Kansas City Area Teachers of Mathematics
2018 KCATM Math Competition

ALGEBRA
GRADE 8

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may use calculators**.
- Mark your answer on the answer sheet by **FILLING in the oval**.
- Letter **"E" is "None of the above"**, which is a correct answer for some of the problems.

Student _____ # _____

School _____

151. Which of the following is an equation in point-slope form?

A. $y = \frac{2}{3}x - 7$ B. $m = \frac{7-3}{2-4}$
C. $4x - 7y = 2$ D. $y - 8 = 3(x + 2)$
E. None of the above

152. Which of the equations is not equivalent to the others?

A. $6x - 12y = 4$ B. $y = \frac{1}{2}x + \frac{1}{3}$
C. $y - \frac{2}{3} = \frac{1}{2}(x - 2)$ D. all are equivalent
E. none are equivalent

153. Which of the following is an example of the commutative property?

A. $2(3x + 7) = 6x + 14$ B. $(3 \cdot 6) \cdot 7 = 3 \cdot (6 \cdot 7)$
C. $6 + x + 7 = x + 6 + 7$ D. $8 + (-8) = 0$
E. None of the above

154. What is the least common multiple of 8, 20 and 36?
A. 4 B. 8 C. 36 D. 360
E. None of the above

155. What is the greatest common factor of $9x^9y^4$, $3x^6y^4$ and $12x^{12}y^8$?
A. $36x^{36}y^8$ B. $36x^{12}y^8$ C. $3x^3y^4$ D. $3x^6y^4$
E. None of the above

For 156-159, solve each equation.

156. $\frac{1}{2}x^2 - 10 = 8$

A. $x = 6$ B. $x = -6$ C. $x = 6$ or -6 D. $x = 2$ or -2
E. None of the above

157. $\frac{x-4}{3} = 3$

A. $x = 4\frac{1}{3}$ B. $x = 5$ C. $x = 13$ D. $x = 21$
E. None of the above

158. $3(2x – 3) = -9$

A. $x = 0$ B. $x = 3$ C. $x = 6$ D. $x = -3$
E. None of the above

159. $6x – 3(2x + 4) = 2x – 2(x + 8)$

A. $x = 6$ B. $x = -6$ C. $x = -4$ D. $x = 0$
E. None of the above

160. Simplify the expression $2x – 3x^2 + 7(x + 1) + 4x^2 – 1$.

A. $7x^2 + 9x$ B. $-7x^2 - 5x - 8$
C. $x^2 + 3x + 6$ D. $x^2 + 9x + 6$
E. None of the above

161. What is the value of $f(-3)$ if $f(x) = 4x^2 – 7x + 3$?

A. -12 B. 18 C. 48 D. 60
E. None of the above

162. Which of the following is a polynomial of degree 3?

A. $X^3 – 7$ B. $3x - 3$
C. $3x^2 – 3x + 3$ D. $8x – 4 + x^2$
E. None of the above

163. What is the slope and y-intercept of the equation $y = -3x + 7$?

A. slope = -3, y-int = (0, 7) B. slope = 7, y-int = (0, -3)
C. slope = 3, y-int = (0, 7) D. slope = $-\frac{3}{7}$, y-int = (7, 0)
E. None of the above

164. What is the slope and y-intercept of the equation $x = 4$?

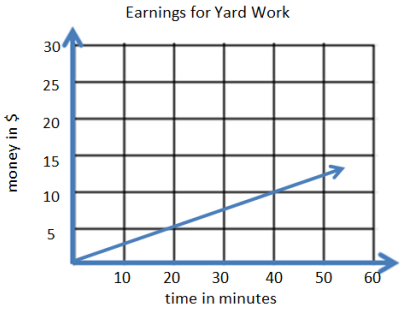
A. slope = undefined, y-intercept = (0, 4)
B. slope = 0, y-intercept = (0, 4)
C. slope = 4, y-intercept = (0, 0)
D. slope = 4, y-intercept = undefined
E. None of the above

165. Which of the following is a solution to both $y < 2x + 6$ and $x \leq 4y - 7$?

A. (-7, 0) B. (6, 0) C. $(\frac{-17}{7}, \frac{8}{7})$ D. $(\frac{-3}{7}, \frac{-6}{7})$

E. None of the above

Refer to the graph for #166-168.



166. What is the hourly rate?

A. $2.50 per hour B. $4 per hour
C. $5 per hour D. $30 per hour
E. None of the above

167. How much money would you make if you worked 20 hours?

A. $600.00 B. $300.00 C. $80.00 D. $5.00
E. None of the above

168. If your friend earns $0.45 per minute, who makes more money in 80 minutes and how much more?

A. you; $164 B. you; $16
C. friend; $164 D. friend; $16
E. None of the above

169. Translate the words into an algebraic expression:

"seventeen less than the product of eight and a number is four more than one half that number"

A. $17 - 8n = 4(\frac{1}{2} + n)$ B. $(17 - 8)n = (4 + \frac{1}{2})n$ C. $8n - 17 = \frac{1}{2}n + 4$
D. $17 - 8n = \frac{1}{2}n + 4$
E. None of the above

170. Multiply $(3x - 4)(3x + 4)$.

A. $9x^2 - 16$ B. $9x^2 - 24x - 16$
C. $9x^2 + 24x - 16$ D. $9x^2 + 16$
E. None of the above

171. Simplify $-3\sqrt{14} \cdot 8\sqrt{21}$

A. $-24\sqrt{294}$ B. $-11\sqrt{294}$ C. $-168\sqrt{6}$ D. $-168\sqrt{42}$
E. None of the above

172. Write $2\sqrt{88}$ in simplest radical form.

A. $16\sqrt{11}$ B. $4\sqrt{22}$ C. $8\sqrt{11}$ D. $4\sqrt{22}$
E. None of the above

For 173-175, solve each equation.

173. $2x^2 + 4 = 16 - 2x$

A. x = 0 B. x = -2, 3 C. x = -3, 2
D. no real solution E. None of the above

174. $x^2 - 12x + 36 = 0$

A. x = -6, 6 B. x = -6, 0 C. x = 6 D. x = -9, -4
E. None of the above

175. $4x^2 - 88 = 56$

A. x = -6, 6 B. $x = -\sqrt{22}$, $\sqrt{22}$
C. $x = -2\sqrt{2}$, $2\sqrt{2}$ D. x = 6, $\sqrt{22}$
E. None of the above

For 176-177, factor each expression.

176. $x^2 + 2x - 24$

A. (x + 2) (x – 24) B. x (x + 2) = 24
C. (x – 6) (x + 4) D. (x – 4) (x + 6)
E. None of the above

177. $3x^2 - 12x$

A. 3 (x^2 – 4) B. 3x (x – 4)
C. x^2 (3x – 12) D. cannot be factored
E. None of the above

178. Simplify $4ab\ (-2a^3b^{-3})^2\ (2ab^2)$.

A. $\frac{-16a^8}{b^3}$ B. $\frac{16a^8}{b^3}$ C. $-16a^{11}b^{12}$ D. $\frac{16a^{11}}{b^{12}}$
E. None of the above

179. Find the sum of $(8x^2 – 7x + 4)$ and $(2x^2 + 3x – 6)$.

A. $16x^2 – 21x – 24$ B. $10x^2 – 4x – 2$
C. $10x^2 – 4x – 10$ D. $6x^2 – 10x + 10$
E. None of the above

180. Find the difference of $(3x^3 – 8x – 4) – (2x^2 + 4x – 7)$.

A. $3x^3 - 2x^2 – 12x + 3$ B. $x^3 – 4x – 11$
C. $3x^3 - 2x^2 – 4x – 11$ D. $3x^3 - 2x^2 – 12x – 11$
E. None of the above

181. Find the value of f(-3) for $f(x) = 2x + |x – 7|$.

A. -16 B. -4 C. 10 D. 4
E. None of the above

182. Find the value of f(g(2)) for $f(x) = \frac{1}{3}x – 8$ and $g(x) = -4x + 17$.

A. $-7\frac{1}{3}$ B. 9 C. $46\frac{1}{3}$ D. -5
E. None of the above

183. What is the equation of the line that contains the points (-3,6) and (4,2)

A. $y = -\frac{4}{7}x - 4$ B. $y – 2 = -\frac{4}{7}(x – 4)$

C. $4x - 7y = 30$ D. $y – 6 = -\frac{7}{4}n + 3$

E. None of the above

184. Which is the point of intersection for the pair of lines?

$y = \frac{1}{3}x + 5$ and $y = 3x + 21$

A. (3, -6) B. (-6, 3) C. (5, 21)
D. They do not intersect. E. None of the above

185. What is the slope of the line that has an x-intercept of 6 and a y-intercept of 9?

A. $\frac{6}{9}$ B. $\frac{9}{6}$ C. $\frac{2}{3}$ D. $\frac{3}{2}$
E. None of the above

186. What is the slope of the line that goes through the point (6,2) and has a y intercept of -3?

A. $-\frac{2}{3}$ B. $-\frac{5}{6}$ C. $\frac{6}{5}$
D. $\frac{5}{6}$ E. None of the above

187. Which of the following is a solution to the inequality $|x - 3| < 4$?

A. $x = -1$ B. $x = 2$ C. $x = 7$
D. $x = 8$ E. None of the above

188. Which of the following equations has a slope of 1?

A. $y - 8 = x + 3$ B. $3x + 8y = 12$ C. $x = 1$
D. $y = 7$ E. None of the above

189. If the equation $s = 15w + 115$ represents your savings *(s)* after some number of weeks *(w),* which of the following is true?

A. You start with $15 and save $115 per week.
B. You start with $115 and save $1 every 15 weeks.
C. After 10 weeks, you have $265.
D. In 3 weeks, you have $360.
E. None of the above

190. If a graph shows the hours remaining that a college student needs to take to complete his/her major with hours on the y-axis and semesters in college on the x-axis, what does the y-intercept represent?

A. It shows the number of credit hours needed each semester.
B. It shows the cost of each credit hour.
C. It shows how many semesters it takes to graduate.
D. It shows how many credits are needed to graduate.
E. None of the above.