Kansas City Area Teachers of Mathematics
2015 KCATM Math Competition

ALGEBRA
GRADE 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 Scantron sheet by **FILLING in the oval**.

- You **may not use rulers, protractors, or other measurement devices** on this test.

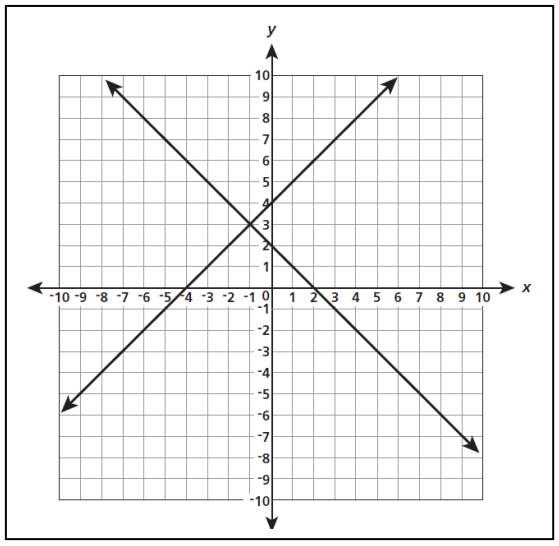
- Unless otherwise stated, letter **"E" is "None of the above"**, which is a correct answer for some of the problems.

- With circles, **exact answers** will be given in terms of π .

Student Name_____Student Number _____

School _____

151. What is the solution to the system of equations?



A (−4, 2)

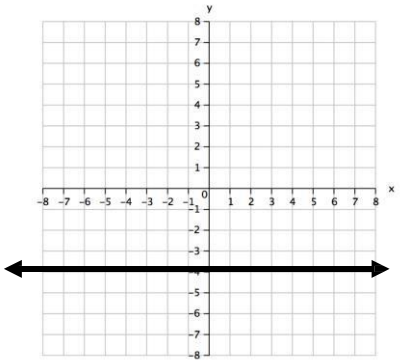
B (−1, 3)

C (0, 2)

D (2, 4)

E None of the above

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



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

153. Simplify the expression to its final answer: $4^3 \times 4^{-7}$

A. 4^{-4} B. 1/256 C. $1/4^4$ D. 16 E. None of the above

154. The sum of the digits of a certain two-digit number is 6. When you reverse its digits you increase the number by 18. Find the number.

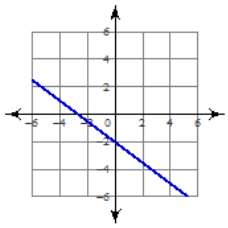
A. 15 B. 24 C. 33 D. 42 E. All of the above

155. Evaluate the logarithm: $\log_3 512 = x$

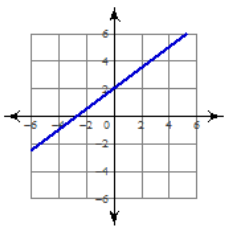
A. 1/3 B. 8 C. 4 D. 27 E. None of the above

156. Which graph has y-intercept -2 and x-intercept -3 ?

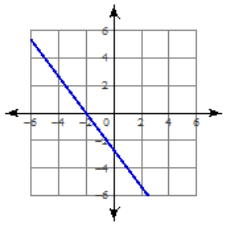
A)



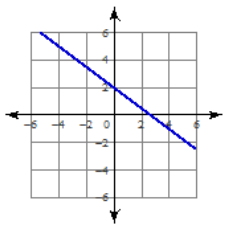
C)



B)



D)



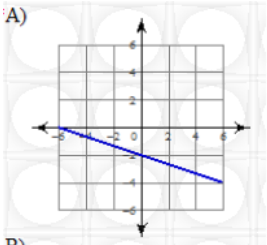
E) None of the above

157. Simplify the expression: $\frac{48x-8}{16}$

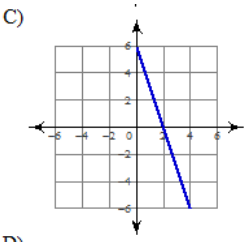
A. 3x - 2 B. 3x – 0.5 C. 3x - 2 D. 3x + 0.5 E. None of the above

158. Which graph has y = -3x + 2 as an equation?

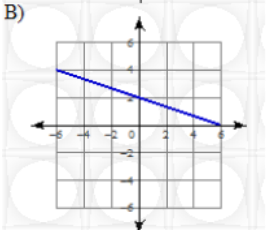
A)



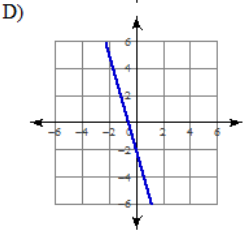
C)



B)



D)



E) None of the above

159. What is the slope between (-9, 5) and (17, -8)?

A. . /2 B. - /2 C. 3/8 D. - /8 E. None of the above

160. Solve: - 27 = 3(x - 4)

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

161. Solve: $\frac{9}{2} = \frac{36}{b}$

A. 4.5 B. 2/9 C. 4 D. 8 E. None of the above

162. Solve: $|x| = -37$

A. -37 B. 37 C. 37 and -37 D. -30 E. None of the above

163. Simplify the expression: -7p – 4 - 5p + 8

A. -2p + 4 B. -12p -12 C. -12p + 4 D. -12p -4 E. None of the above

164. Find the midpoint between the points (-11, 17) and (-8, 4).

A. (9.5, 10.5) B. (-9.5, 6.5) C. (-1.5, 10.5) D. (-9.5, 10.5) E. None of the above

165. Simplify the expression: $(2x)^3(3x)^4$

A. $648x^{12}$ B. $72x^7$ C. $648x^7$ D. $72x^{12}$ E. None of the above

166. Simplify the radical: $6\sqrt{128}$

A. $\sqrt{4608}$ B. $9\sqrt{8}$ C. $48\sqrt{2}$ D. $14\sqrt{2}$ E. None of the above

167. Use the distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ to find the distance between the points (-8, 3) and (6, -7) on a coordinate graph. Round the answer to the nearest thousandth.

A. 14.472 B. 17.205 C. 14.560 D. 17.204 E. None of the above

168. Factor: $j^3 - 216$

A. $(j - 6)(j^2 + 6j + 36)$ B. $(j - 6)(j^2 - 6j + 36)$
C. $(j + 6)(j^2 - 36)$ D. $(j - 6)(j^2 + 36)$
E. None of the above

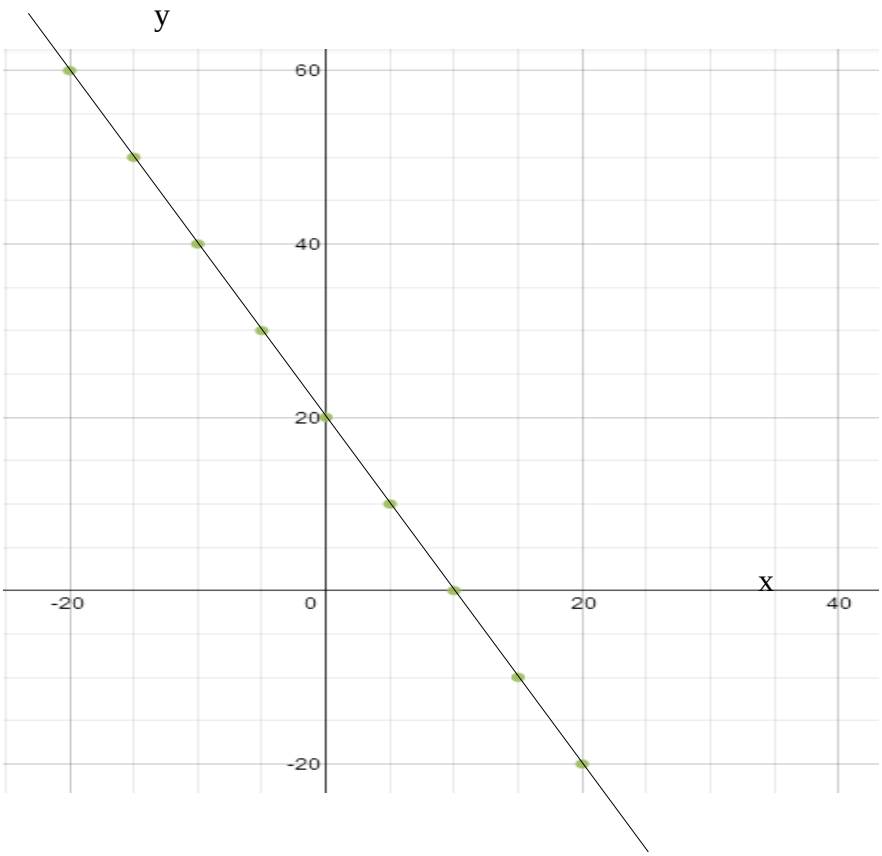
169. Find f(4) when $f(g) = 3g^2 - 2g - 1$

A. 56 B. 39 C. 15 D. 55 E. None of the above

170. Solve for all values: $(z - 6)(z + 17) = 0$

A. 6, 17 B. 6, -17 C. -6, 17 D. -6, -17 E. None of the above

171. Which table of values is graphed?



A.

Data 1	
x	y
20	20
10	15
0	10
-10	5
-20	0
-30	-5
-40	-10
-50	-15
-60	-20

B.

Data 2	
x	y
1	9
2	8
3	7
4	6
5	5
6	4
7	3
8	2
9	1

C.

Data 3	
x	y
17	25
14	20
11	15
8	10
5	5
2	0
-1	-5
-4	-10
-7	-15

D.

Data 4	
x	y
25	40
20	35
15	30
10	25
5	20
0	15
-5	10
-10	5
-15	0

E.

Data 5	
x	y
-20	60
-15	50
-10	40
-5	30
0	20
5	10
10	0
15	-10
20	-20

172. Simplify the expression using scientific notation: $\frac{7\times10^{3}}{8\times10^{8}}$

A. 8.75×10^{11} B. 8.75×10^{5} C. 0.875×10^{-5} D. 8.75×10^{-5} E. None of the above

173. Factor completely: $12u - 60$

A. $4(3u - 15)$ B. $12(u - 5)$ C. $3(4u - 20)$ D. $4(3u - 15)$ E. None of the above

174. What is the solution to the equation? $5(y-7) = 5y + 35$

A. $x = 2\frac{3}{5}$ B. $x = -2\frac{3}{5}$ C. $x = \frac{11}{5}$ D. There is no solution.

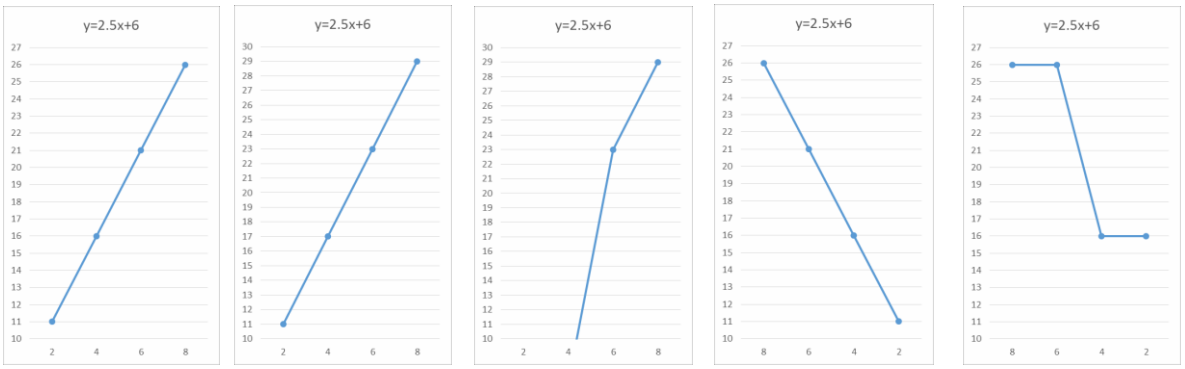
E. There are infinitely many solutions.

175. Factor completely: $4h^2 - 12h - 16$

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

176. Which graph shows the data for the linear equation: $y = 2.5x + 6$?

A. B. C. D. E.



177. Simplify: $-9(w - 2) + 5w$

A. $-14w + 18$ B. $14w + 18$ C. $-4w + 18$ D. $4w + 18$ E. None of the above

178. Write the equation in slope-intercept form: $15x - 3y = 30$

A. $y = -5x + 10$ B. $y = 5x + 10$ C. $y = 5x - 10$ D. $y = -5x - 10$ E. None of the above

179. Use the quadratic formula to solve for all solutions of: $7x^2 - 3x - 4 = 0$

Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

A. 1, -0.571 B. 11.062, -0.362

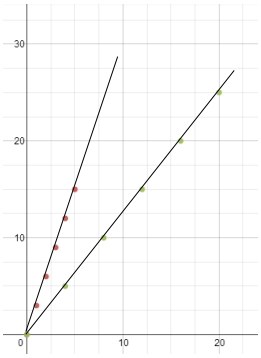
E. None of the above

C. -1, 0.571 D. -11.062, 0.362

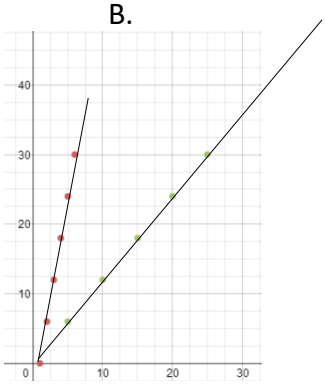
180. Given the two data sets below, select **the most correct graph** that shows the graphs of both data sets. The markings on the graphs are every 2 units.

Data 1		Data 2	
0	0	0	0
4	5	1	3
8	10	2	6
12	15	3	9
16	20	4	12
20	25	5	15

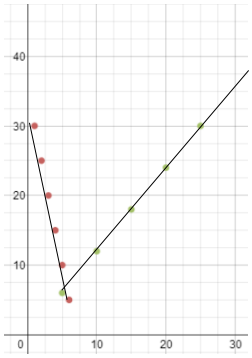
A.



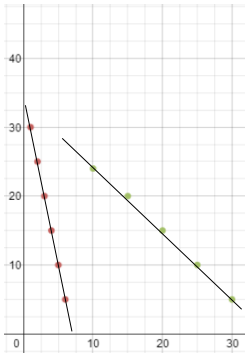
B.



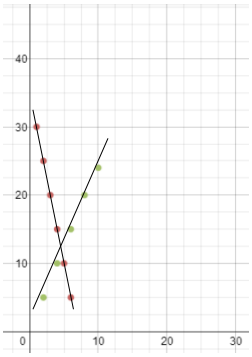
C.



D.



E.



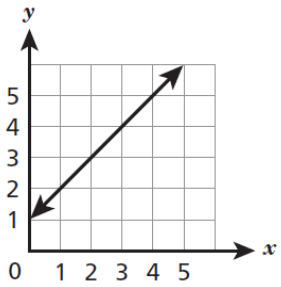
181. Simplify $\frac{4^8}{4^{-4}}$

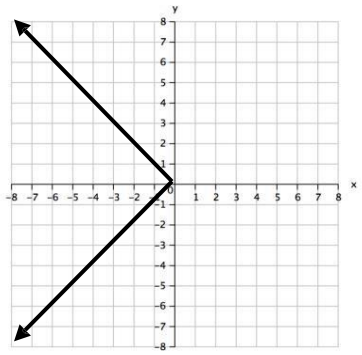
A. 4^{-32} B. 4^{-2} C. 4^4 D. 4^{12} E. None of the above

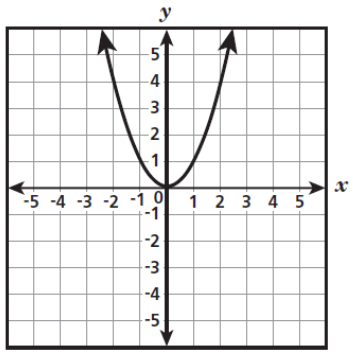
182. Solve the system: $5x + 3y = 2$
$2x + 2y = -6$

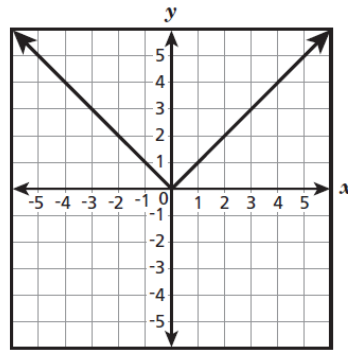
A. (-3, 3) B. (3, 3) C. (-3, -3) D. (3, -3) E. None of the above

183. Which graph below does **not** represent a function?

A 

C 

B 

D 

E. All graphs represent a function.

184. A lab has two bacteria cultures. Culture A contains 3×10^5 bacteria, and culture B contains 6×10^8 bacteria./ How do the two cultures compare in size?

A. Culture A contains twice as many as bacteria as culture B.

B. Culture A contains $\frac{1}{2}$ as many bacteria as culture B.

C. Culture A contains $\frac{1}{25}$ as many bacteria as culture B.

D. Culture A contains $\frac{1}{50}$ as many bacteria as culture B.

E. None of the above

185. Four kg of cashews cost \$9/kg were combined with 5 kg of almonds which cost \$6 per kg. Find the cost per kg if these quantities of nuts are mixed (to the nearest penny).

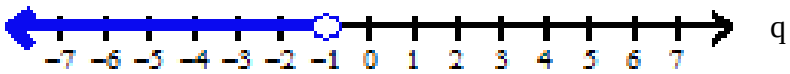
A. \$6.67 B. \$7.33 C. \$7.50 D. \$15.00 E. None of the above

186. Divide: $(h^2 + 4h - 6) \div (h - 2)$

A. $(h+2)+\frac{6}{h-2}$ B. $(h+6)+\frac{3}{h-2}$ C. $(h+2)+\frac{-6}{h-2}$ D. $(h+6)+\frac{6}{h-2}$

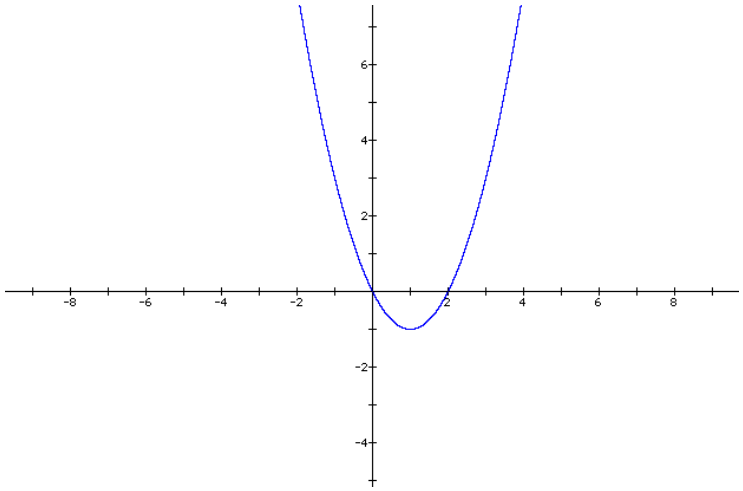
E. None of the above

187. Which inequality is graphed:



A. $q < -1$ B. $q \leq -1$ C. $q > -61$ D. $q \geq -1$ E. None of the above

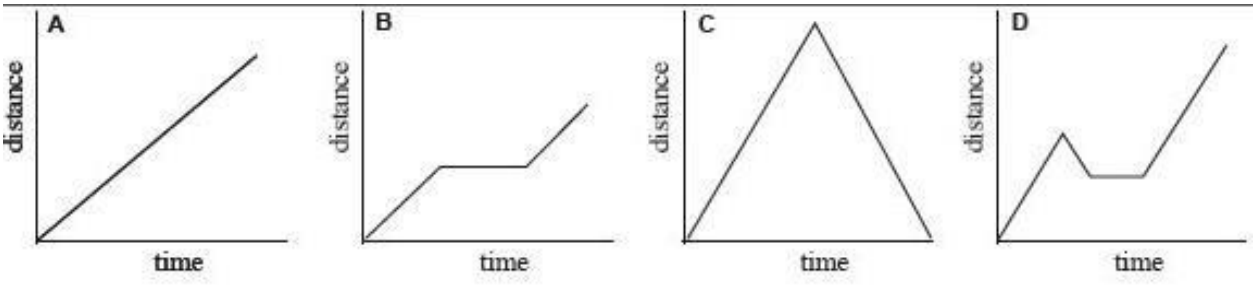
188. Which equation models the following parabolic graph.



A. $y = x^2 + 1$ B. $y = x^2 - 2x$ C. $(y + 1) = (x - 1)^2$ D. $(y - 1) = (x + 1)^2$

E. None of the above

189. Which graph would best fit the following scenario?
You start at home and drive for a given amount of time, stop for awhile, then continue on.



F. None of the above

190. A student drove from home to school at an average speed of 20 kph (km/hr) where a rocket-car was waiting. The student boarded the rocket-car at school and "jetted" to the school-district offices at an average speed of 60 kph. The entire distance was 100 km; the entire trip took two hours. Find the distance from home to school?

A. 40 km B. 20 km C. 5 km D. 10 km E. None of the above

Shade the correct answer!
Example: A ● C D E

Name_____

School _____

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

Shade the correct answer!
Example: A ● C D E

Name_____

School _____

ANSWER KEY

151. A ● C D E
152. A ● C D E
153. A ● C D E
154. A B ● D E
155. ● B C D E
156. A B C ● E
157. A B C D ●
158. A B ● D E
159. A ● C D E
160. A B C ● E
161. A B C D ●
162. A B ● D E
163. A ● C D E
164. A B ● D E
165. A B ● D E
166. A B C ● E
167. ● B C D E
168. A B ● D E
169. A ● C D E
170. A B C D E

171. A B C ● E
172. A ● C D E
173. A B C ● E
174. A ● C D E
175. ● B C D E
176. A B ● D E
177. A B ● D E
178. A B ● D E
179. ● B C D E
180. A B C ● E
181. ● B C D E
182. A B ● D E
183. A B C ● E
184. A ● C D E
185. A B C ● E
186. ● B C D E
187. A B ● D E
188. A ● C D E
189. A B C ● E
190. A B C D E