

Kansas City Area Teachers of Mathematics  
2012 KCATM Math Competition

**PRE-ALGEBRA**  
**GRADE 6**

**INSTRUCTIONS**

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may use calculators** on this test.
- Use the  $\pi$  **key** on your calculator **or 3.14** as the approximation for pi.
- Mark your answer on the Scantron sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.

Student Name \_\_\_\_\_ Student Number \_\_\_\_\_

School \_\_\_\_\_

1. In 1999, the cost of a gallon of gasoline was \$1.00. In 2011, the cost of gas was \$2.20. Find the **average rate of change per year** from 1999-2011.  
A. \$1.20      B. \$1      C. \$0.10      D. \$0.12      E. None of the above
2. Which simplified fraction is equivalent to:  $5/45$ ?  
A.  $1/8$       B.  $1/9$       C.  $1/7$       D.  $2/9$       E. None of the above
3. What is the value of the linear function:  $y = 3x - 2$  when  $x = 5$ ?  
A. 13      B. 6      C. 12      D. 9      E. None of the above
4. Which property is demonstrated by  $(2x + 3) + 11 = 2x + (3 + 11)$ ?  
A. Distributive Property      B. Commutative Property of Addition  
C. Associative Property of Addition      D. Identity Property of Addition  
E. None of the above
5. Identify the next number in the sequence: -2, 4, -8, 16, ?  
A. 32      B. 64      C. -32      D. -64      E. None of the above
6. Identify the rule of this function:
- | x  | y  |
|----|----|
| 34 | 17 |
| 38 | 19 |
| 42 | 21 |
| 46 | 23 |
- A.  $y = 2x$   
B.  $y = 3x - 100$   
C.  $y = 0.5x$   
D.  $y = 0.75x$
7.  $3.24 \times 10^4 =$   
A. 3240.      B. 0.000324      C. 0.0324      D. 32400.      E. None of the above
8. Evaluate:  $(3 \times 10^2)(2 \times 10^3) =$   
A.  $5 \times 10^6$       B.  $6 \times 10^6$       C.  $5 \times 10^5$       D.  $6 \times 10^5$       E. None of the above
9. The population of the Kansas City metropolitan area is 2,068,000. The population in the urban community in Kansas City is 1,362,000. Find the population of the suburbs.  
A. 706,000      B. 306,000      C. 430,000      D. 606,000      E. None of the above
10. What percent of people live in urban communities in Kansas City if 1,362,000 out of 2,068,000 live in urban communities? Round your answer to the nearest whole percent.  
A. 66%      B. 72%      C. 50%      D. 61%      E. None of the above
11. How do you write  $3 \times 3 \times 3 \times 3 \times 3$  using exponents?  
A.  $3 \times 5$       B.  $3^3 \times 5$       C.  $3^5$       D.  $5^3$       E. None of the above
12. Write the expression in numeric form: the “**quotient of three hundred and six**”  
A.  $300 \times 6$       B.  $300 \div 6$       C.  $300 + 6$       D.  $306 + 0$       E. None of the above
13. Write the expression in numeric form: “**Sixteen less than a number**”  
A.  $6 - n$       B.  $n - 6$       C.  $n + 16$       D.  $n - 16$       E. None of the above

14. Find the **simple interest** (I) when the Principal (P) is \$10,000, the rate(r) is 6%, and time (t) is 4 years. *Formula:  $I = Prt$*

- A. \$240,000    B. \$2,400    C. \$240    D. \$2.40    E. None of the above

15. Estimate the value of  $\sqrt{120}$  to the nearest whole number.

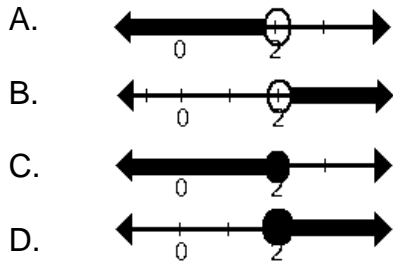
- A. 9    B. 10    C. 11    D. 12    E. None of the above

16. Which inequality is shown in the graph:



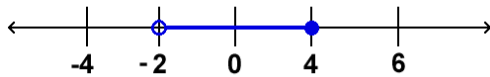
- A.  $n > 4$     B.  $n \geq 4$     C.  $n < 4$     D.  $n \leq 4$     E. None of the above

17. Which graph shows the inequality:  $-x + 5 \leq 3$  ?



E. None of the above

18. Which inequality is shown by the graph:



- A.  $-2 < p < 4$   
 B.  $-2 < p \leq 4$   
 C.  $-2 \leq p < 4$   
 D.  $-2 \leq p \leq 4$   
 E. None of the above

19. What is the value of:  $4^0$  ?

- A. 0    B. 1    C. 4    D. 8    E. None of the above

20. Solve for n:  $2n + 15 = 27$

- A. 6    B. -1    C. 16    D. 5    E. None of the above

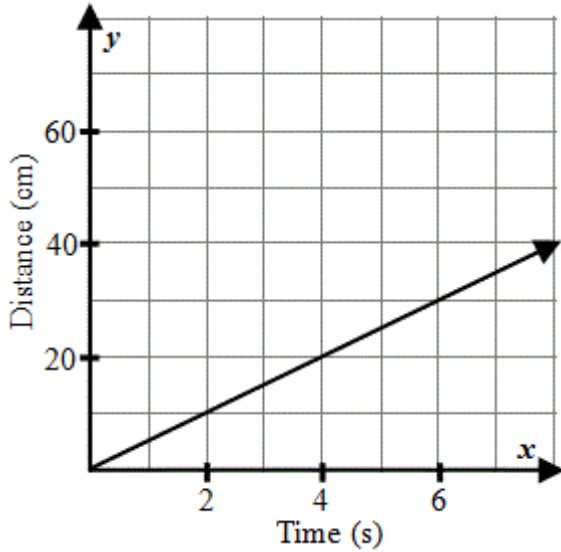
21. Solve for t:  $3(4t - 1) = 15$

- A. 1    B. -1    C. 1.5    D. 2    E. None of the above

22. Solve for all possible values of x:  $2x^2 = 32$

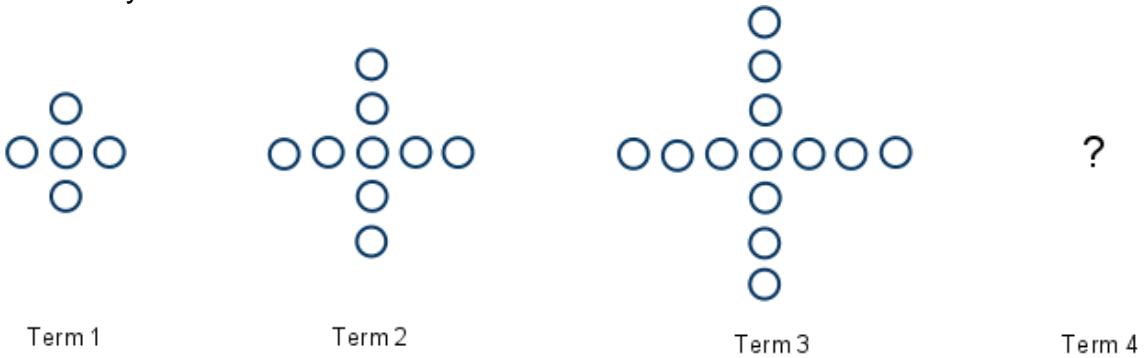
- A.  $x = 8$     B. 4    C. 4 and -4    D. 6 and -6    E. None of the above

23. The graph shows the distance an ant travels over time. Does the ant travel at a constant or a variable speed? If the speed is constant, find the speed at which the ant is traveling.



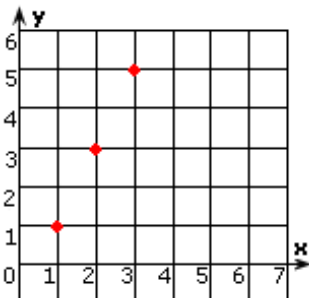
- A. Constant, 2 cm per second
- B. Constant, 5 cm per second
- C. Constant, 10 cm per second
- D. Variable
- E. None of the above

24. How many dots would be in Term 4?



- A. 14
- B. 17
- C. 18
- D. 23
- E. None of the above

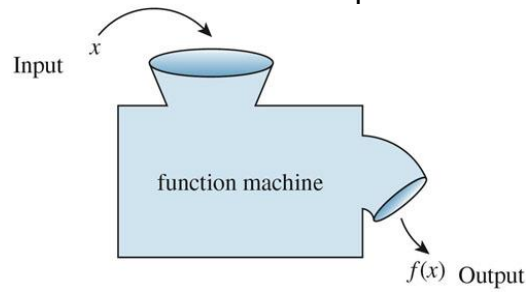
25. If you continue the pattern, what would be the process for finding the next point plotted?



- A. Multiply the x coordinate by 2.
- B. Multiply the x coordinate by 2, then add 1.
- C. Multiply the x coordinate by 3, then subtract 2.
- D. Multiply the x coordinate by 2, then subtract 1.
- E. None of the above

26. Find the value of this expression:  $-2(1 - 4)^2 + 8/4$   
A. -10      B. -16      C. 14      D. 12      E. None of the above
27. Which statement shows the **commutative property of multiplication**?  
A.  $(3 \times 2) \times 5 = 3 \times (2 \times 5)$       B.  $(3 \times 2) \times 5 = (2 \times 3) \times 5$   
C.  $(3 + 2) \times 5 = 3 \times 5 + 2 \times 5$       D.  $(3 + 2) + 5 = 3 + (2 + 5)$   
E. None of the above
28. Which statement shows the **identity property of addition**?  
A.  $6 \times 1 = 6$       B.  $7 + 0 = 7$   
C.  $6 + (-6) = 0$       D.  $7 (1/7) = 1$   
E. None of the above
29. Your garden has an area of 36 sq. ft. Which garden in **NOT** possible?  
A. 4 ft. by 6 ft.      B. 6 ft. by 6 ft.  
C. 18 ft. by 2 ft.      D. 3 ft. by 12 ft.  
E. None of the above
30. Which value of x makes the inequality true?  $-5 < x + 2 < 5$   
A. -6      B. -8      C. 3      D. 4      E. None of the above
31. Solve for all values of x that satisfies the equation:  $|x| = 3$  ?  
A. 3, -3      B. 3      C. -3      D. 0      E. None of the above
32. Three consecutive even numbers have a sum of 60. What is the largest number?  
A. 24      B. 22      C. 20      D. 18      E. None of the above
33. Express the area of a **triangle** with b = base and h = height.  
A.  $A = b + h$       B.  $A = \frac{1}{2} (b + h)$       C.  $A = \frac{1}{2} bh$       D.  $A = bh$   
E. None of the above
34. Which expression is **NOT** equivalent to "half of a half of a number"?  
A.  $0.25n$       B.  $\frac{1}{2} (\frac{1}{2}) n$       C.  $\frac{1}{4} n$       D.  $2n$       E. None of the above
35. Shane has five times as many baseball cards as Tom. Tom has three more cards than Jessie. If Jesse has a prime number of cards between 20 and 25, how many cards would Shane have?  
A. 130 cards      B. 110 cards      C. 120 cards      D. 140 cards      E. None of the above
36. Which set is the set: **{negative even integers}** ?  
A.  $\{\dots -4, -2, 0\}$       B.  $\{\dots -4, -2, 0, 2, 4, \dots\}$   
C.  $\{\dots -4, -2\}$       D.  $\{\dots -3, -1\}$       E. None of the above

Use the **function machine** for problems #37-#39.



37. If the function rule is " $\frac{3}{4}x + 9$ ", what is the output when the input is 12?  
A. 0      B. 9      C. 12      D. 18      E. None of the above
38. If  $f(x) = -5x + 6$  and the output is 41, what would be the input?  
A. -6      B. -7      C. 5      D. 8      E. None of the above
39. Find the value of  $f(4)$  for the function:  $f(x) = 3x^2$ .  
A. 24      B. 12      C. 48      D. 144      E. None of the above
- 
40. What is the prime factorization of 120?  
A.  $12 \times 10$       B.  $2^3 \times 3 \times 5$       C.  $2^2 \times 3 \times 5^2$       D.  $2^3 \times 3^2 \times 5$   
E. None of the above

Shade the correct answer!

Example: A ● C D E

Name \_\_\_\_\_

School \_\_\_\_\_

- 1. A B C D E
- 2. A B C D E
- 3. A B C D E
- 4. A B C D E
- 5. A B C D E
- 6. A B C D E
- 7. A B C D E
- 8. A B C D E
- 9. A B C D E
- 10. A B C D E
- 11. A B C D E
- 12. A B C D E
- 13. A B C D E
- 14. A B C D E
- 15. A B C D E
- 16. A B C D E
- 17. A B C D E
- 18. A B C D E
- 19. A B C D E
- 20. A B C D E

- 21. A B C D E
- 22. A B C D E
- 23. A B C D E
- 24. A B C D E
- 25. A B C D E
- 26. A B C D E
- 27. A B C D E
- 28. A B C D E
- 29. A B C D E
- 30. A B C D E
- 31. A B C D E
- 32. A B C D E
- 33. A B C D E
- 34. A B C D E
- 35. A B C D E
- 36. A B C D E
- 37. A B C D E
- 38. A B C D E
- 39. A B C D E
- 40. A B C D E

Shade the correct answer!

Name \_\_\_\_\_

Example: A ● C D E

School \_\_\_\_\_

**ANSWER KEY**

- 1. A B ● D E
- 2. A ● C D E
- 3. ● B C D E
- 4. A B ● D E
- 5. A B ● D E
- 6. A B ● D E
- 7. A B C ● E
- 8. A B C ● E
- 9. ● B C D E
- 10. ● B C D E
- 11. A B ● D E
- 12. A ● C D E
- 13. A B C ● E
- 14. A ● C D E
- 15. A B ● D E
- 16. A B C ● E
- 17. A B C ● E
- 18. A ● C D E
- 19. A ● C D E
- 20. ● B C D E

- 21. A B ● D E
- 22. A B ● D E
- 23. A ● C D E
- 24. A ● C D E
- 25. A B C ● E
- 26. A ● C D E
- 27. A ● C D E
- 28. A ● C D E
- 29. A B C D ●
- 30. ● B C D E
- 31. ● B C D E
- 32. A ● C D E
- 33. A B ● D E
- 34. A B C ● E
- 35. ● B C D E
- 36. A B ● D E
- 37. A B C ● E
- 38. A ● C D E
- 39. A B ● D E
- 40. A ● C D E