

Kansas City Area Teachers of  
Mathematics  
2018 KCATM Math Competition

**ALGEBRA**  
**GRADE 7**

**INSTRUCTIONS**

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may use calculators**.
- Mark your answer on the answer sheet by **FILLING in the oval**.
- Letter **“E”** is **“None of the above”**, which is a correct answer for some of the problems.

Student \_\_\_\_\_ # \_\_\_\_\_

School \_\_\_\_\_

151. Which of the following is an equation in slope-intercept form?
- A.  $y = \frac{2}{3}x - 7$                       B.  $4x + 3 = 9$   
C.  $4x - 7y = 2$                       D.  $y - 8 = 3(x + 2)$   
E. None of the above
152. Which of the expressions is not equivalent to the others?
- A.  $6x - 12y$                               B.  $6(-2y + x)$   
C.  $5x - 9y + 3y + x$                       D.  $4x - 9y + 2x - 3y$   
E. None of the above; all are equivalent
153. Which of the following is an example of the commutative property?
- A.  $2(3x + 7) = 6x + 14$                       B.  $(3 \cdot 6) \cdot 7 = 3 \cdot (6 \cdot 7)$   
C.  $6 + x + 7 = x + 6 + 7$                       D.  $8 + (-8) = 0$   
E. None of the above
154. What is the least common multiple of 8, 20 and 36?
- A. 4                      B. 8                      C. 36                      D. 360  
E. None of the above
155. What is the greatest common factor of  $9xy$ ,  $3wx$  and  $12xz$ ?
- A. 36                      B.  $36xyz$                       C. 3                      D.  $3x$   
E. None of the above

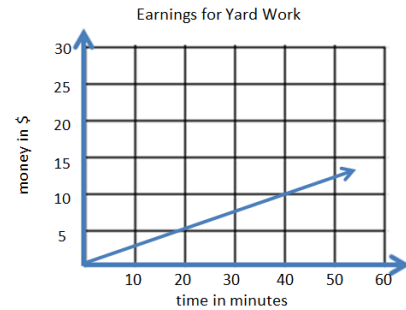
**For 156-159, solve each equation.**

156.  $\frac{2}{3}x + 10 = 8$
- A.  $x = -10$                       B.  $x = -3$                       C.  $x = -\frac{3}{2}$                       D.  $x = 0$   
E. None of the above
157.  $\frac{x-4}{3} = 3$
- A.  $x = 4\frac{1}{3}$                       B.  $x = 5$                       C.  $x = 21$                       D.  $x = 13$   
E. None of the above

158.  $3(2x - 3) = -9$
- A.  $x = 0$                       B.  $x = 3$                       C.  $x = 6$                       D.  $x = -3$   
E. None of the above
159.  $6x + 3(2x + 4) = 2x + 4(x + 8) - 2$
- A.  $x = 3$                       B.  $x = \frac{1}{3}$                       C.  $x = -4$                       D.  $x = 8$   
E. None of the above
160. Find the difference:  $(-2x - 4) - (5x + 4)$
- A.  $-7x$                                       B.  $-7x - 8$   
C.  $3x - 8$                                       D.  $3x$   
E. None of the above
161. What is the value of  $f(-3)$  if  $f(x) = 4x^2 - 7x + 3$ ?
- A.  $-12$                       B.  $18$                       C.  $48$                       D.  $60$   
E. None of the above
162. What is the perimeter of a rectangle with length  $(2x - 5)$  in and width  $(x + 3)$  in?
- A.  $3x - 2$  inches                      B.  $3x + 8$  inches  
C.  $6x - 4$  inches                      D. it cannot be determined  
E. None of the above
163. What is the slope and y-intercept of the equation  $y = -3x + 7$ ?
- A. slope =  $-3$ , y-int =  $(0, 7)$                       B. slope =  $-3$ , y-int =  $(7, 0)$   
C. slope =  $3$ , y-int =  $(0, 7)$                       D. slope =  $-\frac{3}{7}$ , y-int =  $(7, 0)$   
E. None of the above
164. What is the slope and y-intercept of the equation  $y = 4$ ?
- A. slope = undefined, y-intercept =  $(0, 4)$   
B. slope =  $0$ , y-intercept =  $(0, 4)$   
C. slope =  $4$ , y-intercept =  $(0, 0)$   
D. slope =  $4$ , y-intercept = undefined  
E. None of the above

165. Which of the following is a solution to both  $0 < -2x + 6$  and  $x + 6 > 7$ ?
- A.  $x = 0$                       B.  $x = 1$                       C.  $x = 2$                       D.  $x = 3$   
 E. None of the above

Refer to the graph for #166-168.



166. What is the hourly rate?

- A. \$2.50 per hour                      B. \$4 per hour  
 C. \$5 per hour                      D. \$30 per hour  
 E. None of the above

167. How much money would you make if you worked ten hours?

- A. \$250                      B. \$150                      C. \$25                      D. \$2.50  
 E. None of the above

168. If your friend earns \$0.45 per minute, who makes more money in 80 minutes and how much more?

- A. you; \$164                      B. you; \$16  
 C. friend; \$164                      D. friend; \$16  
 E. None of the above

169. Translate the words into an algebraic expression:

*seventeen less than the product of eight and a number*

- A.  $17 - 8n$                       B.  $(17 - 8)n$                       C.  $8n - 17$                       D.  $8(n - 17)$   
 E. None of the above

170. Simplify  $7 - 2(5x - 1)$ .

- A.  $10x - 9$                       B.  $-10x + 5$   
 C.  $25x - 5$                       D.  $20x$   
 E. None of the above

171. Simplify  $4x - 2x(1 + x) - 2x^2$ .

- A.  $-2x^2 + 3x - 1$                       B.  $2x$                       C.  $-4x^2 - 2x$                       D.  $3x^2 + 3x$   
 E. None of the above

172. A rectangle has side lengths of 12 in and 18 in. If you increase the short side length by 24 inches, how much must you decrease the longer side length by to maintain the same area?
- A. 216 in      B. 12 in.      C. 9 in.      D. 6 in.      E. None of the above
173. Solve the equation:  $2(4x + 7) - 3x = x - 4(2 - x) + 3$
- A.  $x = 7, -5$       B.  $x = 0$       C.  $x = 2\frac{3}{8}$   
D. no real solution      E. None of the above
174. Seventeen years ago, John was 3 years more than half of his current age. What equation represents this relationship?
- A.  $x - 17 = \frac{1}{2}x + 3$       B.  $x + 17 = 2x + 3$       C.  $x - 17 = \frac{1}{2}(x + 3)$   
D.  $\frac{1}{2}(x - 17) = x + 3$       E. None of the above
175. Factor  $11x + 20$ .
- A.  $11(x + 20)$       B.  $(5.5x + 10) + (5.5x + 10)$   
C.  $(11 \cdot x) + (4 \cdot 5)$       D. cannot be factored  
E. None of the above
176. Factor  $12x + 60$ .
- A. 12      B.  $(6x + 30) + (6x + 30)$   
C.  $12(x + 5)$       D. cannot be factored  
E. None of the above
177. A rectangle has an area of  $3x - 12$  square centimeters. What are the length and width of the rectangle?
- A. 3 cm;  $(x - 4)$  cm      B.  $3x$  cm; 12 cm  
C.  $3x$  cm; 4 cm      D. cannot be determined  
E. None of the above
178. Simplify  $(4a - 6c) + (b + 9a) - (-2c - b)$
- A.  $-2ac + 10ab - 3cb$       B.  $13a + 2b + 8c$   
C.  $13a + 2b - 8c$       D.  $13a - 4c$   
E. None of the above

179. Find the sum of  $(8x^2 - 7x + 4)$  and  $(2x^2 + 3x - 6)$ .

- A.  $16x^2 - 21x - 24$
- B.  $10x^2 - 4x - 2$
- C.  $10x^2 - 4x - 10$
- D.  $6x^2 - 10x + 10$
- E. None of the above

180. The amount of food the school collects in a food drive is proportional to the number of students. Mr. Shoemaker's class of 17 students collected 43 cans. How many cans were collected in the school, which has 731 students?

- A. 731
- B. 1849
- C. 757
- D. 289
- E. None of the above

181. Find the value of  $f(-3)$  for  $f(x) = 2x + |x - 7|$ .

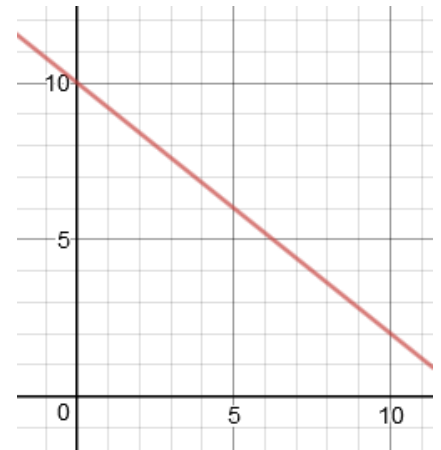
- A. -16
- B. -4
- C. 10
- D. 4
- E. None of the above

182. Find the value of  $f(3) \cdot g(2)$  for  $f(x) = \frac{1}{3}x - 8$  and  $g(x) = -4x + 17$ .

- A. -175
- B. 2
- C. -63
- D.  $-36\frac{2}{3}$
- E. None of the above

183. What is the equation of the line?

- A.  $y = \frac{-4}{5}x + 10$
- B.  $y = -x + 10$
- C.  $y = 10x - \frac{4}{5}$
- D.  $y = \frac{4}{5}x + 10$
- E. None of the above



184. Which is the point of intersection for the pair of lines?

$$y = -3x + 5 \quad \text{and} \quad y = 3x - 7$$

- A. (5, -7)
- B. (2, -1)
- C. (-1, 2)
- D. They do not intersect.
- E. None of the above

185. What is the slope of the line with an x-intercept of (6, 0) and a y-intercept of (0, 9)?

A.  $\frac{6}{9}$

B.  $\frac{9}{6}$

C.  $\frac{2}{3}$

D.  $\frac{3}{2}$

E. None of the above

186. The slope of the line going through points  $(a, 3)$  and  $(7, 9)$  is  $-\frac{2}{3}$ .  
What is the value of  $a$ ?
- A. Cannot be determined    B. -2    C. 2  
D. 16    E. None of the above
187. Which of the following is a solution to the inequality  $|x - 3| < 4$ ?
- A.  $x = -1$     B.  $x = 2$     C.  $x = 7$   
D.  $x = 8$     E. None of the above
188. Which of the following equations has a slope of 1?
- A.  $x = 1$     B.  $y = x + 7$     C.  $y = 7x + 1$   
D.  $y = 1$     E. None of the above
189. If the equation  $s = -115w + 2070$  represents the amount of money you owe on your car ( $s$ ) after some number of weeks ( $w$ ), which of the following is true?
- A. You reduce how much you owe by \$115 each week.  
B. The car cost \$115.  
C. You will have paid off the car after 115 weeks.  
D. It will take 24 weeks to pay off the car.  
E. None of the above
190. The formula for the sum of interior angle measures of an  $n$ -sided polygon is  $180(n - 2)$ . How many sides are on a regular  $n$ -sided polygon with an interior angle measure of  $175.2^\circ$ ?
- A. 180    B. 75    C. 73    D. 68    E. None of the above