

# Kansas City Area Teachers of Mathematics 2014 KCATM Math Competition

## **ALGEBRA GRADE 8**

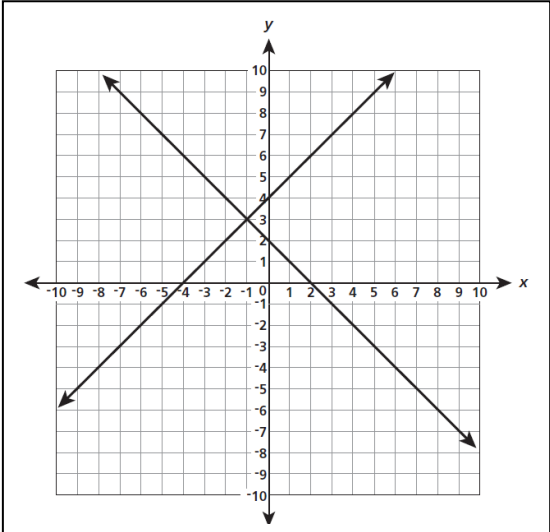
### INSTRUCTIONS

- **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  $\pi$ .

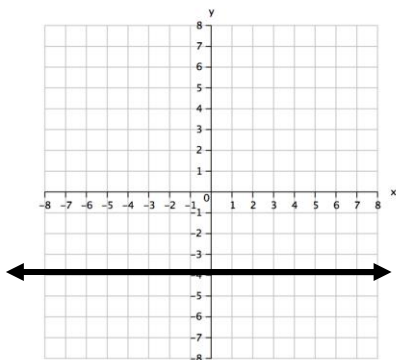
Student Name \_\_\_\_\_ Student Number \_\_\_\_\_

School \_\_\_\_\_

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

	<p>A <math>(-4, 2)</math></p> <p>B <math>(-1, 3)</math></p> <p>C <math>(0, 2)</math></p> <p>D <math>(2, 4)</math></p> <hr style="border: 0.5px solid black;"/> <p>E None of the above</p>
---	---

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:  $3^2 \times 3^{-5}$

- A.  $3^{-3}$
- B.  $1/27$
- C.  $1/3^3$
- D.  $-1$
- E. None of the above

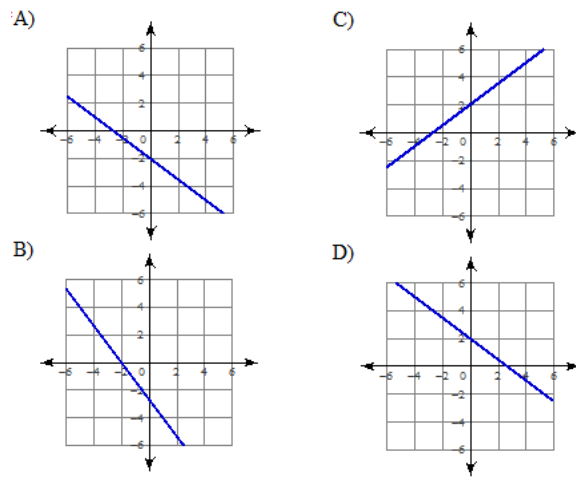
154. The sum of the digits of a certain two-digit number is 7. When you reverse its digits you increase the number by 9. Find the number.

- A. 61
- B. 34
- C. 52
- D. 43
- E. All of the above

155. Evaluate the logarithm:  $\log_4 256 = x$

- A.  $1/4$
- B. 8
- C. 4
- D. 64
- E. None of the above

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

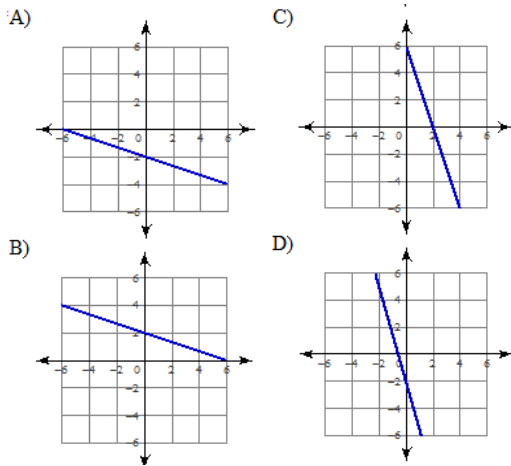


E) None of the above

157. Simplify the expression:  $\frac{18x - 3}{-6}$

- 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?



E) None of the above

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

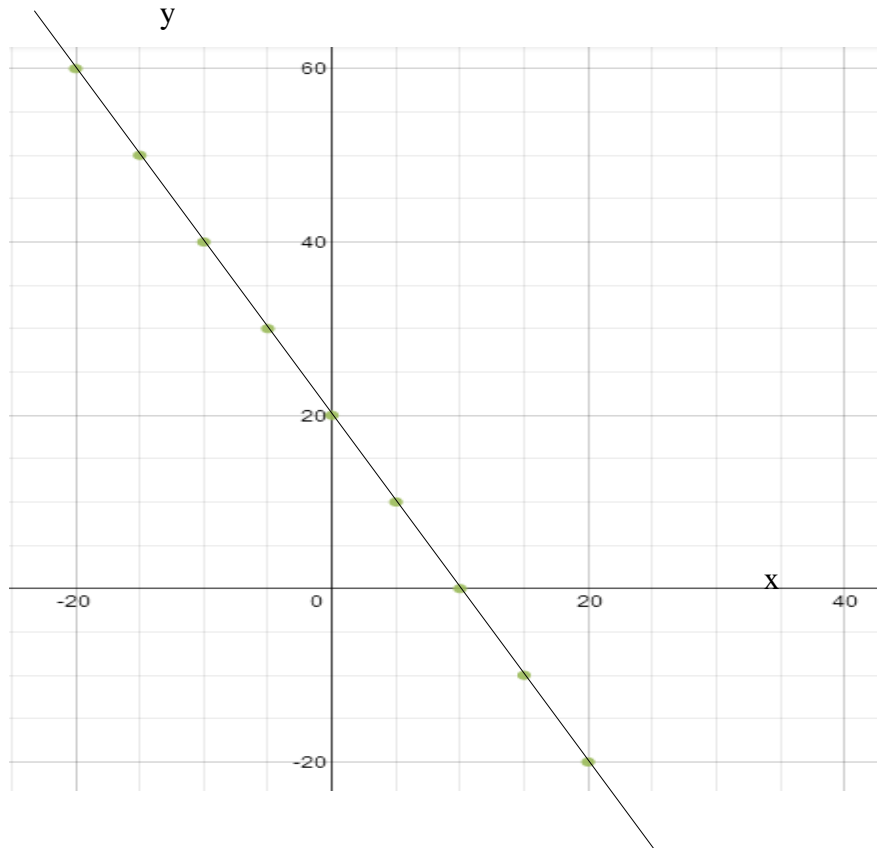
- A.  $3/8$     B.  $3/-8$     C.  $11/8$     D.  $11/-8$     E. None of the above

160. Solve:  $-21 = 3(x - 1)$

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

161. Solve:  $\frac{7}{3} = \frac{n}{18}$
- A. 22                      B.  $11/6$                       C. 21                      D. 42                      E. None of the above
162. Solve:  $|x| = -23$
- A. -23                      B. 23                      C. 23 and -23                      D. -20                      E. None of the above
163. Simplify the expression:  $9 - 4t + 5 - 7t$
- A.  $-3t + 14$                       B.  $11t + 14$                       C.  $-11t + 14$                       D.  $-11t - 4$                       E. None of the above
164. Find the midpoint between the points  $(-9, 13)$  and  $(-3, 1)$ .
- A.  $(6, 6)$                       B.  $(-6, 7)$                       C.  $(-3, 6)$                       D.  $(6, 7)$                       E. None of the above
165. Simplify the expression:  $(3x)^2(2x)^3$
- A.  $72x^6$                       B.  $36x^5$                       C.  $72x^5$                       D.  $36x^6$                       E. None of the above
166. Simplify the radical:  $2\sqrt{98}$
- A.  $\sqrt{392}$                       B.  $7\sqrt{8}$                       C.  $14\sqrt{2}$                       D.  $9\sqrt{2}$                       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  $(-5, 2)$  and  $(4, -5)$  on a coordinate graph. Round the answer to the nearest thousandth.
- A. 5.657                      B. 11.401                      C. 3.163                      D. 11.402                      E. None of the above
168. Factor:  $p^3 - 125$
- A.  $(p - 5)(p^2 + 5p + 25)$                       B.  $(p - 5)(p^2 - 5p + 25)$   
C.  $(p + 5)(p^2 - 25)$                       D.  $(p - 5)(p^2 + 25)$   
E. None of the above
169. Find  $f(3)$  when  $f(v) = 3v^2 - 7v + 5$
- A. 43                      B. 53                      C. 11                      D. 2                      E. None of the above
170. Solve for all values:  $(x - 9)(x + 8) = 0$
- A. 9, 8                      B. 9, -8                      C. -9, 8                      D. -9, -8                      E. None of the above

171. Which table of values is graphed?



A.		B.		C.		D.		E.	
Data 1		Data 2		Data 3		Data 4		Data 5	
x	y	x	y	x	y	x	y	x	y
20	20	1	9	17	25	25	40	-20	60
10	15	2	8	14	20	20	35	-15	50
0	10	3	7	11	15	15	30	-10	40
-10	5	4	6	8	10	10	25	-5	30
-20	0	5	5	5	5	5	20	0	20
-30	-5	6	4	2	0	0	15	5	10
-40	-10	7	3	-1	-5	-5	10	10	0
-50	-15	8	2	-4	-10	-10	5	15	-10
-60	-20	9	1	-7	-15	-15	0	20	-20

172. Simplify the expression using scientific notation:  $\frac{3 \times 10^8}{5 \times 10^3}$

- A.  $6 \times 10^{11}$     B.  $6 \times 10^5$     C.  $0.6 \times 10^5$     D.  $6 \times 10^4$     E. None of the above

173. Factor completely:  $15k - 45$

- A.  $5(3k - 9)$     B.  $15(k - 3)$     C.  $3(5k - 15)$     D.  $5(3k + 9)$     E. None of the above

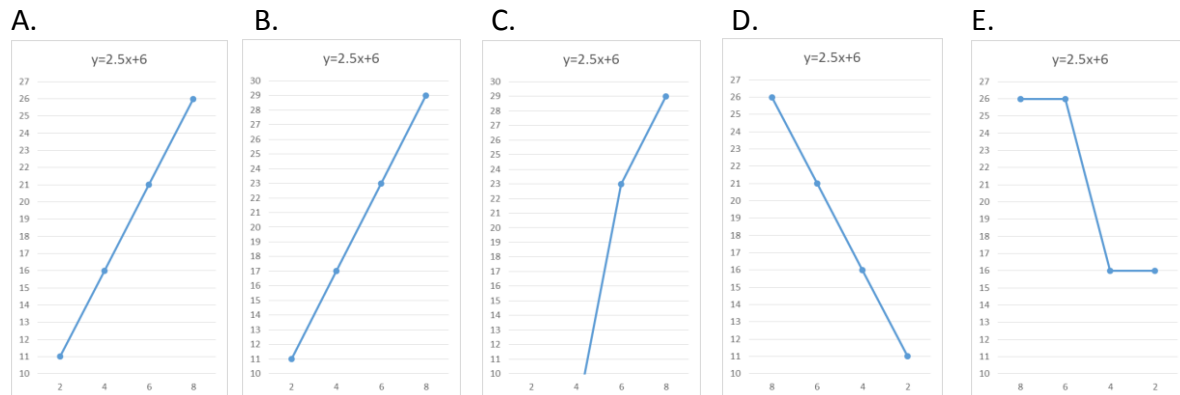
174. What is the solution to the equation?  $2(x-3) = 2x + 5$

- A.  $x = 2\frac{3}{4}$     B.  $x = -2\frac{3}{4}$     C.  $x = \frac{11}{4}$     D. There is no solution.  
E. There are infinitely many solutions.

175. Factor completely:  $6x^2 - 18x - 24$

- A.  $3(2x^2 - 6x - 8)$     B.  $6(x - 4)(x + 1)$   
C.  $(x + 1)(x - 24)$     D.  $3(2x - 8)(x + 1)$     E. None of the above

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



177. Simplify:  $-7(w - 3) + 3w$

- A.  $-10w + 21$     B.  $10w + 21$     C.  $-4w + 21$     D.  $4w + 21$     E. None of the above

178. Write the equation in slope-intercept form:  $12x - 4y = 20$

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

179. Use the quadratic formula to solve for all solutions of:  $6x^2 - 2x - 1$

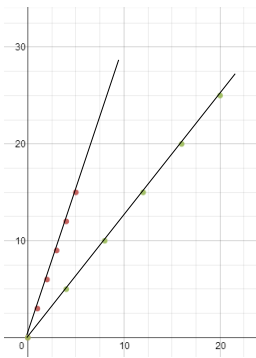
Quadratic formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

- A.  $-0.274, -0.608$     B.  $7.292, 3.292$     C.  $-0.274, 0.608$     D.  $-7.292, -3.292$   
E. None of the above

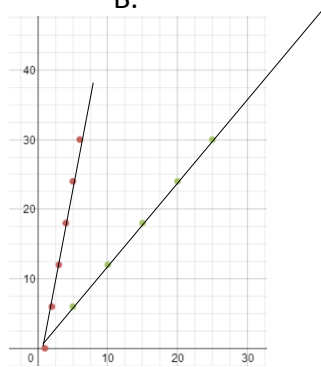
180. Given the two data sets below, select **the most correct graph** that shows the graphs of both data sets. The markings on the graphs are every 2 units.

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

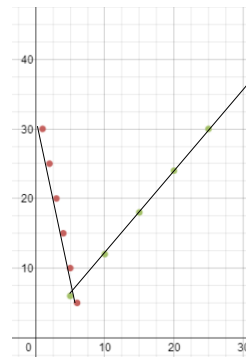
A.



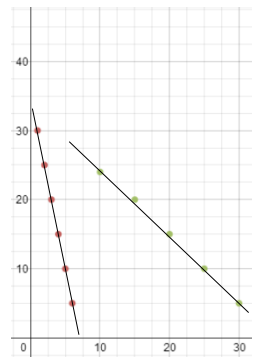
B.



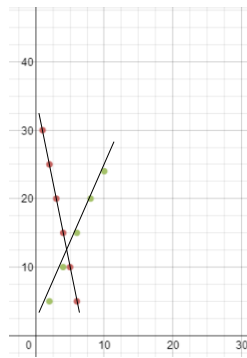
C.



D.



E.



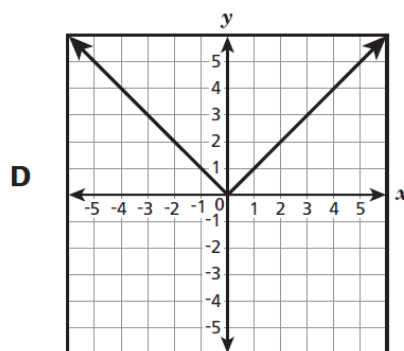
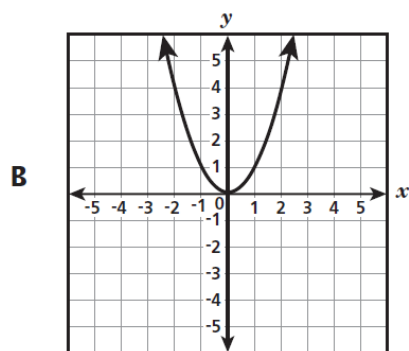
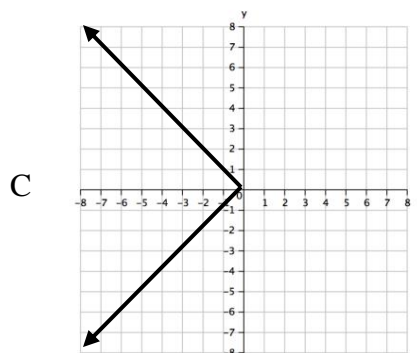
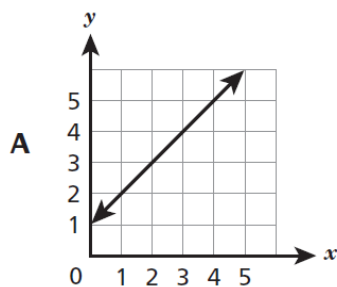
181. Simplify  $\frac{4^8}{4^{-4}}$

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

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

- 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?



E. All graphs represent a function.

184. A lab has two bacteria cultures. Culture A contains  $8 \times 10^4$  bacteria, and culture B contains  $4 \times 10^6$  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

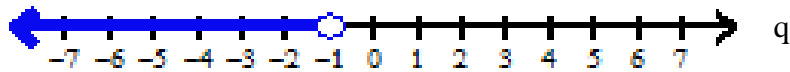
186. Divide:  $(h^2 + 4h - 6) \div (h - 2)$

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

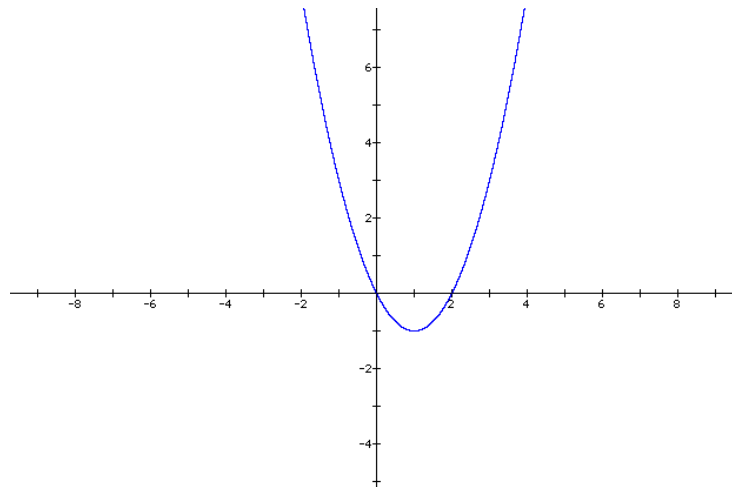


187. Which inequality is graphed:



- 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.

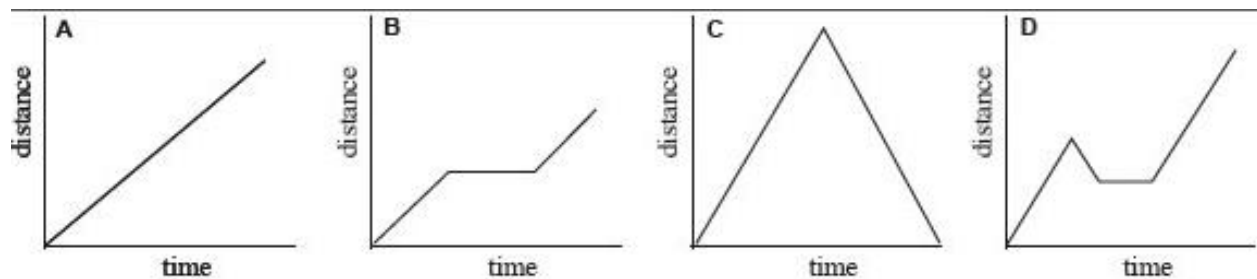


- A.  $y = x^2 + 1$       B.  $y = x^2 - 2x$       C.  $(y + 1) = (x - 1)^2$       D.  $(y - 1) = (x + 1)^2$

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

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  C D E

Name \_\_\_\_\_

School \_\_\_\_\_

**ANSWER KEY**

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