Kansas City Area Teachers of Mathematics
2015 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.
- 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."

e.g. 3 + 4 =

A. 4 B. 5 C. 6 D. 8 E. not given

Student Name _____ Student Number _____

School _____

151. Find an equivalent expression for -7(x + 8) + 2x + 14.

A. 5x + 22 B. -5x + 22 C. -5x - 42 D. -7x -42 E. not given

152. Three fourths of a number and 7 is 19. What is the number?

A. 16 B. 20 C. 32 D. 36 E. not given

153. Solve for x. $\frac{4}{x} = \frac{x}{9}$

A. 6 B. 5 C. 6 and -6 D. 4 and -4 E. not given

154. Solve for x. 4x – 15 = 13

A. 3 B. 4 C. 5 D. 7 E. not given

155. A food store has two vats of fresh black olives weighing 2.2kg each. At the end of the day, the total quantity of fresh black olives was 3.5 kg. What quantity of fresh black olives was sold that day?

A. 0.7kg B. 0.8kg C. 0.9kg D. 1.3kg E. not given

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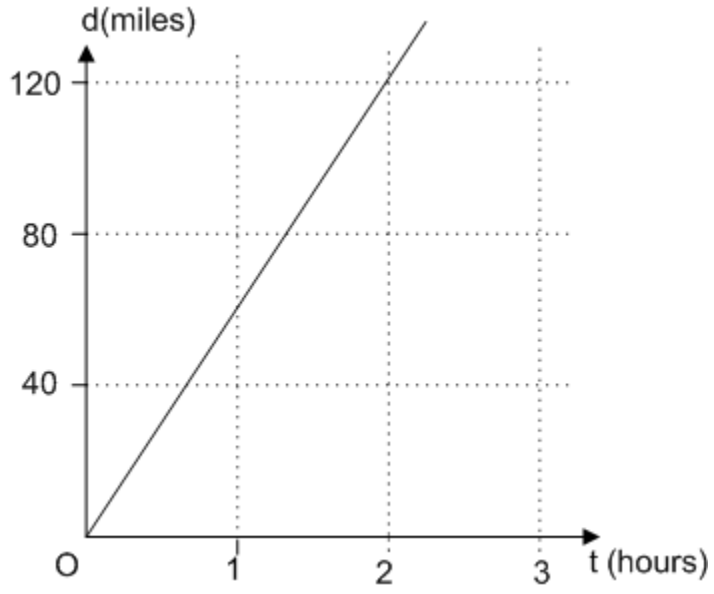
156. A vehicle travels **at constant speed** as shown in the graph below:



How far would the car go in 5 hours if the pattern continued?

A. 250 mi. B. 275 mi. C. 300 mi. D. 350 mi. E. not given

157. Solve for x: 15x = 9

A. $1\frac{2}{3}$ B. $\frac{3}{5}$ C. $\frac{5}{9}$ D. 135 E. not given

158. Isolate the radius (*r*) in the formula for the circumference of a circle: $C = 2\pi r$

A. $r = \frac{C}{2}$ B. $r = \frac{C}{2}\pi$ C. $r = \frac{C}{2\pi}$ D. $r = \frac{2C}{\pi}$ E. not given

159. Identify an equivalent expression for $8x - 7x^2 + 5x + x - 3 + 9x^2 - 14$.

A. $2x^2 + 3x - 17$ B. $-2x^2 + 6x + 17$ C. $2x^2 + 14x + 11$

D. $2x^2 + 14x - 17$ E. not given

160. Solve for *x*: $\frac{2x-5}{12} = \frac{7}{3}$

A. x = 11.5 B. x = 16.5 C. x = 15 D. 4 E. not given

161. Each piece of candy costs 52 cents. The price of "n" pieces of candy is $9.36. Which equation represents how to set the problem up to solve for n?

A. 0.52 x n = 936 B. 0.52 x n = 9.36 C. n = 936/0.52

D. 9.36/52 = n E. not given

162. Which equation below could represent "Thirteen is seventeen less than four times a number"?

A. 13 = 17 – 4n B. 13 – 17 = 4n C. 13 = 4n – 17

D. 17 = 4n - 13 E. not given

163. Which equation below could represented "The quotient of fifty and five more than a number is ten"?

A. $\frac{50}{n+5} = 10$ B. $\frac{10}{n+5} = 50$ C. $\frac{n+5}{50} = 10$

D. $\frac{n+5}{10} = 50$ E. not given

164. Kelsey had $197 in his savings account before he deposited all of his weekly salary for 3 weeks. His current savings balance is $878. If Kelsey deposits all of the weekly earnings, how much money did Kelsey earn each week?

A. $219.50 B. $293.67 C. $287 D. $227 E. not given

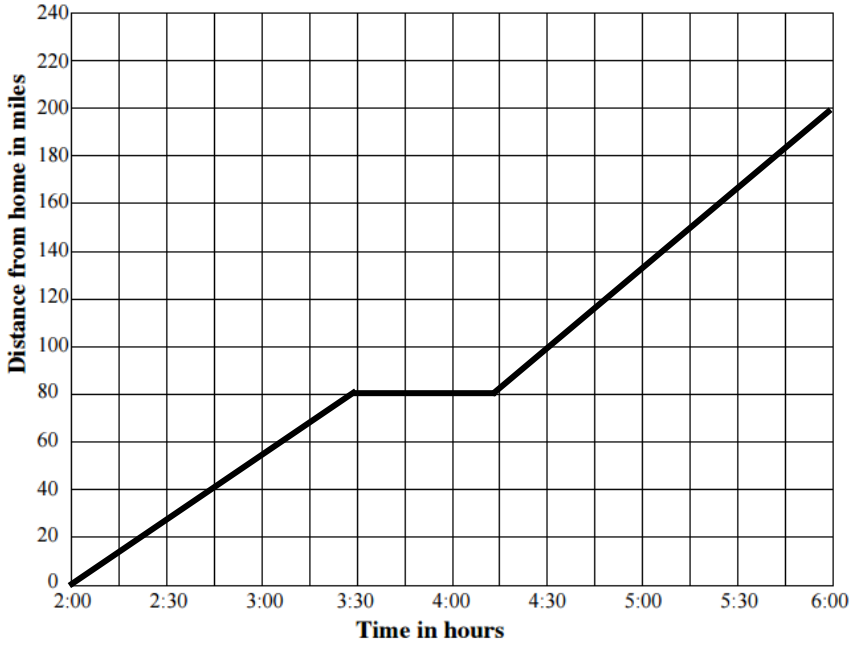
165. One benefit of working for a company is getting a discount on your merchandise. **You get a 15% employee discount, and then you get another 10% discount off the sale price**. How much would a purchase of an item that normally costs $70 cost an employee?

A. $53.55 B. $52.50 C. $45.00 D. $66.50 E. not given

166. Find the value of: $\dfrac{2.1\times10^{6}}{7\times10^{3}}$

A. 3 B. 30 C. 300 D. 3000 E. not given

Use the following coordinate grid for problems 167-169.



167. What was the rate in miles per hour (to the nearest tenth) from 2:00 to 3:30?

A. 58.5 mph B. 60.0 mph C. 53.3 mph D. 40.0 mph E. not given

168. Which scenario could have happened from 3:30-4:15?

A. Driving break B. Stopped to visit grandma C. Napped at a rest stop
D. Took a hike E. All of the above

169. What was the rate in miles per hour (to the nearest tenth) from 4:15-6:00?

A. 68.6 mph B. 60 mph C. 58.5 mph D. 69.2 mph E. not given

170. Logan is organizing a trip to the Plaza for his parents' anniversary party for 75 people. The following two options are being explored:

- Using all small taxi cabs. Each costs $40 for the trip and holds 4 people. *Need:* ____ *taxis*
- Using all large taxi cabs. Each costs $63 for the trip and holds 7 people. *Need:* ____ *taxis*

What is the difference in cost for Logan in planning for the 75 people taking taxis?

A. $67 B. $73 C. $75 D. $65 E. not given

171. **In order, which properties are demonstrated?**

$$-2(5x - 7) = 8$$
$$-10x + 14 = 8$$
$$-10x = -6$$
$$x = 3/5$$

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

172. **Evaluate:** $(2^3 – 2^2) \times 5 - 3^3$

A. -7 B. 1 C. -10 D. -17 E. not given

173. **Factor completely**: $4x^2 – 8x + 12$

A. $2(2x^2 – 4x + 6)$ B. $4(x^2 – 2x + 3)$ C. $2(x – 3)(x – 1)$
D. $4x(x^2 – 2x + 3)$ E. not given

174. What is the **perimeter of a square** with sides lengths of $3x – 1$?

A. $12x - 4$ B. $12x + 4$ C. $9x^2 - 1$ D. $9x^2 – 6x + 1$ E. not given

175. What is the greatest common factor (GCF) of $9x^2y$ and $18x^3y$?

A. $3xy$ B. $9xy$ C. $9x^2y$ D. $18x^2y$ E. not given

176. What is the least common multiple (LCM) of $24n^3$ and $36n^2$?

A. $3n^2$ B. $12n^2$ C. $72n^2$ D. $72n^3$ E. not given

177. Choose an equivalent form of the fraction: $\frac{8m^2n}{2mn}$

A. $4m^2$ B. $6m$ C. $4m$ D. $4mn$ E. not given

178. Which of the following is the **same value** as $\sqrt{2}$?

A. $2^{1/2}$ B. 2^0 C. $\frac{1}{\sqrt{2}}$ D. $\sqrt{4}$ E. not given

179. Multiply: $(3x – 4)(x + 7)$

A. $3x^2 – 28$ B. $3x^2 – 25x – 28$ C. $3x^2 + 17x – 28$
D. $3x^2 – 17x + 28$ E. not given

180. Factor: $16n^2 - 25$

A. $(4n – 5)^2$ B. $(4n – 5)(4n + 5)$ C. $(8n – 5)(8n + 5)$
D. $(2n – 5)(8n + 5)$ E. not given

181. Choose an equivalent form of $\frac{x^2-x-6}{(x-3)}$.

A. (x + 2) B. (x – 2) C. (x – 3) D. (x + 3) E. not given

182. The following equations are for the problem below.

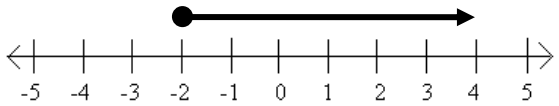
3b + 4c = $12.95
4b + 2c = $14.60

Sal buys 3 bags of potato chips and 4 candy bars and spends $12.95
Jose buys 4 bags of potato chips and 2 candy bars and spends $14.60 from the same store.
What is the cost of each item?

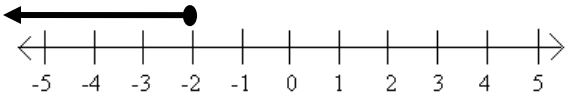
A. Potato chips cost $3.15 and candy bars cost $0.50.
B. Potato chips cost $3.25 and candy bars cost $0.80.
C. Potato chips cost $3.50 and candy bars cost $0.75.
D. Potato chips cost $3.65 and candy bars cost $0.70.
E. not given

183. Which graph shows the **solution** to the inequality? **$-2x + 7 \leq 3$**

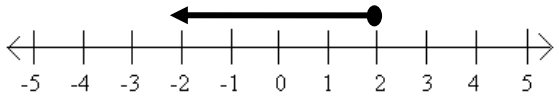
A.



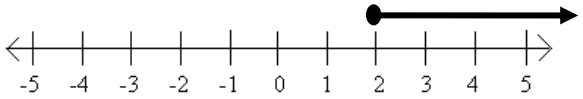
B.



C.



D.



E. not given

184. Evaluate: $\frac{6!}{(6-2)!2!}$

A. 15 B. 12 C. 3/4 D. 7.5 E. not given

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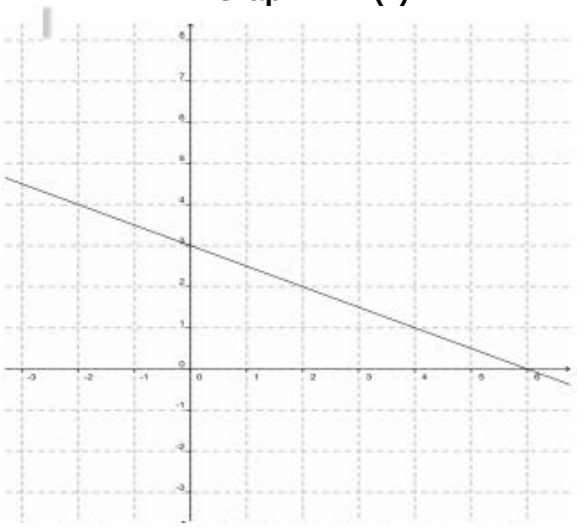
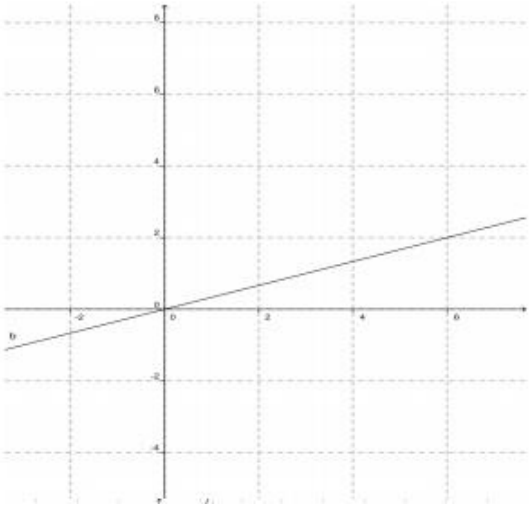
Use the graphs for problems 185-187.

Graph A: f(x)



Graph B: g(x)



185. Which equation represents the line in Graph A, the f(x) function?

A. f(x) = 1/2 x + 3 B. f(x) = - 1/6 x + 3 C. f(x) = - 1/2 x + 3
D. f(x) = - 3/4 x + 3 E. not given

186. Which equation represents the line in Graph B, the g(x) function?

A. g(x) = - 1/3 x B. g(x) = 1/3 x C. g(x) = 6x
D. g(x) = - 1/6 x E. not given

187. What is the value of **f(g(6))?**

A. 0 B. 6 C. 4 D. 2 E. not given

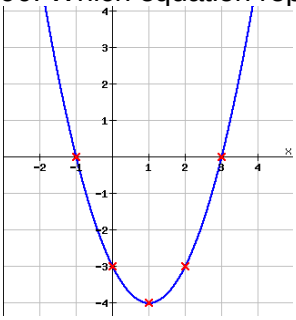
188. What is the solution to the following compound inequality**?** **-16 < 3p - 4 < 5**

A. -4 < p < 3 B. -6 < p < 2 C. -6 2/3 < p < 1/3
D. -5 < p < 3 E. not given

189. What if the linear equation in **slope-intercept form** for a line going through (2, 6) and (3, 4)?

A. y = 2x + 6 B. y = 3x + 4 C. y = - x + 2 D. y = -2x + 10 E. not given

190. Which equation represents the quadratic below?



A. y = (x – 4)(x) B. y = (x + 1)(x – 3)
C. y = (x – 1)(x – 3) D. y = (x – 3)(x – 4)
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 – 3.19.15 JH

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