = -10$

b. $r = \frac{5}{7}$

c. $r = 20$

d. No solution

e. Infinitely many solutions (identity)

17. What is the discriminant of $2x^2 + 6x + 4 = 0$?

a. 2
b. 4
c. 32
d. 68

18. How many real zeros does an equation have if the discriminant is 7?

a. 0
b. 1
c. 2
d. Not enough information

19. Solve $3x^2 - 5x + 1 = 0$

20. Simplify $\frac{-4 \pm \sqrt{4}}{2}$

a. -6 and -2
b. -3 and -1
c. -4 and 0
d. -1 and 0

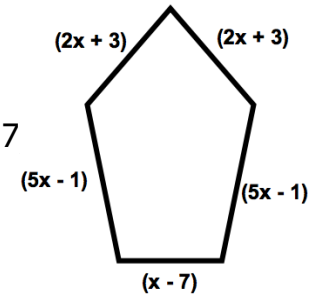
21. Given the height of a rocket as $h = -16t^2 + 160t + 384$, the class was asked when the rocket hits the ground. Kim solved to find the zeros $t = -2$ and $t = 12$. Assuming the calculations were correct, what should the answer to teacher's question be?

a. Both -2 and 12 since the calculations were correct
b. 12 only since it has to be a positive
c. -2 since the sign needs to be changed
d. Neither, since the rocket will not hit the ground

22. Which expression is equivalent to $(3w^7 - 7w^2) - (2w^3 - 11w^2)$?

a. $w^4 + 4$
b. $w^7 + 4w^2$
c. $3w^7 - 2w^3 + 4w^2$
d. $3w^7 - 2w^3 - 18w^2$

23. Which expression(s) represent(s) the perimeter of the following figure? Select all that apply. (answers are in units)



a. 2(2x + 3) + 2(5x – 1) + (x – 7)
b. (2x + 3) + (5x – 1) + (x – 7)
c. (2x + 3) + (2x + 3) + (5x – 1) + (5x – 1) + (x – 7
d. 30x – 63
e. 15x + 15
f. 15x – 3

24. The simplified form of $7x^2y + 3xyx - 2\frac{x^2y^2}{y}$ is

a. $10x^2y^2$
b. $10x^2y - \frac{2x^2}{y}$
c. $8x^2y$
d. $7x^2y + 3xyx - 2\frac{x^2y^2}{y}$

25. What is the degree of $8b^2c^5 - 4a^7b^3 + 10a^5c^4$

a. 7
b. 9
c. 10
d. 14

26. Simplify $4(3x - 2) - 5(2x - 6)$

a. $2x - 38$
b. $2x + 22$
c. $22x - 38$
d. $22x + 22$

27. Multiply $\frac{1}{2}m^3n^2\left(4m^4n^2-\frac{2}{3}m^5n^4+m^2n^{-3}\right)$

a. $2m^7n^4-\frac{1}{3}m^8n^6+\frac{m^5}{2n}$

b. $2m^7n^4-\frac{2}{3}m^8n^6+\frac{m^5}{2n}$

c. $2m^7n^4-\frac{1}{3}m^8n^6+\frac{m^5}{2n^5}$

d. $2m^7n^4-\frac{1}{3}m^8n^6+\frac{m^5n}{2}$

28. Multiply $(2x-3)^2$

a. $4x^2-9$

b. $4x^2+9$

c. $4x^2-6x+9$

d. $4x^2-12x+9$

29. What are the factors of $x^2-7x-30$? Select all that apply.

a. $x+1$

b. $x+2$

c. $x+3$

d. $x+5$

e. $x-6$

f. $x-10$

g. $x-15$

h. $x-30$

30. What type of number is $-\sqrt{7}$? Select all that apply.

a. Rational
b. Irrational
c. Integer
d. Whole Number
e. Natural Number

31. What type of number is $-\sqrt{400}$? Select all that apply.

a. Rational
b. Irrational
c. Integer
d. Whole Number
e. Natural Number

32. Identify the like term(s) for $10y$. Select all that apply.

a. y
b. y^2
c. $16y$
d. 8
e. $9xy$
f. $-13y$

33. Order the terms by the degree of the variable in the expression

$$9a^2 - 10a^4 - 23 + 17a + 3a^3$$

a. $17a + 9a^2 + 3a^3 - 10a^4 - 23$
b. $-23 + 17a + 9a^2 + 3a^3 - 10a^4$
c. $-23 - 10a^4 + 3a^3 + 9a^2 + 17a$
d. $-10a^4 + 3a^3 + 9a^2 + 17a - 23$

34. Which expressions have their terms written in the correct order based on the degree of the variable?
Select all that apply.

a. $8x + 10x^2 - 12 + 3x^3$
b. $10x^2 - 12 + 3x^3 + 8x$
c. $3x^3 + 10x^2 + 8x - 12$
d. $-7x - 5x^2 + 15 + 6x^3$
e. $6x^3 - 5x^2 - 7x + 15$
f. $-5x^2 + 15 + 6x^3 - 7x$

35. Evaluate the expression $\frac{x+y^3}{5} + x^2y$ when $x = 2$ and $y = -3$

36. Evaluate the expression $de + ef^2$ when $d = \frac{2}{5}, e = \frac{5}{8}$, and $f = -2$

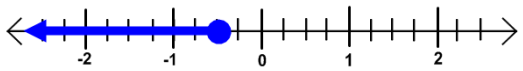
37. Evaluate the expression $\frac{-b+\sqrt{b^2-4ac}}{2a}$, when $a = 1$, $b = -5$, and $c = 4$

38. Which value of x is in the solution set of the inequality $-2(x - 5) < 4$?

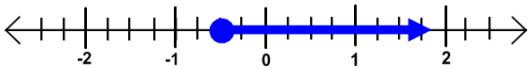
a. 0
b. 2
c. 3
d. 5

39. Which graph represents the solution set for: $\frac{3}{4} - \frac{1}{2}x \leq \frac{1}{2}$

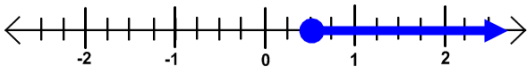
a.



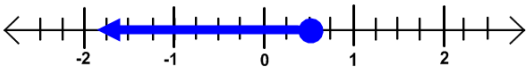
b.



c.



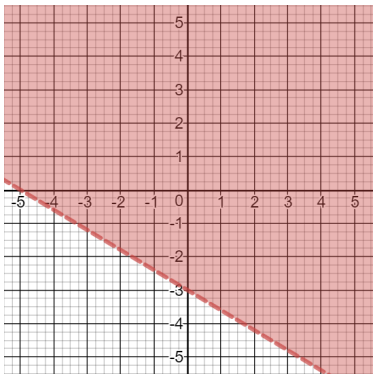
d.



40. Determine which points are solutions to the linear inequality $2x + 3y \geq -3$. Select **all** that apply.

a. $(0, -5)$
b. $(-3, -4)$
c. $(3, -5)$
d. $(2,4)$
e. $(-1.5, 0)$
f. $(-2, 2)$

41. Which inequality describes the graph shown to



a. $3x + 5y > -15$
b. $3x + 5y > 15$
c. $-3x - 5y > -15$
d. $3x - 5y > -15$

42. Determine which points are solutions to the system of linear inequalities shown below. Select **all** that apply.

$$-x + 3y < 12$$
$$5x + 2y \geq -10$$

a. $(-8, 2)$
b. $(-2, 5)$
c. $(0, 4)$
d. $(5, -1)$
e. $(3, 5)$
f. $(-1, 0)$

43. Select all of the following powers of 10 that are correctly written in standard form.

a. $10^5 = 100{,}000$
b. $10^3 = 1{,}000$
c. $10^7 = 1{,}000{,}000$
d. $10^1 = 10$

44. Express the following as a power of ten: $10^4 \times 10^7$. Write your answer in the box.

45. Express the following as a power of ten: $10^{-5} \times 10^{12}$. Write your answer in the box.

46. The temperature at the Sun's core is 1,550,000 kelvins. What is this number correctly written in scientific notation?

a. 155×10^4
b. 155×10^7
c. 1.55×10^4
d. 1.55×10^6

47. The lowest temperature ever recorded in a lab is 0.00000000002 kelvins. What is this number correctly written in scientific notation?

a. 2.0×10^{-10}
b. 2.0×10^{-11}
c. 0.2×10^{-10}
d. 2.0×10^{-12}

48. Order the following from least to greatest.

2.0×10^{2} 3.0×10^{6} 4.0×10^{-7} 5.0×10^{12}

_____ _____ _____ _____

49. Order the following from least to greatest.

3.5×10^{6} 4.8×10^{9} 5.4×10^{-5} 6.9×10^{-8}

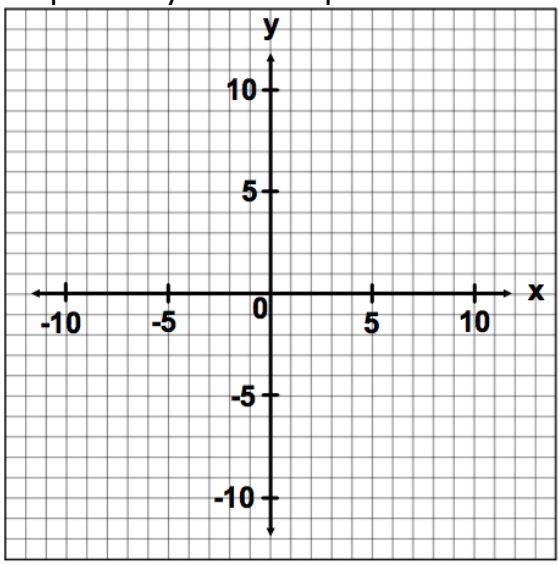
_____ _____ _____ _____

50. Use the equations below to answer the questions:

$$y = x + 8$$
$$x + 3y = 12$$

Part A:

Graph the system of equations in the coordinate plane below.



Part B:

Which is the point of intersection?

a. $(-5, 3)$
b. $(7, 1)$
c. $(6, 2)$
d. $(-3, 5)$

51. Solve the system using the method of your choice:

$$-x + 4y = 12$$
$$5x - 2y = -6$$

52. Solve the system using the method of your choice:

$$y = 3x - 7$$
$$2x - 5y = 22$$

53. What is the value of y in the solution to the following system of linear equations?

$$x + 5y = 7$$
$$x - 3y = -1$$

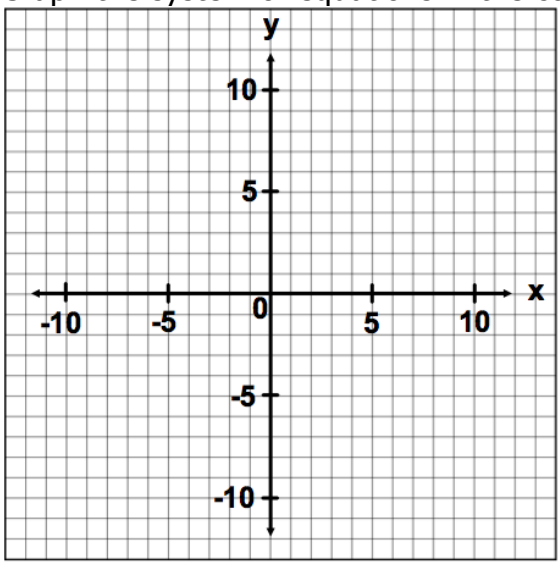
a. 1
b. 2
c. -3
d. 4

54. Use the equations below to answer the questions:

$$3x + 4y = 12$$
$$9x + 12y = 36$$

Part A:

Graph the system of equations in the coordinate plane below.



Part B:

Which point is the point of intersection?

a. No solution
b. Intersect at $(0, 5)$
c. Intersect at $(0, 0)$
d. Infinitely many solutions

55. Solve the system using the method of your choice:

$$3x + 2y = 8$$
$$2x + 3y = 7$$

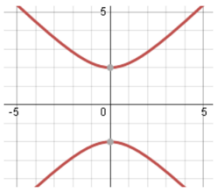
56. Solve the system using the method of your choice:

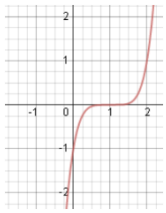
$$y = 6x - 1$$
$$y = x + 4$$

57. State the range for the function $y = x^2 - 5$.

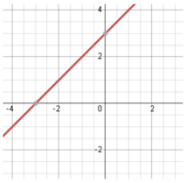
a. $y \leq -5$
b. $y \geq -5$
c. $y \geq 5$
d. $y \leq 5$

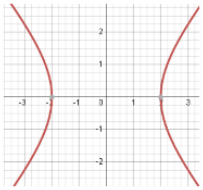
58. Which graph represents a function? Choose all that apply.

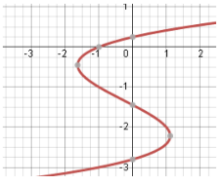
a. 

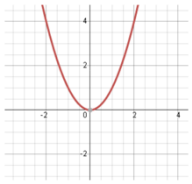
b. 

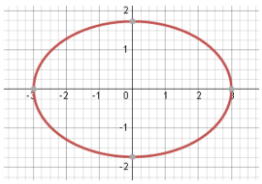
c. 

d. 

e. 

f. 

g. 

h. 

For questions # 7-8, let $f(x) = -2x - 5$ and $g(x) = 3x^2$.

59. What is $f(10)$?

a. –25 b. 10 c. –20 d. –15

60. What is $g(2) - f(4)$?

a. 84 b. 66 c. 76 d. 25

For questions # 61-64, let $f(x) = -8x + 7$ and $g(x) = 5x - 3$. Match each notation with an equivalent expression.

61. _____ $(f + g)(x)$

62. _____ $(f - g)(x)$

63. _____ $(f.g)(x)$

64. _____ $\left(\frac{f}{g}\right)(x)$

A. $\frac{-8x+7}{5x-3}$

B. $-40x^2 + 59x - 21$

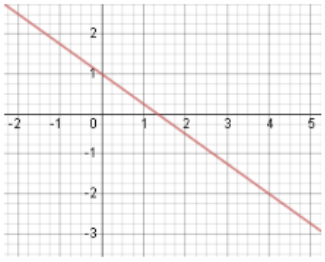
C. $-3x + 4$

D. $-13x + 10$

65. Given that $f(x) = |4x - 2|$ and $g(x) = -3x$, which of the following are greater than zero? Choose all that apply.

a. $f(g(2))$ b. $f(g(-2))$ c. $g(f(2))$ d. $g(f(-2))$

66. Find the slope of the graph.



_____

11. Find the *y*-intercept of the table.

x	f(x)
-2	-5
-1	-3
0	-1
1	1
2	3

_____

67. Use the sequence, 8, 13, 18, 23,…, to answer the following:

Part A

What is the recursive formula for the sequence?

a. $a_1 = 8 \; and \; a_n = a_{n-1} + 5$

b. $a_1 = 8 \; and \; a_n = 5a_{n-1}$

c. $a_1 = 5 \; and \; a_n = a_{n-1} + 8$

d. $a_1 = 8 \; and \; a_n = a_{n-1} + 23$

Part B

What is the value of a_7?

68. What is the explicit formula for the sequence 3, 10, 17, 24,…?

69. Use the table to answer the questions below.

Part A

Is the table a function?

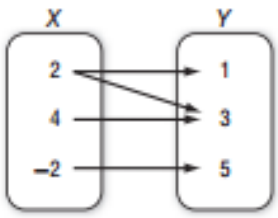
a) yes b) no

x	1	5	9	13	17
y	2	4	5	7	10

Part B

Explain your answer for Part A.

70. Use the mapping to answer the questions below.



Part A

Is the mapping a function?

a) yes b) no

Part B

Explain your answer for Part A.

71. Use the set of ordered pairs to answer the questions below. {(1,2) (2,3) (2,4) (4,5) (5,6)}

Part A

Is the set of ordered pairs a function?

a) yes b) no

Part B

Explain your answer for Part A.

72. Use the description, "A person's favorite ice cream flavor(s)" to answer the questions below.

Part A

Is the description a function?

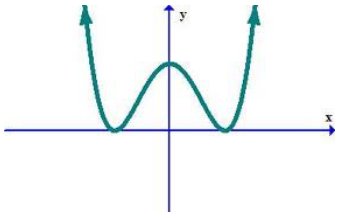
a) yes b) no

Part B

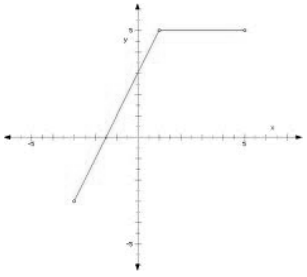
Explain your answer for Part A.

73. Which graph does **NOT** represent a function?

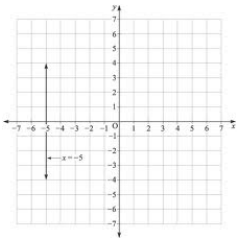
a.



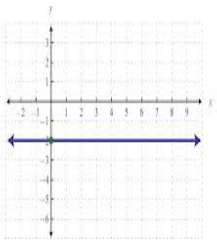
b.



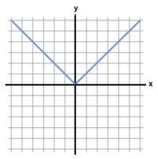
c.

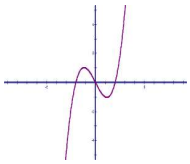


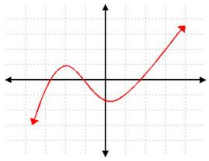
d.

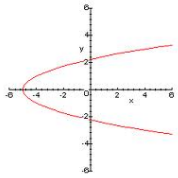


74. Which graph does **NOT** represent a function?

a. 

c. 

b. 

d. 

75. Which numbers are part of the domain? Select all that apply.

{(12,24) (11,22) (10,20) (9,18)}

a. 12
b. 10
c. 18
d. 24
e. 11
f. 9

76. Which numbers are part of the range? Select all that apply.

{(12,24) (11,22) (10,20) (9,18)}

a. 11
b. 24
c. 18
d. 12
e. 9
f. 22

77. Every year, nearly 9.0×10^8 trees are cut down to provide raw materials for American paper and pulp mills. What is 9.0×10^8 in standard form?

a. 9,000,000

b. 90,000,000

c. 900,000,000