

Kansas City Area Teachers of Mathematics
2014 KCATM Math Competition

ALGEBRA REASONING AND FUNCTIONS
GRADE 6

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may use calculators** on this test.
 - 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.
- Choice **E** is a correct answer. It is “None of the above.”

Student Name _____ Student Number _____

School _____

151. There are 12 red jelly beans in a bag. If $\frac{2}{5}$ of the jelly beans are red, and $\frac{1}{5}$ of the jelly beans are green, how many green jelly beans are in the bag?

- A. 6 B. 8 C. 10 D. 12 E. None of the above

152. Ashley and Bridge have 27 coins together. If Ashley has 8 times as many as Bridge, how many coins does Ashley have?

- A. 16 B. 20 C. 22 D. 24 E. None of the above

153. Which of the proportions does **NOT** give you the same value?

- A. $\frac{6}{23} = \frac{x}{69}$ B. $\frac{23}{x} = \frac{6}{69}$ C. $\frac{69}{23} = \frac{x}{6}$ D. $\frac{69}{x} = \frac{23}{6}$ E. None of the above

154. A grocery store sign indicates that apples are 6 for \$1.50, and plums are 5 for \$3.00. Find the total cost of buying 2 apples and 2 plums.

- A. \$0.85 B. \$1.70 C. \$2.25 D. \$4.50 E. None of the above

155. Keenan has two 7-foot long boards. He needs to cut pieces that are 15 inches long from the boards. Which of the following instructions will help you find the maximum number of boards Keenan can cut from the boards?

- A. $(7 \times 12 \div 15)$ Drop the decimal and multiply the value by 2.
 B. $7 \times 2 \div 15$ Drop the decimal and multiply the value by 2.
 C. $7 \times 12 \div 2 \div 15$ Drop the decimal.
 D. $7 \times 12 \times 2 \div 15$ Drop the decimal.
 E. None of the above

156. Multiply the two binomials: $(3x - 2)(x + 5)$

- A. $3x - 10$ B. $x + 5$ C. $3x^2 + 13x - 10$ D. $3x^2 = 10$ E. None of the above

157. Factor out the Greatest Common Factor: $12x^3 - 6x^2 + 4x$

- A. $6(2x^3 - x + 2)$ B. $4x(3x^2 - 2x + 1)$ C. $2x^2(6x - 3 + 2x)$
 D. $2x(6x^2 - 3x + 2)$ E. None of the above

158. Which statement shows one way to find the answer: Whitley walks 3 miles per hour. How far does she walk in 1.5 hours?

- A. $\frac{3 \text{ miles}}{1 \text{ hour}} \bullet 1.5 \text{ hrs.}$ B. $\frac{20 \text{ min}}{1 \text{ mile}} \bullet 1.5 \text{ hrs.}$ C. $\frac{1 \text{ hr.}}{20 \text{ min.}} \bullet \frac{1.5 \text{ hr.}}{x \text{ min.}}$
 D. $\frac{3 \text{ miles}}{1 \text{ hour}} \bullet \frac{1 \text{ hour}}{60 \text{ min}} \bullet \frac{3 \text{ min}}{1}$ E. None of the above

159. Simplify the expression: $-5x - 17x + 3x - 12 + 3x$

- A. $10x$ B. $-16x + 12$ C. $-30x$ D. $16x - 12$ E. None of the above

160. Solve the proportion: $\frac{x-2}{6} = \frac{15}{3}$

- A. $x = 32$ B. $x = 30$ C. $x = 28$ D. 24 E. None of the above

161. A shopper bought three of the same shirt and paid \$63 after the 30% discount. Which of these expressions can be used to find the price of one shirt?

- A. $\$63 \times 0.30 \div 3$ B. $\$63 - 30\% \div 3$ C. $\$63 \times 0.70 \div 3$
 D. $\$63 \div 0.70 \div 3$ E. None of the above

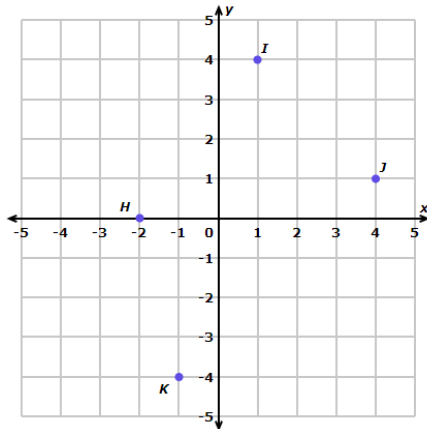
162. Every store employee gets an additional 10% off the already discounted price of 20% off. If an employee buys an item with an original price of \$40, how much will the employee pay?

- A. \$12 B. \$28.80 C. \$28.90 D. \$28.60 E. None of the above

163. A number is decreased by the sum of $2x$ and 5. Which expression is correct?

- A. $(2x + 5) - x$ B. $x - 2x + 5$ C. $(x + 2x) - 5$
 D. $x - (2x + 5)$ E. None of the above

Use the following coordinate grid for problems 164-166.



164. Which point is $(-1, 4)$?

- A. H B. I C. J D. K
 E. None of the above

165. What is the slope of \overline{HI} ?

- A. $3/4$ B. $4/3$ C. $5/4$
 D. 1 E. None of the above

166. What would the equation be of a **vertical** line through the point $(-2, 0)$?

- A. $y = 0$ B. $y = -2$
 C. $x = 0$ D. $x = -2$ E. None of the above

167. Which property is demonstrated? $(2x) + (-2x) = 0$

- A. Addition property of zero (Additive Identity) B. Commutative Property of Addition
 C. Additive Inverse D. Associative Property of Addition
 E. None of the above

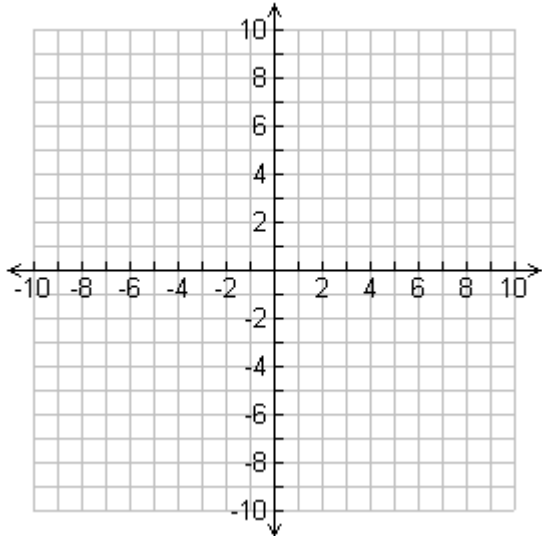
168. Which property is demonstrated? $(3x + 5y) + 6y = 3x + (5y + 6y)$

- A. Addition property of zero (Additive Identity) B. Commutative Property of Addition
 C. Associative Property of Addition D. Additive Inverse
 E. None of the above

169. What is the value of $5!$

- A. 5 B. 10 C. 120 D. 50 E. None of the above

Use the coordinate grid for problems 170-172.



170. How far away from the y axis is the point (-4, 3)?

- A. 5 units
- B. 4 units
- C. 3 units
- D. 1 unit
- E. None of the above

171. Which quadrant does the point (-7, -3) lie?

- A. I
- B. II
- C. III
- D. IV
- E. None of the above

172. What is the distance from (-4, 3) to the origin?

- A. 5 units
- B. 6 units
- C. 7 units
- D. 4 units
- E. None of the above

173. What is the function value of 3 in the equation: $f(x) = 2x + 4$?

- A. 3
- B. 9
- C. 10
- D. 24
- E. None of the above

174. What is the value of $f(-7)$ in the function : $f(x) = -3x + 1$?

- A. 22
- B. 21
- C. -22
- D. -20
- E. None of the above

175. If $f(x) = 14$ when $f(x) = x^2 + 5$, what would the value of x be?

- A. 201
- B. 19
- C. 3, -3
- D. 3
- E. None of the above

176. The expression $6^3 \times 4^2$ is equivalent to which of the following numerical expression?

- A. 18×8
- B. $(6 + 4)^5$
- C. 24^6
- D. 216×16
- E. None of the above

177. Write an equation in slope-intercept form for the line going through (3, 1) and (6, -1).

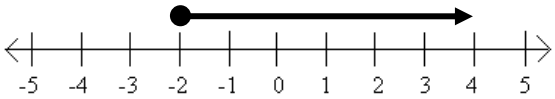
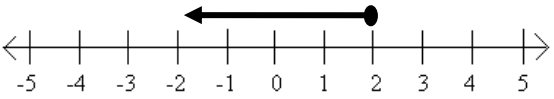
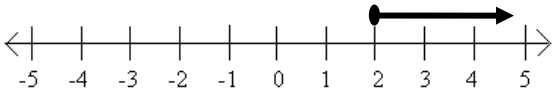
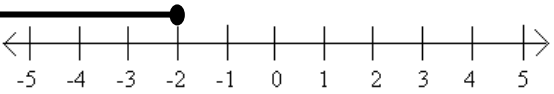
- A. $y = 3x + 6$
- B. $y = -3/2 x + 3$
- C. $y = 2/3 x + 4.2$
- D. $y = -2/3 x + 3$
- E. None of the above

178. Which graph shows the solution to the inequality: $2x + 3 \leq 1$?

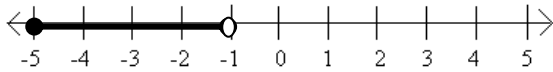
- A.
- B.
- C.
- D.

E. None of the above

179. Solve and graph the inequality: $-3x - 2 \geq x + 6$

- A. 
- B. 
- C. 
- D. 

180. Write an inequality for the graph:



- A. $-5 < x < -1$ B. $-5 \leq x \leq -1$ C. $-5 \leq x < -1$ D. $-5 < x \leq -1$ E. None of the above

181. What values of x would be the solution to the compound inequality: $-3 < 2x + 1 < 5$?

- A. $-2 < x < 2$ B. $-6 < x < 4$ C. $-1 < x < 2$ D. $-2 > x > 2$ E. None of the above

182. Evaluate the expression when $x = -2$ and $y = 3$ in: $(4x - 1) + 2(y - 3) - x$

- A. -7 B. 7 C. 8 D. -8 E. None of the above

183. Evaluate the expression when $n = -4$ in: $n^2 - 3$

- A. -11 B. -7 C. -19 D. 5 E. None of the above

184. What is the equation of a line in point-slope form that has a slope of -2 going through the point $(-1, 3)$?

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

185. Write the polynomial in Standard form: $7 - 3x - 5x^3 + 2x^2$

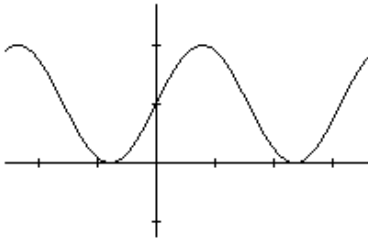
- A. $2x^2 - 3x - 5x^3 + 7$ B. $7 - 3x - 5x^3 + 2x^2$ C. $-5x^3 + 2x^2 - 3x + 7$
 D. $7 - 3x + 2x^2 - 5x^2$ E. None of the above

186. Which of the following data sets **IS** a **linear** function?

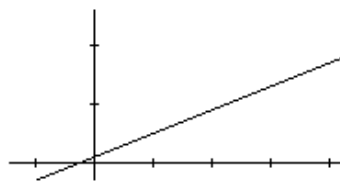
A.		B.		C.		D.		E.
x	f(x)	x	f(x)	x	f(x)	x	f(x)	None of the above
-1	11	0	0	-2	1	1	-8	
0	9	3	2	0	-3	2	-4	
1	5	6	4	2	5	3	0	
2	4	9	6	4	-7	4	12	

187. Which of the following graphs is **NOT** a function?

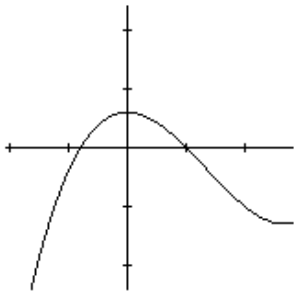
A.



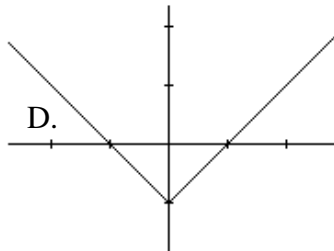
B.



C.



D.



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E. None of the above

188. Which expression is: “the difference of two squares ” ?

A. $3n - 7$

B. $4x^2 + 9$

C. $25p^2 - 36$

D. $9y - 16$

E. None of the above

189. Solve the quadratic: $x^2 - 7x + 6 = 0$

A. $\{-7, 6\}$

B. $\{-6, -1\}$

C. $\{-1, 6\}$

D. $\{1, 6\}$

E. None of the above

190. What is the percent of increase of a pair of shoes that used to cost \$40 and now cost \$70?

A. \$30

B. 30%

C. 22%

D. 75%

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 KEY151. A B C D E152. A B C D E153. A B C D E154. A B C D E155. A B C D E156. A B C D E157. A B C D E158. A B C D E159. A B C D E160. A B C D E161. A B C D E162. A B C D E163. A B C D E164. A B C D E165. A B C D E166. A B C D E167. A B C D E168. A B C D E169. A B C D E170. A B C D E171. A B C D E172. A B C D E173. A B C D E174. A B C D E175. A B C D E176. A B C D E177. A B C D E178. A B C D E179. A B C D E180. A B C D E181. A B C D E182. A B C D E183. A B C D E184. A B C D E185. A B C D E186. A B C D E187. A B C D E188. A B C D E189. A B C D E190. A B C D E