

# Kansas City Area Teachers of Mathematics 2014 KCATM Math Competition

## **ALGEBRA GRADE 7**

### INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may NOT** use calculators.
- Mark your answer on the answer sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.
- Letter **“E”** is **“None of the above”**, which is a correct answer for some of the problems.
- With circles, **exact answers** will be given in terms of  $\pi$ .

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

School \_\_\_\_\_

151. Which property is **NOT** used in finding the sum of  $2x + 1$  and  $5x$ ?

$$(2x + 1) + 5x$$

$$2x + (1 + 5x)$$

$$2x + (5x + 1)$$

$$(2x + 5x) + 1$$

$$(2 + 5)x + 1$$

$$7x + 1$$

- A. Associative Property of addition
- B. Commutative Property of Addition
- C. Distributive Property
- D. Additive Identity
- E. None of the above

152. Find the sum of  $(8a + 2b - 4)$  and  $(3b - 5)$

- A.  $8a + 5b - 9$
- B.  $11a + 2b - 9$
- C.  $13ab - 9$
- D.  $6b - 9$
- E. None of the above

153. Write the expression in standard form:  $4(2a) + 7(-4b) + (3)(c)(5)$

- A.  $23a - 28b$
- B.  $8a - 28b + 35c$
- C.  $8a - 28b + 15c$
- D.  $8a + 28b + 15c$
- E. None of the above

154. Evaluate the expression:  $(5r)(-2)$  for  $r = -3$

- A. -16
- B. +16
- C. -30
- D.  $11r$
- E. None of the above

155. Evaluate  $3b(8) + (-2)(7c)$  for  $b = 2$  and  $c = 3$

- A. -6
- B. 6
- C. 44
- D. -44
- E. None of the above

156. Evaluate  $-4(3s) + 2(-t)$  for  $s = 1/2$  and  $t = -3$

- A. 0
- B. -6
- C. +6
- D. 12
- E. None of the above

157. Which expression is NOT equivalent to  $3x + 4y$  when  $x = -2$  and  $y = -3$ ?

- A.  $9x$
- B.  $(3)(4) - xy$
- C.  $6y$
- D.  $4y + 2(-3) - 2$
- E. All are equivalent

158. Which statement is equivalent to "the opposite of  $(x + 3)$ " ?

- A.  $-x + 3$
- B.  $-x - 3$
- C.  $x - 3$
- D.  $-(x - 3)$
- E. None of the above

159. Simplify the expression:  $\frac{-6x^2 + 12x + 18}{-6}$
- A.  $x^2 + 2x - 3$       B.  $-x^2 - 2x - 3$       C.  $x^2 - 2x - 3$       D.  $x^2 - 2x + 3$       E. None of the above
160. Simplify the radical expression:  $4\sqrt{8} + 3\sqrt{2} - 5\sqrt{32}$
- A.  $-9\sqrt{2}$       B.  $2\sqrt{42}$       C.  $\sqrt{2}$       D.  $-2\sqrt{2}$       E. None of the above
161. Simplify the radical expression:  $(3\sqrt{8})(2\sqrt{9})$
- A.  $6\sqrt{17}$       B.  $12\sqrt{3}$       C.  $12\sqrt{2}$       D.  $36\sqrt{2}$       E. None of the above
162. What is the value of  $5!$  ?
- A. 60      B. 120      C. 5      D. 20      E. None of the above
163. Subtract  $(3x + 5y - 4) - (4x + 11)$
- A.  $-x + 5y - 15$       B.  $-x - y + 7$       C.  $7x + 5y + 7$   
D.  $4x + 5y + 15$       E. None of the above
164. Simplify the expression:  $(5x)^2(7x)^0$
- A.  $10x^2$       B.  $35x^2$       C.  $35x^3$       D.  $25x^2$       E. None of the above
165. Factor the quadratic:  $x^2 - 7x + 12$
- A.  $(x - 7)(x + 12)$       B.  $(x - 4)(x + 3)$       C.  $(x - 4)(x - 3)$   
D.  $(x + 4)(x - 3)$       E. None of the above
166. Factor and solve:  $x^2 - 5x + 6 = 0$
- A. 6, 1      B. -6, 1      C. -3, -2      D. 3, 2      E. None of the above
167. Factor by grouping:  $4x^3 - 2x^2 + 18x - 9$
- A.  $(4x^2 - 3)(x + 3)$       B.  $2x^2(2x - 1) + 9$       C.  $(2x^2 - 1)(2x - 9)$   
D.  $(2x - 1)(2x^2 + 9)$       E. None of the above

168. A sum of money was shared between George and Brian in a ratio of 3:4. If the sum of the money was \$56.00, how much did George get?

- A. \$8      B. \$16      C. \$24      D. \$56      E. None of the above

169. Find the midpoint of  $\overline{AB}$  if A (-2, 9) and B (-1, -7)

- A. (-3, 2)      B. (-1½, 1)      C. (-1, 8)      D. (½, 1)      E. None of the above

170. Use the distance formula:  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$  to find the distance between the points (3, 7) and (-3, -1) on a coordinate graph.

- A. 10      B. 7.5      C. 8      D. 6      E. None of the above

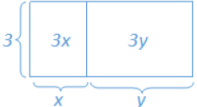

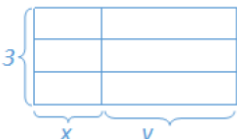
171. Find  $f(-2)$  when  $f(x) = x^2 - 3x + 7$

- A. -3      B. 17      C. 5      D. -2      E. None of the above

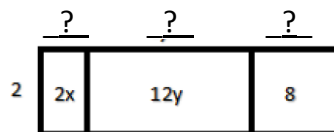
172. Find  $g(\frac{1}{2})$  when  $g(x) = 11x - (-2x + 2)$

- A.  $4\frac{1}{2}$       B.  $8\frac{1}{2}$       C.  $5\frac{1}{2}$       D.  $7\frac{1}{2}$       E. None of the above

173. Which of these is NOT equivalent to  $3(x + y)$

<p>A. </p>	<p>B. <math>3x + 3y</math></p>	
<p>D. </p>	<p>E. None of the above</p>	

174. What are the missing values?



- A.  $x, 3y, 8$       B.  $2x, 8y, 4$       C.  $x, 6y, 4$   
 D.  $4x, 24y, 16$       E. None of the above

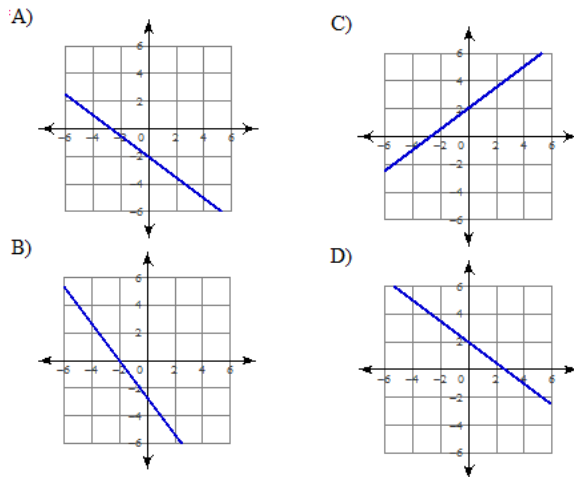
175. What is the multiplicative inverse of  $(3x - 5)$  ?
- A.  $-3x + 5$     B.  $3x - 5$     C.  $1/(3x - 5)$     D.  $(3x - 5)^2$     E. None of the above

176. Simplify the expression using scientific notation:  $\frac{6 \times 10^{-2}}{2 \times 10^2}$
- A.  $3 \times 10^{-4}$     B.  $3 \times 10^0$     C.  $3 \times 10^4$     D.  $3 \times 10^{-8}$     E. None of the above

177. Simplify:  $\frac{3x^2 - 9x}{12x}$
- A.  $\frac{(x-3)}{4x}$     B.  $\frac{(x-3)}{4}$     C.  $\frac{(3x-3)}{x}$     D.  $\frac{3(x-3)}{4x}$     E. None of the above

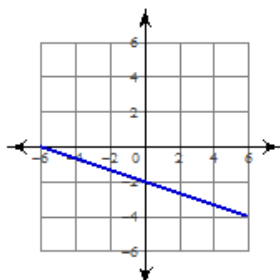
178. Factor **completely**:  $3x^2 - 2x - 5$
- A.  $(3x - 5)(x - 2)$     B.  $(3x + 5)(x - 1)$   
 C.  $(3x - 1)(x - 5)$     D.  $(3x - 5)(x + 1)$     E. None of the above

179. Which graph has y-intercept 2 and a slope of  $-1$  ?



- E) None of the above

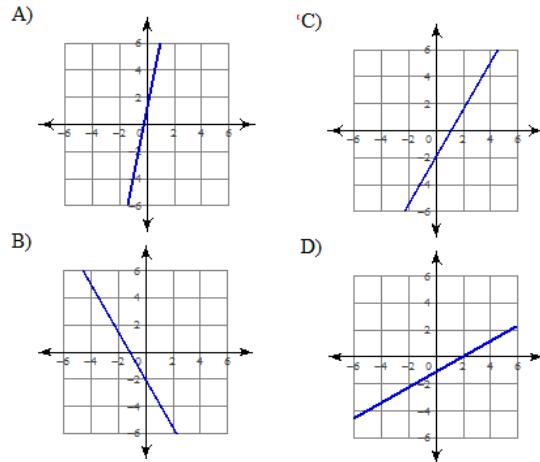
180. Given the graph, write the **equation** of the line.



- A.  $y = -1x - 2$   
 B.  $y = -1/3x - 2$   
 C.  $y = -2/3x - 2$   
 D.  $x = -3/2x - 2$   
 E. None of the above

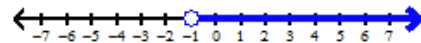
181. Write the equation in **Standard form**:  $y = \frac{3}{4}x + 1$
- A.  $4x - 1y = 3$                       B.  $x - 4y = 2x - 3$                       C.  $3x + y = 4$   
 D.  $3x - 4y = -4$                       E. None of the above

182. Which graph best shows the linear equation:  $x - 2y = 2$  ?



E. None of the above

183. Which inequality statement is graphed:



- A.  $n - 5 < -6$                       B.  $n - 1 < -6$                       C.  $-2n < 2$   
 D.  $3n - 1 \geq -13$                       E. None of the above

184. The perimeter of a rectangle is 30 inches. If its length is three times its width, find the dimensions.

- A. Width:  $3 \frac{3}{4}$  in.; Length:  $11 \frac{1}{4}$  in.  
 B. Width:  $3 \frac{1}{2}$  in.; Length:  $12 \frac{1}{2}$  in.  
 C. Width:  $4 \frac{1}{4}$  in.; Length:  $10 \frac{3}{4}$  in.  
 D. Width:  $2 \frac{3}{4}$  in.; Length:  $10 \frac{1}{4}$  in.  
 E. None of the above



185. What is the rate of change of the following data given the year and the cost of a pair of gym shoes? (2000, \$35) (2010, \$43)

- A. \$4 every 5 years                      B. \$2 every year                      C. \$3 every two years  
 D. \$1 every year                      E. None of the above

186. Simplify the radical expression:  $6\sqrt{75}$

- A.  $150\sqrt{3}$       B.  $30\sqrt{3}$       C.  $11\sqrt{3}$       D.  $18\sqrt{5}$       E. None of the above

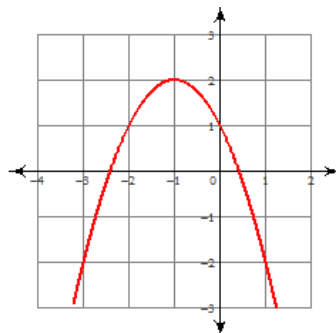
187.

- A. 40 minutes      B. 45 minutes      C. 50 minutes      D. 55 minutes  
E. None of the above

188. What is the value of  $64^{2/3}$ ?

- A. 32      B. 16      C. 24      D. 42      E. None of the above

189. Which equation models the following parabolic graph.



- A.  $f(x) = -1(x + 1)^2 + 2$       B.  $f(x) = (x + 1)^2 + 2$       C.  $f(x) = -2(x - 1)^2 + 2$   
D.  $f(x) = -2(x - 1)^2 + 2$       E. None of the above

190. Write an expression for the following sum:  $\frac{9w}{6} + \frac{2w-7}{3} - \frac{w-5}{4}$

- A.  $\frac{10w-2}{13}$       B.  $\frac{6w-1}{6}$       C.  $\frac{16w-9}{24}$       D.  $\frac{23w-13}{12}$       E. None of the above

**Shade the correct answer!**

Example: A ● C D E

Name \_\_\_\_\_

School \_\_\_\_\_

151. A B C D E

152. A B C D E

153. A B C D E

154. A B C D E

155. A B C D E

156. A B C D E

157. A B C D E

158. A B C D E

159. A B C D E

160. A B C D E

161. A B C D E

162. A B C D E

163. A B C D E

164. A B C D E

165. A B C D E

166. A B C D E

167. A B C D E

168. A B C D E

169. A B C D E

170. A B C D E

171. A B C D E

172. A B C D E

173. A B C D E

174. A B C D E

175. A B C D E

176. A B C D E

177. A B C D E

178. A B C D E

179. A B C D E

180. A B C D E

181. A B C D E

182. A B C D E

183. A B C D E

184. A B C D E

185. A B C D E

186. A B C D E

187. A B C D E

188. A B C D E

189. A B C D E

190. A B C D E



Shade the correct answer!

Example: A  B  C  D  E

Name \_\_\_\_\_

School \_\_\_\_\_

**ANSWER KEY - NEED TO CHANGE**

- |      |                                  |                                  |                                  |                                  |                                  |      |                                  |                                  |                                  |                                  |                                  |
|------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 151. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                | 171. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 152. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                | 172. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                |
| 153. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                | 173. | A                                | B                                | C                                | D                                | <input checked="" type="radio"/> |
| 154. | A                                | B                                | C                                | D                                | <input checked="" type="radio"/> | 174. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                |
| 155. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                | 175. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                |
| 156. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                | 176. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                |
| 157. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                | 177. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 158. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                | 178. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                |
| 159. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                | 179. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                |
| 160. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                | 180. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 161. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                | 181. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                |
| 162. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                | 182. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 163. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                | 183. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                |
| 164. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                | 184. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                |
| 165. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                | 185. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                |
| 166. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                | 186. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 167. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                | 187. | A                                | B                                | C                                | D                                | <input checked="" type="radio"/> |
| 168. | A                                | B                                | <input checked="" type="radio"/> | D                                | E                                | 188. | A                                | <input checked="" type="radio"/> | C                                | D                                | E                                |
| 169. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                | 189. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                |
| 170. | <input checked="" type="radio"/> | B                                | C                                | D                                | E                                | 190. | A                                | B                                | C                                | <input checked="" type="radio"/> | E                                |