**ALGEBRA I SEMESTER I EXAM**

***Bubble your answers on the scantron provided.***

(each question is worth ½ point)1. Nicholas assembles toys at a rate of 30 per hour. Francine is a new employee and she can only assemble ⅔ the number of toys as Nicholas in a given time. The two employees must assemble a total of 400 toys before leaving for the day, and the two employees work the same amount of time. The situation is graphed below, where *N* is the number of toys assembled by Nicholas and *F* is the number assembled by Francine. Find the solution to this system of equations to determine the number of toys that Francine must assemble before leaving for the day.

1. *F* = 160
2. *F* = 200
3. *F* = 240
4. *F* = 400



2. Multiply the fractions below and simplify as much as possible.

$$\frac{2}{4x}∙\frac{2}{4y}$$

 A. $\frac{1}{8xy}$

B. $\frac{1}{4xy}$

 C. $\frac{1}{2xy}$

 D. $\frac{1}{xy}$

3. Solve the inequality |*x* + 3| – 8 ≥ -1.

1. No solution
2. 4 ≤ *x* ≤ -10
3. *x* ≥4 or *x* ≤ -10

D. *x* ≥ 4 or *x* ≤ 6

4. Fifty-four students attended the winter dance. There were twice as many girls present as

boys. This is shown in the system of equations below, where *g* is the number of girls and *b* is the number of boys. Solve the system to find the number of girls at the dance.

 *g + b* = 54

 2*b = g*

* 1. 18
	2. 27
	3. 36
	4. 42

5. Marty wants to build a rectangular sandbox that is 2 feet longer than it is wide. He wants the

perimeter of the sandbox to be 20 feet. Which equation can Marty use to find *w*, the width that the sandbox should be, in feet?

 A. 2*w* + 2(*w* + 2) = 20

 B. 2*w* + 2 = 20

 C. 2(*w* + 2) = 20

D. 4(*w* + 2) = 20

6. Which graph displays the solution for the inequality 3*n* – 4 ≥ -10?

A. B. 

C.  D. 

7. Simplify the following expression: 2(*x* + 5) – 4(3 – *x*)

 A. -2*x* - 12

 B. -2*x* – 2

 C. *x* – 7

 D. 6*x* – 2

8. Medina and Muriel each paid the same amount for a dress that originally cost *d* dollars. Medina’s

dress was on sale for $10 off the original price, and she used an additional 20% coupon. Muriel’s dress was also on sale for $10 off the original price, and she used a coupon for an additional $15 discount. Solve the equation 0.8(*d* – 10) = (*d* – 10) – 15 to find the original price of each of the dresses.

 A. *d* = $85

 B. *d* = $75

 C. *d* = $55

 D. *d* = $15

9. (10*x*2 + 3*x* – 95) + 30*x* + (-4*x*2 + 4) =

 A. 39(*x*2 + *x*) – 91

 B. 14*x*2 + 33*x* – 99

 C. 6*x*2 + 33*x* – 91

 D. -52*x*6

10. Which of these sets of numbers is ordered from least to greatest?

 A. -0.6, -0.68, -⅔, -½

 B. -½, -.06, -⅔, -0.68

 C. -0.68, -⅔, -0.6, -½

 D. -½, -⅔, -0.68, -0.6

11. Mike and Kim invest $14,000 in equipment to print yearbooks for schools. Each yearbook costs

$7 to print and sells for $35. How many yearbooks must they sell before their business breaks even?

 A. 650

 B. 2,000

 C. 500

 D. 400

 12. Look at the scatter plot below. Which of the following is a reasonable equation for the line of best fit for this data?

 A. *y* = 4*x* + $0.30

 B. *y* = 0.025*x* + $0.31

 C. *y* = 0.75*x* + 15

 D. *y* = -4*x*



**Use the following information to answer question 13.**

 **Marisol solved an equation, as shown below.**

**Given: 6*x* + 4 + (3 + -30*x*) = 17**

**Step 1: 6*x* + (4 + 3) + -30*x* = 17**

**Step 2: 6*x* + -30*x* + (4 + 3) = 17**

**Step 3: 6*x*(1 + -5) + (4 + 3) = 17**

**Step 4: -24*x* + 7 +-7 = 17 + -7**

**Solution: *x* =** $-\frac{10}{24}$

13. What property did Marisol use to get from Step 2 to Step 3?

 A. Associative Property

 B. Commutative Property

 C. Distributive Property

 D. Identity Property

14. In an ultra distance triathlon, athletes swim 3.8 kilometer, bicycle 180 kilometers, and run 42.2 kilometers. To the nearest mile, how many total miles do athletes swim, bicycle, and run? (1 kilometer $≈$ 0.62 miles)

 A. 100 miles

 B. 140 miles

 C. 227 miles

 D. 365 miles

15. Solve for *y*: -3*y* = 2*y* – 10

 A. 0

 B. -10

 C. -2

 D. 2

 16. Without solving, decide whether the system has *one solution*, *no solution*, or *infinitely*

 *many* *solutions*. **

 **

A. One solution

B. No solution

C. Infinitely many solutions

D. Cannot be determined

17. Simplify 35*c* – (84*d*)

 -7

 A. 5*c* + 12*d*

 B. -5*c* + (-12*d*)

 C. -5*c* + 12*d*

 D. 5*c* + (-12*d*)

18. Translate the following sentence into an algebraic expression and solve:

“fifteen less than twice a number equals forty-five”.

 A. -15

 B. 30

 C. 15

 D. -30

19. What is the opposite of (-13)?

 A. 13

 B. 

 C. 

 D. 

20. Solve *y* = *mx + b* for *m*.

 A. *m = y – b*

 B. *m* = *b – y*

 *x*

 C. *m = b – y*

 D. *m* = *y – b*

 *x*

21. The chart below shows the number of houses that a builder can construct on lots of various sizes. Which function shows the information that is in the table?

 A. *n* = $\frac{s}{4000}+3$

 B. *n = s +* 4000

 C. *n =* 4000*s*

D. *n* = $\frac{3s}{4000}-2$

|  |  |
| --- | --- |
| **Lot Size in****Square Yards, *s*** | **Number of****Houses, *n*** |
| 4,000 | 1 |
| 8,000 | 4 |
| 12,000 | 7 |
| 16,000 | 10 |
| 20,000 | 13 |

22. If *f*(*x*) = 4*x*2 – 6, find *f*(-2)

 A. -22

 B. 2

 C. 10

 D. -10

23. What would be the eighth term in the following sequence: 3,4,6,9,13,…

 A. 31

 B. 28

 C. 18

 D. Cannot be determined

24. Which of the following is the graph of *y* = 3*x* + 2?

A. B.

 

C. D.

 

25. A researcher recorded the number of badger observed in a park each year for 20

years. The table shows the number of badgers recorded in two years. Which of these expressions represents the average rate of change between Year 6 and Year 13 in badgers observed per year?

|  |  |
| --- | --- |
| **Year** | **Number** |
| 6 | 63 |
| 13 | 89 |

A. 89 – 63 B. 13 – 6 C. 89 – 13 D. 63 – 89

 13 – 6 89 – 63 63 – 6 13 – 6

26. Which of the lines graphed below has a slope of 0?

A. B.

 

C. D.

 

27. Which of the following is not a function?

A. B. {(1,8),(3,9),(5,10),(6,11)} C. D.

|  |  |
| --- | --- |
| *x* | *y* |
| 3 | 4 |
| 5 | 6 |
| 7 | 8 |
| 9 | 10 |

 

28. Which graph represents the given linear function? *x* = -2

A. B.



 C. D.



***Showing ALL YOUR WORK, complete the following short-answer questions.***

***Solve the following equations.***

 29. 3*p* – 1 = 5(*p* – 1) – 2(7 – 2*p*) (2 points)

 30.  (2 points)

***Solve and graph the solutions to the following inequalities.***

 31. 12*x* – 3*x* + 11 > 4*x* – (17 – 9*x*) (3 points)

 32. -6*x* – 1 + 4 > 5 OR 11 + *x* – 7 ≥ 2 (4 points)

 3 2

 33. 3| 3 – 2 (*x* – 2) + 5 | < 6 (4 points)

 34. Which is the better buy? (2 points)

 A 16-oz bottle of water costs $1.44 or a 20-oz bottle of water costs $1.90

 35. A car is driving at a speed of 60 mi/h. What is the speed of the car in meters per second? (Round to the nearest tenth if necessary). (3 points)

 36. Solve 3*a* = 1 – 2*c* for *d*. (2 points)

 *d*

 37.You budget $100 for parking each month. Each day you use the downtown parking lot, it

 costs you $5. Write a rule to represent the amount of money left in your monthly budget. How

 much money is left in your budget after you have used the downtown parking lot 11 times this

 month? (2 points)

 38. Find the rate of change for the following graph and **explain** what the rate of change means for the situation. (2 points)

 

 39. Write an equation for the line in slope intercept form that passes through the points (–3, 4) and

 (2, –1). (3 points)

40. a. The map shows Hope Road and the construction site for the new library. Find the equation of a

 “street” that passes through the building site and is parallel to Hope Road.

b. City contractors would like to build a park on a road that is perpendicular to Grace Street at the

 indicated spot. What is the equation of that street? (4 points)

 

***For questions 41-43, write and solve a system of linear equations for the situation.***

41. Suppose an antique car club publishes a newsletter. Expenses are $0.35 for printing and mailing each copy, plus $770 total for research and writing. The price of the newsletter is $0.55 per copy. How many copies must the club sell to break even? (3 points)

42. John paid $34 for two algebra and three geometry books. He paid $36 for three algebra and two

 geometry books. What is the cost of each book? (5 points)

43. You split $1500 between two savings accounts. Account A pays annual 5% interest and account B pays 4% annual interest. After one year, you have earned a total of $69.50 in interest. How much money did you invest in each account? (5 points)

44. In order to raise money, you are planning to work during the summer babysitting and

cleaning houses. You earn $10 per hour while babysitting and $20 per hour while cleaning houses. You need to earn at least $1000 during the summer.

1. Write a mathematical model (inequality) representing the total amount of money earned over the summer from babysitting and cleaning houses. (1 point)

(b) Graph the mathematical model. (3 points)

(c) Use the graph to answer the following:

i. Why does the graph only fall in the 1st Quadrant? (1 point)

ii. Is it acceptable to earn exactly $1000? List 2 possible combinations of outcomes that

equal exactly $1000? Where do all of the outcomes that total $1000 lie on the graph? (3 points)

iii. Is it acceptable to earn more than $1000? Where do all of these outcomes fall on

the graph? (2 points)

iv. Is it acceptable to work 10 hours babysitting and 10 hours cleaning houses? Why

or why not? (2 points)

v. Where does the combination of 10 hours babysitting and 10 hours cleaning houses

fall on the graph? Are combinations that fall in this area a solution to the mathematical model? Why or why not? (3 points)

 (d) How would the model change if you could only earn more than $1000? Write a new

 model to represent needing to earn more than $1000. How would this change the

 graph of the model? Would the line still be part of the solution? How would you

 change the line to show this? (5 points)

45. A local citizen wants to fence a rectangular community garden. The length of the garden should

 be at least 110 ft, and the distance around should be no more than 380 ft.

|  |  |
| --- | --- |
| **a.** | Write a system of inequalities that models the possible dimensions of the garden. |
| **b.** | Graph the system to show all possible solutions. |

 (5 points)