Kansas City Area Teachers of Mathematics 2016 KCATM Math Competition

ALGEBRA: REASONING AND FUNCTIONS GRADE 6

INSTRUCTIONS

•	Do not	open	this	booklet	until	instructed	to	do	SO.
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- Time limit: 20 minutes
- You may use calculators on this test.

School

- 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.
- Some multiple-choice questions do not have a correct answer provided as options A, B, C, or D. On those questions, the response is "E. not given."

Student Name	Student Number						

151. Find an **equivalent expression** for 5(x-4) + 3x - 15.

- A. 8x + 5
- B. 20x 19
- C. 8x 35
- D. -17x 95
- E. None of the above

152. Write the expression: Four less than twice a number

- A. 4 2 + n
- B. 4 2n
- C. 2n + 4
- D. 2n 4
- E. None of the above

153. **Solve for x.** $\frac{4}{3} = \frac{x}{18}$

- A. 6
- B. 24
- C. 27
- D. 72
- E. None of the above

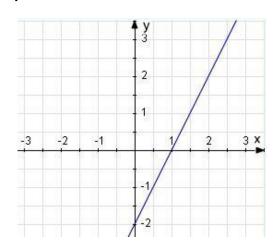
154. Solve for x. 5x - 10 = 23

- A. 6.6
- B. 2.6
- C. 165
- D. 28
- E. None of the above

155. Which method **NOT** correct when finding tip of 15% of \$20?

- $A.\frac{x}{20} = \frac{15}{100}$
- B. 0.15 x 20
- C. 20 x 0.15
- $D. 20 \div 0.15$
- E. None of the above

Use the following graph for problems #156-158.



156. What is the **x-intercept**?

- A. (1, 0)
- B. (2, 0)
- C. (0, -2) D. (0, -4)
- E. None of the above

157. What is the **slope** of the line?

- A. -2
- B. 2
- C. 4
- D. -4
- E. None of the above

158. What is the **equation** of the line in slope-intercept form?

- A. y = 2x 2

- B. y = -2x + 1 C. y = 4x 2 D. y = -2 E. None of the above

159. **Solve for x:** $\frac{3}{5}x = 9$

- A. 12
- B. 15
- C. 9
- D. 30
- E. None of the above

160. Find the radius (r) using the formula for the circumference of a circle: $C = 2\pi r$ when the circumference is 16π . $16\pi = 2\pi r$

- A. 16
- B. 4
- C. 8
- D. 2
- E. None of the above

161. Identify an equivalent expression for 3xy - 5xy + 7x + 12x - 7

- A. $2xy^2 + 19x 7$
- B. -2xy + 19x + 7
- C. -2xy + 19x 7

- D. 2xy + 19x 7
- E. None of the above

162. Solve for *x*: $\frac{2x+4}{8} = 5$

- A. x = 16 B. x = 18
- C. x = 20 D. 24
- E. None of the above

163. Your parent's boss wanted to purchase Royals World Series Champion t-shirt for the employees. They cost \$18 each. The boss spent \$774 before tax. Which equation does NOT represent a correct way to solve for the number of t-shirts the boss purchased?

A. $18 \times n = 774$

- B. 18n = 774 C. $n = 774 \div 18$

D. n = 774 - 18

E. None of the above

164. Which inequality represents "Thirteen is less than four times a number"?

A. 13 > 4n

B. 13 > 4n

C. 13 < 4n

D. 13 = 4n

E. None of the above

165. Which equation below could represented "The quotient of ten and 3 more than twice a number is seven"?

A. $\frac{10}{n+3} = 7$

- B. $\frac{10}{3n+2} = 7$
- C. $\frac{2n+3}{10} = 7$

D. $\frac{10}{2n+3} = 7$

E. None of the above

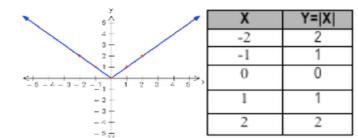
166. You are going to the mall and have no more than \$20 to spend. You find an item for \$8. Which inequality represents how much more you can spend?

- A. x + 8 > 20 B. x + 8 < 20 C. x + 8 < 20 D. x + 8 > 20 E. None of the above

- 167. One benefit of working for a company is getting a discount on your merchandise. **You get** a **20% employee discount.** You went shopping and found a shirt for \$23, a pair of shoes for \$35, a pair of jeans for \$45. **What is the <u>discount</u> and the <u>sale price</u> after you get your discount?**
 - A. \$18.60; \$74.40
- B. \$20.60; \$82.40
- C. \$0.20; \$102.80

- D. \$20; \$83
- E. None of the above
- 168. Find the value of: $\frac{9 \times 10^6}{3 \times 10^4}$
 - A. 3
- B. 30
- C. 300
- D. 3000
- E. None of the above

Use the following coordinate grid and table for problems #169-171.



- 169. Why is there no graph in the third and fourth quadrants?
 - A. This is a quadratic graph and all y-values would be positive.
 - B. This is an absolute value graph and all y-values would be positive.
 - C. This is a linear graph and all y-values would be positive.
 - D. This is an exponential graph and all y-values would be positive.
 - E. None of the above
- 170. When the output is 10, what could the x input value(s) be?
 - A. 10
- B. -10
- C. 10 and -10

- D. 0
- E. None of the above
- 171. Using the function equation: f(x) = |x| in the above table, if $x = \frac{1}{2}$, what would the function value be?
 - A. ½
- B. ½
- C. 3/4
- D. 1
- E. None of the above

172. In order, which properties are demonstrated? -(6x - 7) = 8-6x + 7 = 8

$$-6x = 1$$

 $x = -1/6$

- A. Distributive Property, Subtraction Property of Equality, Addition Property of Equality
- B. Division Property of Equality, Distributive Property, Subtraction Property of Equality
- C. Division Property of Equality, Distributive Property, Division Property of Equality
- D. Distributive Property, Subtraction Property of Equality, Division Property of Equality
- E. None of the above

173. **Evaluate:** $8 \times 2 - 7 \times 2 + 2^3$

- A. 7
- B. 14
- C. 8
- D. 10
- E. None of the above

174. Factor completely: $x^2 + 8x + 15$

- A. (x + 5)(x + 3)
- B. (x-5)(x+3)
- C. (x-5)(x-3)

- D. (x + 5)(x 3)
- E. None of the above
- 175. What is the expression for the area of a square with sides lengths of 5x?
 - A. 10x
- B. 20x
- C. 25x
- D. 25x²
- E. None of the above

176. What is the greatest common factor (GCF) of 72 and 48?

- A. 3
- B. 6
- C. 9
- D. 12
- E. None of the above

177. Simplify the expression to an **equivalent form** of the fraction: $\frac{15x^5y}{3xy}$

- A. 5xy²
- B. 5x⁴y
- C. 5x²y
- D. 5xy
- E. None of the above
- 178. Between which two whole numbers does $\sqrt{40}$ fall?
 - A. 3 and 4
- B. 4 and 5
- C. 5 and 6
- D. 6 and 7
- E. None of the above

179. Expand using the distributive property: (2x - 1)(x + 3) (do not simplify)

- A. $2x^2 + 5x 1x + 2$
- B. 3x + 5x 1x + 2
- C. $2x^2 + 6x 1x 3$

- D. $3x^2 17x + 28$
- E. None of the above

180. Solve for the value(s) of x: (2x - 1)(x + 3) = 0

- A. {1/2,-3}
- B. {-1/2, -3}

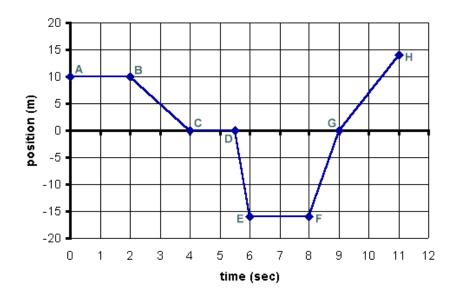
C. {2, -3}

D. {-2, 3}

E. None of the above

Use the function graph below for problems #181-184.

Position vs Time



181. Which segment has the steepest rate of change?

- A. \overline{BC}
- B. \overline{DE}
- C. \overline{FG}
- D. \overline{GH}
- E. None of the above

182. Which scenario could this graph be showing?

- A. The position of an airplane over time
- B. A person going swimming by a boat in a lake
- C. A car driving in Kansas City.
- D. A ball being tossed to a dog.
- E. None of the above

183. What is the slope of \overline{BC} ?

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

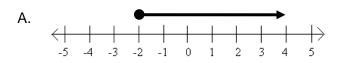
184. What is happening during 1-2 seconds, 4-5 seconds, and 6-8 seconds?

- A. The object was moving very slowly.
- B. The position of the object was steadily moving over time.
- C. The object's position did not change.
- D. The object was rolling on the ground.
- E. None of the above

185. f(x) = 3x - 5 and g(x) = 2x + 7. What is f(x) + g(x)?

- A. $5x^2 + 2$
- B. x + 2
- C. x 12 D. 5x + 2
- E. None of the above

186. Which graph shows the **solution** to the inequality? $-2x + 5 \le 3 - x$









E. None of the above

187. Which statement is correct about the values of (-4)² and -4²?

- A. There is no difference.
- B. $(-4)^2$ is 16 and -4^2 is -16
- C. Both are -8
- D. $(-4)^2$ is (-4)(-4) which is 16, and -4^2 is a -8.
- E. None of the above

188. What is the linear equation in **slope-intercept form** for a line going through (2, 6) and (0, 4)?

- A. y = x + 4
- B. y = 2x + 4
- C. y = -x + 4
- D. y = -2x + 4
 - E. None of the above

189. What value(s) of x would work in the equation $(x-2)^2 = 16$?

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

190. Write the equation that represents the pattern in the table below and then find the value when x = 5?

X	у
0	0
1	1
2	8
3	27
5	

- A. y = x; y = 5
- B. y = 2x; y = 10
- C. $y = x^2$; y = 25
- D. $y = x^3$; y = 125
- E. None of the above

168. A B C D E

169. A B C D E

170. A B C D E

Shade the correct answer! Name													
Example: A • C D E				E	Cal	2001							
							SCI	nool .					
151.	Α	В	С	D	Ε		171.	Α	В	С	D	E	
152.	Α	В	С	D	Е		172.	Α	В	С	D	Ε	
153.	Α	В	С	D	Е		173.	Α	В	С	D	Ε	
154.	Α	В	С	D	Е		174.	Α	В	С	D	Е	
155.	Α	В	С	D	Е		175.	Α	В	С	D	Ε	
156.	Α	В	С	D	Е		176.	Α	В	С	D	Ε	
157.	Α	В	С	D	Е		177.	Α	В	С	D	Ε	
158.	Α	В	С	D	Е		178.	Α	В	С	D	Ε	
159.	Α	В	С	D	Е		179.	Α	В	С	D	Ε	
160.	Α	В	С	D	Е		180.	Α	В	С	D	Ε	
161.	Α	В	С	D	Е		181.	Α	В	С	D	Ε	
162.	Α	В	С	D	Е		182.	Α	В	С	D	Е	
163.	Α	В	С	D	Ε		183.	Α	В	С	D	Е	
164.	Α	В	С	D	Ε		184.	Α	В	С	D	Е	
165.	Α	В	С	D	Ε		185.	Α	В	С	D	Ε	
166.	Α	В	С	D	Ε		186.	Α	В	С	D	Е	
167.	Α	В	С	D	Ε		187.	Α	В	С	D	Ε	

188. A B C D E

189. A B C D E

190. A B C D E

Shade the correct answer!

Example: C Α Ε D

Name_____

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ANSWER KEY

151. Α В D Ε

С Ε 152. В Α

153. C Ε Α D

C 154. В Ε D

Ε 155. C Α В

156. В C D Ε

С Ε 157. Α D

158. В C Ε D

159. C Ε Α D

В Ε 160. Α D

161. Α В D Ε

A • C Ε 162. D

163. C Ε Α В

164. C Α В D

165. В C Ε Α

Ε 166. Α В D

C 167. Α D Ε

168. Α В D Ε

169. Ε Α C D

170. Α В D Ε 171. В C Ε D

172. C Ε Α В

C Ε 173. Α В

C 174. В Ε D

C Ε 175. Α В

176. Α В C D

C 177. Α Ε D

В C Ε 178. Α

Ε 179. В D Α

Ε C 180. В D

181. Α C D Ε

C Ε 182. Α D

183. В C Ε Α

Ε 184. Α В D

В

Α

185.

C

Ε

C Ε 186. Α В

C 187. Α D Ε

C Ε 188. В D

189. Α В C D

190. Α В C D