

Kansas City Area Teachers of Mathematics 2013 KCATM Math Competition

ALGEBRA GRADES 7-8

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 π .

Student Name _____ Student Number _____

School _____

151. Solve: $-6 = 3(x + 1)$
A. 1 B. -3 C. -3/6 D. -1 E. None of the above
152. Solve: $\frac{7}{3} = \frac{n}{18}$
A. 22 B. 11/6 C. 21 D. 42 E. None of the above
153. Solve: $|x| = -11$
A. 11 B. -11 C. 22 D. -11 and 11 E. None of the above
154. Simplify the expression: $\frac{12x+18}{-6}$
A. $2x + 3$ B. $-2x - 3$ C. $-2x + 3$ D. $2x - 3$ E. None of the above
155. Simplify the expression: $5 - 7x + 4 - 9x - 14$
A. $-2x - 15$ B. $-16x - 23$ C. $2x - 5$ D. $-16x - 5$ E. None of the above
156. Simplify the radical: $3\sqrt{50}$
A. $\sqrt{150}$ B. $6\sqrt{6}$ C. $15\sqrt{2}$ D. $6\sqrt{5}$ E. None of the above
157. Simplify the expression: $(2x)^2(3x)^3$
A. $81x^6$ B. $81x^5$ C. $108x^5$ D. $108x^6$ E. None of the above
158. Use the distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ to find the distance between the points $(-3, 1)$ and $(5, 4)$ on a coordinate graph. Round the answer to the nearest thousandth.
A. 8.544 B. 3.606 C. 8.545 D. 8.500 E. None of the above
159. Find the midpoint between the points $(5, 4)$ and $(-3, 1)$.
A. $(2, 5)$ B. $(4, 2.5)$ C. $(-4, 1.5)$ D. $(1, 2.5)$ E. None of the above
160. Find $f(3)$ when $f(x) = 4x^2 - 2x + 7$
A. 49 B. 37 C. 19 D. 34 E. None of the above

161. Solve for both values of x : $(x + 7)(x - 6) = 0$
 A. 7 B. 7, 6 C. 6 D. -7, 6 E. None of the above

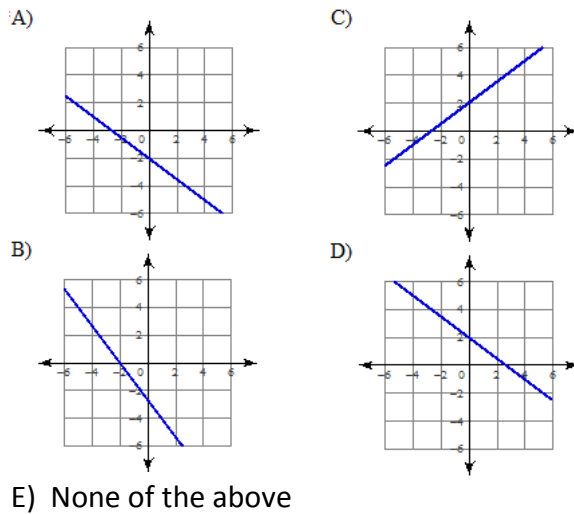
162. Simplify the expression using scientific notation: $\frac{4 \cdot 10^7}{5 \cdot 10^2}$
 A. 8×10^9 B. 8×10^5 C. 8×10^4 D. 1×10^7 E. None of the above

163. Factor completely: $24x - 36$
 A. $6(4x - 6)$ B. $4(6x - 9)$ C. $3(8x - 12)$ D. $12(2x - 3)$ E. None of the above

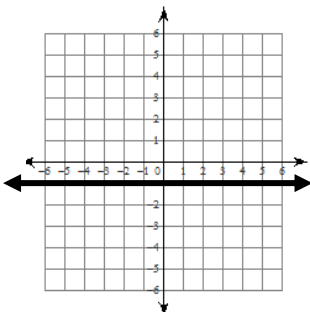
164. Factor **completely**: $4x^2 - 12x - 16$
 A. $4(x - 4)(x + 1)$ B. $2(2x^2 - 6x - 8)$
 C. $(4x + 1)(x - 16)$ D. $(2x - 8)(2x + 2)$ E. None of the above

165. Simplify: $-5(a - 4) + 7a$
 A. $-12a - 84$ B. $2a + 20$ C. $2a - 8$ D. $2a + 35$ E. None of the above

166. Which graph has y -intercept -2.5 and x -intercept 2 ?



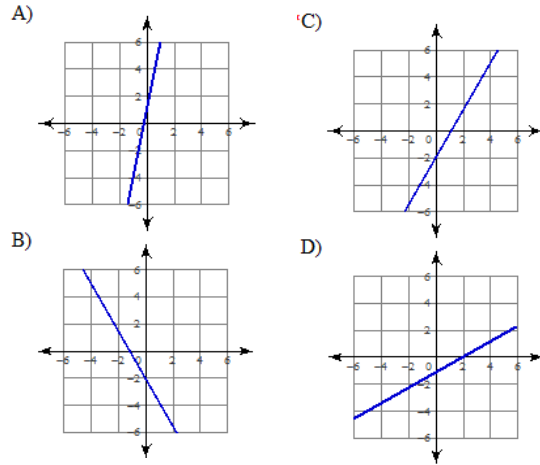
167. Given the graph, write the equation of the line.



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

168. Write the equation in slope-intercept form: $8x - 4y = 12$
 A. $y = 2x + 3$ B. $y = 2x - 3$ C. $y = -2x - 3$ D. $y = -2x + 3$ E. None of the above

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

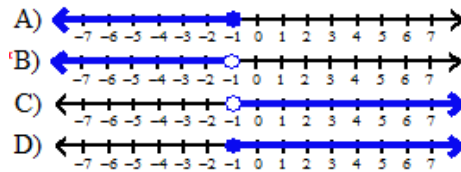


170. Which inequality is graphed:



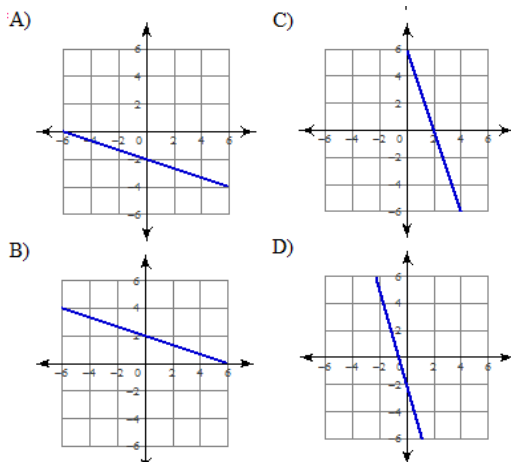
- A. $n < -6$ B. $n \leq -6$ C. $n > -6$ D. $n \geq -6$ E. None of the above

171. What is the solution to the inequality: $7 - d - 3 \geq 5$



- E. None of the above

172. Which graph has $y = -1/3 x - 2$ as an equation?

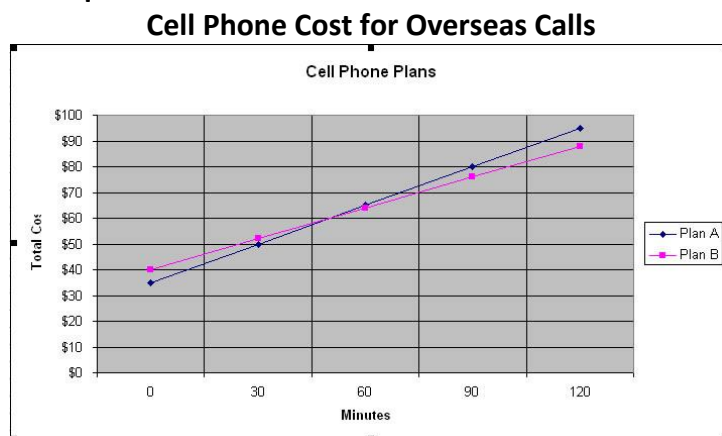


- E) None of the above

173. What is the slope between $(-7, 5)$ and $(4, 13)$?

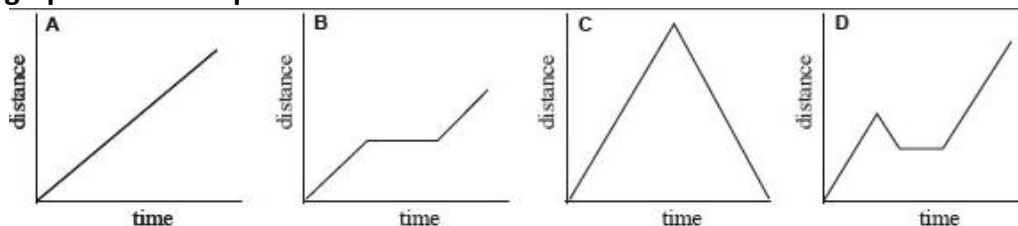
- A. $8/3$ B. $-8/3$ C. $8/11$ D. $-8/11$ E. None of the above

Use the graph below for questions #24-#26.



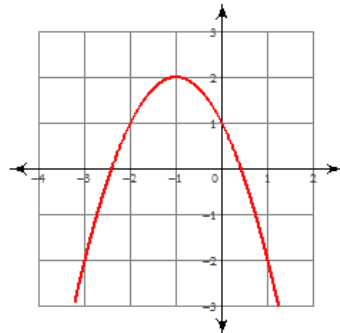
174. What is the cost per minute for a 90 minute call under Plan B?
- A. \$1.91 per minute B. \$1.89 per minute C. \$1.06 per minute
 D. \$1.84 per minute E. None of the above
175. What is the most reasonable equation that represents the cost for an overseas call for Plan A?
- A. $C = 0.5m + 27$ B. $C = 2m + 32$ C. $C = 2.5m + 32$
 D. $C = 0.4m + 27$ E. None of the above
176. The **intersection** of the two lines can be interpreted as:
- A. Plan A is a less expensive company for your cell phone plan.
 B. Plan B is a less expensive company for your cell phone plan.
 C. The point when Plan A and Plan B are equal in their cell phone plans for overseas calls.
 D. Plan A is less expensive until 60 minutes of calls, then Plan A becomes the less expensive plan.
 E. None of the above

Use the graph below for questions 177-178.



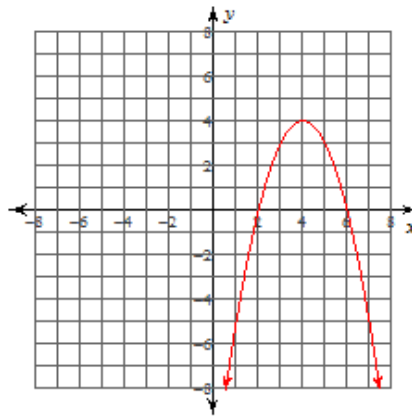
177. Which graph(s) shows three changes in rate over time after you initially leave the original location?
- A. C only B. B and D C. B only
 D. D only E. None of the above
178. Which graph would best fit the following scenario?
 You start at home and drive for a given amount of time, turn around and travel back home.
- A. B. C. D. E. None of the above

179. Which equation models the following parabolic graph.



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

180. Which equation produces the following graph with the given zeros of the quadratic function?



- A. $y = -x^2 - 8x - 12$
 B. $y = -x^2 - 8x + 12$
 C. $y = -x^2 + 8x - 12$
 D. $y = x^2 + 8x + 12$
 E. None of the above

181. Divide: $(g^2 + 6g - 8) \div (g + 4)$

- A. $(g - 2) + \frac{-16}{g + 4}$ B. $(g + 2) + \frac{-16}{g + 4}$ C. $(g + 2) + \frac{-22}{g + 4}$ D. $(g - 2) + \frac{-22}{g + 4}$
 E. None of the above

182. Solve the system:
 $-3x + 2y = -4$
 $x - 4y = -12$

- A. $(-4, 4)$ B. $(4, 4)$ C. $(-4, -4)$ D. $(4, -4)$ E. None of the above

183. Luis traveled to his cabin on the lake and back. It took two hours less time to get there than it did to get back. The average speed on the trip there was 68 miles/hr. The average speed on the way back was 46 miles/hr. because of an accident on the highway. How many hours did the trip there take?

- A. 3.9 hr. B. 4 hrs. C. 4.1 hrs. D. 4.2 hrs. E. None of the above

184. Two kg of pecans cost \$8/kg were combined with 5 kg of peanuts which cost \$5 per kg. Find the cost per kg of the mixed nuts.
A. \$6.50 B. \$5.86 C. \$5.72 D. \$6.00 E. None of the above
185. The sum of the digits of a certain two-digit number is 11. When you reverse its digits you decrease the number by 9. Find the number.
A. 83 B. 74 C. 65 D. 56 E. None of the above
186. JoAnn is selling ticket a community theater musical. On the first day of the ticket sales she sold 2 student tickets and 6 adult tickets for a total of \$58. She sold \$152 in tickets on the second day by selling 8 student tickets and 14 adult tickets. What is the price for adult and student tickets?
A. Student ticket: \$6, adult ticket: \$8 B. student ticket: \$5, adult ticket: \$8
C. Student ticket: \$6, adult ticket: \$10 D. student ticket: \$5, adult ticket: \$10
187. Evaluate the logarithm: $\log_3 81 = x$
A. 4 B. 9 C. 1/4 D. 27 E. None of the above
188. Use the quadratic formula to solve for all solutions of: $-5x^2 - 3x + 4 = 0$
Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
A. 1.243, -0.043 B. 8.53, 0.043 C. -1.243, 0.043 D. -8.53, -0.043
E. None of the above
189. Compound interest is computed by the formula: $A = P(1 + r/n)^{nt}$ where A = Accrued amount, P = Principal, r = Annual rate of interest, n = number of times per year interest is paid, and t = time in years. How much money would be accrued if **\$1000** receives **3%** interest **compounded monthly** for **2 years**? Round your answer to the nearest dollar.
A. \$1061 B. \$1062 C. \$1060 D. \$1063 E. None of the above
190. Factor: $z^3 - 64$
A. $(z - 4)(z^2 + 4z + 16)$ B. $(z + 4)(z^2 - 16)$
C. $(z - 4)(z^2 - 4z + 16)$ D. $(z - 4)(z^2 + 16)$
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