

Kansas City Area Teachers of Mathematics
2018 KCATM Math Competition

ALGEBRA: REASONING AND FUNCTIONS
GRADE 6
#151-190

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.
- 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. None of the above."

Example: $3 + 4 =$

A. 4 B. 5 C. 6 D. 8 E. None of the above

Student Name _____ Student Number _____

School _____

151. The first term in a sequence of numbers is 7 with each consecutive term found by adding 1.5. What would be the 6th term?

- A. 11.5 B. 14.5 C. 16 D. 17.5 E. None of the above

152. What is the pattern in this sequence of numbers: 60, 30, 15, 7.5, ...

- A. Divide by 3 B. Add -30 C. Subtract 30
D. Multiply by $\frac{1}{2}$ E. None of the above

153. If you mow lawns and charge \$35 per yard, what is the equation you would use and how much would you make if you mowed 5 yards (y)?

- A. $35y + 5$; \$180 B. $35y$; \$175 C. $5y + 35$; \$60
D. $(35)(5)y$; \$875 E. None of the above

154. In addition to charging \$35 per yard to mow, you charge \$2 per bush to trim. In one month you plan on mowing 45 yards and trimming 105 bushes. How much would you make?

- A. \$1665 B. \$1578 C. \$1680 D. \$1785 E. None of the above

155. The ratio of the quantities of sugar and flour needed to bake a cake is 3:5. What is the quantity of sugar needed for a cake if 750 grams of flour are used to bake it?

- A. 150g B. 200g C. 250g D. 300g E. None of the above

156. A school cafeteria spent \$2,700 for ingredients necessary to prepare 450 meals. What is the cost per meal?

- A. \$5.50 B. \$6.00 C. \$6.50 D. \$7.00 E. None of the above

157. A school has 300 students and 30 teachers. What is the ratio between the number of teachers to the number of students in the school?

- A. 1:10 B. 1:1 C. 3:1 D. 10:1 E. None of the above

158. A family went out to eat and the cost of the food was \$80. The family left a 15% tip. What was the total cost of the meal?

- A. \$88 B. \$92 C. \$94 D. \$96 E. None of the above

159. Evaluate: $(2^3 - 2^2) \times 4 - 3^2$

- A. 4 B. 6 C. 7 D. 9 E. None of the above

160. Factor out the Greatest Common Factor (GCF) from:

$$12x - 3y + 33$$

- A. $4(3x - y + 33)$ B. $3(4x - y - 11)$ C. $3(4x - 3y + 11)$
D. $3(4x - y + 11)$ E. None of the above

161. Solve: $12x = 32$

- A. $5/6$ B. $4/3$ C. $8/3$ D. $1/6$ E. None of the above

162. Solve: $2x + 5 = 35$

- A. 15 B. 16 C. 19 D. 20 E. None of the above

Use the following graph for problems #163- 164.

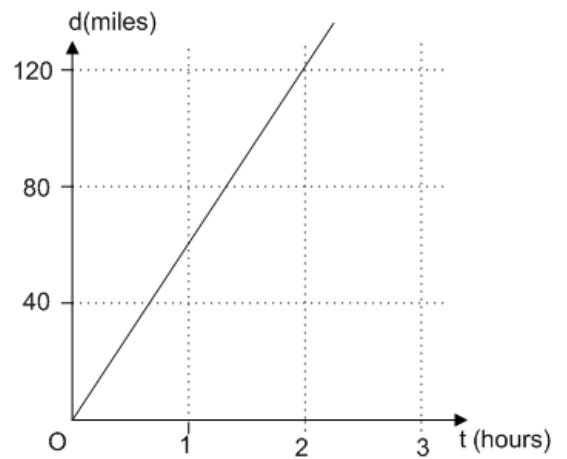
A vehicle travels at a constant speed as graphed:

163. What is the rate of the car?

- A. 45 mph B. 60 mph C. 70 mph
D. 75 mph E. None of the above

164. What is the linear equation that represents the distance vs. time relationship in the graph?

- A. $d = 60t$ B. $d = -60t$
C. $d = 50t$ D. $d = 48t$
E. None of the above



165. The Wantabe family drove from Kansas City to Nashville to see if they could audition for a music group. The 480 mile trip took 7.5 hours. Which trip represents the same rate of travel?

- A. 120 miles in 2 hours
B. 192 miles in 3 hours
C. 100 miles in 1.5 hours
D. 240 miles in 3.25 hours
E. None of the above

166. You want to earn at least \$800 to be able to take a trip with your friend's family to Orlando, Florida to Disney World. When you babysit you earn \$25 each time. Which inequality will tell you how many times you will need to baby so you can earn at least \$800 for the trip.

- A. $25x > 800$
B. $25x < 800$
C. $25x \geq 800$
D. $25x \leq 800$
E. None of the above

167. Bradley is cooking dinner for his family. The dessert he wants to make calls for $\frac{3}{4}$ cup of sugar. He has $3\frac{1}{2}$ cups of sugar in his sugar jar. Which equation would he use to find out how many recipes he can make using all of the sugar?

- A. $3\frac{1}{2} \times \frac{3}{4} = x$
B. $3\frac{1}{2} \div \frac{3}{4} = x$
C. $3\frac{1}{2} + x = \frac{3}{4}$
D. $3\frac{1}{2} - b = \frac{3}{4}$
E. None of the above

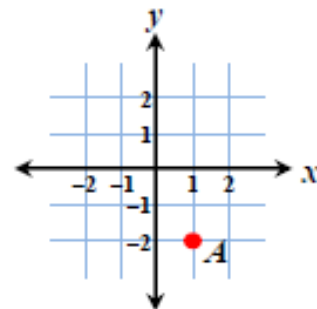
Use the graph to answer problems #168 – 170.

168. What are the coordinates of the point on the graph?

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

169. The point (-2, -2) is in which quadrant?

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



170. Which axis is the vertical axis?

- A. X axis B. Y axis

171. In 1987 the cost of a movie was \$3.75 per ticket. In 2017, the cost of a ticket is \$10.50. What is the percent of increase in the past 30 years?

- A. 180% B. 200% C. 225% D. 250% E. None of the above

172. Find the slope between the 2 points: (3, 4) and (7, 9).

- A. 10/13 B. 13/10 C. 4/5 D. 5/4 E. None of the above

173. Choose the equation that is parallel to $y = 4x - 5$

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

174. Which of the following is **NOT** equal to 64?

- A. 2^6 B. 4^3 C. 8^2 D. 64^0 E. None of the above

175. Simplify this expression: $3x - x + 5 + 4x$

- A. $2x + 5$ B. $11x$ C. $8x + 5$
D. $6x + 5$ E. None of the above

176. Multiply the monomial by the binomial: $8x(x + 7)$

- A. $8x^2 + 56x$ B. $9x + 7$ C. $9x + 15x$
D. $8x^2 + 48x$ E. None of the above

177. Simplify: $(x + 5)(x - 4)$

- A. $2x + 1$ B. $x^2 + x + 1$ C. $2x - 20$
D. $x^2 + x - 20$ E. None of the above

178. Solve: $3(x + 4) = 21$

- A. 2 B. 3 C. 4 D. -7 E. None of the above

179. You are moving boxes into your new residence. There boxes are small enough for your father to carry two at a time, while you (x) take in one. Which equation represents options for carrying in 48 boxes?

- A. $x + x = 48$ B. $2x = 48$ C. $2x + 2x = 48$
- D. $2x + x = 48$ E. None of the above

180. Which expression is equivalent to $3x - 3y$?

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

181. Subtract: $(3x^2 - 5x + 2y) - (5x^2 + 1 + y)$

- A. $2x^2 - 5x + 3y - 1$ B. $2x^2 - 5x + y + 1$ C. $-2x^2 - 5x + y - 1$
- D. $-2x^2 - 5x + 3y - 1$ E. None of the above

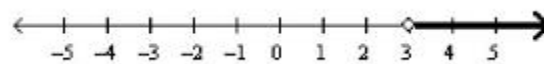
182. Solve: $(x + 8)(x - 2) = 0$

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

183. Which equation does NOT have 5 as a solution?

- A. $2x + 7 = 17$ B. $6x - 10 = 20$ C. $-3x + 1 = 16$
- D. $x - 8 = -3$ E. None of the above

184. Which inequality is graphed:



- A. $x < 3$ B. $x \leq 3$ C. $x > 3$ D. $x \geq 3$ E. None of the above

185. Which inequality is graphed:



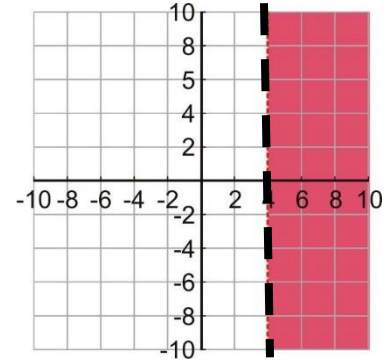
- A. $-1 \leq x < 2$ B. $-1 \leq x \leq 2$ C. $-1 < x \leq 2$
- D. $-1 < x < 2$ E. None of the above F.

186. Solve: $\frac{2x}{5} = \frac{3}{10}$

- A. 1/2 B. 2/5 C. 3/5 D. 3/4 E. None of the above

187. What is the linear inequality is represented by the graph:

- A. $x > 4$
- B. $x \geq 4$
- C. $y > 4$
- D. $y \geq 4$
- E. None of the above



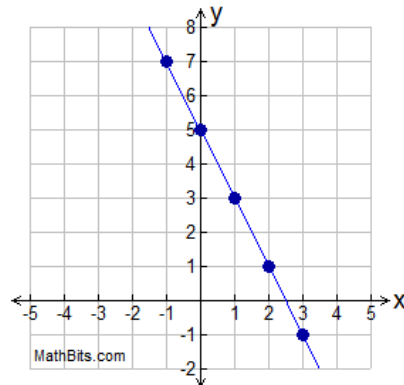
188. Which point is the solution to this system:

$$\begin{aligned} x + 2y &= 8 \\ 3x + y &= -1 \end{aligned}$$

- A. (2, 3)
- B. (-2, 5)
- C. (-1, 4)
- D. (4, 2)
- E. None of the above

189. What is the equation for the line graphed:

- A. $y = 1/2x + 5$
- B. $y = -1/2x + 5$
- C. $y = 2x + 5$
- D. $y = -2x + 5$
- E. None of the above



190. Write an expression for the **perimeter** of the given rectangle with the length is 5 more than twice the width.

- A. $P = 3x + 5$
- B. $P = 2x + 10$
- C. $P = 4x + 10$
- D. $P = 6x + 10$
- E. None of the above

