

- (A) $\frac{13}{48}$
 (B) $\frac{5}{12}$
 (C) $\frac{1}{2}$
 (D) $\frac{7}{12}$
 (E) $\frac{5}{8}$

113. If $a = -0.3$, which of the following is true?

- (A) $a < a^2 < a^3$
 (B) $a < a^3 < a^2$
 (C) $a^2 < a < a^3$
 (D) $a^2 < a^3 < a$
 (E) $a^3 < a < a^2$

114. Which of the following is the product of two integers whose sum is 11?

- (A) -42
 (B) -28
 (C) 12
 (D) 26
 (E) 32

115. Mary's income is 60 percent more than Tim's income, and Tim's income is 40 percent less than Juan's income. What percent of Juan's income is Mary's income?

- (A) 124%
 (B) 120%
 (C) 96%
 (D) 80%
 (E) 64%

- (A) $\frac{1}{2}$
 (B) 0
 (C) $\frac{1}{5}$
 (D) $\frac{1}{6}$
 (E) $\frac{1}{8}$

	City A	City B	City C	City D	City E
City A
City B
City C
City D
City E

116. Each • in the mileage table above represents an entry indicating the distance between a pair of the five cities. If the table were extended to represent the distances between all pairs of 30 cities and each distance were to be represented by only one entry, how many entries would the table then have?
- (A) 60
 (B) 435
 (C) 450
 (D) 465
 (E) 900

117. Which of the following has a value less than 1?

- (A) $2\left(\frac{7}{13}\right)$
 (B) $\frac{\sqrt{10}}{2}$
 (C) $\frac{2}{\sqrt{2}}$
 (D) $\frac{1}{2}$
 (E) $\left(\frac{9}{10}\right)^2$

118. The ratio of the length to the width of a rectangular advertising display is approximately 3.3 to 2. If the width of the display is 8 meters, what is the approximate length of the display, in meters?
- (A) 7
 (B) 11
 (C) 13
 (D) 16
 (E) 26

119. The average (arithmetic mean) salary of 15 people in the shipping department at a certain firm is \$20,000. The salary of 5 of the employees is \$25,000 each and the salary of 4 of the employees is \$16,000 each. What is the average salary of the remaining employees?

(A) \$19,250
 (B) \$18,500
 (C) \$18,000
 (D) \$15,850
 (E) \$12,300

120. David has d books, which is 3 times as many as Jeff and $\frac{1}{2}$ as many as Paula. How many books do the three of them have altogether, in terms of d ?

(A) $\frac{5}{6}d$
 (B) $\frac{7}{3}d$
 (C) $\frac{10}{3}d$
 (D) $\frac{7}{2}d$
 (E) $\frac{9}{2}d$

121. There are 8 teams in a certain league and each team plays each of the other teams exactly once. If each game is played by 2 teams, what is the total number of games played?

(A) 15
 (B) 16
 (C) 28
 (D) 56
 (E) 64

122. An operation θ is defined by the equation

$a \theta b = \frac{a - b}{a + b}$, for all numbers a and b such that $a \neq -b$. If $a \neq -c$ and $a \theta c = 0$, then $c =$

(A) $-a$
 (B) $-\frac{1}{a}$
 (C) 0
 (D) $\frac{1}{a}$
 (E) a

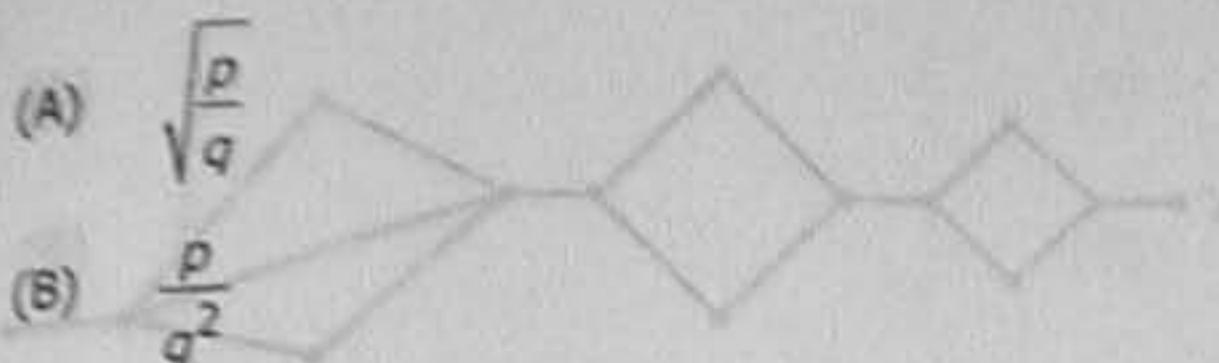
123. The price of lunch for 15 people was \$207.00, including a 15 percent gratuity for service. What was the average price per person, EXCLUDING the gratuity?

(A) \$11.73
 (B) \$12.00
 (C) \$13.80
 (D) \$14.00
 (E) \$15.87

124. According to a car dealer's sales report, $\frac{1}{3}$ of the cars sold during a certain period were sedans and $\frac{1}{5}$ of the other cars sold were station wagons. If N station wagons were sold during that period, how many sedans, in terms of N , were sold?

(A) $\frac{2}{15}N$
 (B) $\frac{3}{5}N$
 (C) $\frac{5}{3}N$
 (D) $\frac{5}{2}N$
 (E) $\frac{15}{2}N$

125. If $\frac{p}{q} < 1$, and p and q are positive integers, which of the following must be greater than 1?



- (A) $\frac{p}{q}$
 (B) $\frac{p}{q^2}$
 (C) $\frac{p}{2q}$
 (D) $\frac{q}{p^2}$
 (E) $\frac{q}{p}$

126. It would take one machine 4 hours to complete a large production order and another machine 3 hours to complete the same order. How many hours would it take both machines, working simultaneously at their respective constant rates, to complete the order?

- (A) $\frac{7}{12}$
 (B) $1\frac{1}{2}$
 (C) $1\frac{5}{7}$
 (D) $3\frac{1}{2}$
 (E) 7

127. To mail a package, the rate is x cents for the first pound and y cents for each additional pound, where $x > y$. Two packages weighing 3 pounds and 5 pounds, respectively, can be mailed separately or combined as one package. Which method is cheaper, and how much money is saved?

- (A) Combined, with a saving of $x - y$ cents
 (B) Combined, with a saving of $y - x$ cents
 (C) Combined, with a saving of x cents
 (D) Separately, with a saving of $x - y$ cents
 (E) Separately, with a saving of y cents

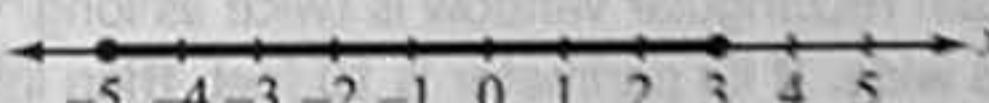
128. If money is invested at r percent interest, compounded annually, the amount of the investment will double in approximately $\frac{70}{r}$ years. If Pat's parents invested

\$5,000 in a long-term bond that pays 8 percent interest, compounded annually, what will be the approximate total amount of the investment 18 years later, when Pat is ready for college?

- (A) \$20,000
 (B) \$15,000
 (C) \$12,000
 (D) \$10,000
 (E) \$9,000

129. On a recent trip, Cindy drove her car 290 miles, rounded to the nearest 10 miles, and used 12 gallons of gasoline, rounded to the nearest gallon. The actual number of miles per gallon that Cindy's car got on this trip must have been between

- (A) $\frac{290}{12.5}$ and $\frac{290}{11.5}$
 (B) $\frac{295}{12}$ and $\frac{285}{11.5}$
 (C) $\frac{285}{12}$ and $\frac{295}{12}$
 (D) $\frac{285}{12.5}$ and $\frac{295}{11.5}$
 (E) $\frac{295}{12.5}$ and $\frac{285}{11.5}$



130. Which of the following inequalities is an algebraic expression for the shaded part of the number line above?

- (A) $|x| \leq 3$
 (B) $|x| \leq 5$
 (C) $|x - 2| \leq 3$
 (D) $|x - 1| \leq 4$
 (E) $|x + 1| \leq 4$

131. A factory has 500 workers, 15 percent of whom are women. If 50 additional workers are to be hired and all of the present workers remain, how many of the additional workers must be women in order to raise the percent of women employees to 20 percent?

(A) 3
(B) 10
(C) 25
(D) 30
(E) 35

132. In a small snack shop, the average (arithmetic mean) revenue was \$400 per day over a 10-day period. During this period, if the average daily revenue was \$360 for the first 6 days, what was the average daily revenue for the last 4 days?

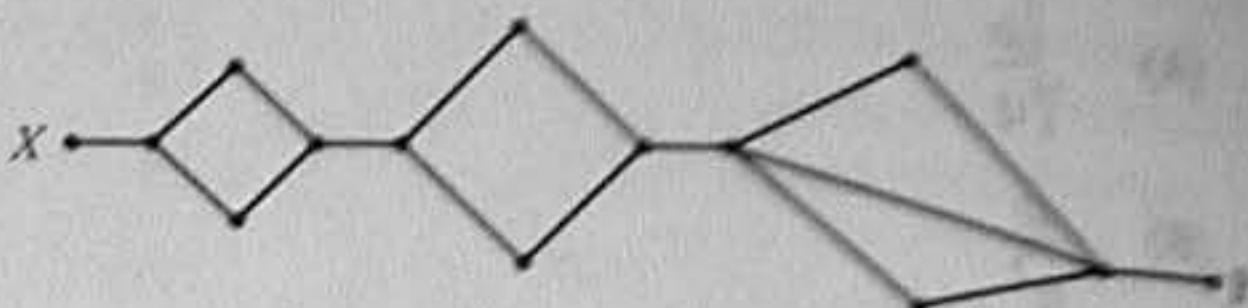
(A) \$420
(B) \$440
(C) \$450
(D) \$460
(E) \$480

133. A certain country had a total annual expenditure of $\$1.2 \times 10^{12}$ last year. If the population of the country was 240 million last year, what was the per capita expenditure?

(A) \$500
(B) \$1,000
(C) \$2,000
(D) \$3,000
(E) \$5,000

134. A certain rectangular window is twice as long as it is wide. If its perimeter is 10 feet, then its dimensions in feet are

(A) $\frac{3}{2}$ by $\frac{7}{2}$
(B) $\frac{5}{3}$ by $\frac{10}{3}$
(C) 2 by 4
(D) 3 by 6
(E) $\frac{10}{3}$ by $\frac{20}{3}$



135. The diagram above shows the various paths along which a mouse can travel from point X, where it is released, to point Y, where it is rewarded with a food pellet. How many different paths from X to Y can the mouse take if it goes directly from X to Y without retracing any point along a path?

(A) 6
(B) 7
(C) 12
(D) 14
(E) 17

136. If the operation \odot is defined by $x \odot y = \sqrt{xy}$ for all positive numbers x and y , then $(5 \odot 45) \odot 60 =$

(A) 30
(B) 60
(C) 90
(D) $30\sqrt{15}$
(E) $60\sqrt{15}$

137. A bar over a sequence of digits in a decimal indicates that the sequence repeats indefinitely. What is the value of $(10^4 - 10^2)(0.\overline{012})$?

(A) 0
(B) $0.\overline{12}$
(C) 1.2
(D) 10
(E) 12

138. At a loading dock, each worker on the night crew loaded $\frac{3}{4}$ as many boxes as each worker on the day crew. If the night crew has $\frac{4}{5}$ as many workers as the day crew, what fraction of all the boxes loaded by the two crews did the day crew load?

- (A) $\frac{1}{2}$
 (B) $\frac{2}{5}$
 (C) $\frac{3}{5}$
 (D) $\frac{4}{5}$
 (E) $\frac{5}{8}$

139. A restaurant meal cost \$35.50 and there was no tax. If the tip was more than 10 percent but less than 15 percent of the cost of the meal, then the total amount paid must have been between

- (A) \$40 and \$42
 (B) \$39 and \$41
 (C) \$38 and \$40
 (D) \$37 and \$39
 (E) \$36 and \$37

140. In a weight-lifting competition, the total weight of Joe's two lifts was 750 pounds. If twice the weight of his first lift was 300 pounds more than the weight of his second lift, what was the weight, in pounds, of his first lift?

- (A) 225
 (B) 275
 (C) 325
 (D) 350
 (E) 400

141. A club collected exactly \$599 from its members. If each member contributed at least \$12, what is the greatest number of members the club could have?

- (A) 43
 (B) 44
 (C) 49
 (D) 50
 (E) 51

142. Of the 3,600 employees of Company X, $\frac{1}{3}$ are clerical. If the clerical staff were to be reduced by $\frac{1}{3}$, what percent of the total number of the remaining employees would then be clerical?

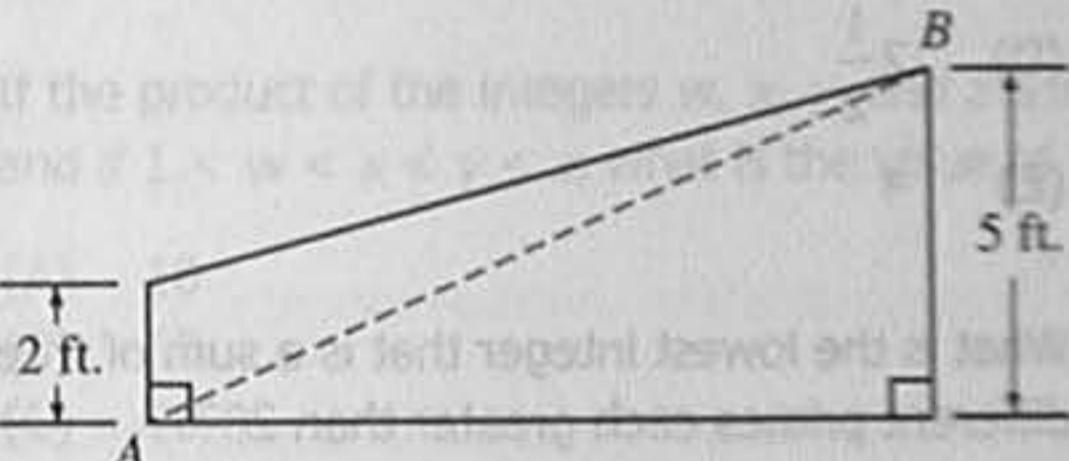
- (A) 25%
 (B) 22.2%
 (C) 20%
 (D) 12.5%
 (E) 11.1%

143. $\frac{3.003}{2.002} =$

- (A) 1.05
 (B) 1.50015
 (C) 1.501
 (D) 1.5015
 (E) 1.5

144. If $\frac{4-x}{2+x} = x$, what is the value of $x^2 + 3x - 4$?

- (A) -4
 (B) -1
 (C) 0
 (D) 1
 (E) 2

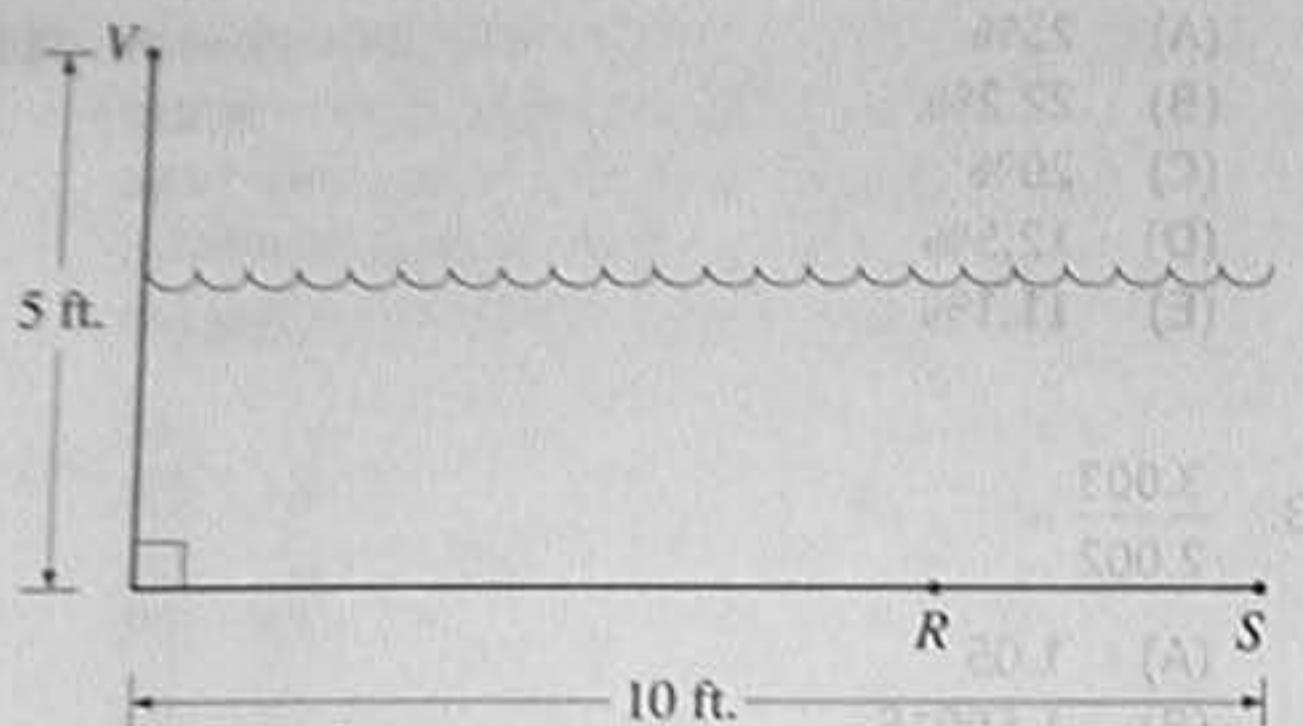


145. The trapezoid shown in the figure above represents a cross section of the rudder of a ship. If the distance from A to B is 13 feet, what is the area of the cross section of the rudder in square feet?

- (A) 39
 (B) 40
 (C) 42
 (D) 45
 (E) 46.5

146. If $0 \leq x \leq 4$ and $y < 12$, which of the following CANNOT be the value of xy ?

- (A) -2
 (B) 0
 (C) 6
 (D) 24
 (E) 48



147. In the figure above, V represents an observation point at one end of a pool. From V , an object that is actually located on the bottom of the pool at point R appears to be at point S . If $VR = 10$ feet, what is the distance RS , in feet, between the actual position and the perceived position of the object?

(A) $10 - 5\sqrt{3}$
 (B) $10 - 5\sqrt{2}$
 (C) 2
 (D) $2\frac{1}{2}$
 (E) 4

148. What is the lowest integer that is a sum of three different primes each greater than 20?

(A) 69
 (B) 73
 (C) 75
 (D) 79
 (E) 83

149. The average (arithmetic mean) of 6, 8, and 10 equals the average of 7, 9, and

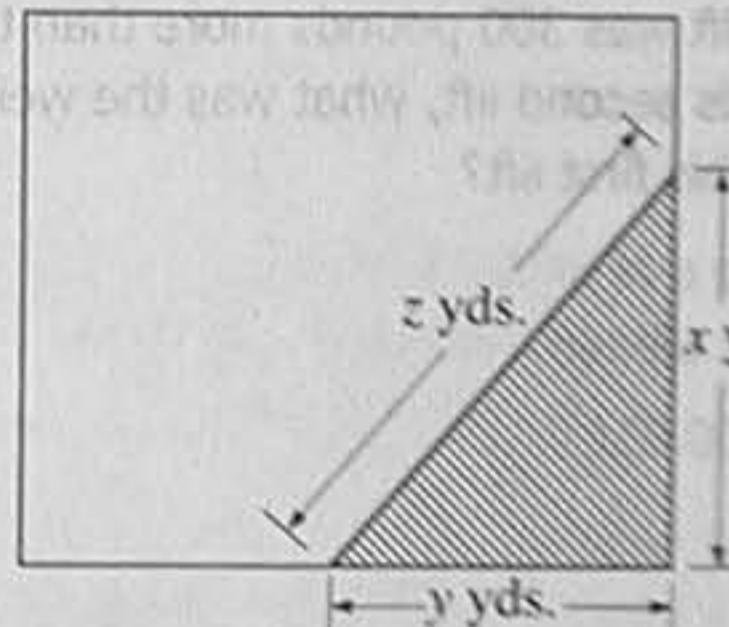
(A) 5
 (B) 7
 (C) 8
 (D) 9
 (E) 11

150. If $x = -1$, then $\frac{x^4 - x^3 + x^2}{x - 1} =$

(A) $-\frac{3}{2}$
 (B) $-\frac{1}{2}$
 (C) 0
 (D) $\frac{1}{2}$
 (E) $\frac{3}{2}$

151. A toy store regularly sells all stock at a discount of 20 percent to 40 percent. If an additional 25 percent were deducted from the discount price during a special sale, what would be the lowest possible price of a toy costing \$16 before any discount?

(A) \$5.60
 (B) \$7.20
 (C) \$8.80
 (D) \$9.60
 (E) \$15.20



152. The shaded portion of the rectangular lot shown above represents a flower bed. If the area of the bed is 24 square yards and $x = y + 2$, then z equals

(A) $\sqrt{13}$
 (B) $2\sqrt{13}$
 (C) 6
 (D) 8
 (E) 10

153. Jack is now 14 years older than Bill. If in 10 years Jack will be twice as old as Bill, how old will Jack be in 5 years?

- (A) 9
 (B) 19
 (C) 21
 (D) 23
 (E) 33

154. An empty pool being filled with water at a constant rate takes 8 hours to fill to $\frac{3}{5}$ of its capacity. How much more time will it take to finish filling the pool?

- (A) 5 hrs. 30 mins.
 (B) 5 hrs. 20 mins.
 (C) 4 hrs. 48 mins.
 (D) 3 hrs. 12 mins.
 (E) 2 hrs. 40 mins.

155. A positive number x is multiplied by 2, and this product is then divided by 3. If the positive square root of the result of these two operations equals x , what is the value of x ?

- (A) $\frac{9}{4}$
 (B) $\frac{3}{2}$
 (C) $\frac{4}{3}$
 (D) $\frac{2}{3}$
 (E) $\frac{1}{2}$

156. A tank contains 10,000 gallons of a solution that is 5 percent sodium chloride by volume. If 2,500 gallons of water evaporate from the tank, the remaining solution will be approximately what percent sodium chloride?

- (A) 1.25%
 (B) 3.75%
 (C) 6.25%
 (D) 6.67%
 (E) 11.7%

157. If $x + 5y = 16$ and $x = -3y$, then $y =$

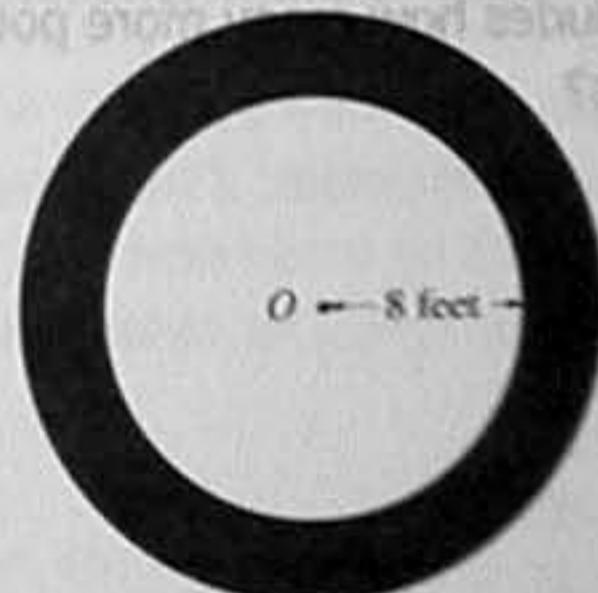
- (A) -24
 (B) -8
 (C) -2
 (D) 2
 (E) 8

158. A committee is composed of w women and m men. If 3 women and 2 men are added to the committee, and if one person is selected at random from the enlarged committee, then the probability that a woman is selected can be represented by

- (A) $\frac{w}{m}$
 (B) $\frac{w}{w+m}$
 (C) $\frac{w+3}{m+2}$
 (D) $\frac{w+3}{w+m+3}$
 (E) $\frac{w+3}{w+m+5}$

159. If the product of the integers w , x , y , and z is 770, and if $1 < w < x < y < z$, what is the value of $w + z$?

- (A) 10
 (B) 13
 (C) 16
 (D) 18
 (E) 21



160. The figure above shows a circular flower bed, with its center at O , surrounded by a circular path that is 3 feet wide. What is the area of the path, in square feet?

- (A) 25π
 (B) 38π
 (C) 55π
 (D) 57π
 (E) 64π

161. The positive integer n is divisible by 25. If \sqrt{n} is greater than 25, which of the following could be the value of $\frac{n}{25}$?

(A) 22
(B) 23
(C) 24
(D) 25
(E) 26

162. $\frac{1}{1 + \frac{1}{2 + \frac{1}{3}}} =$

(A) $\frac{3}{10}$
(B) $\frac{7}{10}$
(C) $\frac{6}{7}$
(D) $\frac{10}{7}$
(E) $\frac{10}{3}$

163. A fruit-salad mixture consists of apples, peaches, and grapes in the ratio 6 : 5 : 2, respectively, by weight. If 39 pounds of the mixture is prepared, the mixture includes how many more pounds of apples than grapes?

(A) 15
(B) 12
(C) 9
(D) 6
(E) 4

164. Lois has x dollars more than Jim has, and together they have a total of y dollars. Which of the following represents the number of dollars that Jim has?

ANS. (A)
PRT. (B)
INC. (C)
INT. (D)
END. (E)

(A) $\frac{y - x}{2}$

(B) $y - \frac{x}{2}$

(C) $\frac{y}{2} - x$

(D) $2y - x$

(E) $y - 2x$

165. During a certain season, a team won 80 percent of its first 100 games and 50 percent of its remaining games. If the team won 70 percent of its games for the entire season, what was the total number of games that the team played?

(A) 180
(B) 170
(C) 156
(D) 150
(E) 105

166. Of 30 applicants for a job, 14 had at least 4 years' experience, 18 had degrees, and 3 had less than 4 years' experience and did not have a degree. How many of the applicants had at least 4 years' experience and a degree?

(A) 14
(B) 13
(C) 9
(D) 7
(E) 5

167. If $1 + \frac{1}{x} = 2 - \frac{2}{x}$, then $x =$

(A) -1
(B) $\frac{1}{3}$
(C) $\frac{2}{3}$
(D) 2
(E) 3

168. Last year, for every 100 million vehicles that traveled on a certain highway, 96 vehicles were involved in accidents. If 3 billion vehicles traveled on the highway last year, how many of those vehicles were involved in accidents? (1 billion = 1,000,000,000)
- (A) 288
 (B) 320
 (C) 2,880
 (D) 3,200
 (E) 28,800
169. Thirty percent of the members of a swim club have passed the lifesaving test. Among the members who have *not* passed the test, 12 have taken the preparatory course and 30 have not taken the course. How many members are there in the swim club?
- (A) 60
 (B) 80
 (C) 100
 (D) 120
 (E) 140
170. In a certain company, the ratio of the number of managers to the number of production-line workers is 5 to 72. If 8 additional production-line workers were to be hired, the ratio of the number of managers to the number of production-line workers would be 5 to 74. How many managers does the company have?
- (A) 5
 (B) 10
 (C) 15
 (D) 20
 (E) 25
171. If $(x - 1)^2 = 400$, which of the following could be the value of $x - 5$?
- (A) 15
 (B) 14
 (C) -24
 (D) -25
 (E) -26

172. Which of the following describes all values of x for which $1 - x^2 \geq 0$?
- (A) $x \geq 1$
 (B) $x \leq -1$
 (C) $0 \leq x \leq 1$
 (D) $x \leq -1$ or $x \geq 1$
 (E) $-1 \leq x \leq 1$
173. The probability is $\frac{1}{2}$ that a certain coin will turn up heads on any given toss. If the coin is to be tossed three times, what is the probability that on at least one of the tosses the coin will turn up tails?
- (A) $\frac{1}{8}$
 (B) $\frac{1}{2}$
 (C) $\frac{3}{4}$
 (D) $\frac{7}{8}$
 (E) $\frac{15}{16}$
174. Of the final grades received by the students in a certain math course, $\frac{1}{5}$ are A's, $\frac{1}{4}$ are B's, $\frac{1}{2}$ are C's, and the remaining 10 grades are D's. What is the number of students in the course?
- (A) 80
 (B) 110
 (C) 160
 (D) 200
 (E) 400

175. As x increases from 165 to 166, which of the following must increase?

I. $2x - 5$

II. $1 - \frac{1}{x}$

III. $\frac{1}{x^2 - x}$

- (A) I only
 (B) III only
 (C) I and II
 (D) I and III
 (E) II and III

176. A rectangular box is 10 inches wide, 10 inches long, and 5 inches high. What is the greatest possible (straight-line) distance, in inches, between any two points on the box?

- (A) 15
 (B) 20
 (C) 25
 (D) $10\sqrt{2}$
 (E) $10\sqrt{3}$

177. A company accountant estimates that airfares next year for business trips of a thousand miles or less will increase by 20 percent and airfares for all other business trips will increase by 10 percent. This year total airfares for business trips of a thousand miles or less were \$9,900 and airfares for all other business trips were \$13,000. According to the accountant's estimate, if the same number of business trips will be made next year as this year, how much will be spent for airfares next year?

- (A) \$22,930
 (B) \$26,180
 (C) \$26,330
 (D) \$26,490
 (E) \$29,770

178. If $x * y = xy - 2(x + y)$ for all integers x and y , then $2 * (-3) =$

- (A) -16
 (B) -11
 (C) -4
 (D) 4
 (E) 16

Club	Number of students
Chess	40
Drama	30
Math	25

179. The table above shows the number of students in three clubs at McAuliffe School. Although no student is in all three clubs, 10 students are in both Chess and Drama, 5 students are in both Chess and Math, and 6 students are in both Drama and Math. How many different students are in the three clubs?

- (A) 68
 (B) 69
 (C) 74
 (D) 79
 (E) 84

180. In a nationwide poll, N people were interviewed. If $\frac{1}{4}$ of them answered "yes" to question 1, and of those, $\frac{1}{3}$ answered "yes" to question 2, which of the following expressions represents the number of people interviewed who did not answer "yes" to both questions?

- (A) $\frac{N}{7}$
 (B) $\frac{6N}{7}$
 (C) $\frac{5N}{12}$
 (D) $\frac{7N}{12}$
 (E) $\frac{11N}{12}$

181. The ratio of two quantities is 3 to 4. If each of the quantities is increased by 5, what is the ratio of these two new quantities?

- (A) $\frac{3}{4}$
 (B) $\frac{8}{9}$
 (C) $\frac{18}{19}$
 (D) $\frac{23}{24}$
 (E) It cannot be determined from the information given.
182. If the average (arithmetic mean) of x and y is 60 and the average (arithmetic mean) of y and z is 80, what is the value of $z - x$?
 (A) 70
 (B) 40
 (C) 20
 (D) 10
 (E) It cannot be determined from the information given.
183. If $\frac{1}{2}$ of the air in a tank is removed with each stroke of a vacuum pump, what fraction of the original amount of air has been removed after 4 strokes?
 (A) $\frac{15}{16}$
 (B) $\frac{7}{8}$
 (C) $\frac{1}{4}$
 (D) $\frac{1}{8}$
 (E) $\frac{1}{16}$
184. If the two-digit integers M and N are positive and have the same digits, but in reverse order, which of the following CANNOT be the sum of M and N ?
 (A) 181
 (B) 165
 (C) 121
 (D) 99
 (E) 44

185. Car X and car Y traveled the same 80-mile route. If car X took 2 hours and car Y traveled at an average speed that was 50 percent faster than the average speed of car X, how many hours did it take car Y to travel the route?
 (A) $\frac{2}{3}$
 (B) 1
 (C) $1\frac{1}{3}$
 (D) $1\frac{3}{5}$
 (E) 3
186. If the average (arithmetic mean) of the four numbers K , $2K + 3$, $3K - 5$, and $5K + 1$ is 63, what is the value of K ?
 (A) 11
 (B) $15\frac{3}{4}$
 (C) 22
 (D) 23
 (E) $25\frac{3}{10}$
187. If p is an even integer and q is an odd integer, which of the following must be an odd integer?
 (A) $\frac{p}{q}$
 (B) pq
 (C) $2p + q$
 (D) $2(p + q)$
 (E) $\frac{3p}{q}$

188. Drum X is $\frac{1}{2}$ full of oil and drum Y, which has twice the capacity of drum X, is $\frac{2}{3}$ full of oil. If all of the oil in drum X is poured into drum Y, then drum Y will be filled to what fraction of its capacity?

(A) $\frac{3}{4}$
 (B) $\frac{5}{6}$
 (C) $\frac{11}{12}$
 (D) $\frac{7}{6}$
 (E) $\frac{11}{6}$

189. If $x > 0$, $\frac{x}{50} + \frac{x}{25}$ is what percent of x?

(A) 6%
 (B) 25%
 (C) 37%
 (D) 60%
 (E) 75%

190. If the operation \odot is defined for all a and b by the equation $a \odot b = \frac{a^2b}{3}$, then $2 \odot (3 \odot -1) =$

(A) 4
 (B) 2
 (C) $-\frac{4}{3}$
 (D) -2
 (E) -4

191. The inside dimensions of a rectangular wooden box are 6 inches by 8 inches by 10 inches. A cylindrical canister is to be placed inside the box so that it stands upright when the closed box rests on one of its six faces. Of all such canisters that could be used, what is the radius, in inches, of the one that has maximum volume?

(A) 3
 (B) 4
 (C) 5
 (D) 6
 (E) 8

192. $(\sqrt{2} + 1)(\sqrt{2} - 1)(\sqrt{3} + 1)(\sqrt{3} - 1) =$

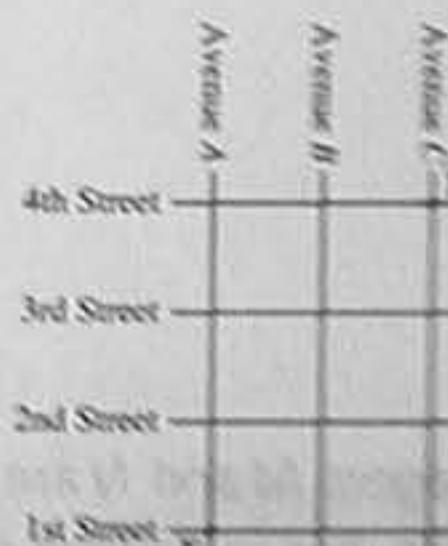
(A) 2
 (B) 3
 (C) $2\sqrt{6}$
 (D) 5
 (E) 6

193. In a certain calculus class, the ratio of the number of mathematics majors to the number of students who are not mathematics majors is 2 to 5. If 2 more mathematics majors were to enter the class, the ratio would be 1 to 2. How many students are in the class?

(A) 10
 (B) 12
 (C) 21
 (D) 28
 (E) 35

194. What is the units digit of $(13)^x(17)^y(29)^z$?

(A) 9
 (B) 7
 (C) 5
 (D) 3
 (E) 1



195. Pat will walk from intersection X to intersection Y along a route that is confined to the square grid of four streets and three avenues shown in the map above. How many routes from X to Y can Pat take that have the minimum possible length?

- (A) 6
 (B) 8
 (C) 10
 (D) 14
 (E) 16

196. The ratio, by volume, of soap to alcohol to water in a certain solution is 2:50:100. The solution will be altered so that the ratio of soap to alcohol is doubled while the ratio of soap to water is halved. If the altered solution will contain 100 cubic centimeters of alcohol, how many cubic centimeters of water will it contain?

- (A) 50
 (B) 200
 (C) 400
 (D) 625
 (E) 800

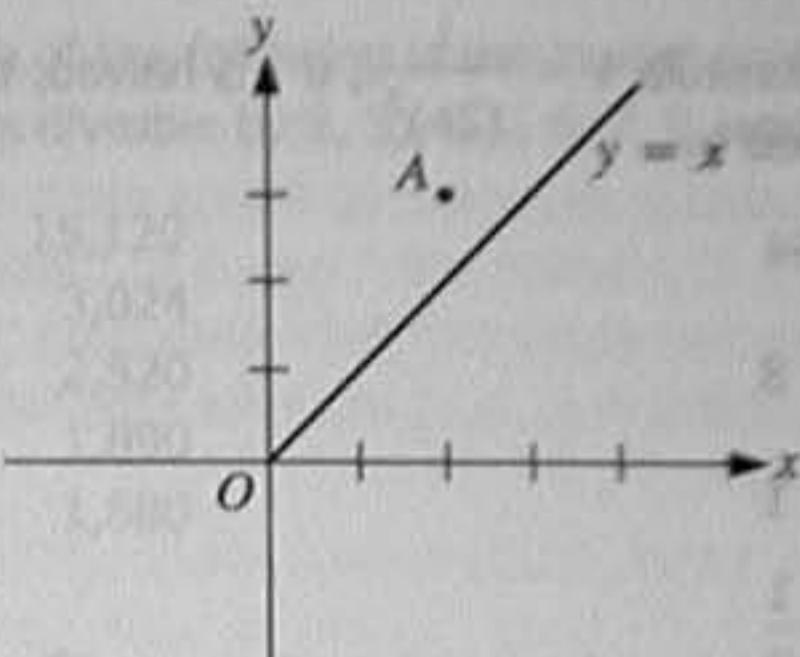
197. If 75 percent of a class answered the first question on a certain test correctly, 55 percent answered the second question on the test correctly, and 20 percent answered neither of the questions correctly, what percent answered both correctly?

- (A) 10%
 (B) 20%
 (C) 30%
 (D) 50%
 (E) 65%

198. If $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{x}$, which of the following must be an integer?

- I. $\frac{x}{8}$
 II. $\frac{x}{12}$
 III. $\frac{x}{24}$

- (A) I only
 (B) II only
 (C) I and III only
 (D) II and III only
 (E) I, II, and III



199. In the rectangular coordinate system above, the line $y = x$ is the perpendicular bisector of segment AB (not shown), and the x -axis is the perpendicular bisector of segment BC (not shown). If the coordinates of point A are $(2, 3)$, what are the coordinates of point C ?

- (A) $(-3, -2)$
 (B) $(-3, 2)$
 (C) $(2, -3)$
 (D) $(3, -2)$
 (E) $(2, 3)$

200. A store currently charges the same price for each towel that it sells. If the current price of each towel were to be increased by \$1, 10 fewer of the towels could be bought for \$120, excluding sales tax. What is the current price of each towel?

- (A) \$1
 (B) \$2
 (C) \$3
 (D) \$4
 (E) \$12

201. If the sum of n consecutive integers is 0, which of the following must be true?

- I. n is an even number.
 II. n is an odd number.
 III. The average (arithmetic mean) of the n integers is 0.
- (A) I only
 (B) II only
 (C) III only
 (D) I and III
 (E) II and III

202. In the formula $V = \frac{1}{(2r)^3}$, if r is halved, then V is multiplied by

(A) 64
 (B) 8
 (C) 1
 (D) $\frac{1}{8}$
 (E) $\frac{1}{64}$

203. A certain bakery has 6 employees. It pays annual salaries of \$14,000 to each of 2 employees, \$16,000 to 1 employee, and \$17,000 to each of the remaining 3 employees. The average (arithmetic mean) annual salary of these employees is closest to which of the following?

(A) \$15,200
 (B) \$15,500
 (C) \$15,800
 (D) \$16,000
 (E) \$16,400

204. If x is equal to the sum of the even integers from 40 to 60, inclusive, and y is the number of even integers from 40 to 60, inclusive, what is the value of $x + y$?

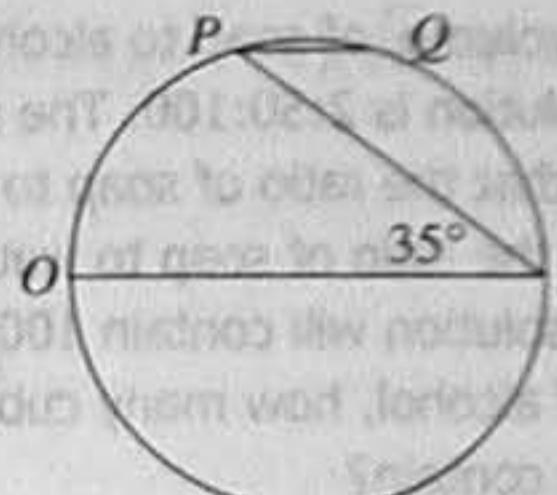
(A) 550
 (B) 551
 (C) 560
 (D) 561
 (E) 572

Number of Solid-Colored Marbles in Three Jars

Jar	Number of red marbles	Number of green marbles	Total number of red and green marbles
P	x	y	80
Q	y	z	120
R	x	z	160

205. In the table above, what is the number of green marbles in jar R?

(A) 70
 (B) 80
 (C) 90
 (D) 100
 (E) 110



206. In the circle above, PQ is parallel to diameter OR , and OR has length 18. What is the length of minor arc PQ ?

(A) 2π
 (B) $\frac{9\pi}{4}$
 (C) $\frac{7\pi}{2}$
 (D) $\frac{9\pi}{2}$
 (E) 3π

207. If $n = 4p$, where p is a prime number greater than 2, how many different positive even divisors does n have, including n ?

(A) 2
 (B) 3
 (C) 4
 (D) 6
 (E) 8

208. S is a set containing 9 different numbers. T is a set containing 8 different numbers, all of which are members of S . Which of the following statements CANNOT be true?

(A) The mean of S is equal to the mean of T .
 (B) The median of S is equal to the median of T .
 (C) The range of S is equal to the range of T .
 (D) The mean of S is greater than the mean of T .
 (E) The range of S is less than the range of T .

209. How many different positive integers are factors of 441?

(A) 4
(B) 6
(C) 7
(D) 9
(E) 11

210. A television manufacturer produces 600 units of a certain model each month at a cost to the manufacturer of \$90 per unit and all of the produced units are sold each month. What is the minimum selling price per unit that will ensure that the monthly profit (revenue from sales minus the manufacturer's cost to produce) on the sales of these units will be at least \$42,000?

(A) \$110
(B) \$120
(C) \$140
(D) \$160
(E) \$180

211. If $4x + 3y = -2$ and $3x + 6 = 0$, what is the value of y ?

(A) $-3\frac{1}{3}$
(B) -2
(C) $-\frac{2}{3}$
(D) $\frac{2}{3}$
(E) 2

- I. 72, 73, 74, 75, 76
II. 74, 74, 74, 74, 74
III. 62, 74, 74, 74, 89

212. The data sets I, II, and III above are ordered from greatest standard deviation to least standard deviation in which of the following?

(A) I, II, III
(B) I, III, II
(C) II, III, I
(D) III, I, II
(E) III, II, I

213. Which of the following is the lowest positive integer that is divisible by 2, 3, 4, 5, 6, 7, 8, and 9?

(A) 15,120
(B) 3,024
(C) 2,520
(D) 1,890
(E) 1,680

214. Of the 50 researchers in a workgroup, 40 percent will be assigned to team A and the remaining 60 percent to team B. However, 70 percent of the researchers prefer team A and 30 percent prefer team B. What is the lowest possible number of researchers who will NOT be assigned to the team they prefer?

(A) 15
(B) 17
(C) 20
(D) 25
(E) 30

215. If m is the average (arithmetic mean) of the first 10 positive multiples of 5 and if M is the median of the first 10 positive multiples of 5, what is the value of $M - m$?

(A) -5
(B) 0
(C) 5
(D) 25
(E) 27.5

216. If $m > 0$ and x is m percent of y , then, in terms of m , y is what percent of x ?

(A) $100m$
(B) $\frac{1}{100m}$
(C) $\frac{1}{m}$
(D) $\frac{10}{m}$
(E) $\frac{10,000}{m}$

217. A certain junior class has 1,000 students and a certain senior class has 800 students. Among these students, there are 60 sibling pairs, each consisting of 1 junior and 1 senior. If 1 student is to be selected at random from each class, what is the probability that the 2 students selected will be a sibling pair?

(A) $\frac{3}{40,000}$
 (B) $\frac{1}{3,600}$
 (C) $\frac{9}{2,000}$
 (D) $\frac{1}{60}$
 (E) $\frac{1}{15}$

218. Which of the following CANNOT be the median of the three positive integers x , y , and z ?

(A) x
 (B) z
 (C) $x + z$
 (D) $\frac{x+z}{2}$
 (E) $\frac{x+z}{3}$

219. What is the 25th digit to the right of the decimal

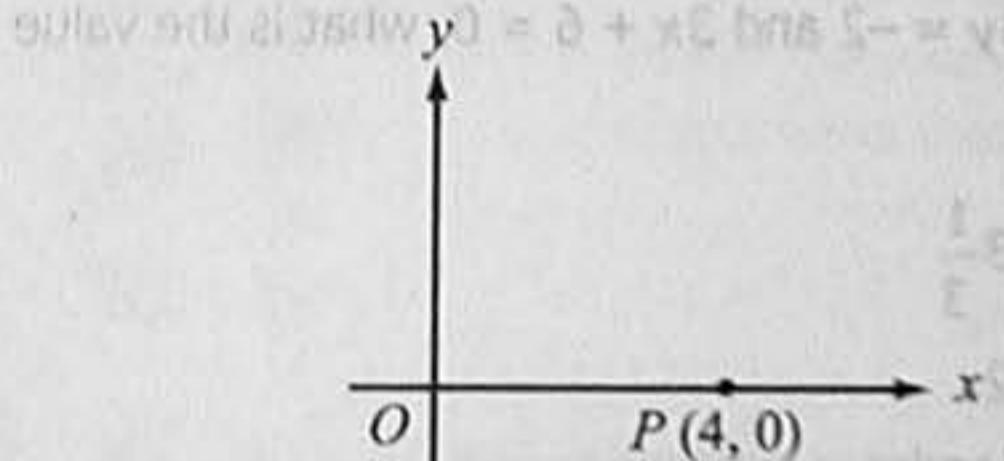
point in the decimal form of $\frac{6}{11}$?

(A) 3
 (B) 4
 (C) 5
 (D) 6
 (E) 7

220. John and Mary were each paid x dollars in advance to do a certain job together. John worked on the job for 10 hours and Mary worked 2 hours less than John. If Mary gave John y dollars of her payment so that they would have received the same hourly wage, what was the dollar amount, in terms of y , that John was paid in advance?

(A) $4y$
 (B) $5y$
 (C) $6y$
 (D) $8y$
 (E) $9y$

221. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{3}}} =$
- (A) $\frac{4}{7}$
 (B) $\frac{4}{3}$
 (C) $\frac{11}{8}$
 (D) $\frac{11}{7}$
 (E) $\frac{7}{4}$



222. In the rectangular coordinate system above, if point R (not shown) lies on the positive y -axis and the area of triangle ORP is 12, what is the y -coordinate of point R ?

(A) 3
 (B) 6
 (C) 9
 (D) 12
 (E) 24

223. Car A is 20 miles behind car B, which is traveling in the same direction along the same route as car A. Car A is traveling at a constant speed of 55 miles per hour and car B is traveling at a constant speed of 50 miles per hour. How many hours will it take for car A to overtake and drive 8 miles ahead of car B?

- (A) 1.5
 (B) 2.0
 (C) 2.5
 (D) 3.0
 (E) 3.5

$$\left(\frac{1}{2}\right)$$

(A)

$$\left(\frac{1}{2}\right)$$

(B)

$$\left(\frac{1}{2}\right)$$

(C)

$$\left(\frac{1}{2}\right)$$

(D)

$$\left(\frac{1}{2}\right)$$

(E)

224. For the past n days, the average (arithmetic mean) daily production at a company was 50 units. If today's production of 90 units raises the average to 55 units per day, what is the value of n ?

- (A) 30
 (B) 18
 (C) 10
 (D) 9
 (E) 7

225. If $x \neq 0$ and $x \neq 1$, and if x is replaced by $\frac{1}{x}$ everywhere in the expression above, then the resulting expression is equivalent to

(A) $\left(\frac{x+1}{x-1}\right)^2$

(A)
 (B)
 (C)

(B) $\left(\frac{x-1}{x+1}\right)^2$

(A)
 (B)
 (C)

(C) $\frac{x^2+1}{1-x^2}$

(A)
 (B)
 (C)

(D) $\frac{x^2-1}{x^2+1}$

(A)
 (B)
 (C)

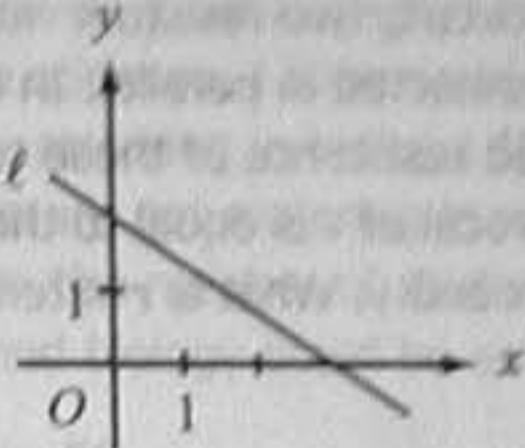
(E) $-\left(\frac{x-1}{x+1}\right)^2$

(A)
 (B)
 (C)



226. In the figure above, if $z = 50$, then $x + y =$

- (A) 230
 (B) 250
 (C) 260
 (D) 270
 (E) 290

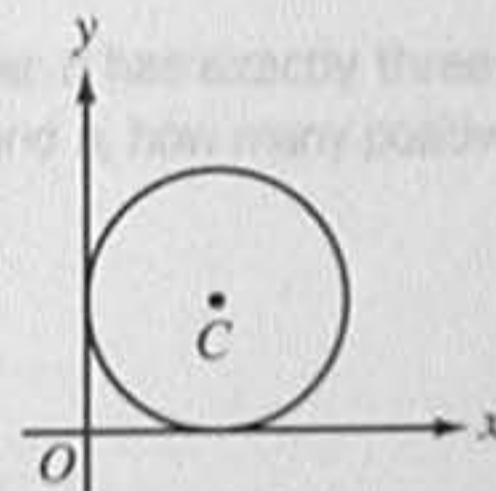


227. In the coordinate system above, which of the following is the equation of line ℓ ?

- (A) $2x - 3y = 6$
 (B) $2x + 3y = 6$
 (C) $3x + 2y = 6$
 (D) $2x - 3y = -6$
 (E) $3x - 2y = -6$

228. If a two-digit positive integer has its digits reversed, the resulting integer differs from the original by 27. By how much do the two digits differ?

- (A) 3
 (B) 4
 (C) 5
 (D) 6
 (E) 7



229. The circle with center C shown above is tangent to both axes. If the distance from O to C is equal to k , what is the radius of the circle, in terms of k ?

- (A) k
 (B) $\frac{k}{\sqrt{2}}$
 (C) $\frac{k}{\sqrt{3}}$
 (D) $\frac{k}{2}$
 (E) $\frac{k}{3}$

230. In an electric circuit, two resistors with resistances x and y are connected in parallel. In this case, if r is the combined resistance of these two resistors, then the reciprocal of r is equal to the sum of the reciprocals of x and y . What is r in terms of x and y ?

- (A) xy
(B) $x + y$
(C) $\frac{1}{x+y}$
(D) $\frac{xy}{x+y}$
(E) $\frac{x+y}{xy}$

231. Xavier, Yvonne, and Zelda each try independently to solve a problem. If their individual probabilities for success are $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{5}{8}$, respectively, what is the probability that Xavier and Yvonne, but not Zelda, will solve the problem?

- (A) $\frac{11}{8}$
(B) $\frac{7}{8}$
(C) $\frac{9}{64}$
(D) $\frac{5}{64}$
(E) $\frac{3}{64}$

232. If $\frac{1}{x} - \frac{1}{x+1} = \frac{1}{x+4}$, then x could be
(A) 0
(B) -1
(C) -2
(D) -3
(E) -4

233. $\left(\frac{1}{2}\right)^{-3} \left(\frac{1}{4}\right)^{-2} \left(\frac{1}{16}\right)^{-1} =$
the dollar amount of money John worked at
for 10 hours at \$10 per hour.

- (A) $\left(\frac{1}{2}\right)^{-48}$
(B) $\left(\frac{1}{2}\right)^{-11}$
(C) $\left(\frac{1}{2}\right)^{-6}$
(D) $\left(\frac{1}{8}\right)^{-11}$
(E) $\left(\frac{1}{8}\right)^{-6}$

234. In a certain game, a large container is filled with red, yellow, green, and blue beads worth, respectively, 7, 5, 3, and 2 points each. A number of beads are then removed from the container. If the product of the point values of the removed beads is 147,000, how many red beads were removed?

- (A) 5
(B) 4
(C) 3
(D) 2
(E) 0

235. If $\frac{2}{1+\frac{2}{y}} = 1$, then $y =$

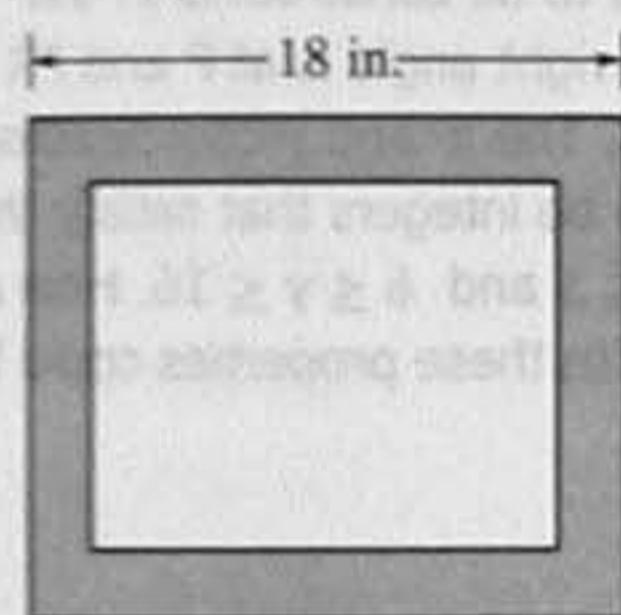
- (A) -2
(B) $-\frac{1}{2}$
(C) $\frac{1}{2}$
(D) 2
(E) 3

236. If a , b , and c are consecutive positive integers and $a < b < c$, which of the following must be true?

- I. $c - a = 2$
II. abc is an even integer.
III. $\frac{a+b+c}{3}$ is an integer.

- (A) I only
 (B) II only
 (C) I and II only
 (D) II and III only
 (E) I, II, and III
237. A part-time employee whose hourly wage was increased by 25 percent decided to reduce the number of hours worked per week so that the employee's total weekly income would remain unchanged. By what percent should the number of hours worked be reduced?

- (A) 12.5%
 (B) 20%
 (C) 25%
 (D) 50%
 (E) 75%



Note: Figure not drawn to scale.

238. The shaded region in the figure above represents a rectangular frame with length 18 inches and width 15 inches. The frame encloses a rectangular picture that has the same area as the frame itself. If the length and width of the picture have the same ratio as the length and width of the frame, what is the length of the picture, in inches?

- (A) $9\sqrt{2}$
 (B) $\frac{3}{2}$
 (C) $\frac{9}{\sqrt{2}}$
 (D) $15\left(1 - \frac{1}{\sqrt{2}}\right)$
 (E) $\frac{9}{2}$

239. Of the 200 students at College T majoring in one or more of the sciences, 130 are majoring in chemistry and 150 are majoring in biology. If at least 30 of the students are not majoring in either chemistry or biology, then the number of students majoring in both chemistry and biology could be any number from

- (A) 20 to 50
 (B) 40 to 70
 (C) 50 to 130
 (D) 110 to 130
 (E) 110 to 150

240. Seed mixture X is 40 percent ryegrass and 60 percent bluegrass by weight; seed mixture Y is 25 percent ryegrass and 75 percent fescue. If a mixture of X and Y contains 30 percent ryegrass, what percent of the weight of the mixture is X?

- (A) 10%
 (B) $33\frac{1}{3}\%$
 (C) 40%
 (D) 50%
 (E) $66\frac{2}{3}\%$

241. If the integer n has exactly three positive divisors, including 1 and n , how many positive divisors does n^2 have?

- (A) 4
 (B) 5
 (C) 6
 (D) 8
 (E) 9

242. If n is a positive integer, then $n(n + 1)(n + 2)$ is

- (A) even only when n is even
 (B) even only when n is odd
 (C) odd whenever n is odd
 (D) divisible by 3 only when n is odd
 (E) divisible by 4 whenever n is even

243. A straight pipe 1 yard in length was marked off in fourths and also in thirds. If the pipe was then cut into separate pieces at each of these markings, which of the following gives all the different lengths of the pieces, in fractions of a yard?

- (A) $\frac{1}{6}$ and $\frac{1}{4}$ only (B) $\frac{1}{6}$ and $\frac{1}{3}$ only
 (C) $\frac{1}{6}, \frac{1}{4}$, and $\frac{1}{3}$ (D) $\frac{1}{12}, \frac{1}{6}$, and $\frac{1}{4}$
 (E) $\frac{1}{12}, \frac{1}{6}$, and $\frac{1}{3}$

244. If $\frac{0.0015 \times 10^m}{0.03 \times 10^k} = 5 \times 10^7$, then $m - k =$

- (A) 9 (B) 8 (C) 7 (D) 6 (E) 5

245. If $x + y = a$ and $x - y = b$, then $2xy =$

- (A) $\frac{a^2 - b^2}{2}$
 (B) $\frac{b^2 - a^2}{2}$
 (C) $\frac{a - b}{2}$
 (D) $\frac{ab}{2}$
 (E) $\frac{a^2 + b^2}{2}$

246. A rectangular circuit board is designed to have width w inches, perimeter p inches, and area k square inches. Which of the following equations must be true?

- (A) $w^2 + pw + k = 0$
 (B) $w^2 - pw = 2k = 0$
 (C) $2w^2 + pw + 2k = 0$
 (D) $2w^2 - pw - 2k = 0$
 (E) $2w^2 - pw + 2k = 0$

p, r, s, t, u

247. An arithmetic sequence is a sequence in which each term after the first is equal to the sum of the preceding term and a constant. If the list of numbers shown above is an arithmetic sequence, which of the following must also be an arithmetic sequence?

- I. $2p, 2r, 2s, 2t, 2u$
 II. $p - 3, r - 3, s - 3, t - 3, u - 3$
 III. p^2, r^2, s^2, t^2, u^2
 (A) I only (B) II only (C) III only
 (D) I and II (E) II and III

248. Right triangle PQR is to be constructed in the xy-plane so that the right angle is at P and PR is parallel to the x-axis. The x- and y-coordinates of P, Q, and R are to be integers that satisfy the inequalities $-4 \leq x \leq 5$ and $6 \leq y \leq 16$. How many different triangles with these properties could be constructed?

- (A) 110 (B) 1,100 (C) 9,900
 (D) 10,000 (E) 12,100

249. If n is a positive integer less than 200 and $\frac{14n}{60}$ is an integer, then n has how many different positive prime factors?

- (A) 2 (B) 3 (C) 5
 (D) 6 (E) 8

5.4 Problem Solving Answer Key

1. A	32. B	63. B	94. B
2. C	33. A	64. B	95. C
3. E	34. D	65. B	96. E
4. C	35. B	66. B	97. D
5. B	36. B	67. E	98. B
6. E	37. C	68. C	99. C
7. E	38. A	69. C	100. B
8. D	39. A	70. A	101. C
9. E	40. E	71. B	102. D
10. A	41. D	72. E	103. D
11. A	42. D	73. D	104. D
12. B	43. C	74. D	105. B
13. D	44. C	75. C	106. E
14. B	45. A	76. A	107. B
15. D	46. B	77. D	108. E
16. E	47. D	78. B	109. A
17. E	48. B	79. C	110. B
18. A	49. C	80. B	111. D
19. B	50. E	81. E	112. D
20. A	51. E	82. B	113. B
21. E	52. E	83. A	114. A
22. E	53. B	84. C	115. C
23. E	54. A	85. A	116. B
24. B	55. D	86. A	117. E
25. D	56. B	87. A	118. C
26. C	57. D	88. E	119. B
27. B	58. E	89. D	120. C
28. B	59. E	90. E	121. C
29. B	60. A	91. B	122. E
30. C	61. A	92. E	123. S
31. A	62. B	93. B	124. D

Part 2: Problem Solving Answer Explanations

125. E 156. D 187. C 218. C
126. C 157. E 188. C 219. C
127. A 158. E 189. A 220. E
128. A 159. B 190. E 221. D
129. D 160. D 191. B 222. B
130. E 161. E 192. A 223. E
131. E 162. B 193. D 224. E
132. D 163. B 194. E 225. A
133. E 164. A 195. C 226. D
134. B 165. D 196. E 227. B
135. C 166. E 197. D 228. A
136. A 167. E 198. B 229. B
137. E 168. C 199. D 230. D
138. E 169. A 200. C 231. E
139. B 170. D 201. E 232. C
140. D 171. C 202. B 233. B
141. C 172. E 203. C 234. D
142. A 173. D 204. D 235. D
143. E 174. D 205. D 236. E
144. C 175. C 206. A 237. B
145. C 176. A 207. C 238. A
146. E 177. B 208. E 239. D
147. A 178. C 209. D 240. B
148. E 179. C 210. D 241. B
149. C 180. E 211. E 242. E
150. A 181. E 212. D 243. D
151. B 182. B 213. C 244. A
152. E 183. A 214. A 245. A
153. D 184. A 215. B 246. E
154. B 185. C 216. E 247. D
155. D 186. D 217. A 248. C
 218. B

6.0 Data Sufficiency

Data sufficiency questions appear in the Quantitative section of the GMAT® exam. Multiple-choice Data sufficiency questions are intermingled with problem solving questions throughout the section. You will have 75 minutes to complete the Quantitative section of the GMAT® exam, or about 2 minutes to answer each question. These questions require knowledge of the following topics:

- Arithmetic
- Elementary algebra
- Commonly known concepts of geometry

Data sufficiency questions are designed to measure your ability to analyze a quantitative problem, recognize which given information is relevant, and determine at what point there is sufficient information to solve a problem. In these questions, you are to classify each problem according to the five fixed answer choices, rather than find a solution to the problem.

Each Data sufficiency question consists of a question, often accompanied by some initial information, and two statements, labeled (1) and (2), which contain additional information. You must decide whether the information in each statement is sufficient to answer the question or—if neither statement provides enough information—whether the information in the two statements together is sufficient. It is also possible that the statements in combination do not give enough information to answer the question.

Begin by reading the initial information and the question carefully. Next, consider the first statement. Does the information provided by the first statement enable you to answer the question? Go on to the second statement. Try to ignore the information given in the first statement when you consider whether the second statement provides information that, by itself, allows you to answer the question. Now you should be able to say, for each statement, whether it is sufficient to determine the answer.

Next, consider the two statements in tandem. Do they, together, enable you to answer the question?

Look again at your answer choices. Select the one that most accurately reflects whether the statements provide the information required to answer the question.

6.1 Test-Taking Strategies for Data Sufficiency Questions

1. Do not waste valuable time solving a problem.

You only need to determine whether sufficient information is given to solve it.

2. Consider each statement separately first.

Then you can decide whether each alone gives sufficient information to solve the problem. Be sure to disregard the information given in statement (1) when you evaluate the information given in statement (2). If either, or both, of the statements give(s) sufficient information to solve the problem, select the answer corresponding to the description of which statement(s) give(s) sufficient information to solve the problem.

3. Judge the statements in tandem if neither statement is sufficient by itself.

It is possible that the two statements together do not provide sufficient information. Once you decide, select the answer corresponding to the description of whether the statements together give sufficient information to solve the problem.

4. Answer the question asked.

For example, if the question asks, “What is the value of y ?” for an answer statement to be sufficient, you must be able to find one and only one value for y . Being able to determine minimum or maximum values for an answer (e.g., $y = x + 2$) is not sufficient, because such answers constitute a range of values rather than the specific value of y .

5. Be very careful not to make unwarranted assumptions based on the images represented.

Figures are not necessarily drawn to scale; they are generalized figures showing little more than intersecting line segments and the relationships of points, angles, and regions. So, for example, if a figure described as a rectangle looks like a square, do *not* conclude that it is, in fact, a square just by looking at the figure.

If statement 1 is sufficient, then the answer must be **A or D**.

If statement 2 is not sufficient, then the answer must be **A**.

If statement 2 is sufficient, then the answer must be **D**.

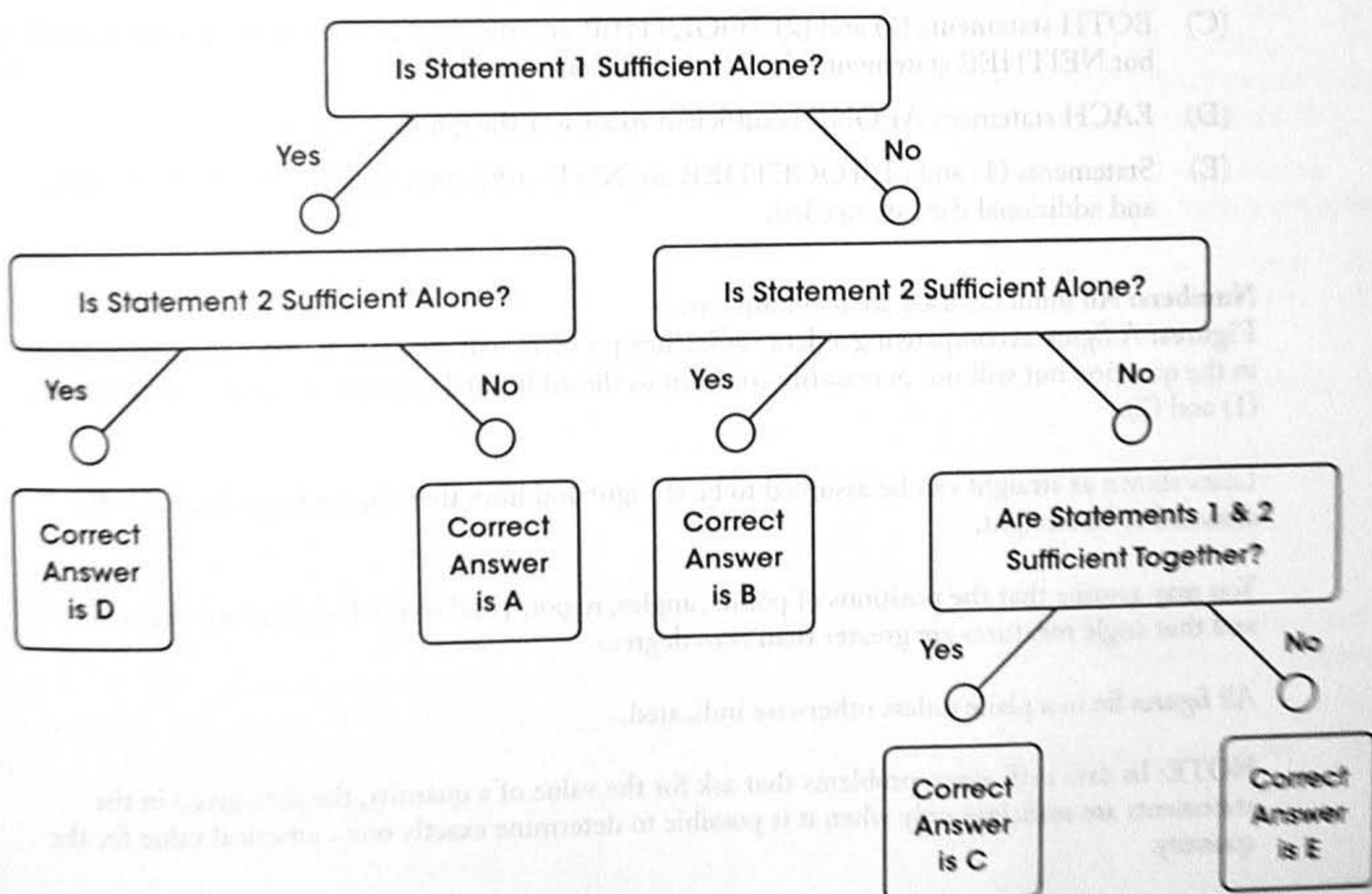
If statement 1 is not sufficient, then the answer must be **B, C, or E**.

If statement 2 is sufficient, then the answer must be **B**.

If statement 2 is not sufficient, then the answer must be **C or E**.

If both statements together are sufficient, then the answer must be **C**.

If both statements together are still not sufficient, then the answer must be **E**.



6.2 The Directions

These directions are very similar to those you will see for data sufficiency questions when you take the GMAT® test. If you read the directions carefully and understand them clearly before going to sit for the exam, you will not need to spend too much time reviewing them when you take the GMAT® exam.

Each data sufficiency problem consists of a question and two statements, labeled (1) and (2), that give data. You have to decide whether the data given in the statements are *sufficient* for answering the question. Using the data given in the statements *plus* your knowledge of mathematics and everyday facts (such as the number of days in July or the meaning of *counterclockwise*), you must indicate whether the data given in the statements are sufficient for answering the questions and then indicate one of the following answer choices:

- (A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked;
- (B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked;
- (C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient;
- (D) EACH statement ALONE is sufficient to answer the question asked;
- (E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data are needed.

Numbers: All numbers used are real numbers.

Figures: A figure accompanying a data sufficiency problem will conform to the information given in the question but will not necessarily conform to the additional information given in statements (1) and (2).

Lines shown as straight can be assumed to be straight and lines that appear jagged can also be assumed to be straight.

You may assume that the positions of points, angles, regions, and so forth exist in the order shown and that angle measures are greater than zero degrees.

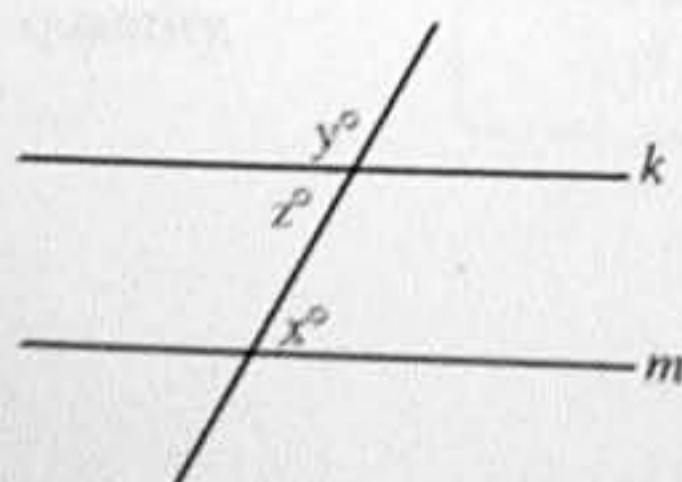
All figures lie in a plane unless otherwise indicated.

NOTE: In data sufficiency problems that ask for the value of a quantity, the data given in the statements are sufficient only when it is possible to determine exactly one numerical value for the quantity.

6.3 Data Sufficiency Sample Questions

- A Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
 B Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
 C BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
 D EACH statement ALONE is sufficient.

- How much is 20 percent of a certain number?
 (1) 10 percent of the number is 5.
 (2) 40 percent of twice the number is 40.
- A thoroughly blended biscuit mix includes only flour and baking powder. What is the ratio of the number of grams of baking powder to the number of grams of flour in the mix?
 (1) Exactly 9.9 grams of flour is contained in 10 grams of the mix.
 (2) Exactly 0.3 gram of baking powder is contained in 30 grams of the mix.
- What is the value of $|x|$?
 (1) $x = -|x|$
 (2) $x^2 = 4$
- Is r greater than 0.27?
 (1) r is greater than $\frac{1}{4}$.
 (2) r is equal to $\frac{3}{10}$.
- What is the value of the sum of a list of n odd integers?
 (1) $n = 8$
 (2) The square of the number of integers on the list is 64.



- In the figure above, if lines k and m are parallel, what is the value of x ?

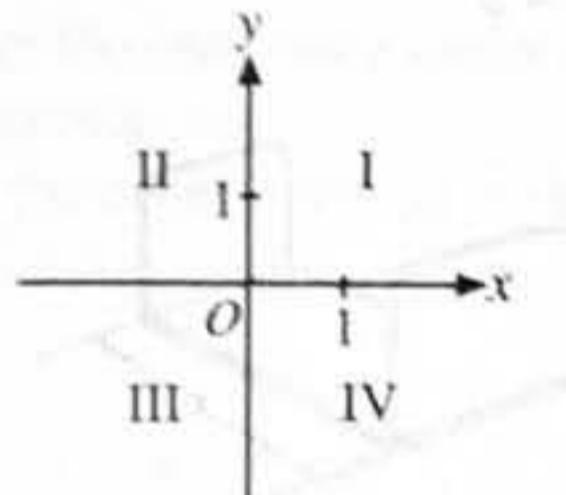
- (1) $y = 120$
 (2) $z = 60$
- What percent of a group of people are women with red hair?
 (1) Of the women in the group, 5 percent have red hair.
 (2) Of the men in the group, 10 percent have red hair.
- If r and s are positive integers, r is what percent of s ?
 (1) $r = \frac{3}{4}s$
 (2) $r + s = \frac{75}{100}$
- Is it true that $a > b$?
 (1) $2a > 2b$
 (2) $a + c > b + c$
- In a certain class, one student is to be selected at random to read. What is the probability that a boy will read?
 (1) Two-thirds of the students in the class are boys.
 (2) Ten of the students in the class are girls.
- If $5x + 3y = 17$, what is the value of x ?
 (1) x is a positive integer.
 (2) $y = 4x$
- Does the product $jkmn$ equal 1?
 (1) $\frac{jk}{mn} = 1$
 (2) $j = \frac{1}{k}$ and $m = \frac{1}{n}$

13. A certain expressway has exits J, K, L, and M, in that order. What is the road distance from exit K to exit L?

- (1) The road distance from exit J to exit L is 21 kilometers.
- (2) The road distance from exit K to exit M is 26 kilometers.

14. Is the integer k a prime number?

- (1) $2k = 6$
- (2) $1 < k < 6$



15. If $ab \neq 0$, in what quadrant of the coordinate system above does point (a, b) lie?

- (1) (b, a) lies in quadrant IV.
- (2) $(a, -b)$ lies in quadrant III.

16. Is x greater than 1.8?

- (1) $x > 1.7$
- (2) $x > 1.9$

17. If n is an integer, is $n + 1$ odd?

- (1) $n + 2$ is an even integer.
- (2) $n - 1$ is an odd integer.

18. Is $1 < x < 2$?

- (1) $0 < x$
- (2) $x < 3$

19. Water is pumped into a partially filled tank at a constant rate through an inlet pipe. At the same time, water is pumped out of the tank at a constant rate through an outlet pipe. At what rate, in gallons per minute, is the amount of water in the tank increasing?

- (1) The amount of water initially in the tank is 200 gallons.
- (2) Water is pumped into the tank at a rate of 10 gallons per minute and out of the tank at a rate of 10 gallons every $2\frac{1}{2}$ minutes.

20. Is x a negative number?

- (1) $9x > 10x$
- (2) $x + 3$ is positive.

21. Does $2m - 3n = 0$?

- (1) $m \neq 0$
- (2) $6m = 9n$

22. What is the value of the integer x ?

- (1) x is a prime number.
- (2) $31 \leq x \leq 37$

23. If P , Q , and R are three distinct points, do line segments PQ and PR have the same length?

- (1) P is the midpoint of line segment QR .
- (2) Q and R lie on the same circle with center P .

24. Is the number x between 0.2 and 0.7?

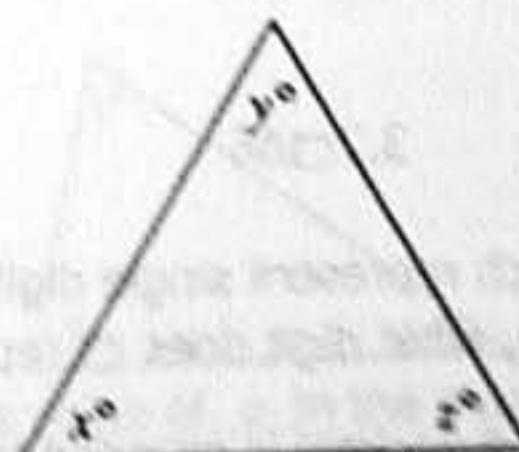
- (1) $560x < 280$
- (2) $700x > 280$

25. If i and j are integers, is $i + j$ an even integer?

- (1) $i < 10$
- (2) $i = j$

26. If $n + k = m$, what is the value of k ?

- (1) $n = 10$
- (2) $m + 10 = n$



27. Is the triangle above equilateral?

- (1) $x = y$
- (2) $z = 60$

28. Is x an integer?

- (1) $\frac{x}{2}$ is an integer.
(2) $2x$ is an integer.

29. What is the value of x ?

- (1) $2x + 1 = 0$
(2) $(x + 1)^2 = x^2$

30. What is the value of $\frac{1}{k} + \frac{1}{r}$?

- (1) $k + r = 20$
(2) $kr = 64$

31. If x is equal to one of the numbers $\frac{1}{4}$, $\frac{3}{8}$, or $\frac{2}{5}$, what is the value of x ?

- (1) $\frac{1}{4} < x < \frac{1}{2}$
(2) $\frac{1}{3} < x < \frac{3}{5}$

32. In $\triangle PQR$, if $PQ = x$, $QR = x + 2$, and $PR = y$, which of the three angles of $\triangle PQR$ has the greatest degree measure?

- (1) $y = x + 3$
(2) $x = 2$

33. What distance did Jane travel?

- (1) Bill traveled 40 miles in 40 minutes.
(2) Jane traveled at the same average rate as Bill.

34. What number is 15 percent of x ?

- (1) 18 is 6 percent of x .
(2) $\frac{2}{3}$ of x is 200.

3.2 □Δ6

35. If □ and Δ each represent single digits in the decimal above, what digit does □ represent?

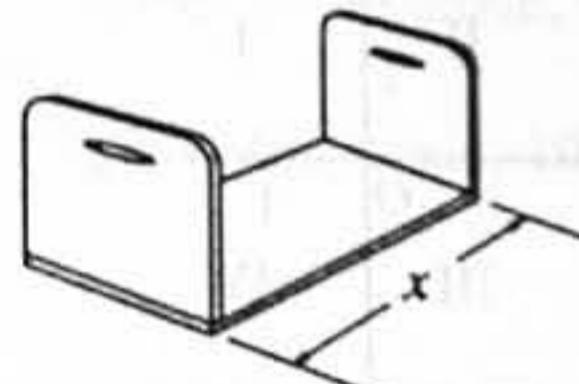
- (1) When the decimal is rounded to the nearest tenth, 3.2 is the result.
(2) When the decimal is rounded to the nearest hundredth, 3.24 is the result.

36. The profit from the sale of a certain appliance increases, though not proportionally, with the number of units sold. Did the profit exceed \$4 million on sales of 380,000 units?

- (1) The profit exceeded \$2 million on sales of 200,000 units.
(2) The profit exceeded \$5 million on sales of 350,000 units.

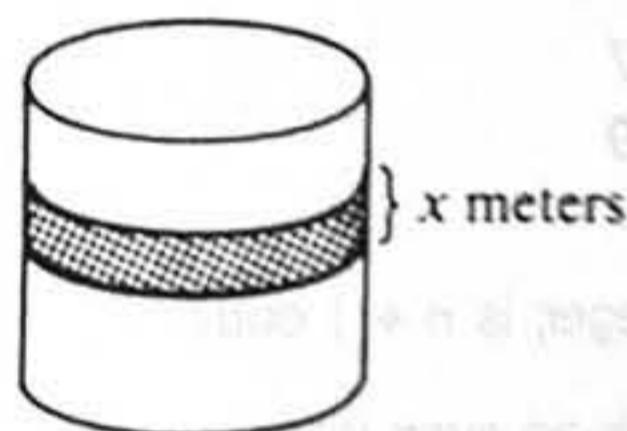
37. What is the value of $xy - yz$?

- (1) $y = 2$
(2) $x - z = 5$



38. Will the first 10 volumes of a 20-volume encyclopedia fit upright in the book rack shown above?

- (1) $x = 50$ centimeters
(2) Twelve of the volumes have an average (arithmetic mean) thickness of 5 centimeters.

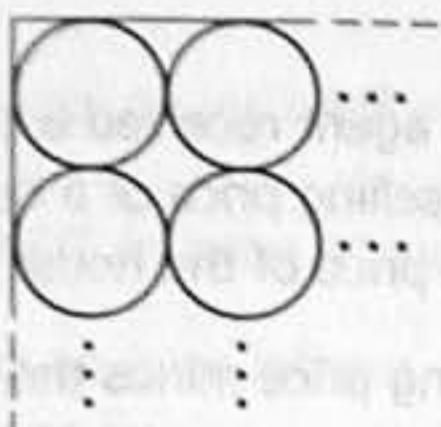


39. A circular tub has a band painted around its circumference, as shown above. What is the surface area of this painted band?

- (1) $x = 0.5$
(2) The height of the tub is 1 meter.

40. What is the value of integer n ?

- (1) $n(n+1) = 6$
(2) $2^{2n} = 16$



41. The inside of a rectangular carton is 48 centimeters long, 32 centimeters wide, and 15 centimeters high. The carton is filled to capacity with k identical cylindrical cans of fruit that stand upright in rows and columns, as indicated in the figure above. If the cans are 15 centimeters high, what is the value of k ?

- (1) Each of the cans has a radius of 4 centimeters.
 (2) Six of the cans fit exactly along the length of the carton.

$$\begin{cases} x - 4 = z \\ y - x = 8 \\ 8 - z = t \end{cases}$$

42. For the system of equations given, what is the value of z ?

- (1) $x = 7$
 (2) $t = 5$

43. Is x equal to 5?

- (1) $x \geq 5$
 (2) $x \leq 5$

	R	S	T	U
R	0	y	x	62
S	y	0	56	75
T	x	56	0	69
U	62	75	69	0

44. The table above shows the distance, in kilometers, by the most direct route, between any two of the four cities, R, S, T, and U. For example, the distance between City R and City U is 62 kilometers. What is the value of x ?

- (1) By the most direct route, the distance between S and T is twice the distance between S and R.
 (2) By the most direct route, the distance between T and U is 1.5 times the distance between R and T.

45. What is the value of the two-digit integer x ?

- (1) The sum of the two digits is 3.
 (2) x is divisible by 3.

46. What is the tenths digit in the decimal representation of a certain number?

- (1) The number is less than $\frac{1}{3}$.
 (2) The number is greater than $\frac{1}{4}$.

47. If the two floors in a certain building are 9 feet apart, how many steps are there in a set of stairs that extends from the first floor to the second floor of the building?

- (1) Each step is $\frac{3}{4}$ foot high.
 (2) Each step is 1 foot wide.

48. If $xy \neq 0$, is $\frac{x}{y} < 0$?

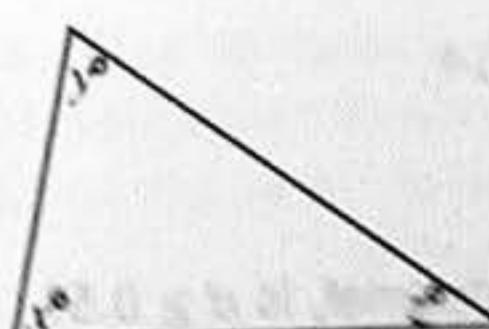
- (1) $x = -y$
 (2) $-x = -(-y)$

49. How many people are directors of both Company K and Company R?

- (1) There were 17 directors present at a joint meeting of the directors of Company K and Company R, and no directors were absent.
 (2) Company K has 12 directors and Company R has 8 directors.

50. If x and y are positive, is $\frac{x}{y}$ greater than 1?

- (1) $xy > 1$
 (2) $x - y > 0$



51. What is the value of z in the triangle above?

- (1) $x + y = 139$
 (2) $y + z = 108$

52. If x , y , and z are nonzero numbers, is $xz = 12$?
- $x^2yz = 12xy$
 - $\frac{z}{4} = \frac{3}{x}$
53. A certain company currently has how many employees?
- If 3 additional employees are hired by the company and all of the present employees remain, there will be at least 20 employees in the company.
 - If no additional employees are hired by the company and 3 of the present employees resign, there will be fewer than 15 employees in the company.
54. What is the value of n in the equation $-25 + 19 + n = s$?
- $s = 2$
 - $\frac{n}{s} = 4$
55. At a certain picnic, each of the guests was served either a single scoop or a double scoop of ice cream. How many of the guests were served a double scoop of ice cream?
- At the picnic, 60 percent of the guests were served a double scoop of ice cream.
 - A total of 120 scoops of ice cream were served to all the guests at the picnic.
56. What is the value of xy ?
- $y = x + 1$
 - $y = x^2 + 1$
57. What is the value of $\frac{1}{x} + \frac{1}{y}$?
- $x + y = 14$
 - $xy = 24$
58. If d denotes a decimal, is $d \geq 0.5$?
- When d is rounded to the nearest tenth, the result is 0.5.
 - When d is rounded to the nearest integer, the result is 1.
59. If a real estate agent received a commission of 6 percent of the selling price of a certain house, what was the selling price of the house?
- The selling price minus the real estate agent's commission was \$84,600.
 - The selling price was 250 percent of the original purchase price of \$36,000.
60. If $\frac{\sqrt{x}}{y} = n$, what is the value of x ?
- $yn = 10$
 - $y = 40$ and $n = \frac{1}{4}$
61. How many integers are there between, but not including, integers r and s ?
- $s - r = 10$
 - There are 9 integers between, but not including, $r + 1$ and $s + 1$.
62. What is the number of members of Club X who are at least 35 years of age?
- Exactly $\frac{3}{4}$ of the members of Club X are under 35 years of age.
 - The 64 women in Club X constitute 40 percent of the club's membership.
63. Carlotta can drive from her home to her office by one of two possible routes. If she must also return by one of these routes, what is the distance of the shorter route?
- When she drives from her home to her office by the shorter route and returns by the longer route, she drives a total of 42 kilometers.
 - When she drives both ways, from her home to her office and back, by the longer route, she drives a total of 46 kilometers.
64. Is $x > y$?
- $x = y + 2$
 - $\frac{x}{2} = y - 1$

65. If m is an integer, is m odd?
- $\frac{m}{2}$ is NOT an even integer.
 - $m - 3$ is an even integer.
-
66. What is the area of triangular region ABC above?
- The product of BD and AC is 20.
 - $x = 45$
67. What is the value of $b + c$?
- $ab + cd + ac + bd = 6$
 - $a + d = 4$
68. What is the average (arithmetic mean) of j and k ?
- The average (arithmetic mean) of $j + 2$ and $k + 4$ is 11.
 - The average (arithmetic mean) of j , k , and 14 is 10.
69. Paula and Sandy were among those people who sold raffle tickets to raise money for Club X. If Paula and Sandy sold a total of 100 of the tickets, how many of the tickets did Paula sell?
- Sandy sold $\frac{2}{3}$ as many of the raffle tickets as Paula did.
 - Sandy sold 8 percent of all the raffle tickets sold for Club X.
70. Is $ax = 3 - bx$?
- $x(a + b) = 3$
 - $a = b = 1.5$ and $x = 1$.

71. A number of people each wrote down one of the first 30 positive integers. Were any of the integers written down by more than one of the people?
- The number of people who wrote down an integer was greater than 40.
 - The number of people who wrote down an integer was less than 70.
-
72. In the figure above, is $CD > BC$?
- $AD = 20$
 - $AB = CD$
73. How much did a certain telephone call cost?
- The call lasted 53 minutes.
 - The cost for the first 3 minutes was 5 times the cost for each additional minute.
74. In a certain office, 50 percent of the employees are college graduates and 60 percent of the employees are over forty years old. If 30 percent of those over forty have master's degrees, how many of the employees over forty have master's degrees?
- Exactly 100 of the employees are college graduates.
 - Of the employees 40 years old or less, 25 percent have master's degrees.

75. Is $rst = 1$?

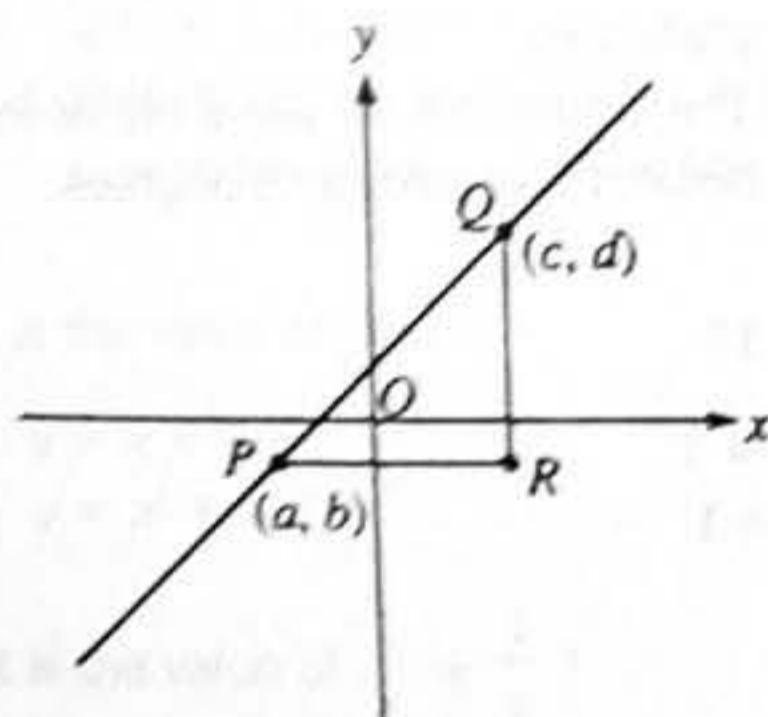
- $rs = 1$
 - $st = 1$
-

TOTAL EXPENSES FOR THE FIVE DIVISIONS OF COMPANY H



76. The figure above represents a circle graph of Company H's total expenses broken down by the expenses for each of its five divisions. If O is the center of the circle and if Company H's total expenses are \$5,400,000, what are the expenses for division R?
- $x = 94$
 - The total expenses for divisions S and T are twice as much as the expenses for division R.

77. If Ms. Smith's income was 20 percent more for 1991 than it was for 1990, how much was her income for 1991?
- Ms. Smith's income for the first 6 months of 1990 was \$17,500 and her income for the last 6 months of 1990 was \$20,000.
 - Ms. Smith's income for 1991 was \$7,500 greater than her income for 1990.



78. In the figure above, segments PR and QR are each parallel to one of the rectangular coordinate axes. Is the ratio of the length of QR to the length of PR equal to 1?
- $c = 3$ and $d = 4$.
 - $a = -2$ and $b = -1$.

79. While on a straight road, car X and car Y are traveling at different constant rates. If car X is now $\frac{1}{2}$ mile ahead of car Y, how many minutes from now will car X be 2 miles ahead of car Y?
- Car X is traveling at 50 miles per hour and car Y is traveling at 40 miles per hour.
 - Three minutes ago car X was $\frac{1}{2}$ mile ahead of car Y.
80. If a , b , and c are integers, is $a - b + c$ greater than $a + b - c$?
- b is negative.
 - c is positive.
81. If a certain animated cartoon consists of a total of 17,280 frames on film, how many minutes will it take to run the cartoon?
- The cartoon runs without interruption at the rate of 24 frames per second.
 - It takes 6 times as long to run the cartoon as it takes to rewind the film, and it takes a total of 14 minutes to do both.
82. A box contains only red chips, white chips, and blue chips. If a chip is randomly selected from the box, what is the probability that the chip will be either white or blue?
- The probability that the chip will be blue is $\frac{1}{5}$.
 - The probability that the chip will be red is $\frac{1}{3}$.
83. If the successive tick marks shown on the number line above are equally spaced and if x and y are the numbers designating the end points of intervals as shown, what is the value of y ?
- $x = \frac{1}{2}$
 - $y - x = \frac{2}{3}$

84. On a company-sponsored cruise, $\frac{2}{3}$ of the passengers were company employees and the remaining passengers were their guests. If $\frac{3}{4}$ of the company-employee passengers were managers, what was the number of company-employee passengers who were NOT managers?
- There were 690 passengers on the cruise.
 - There were 230 passengers who were guests of the company employees.
85. In the xy -plane, does the point $(4, 12)$ lie on line k ?
- The point $(1, 7)$ lies on line k .
 - The point $(-2, 2)$ lies on line k .
86. The length of the edging that surrounds circular garden K is $\frac{1}{2}$ the length of the edging that surrounds circular garden G . What is the area of garden K ? (Assume that the edging has negligible width.)
- The area of G is 25π square meters.
 - The edging around G is 10π meters long.
87. An employee is paid 1.5 times the regular hourly rate for each hour worked in excess of 40 hours per week, excluding Sunday, and 2 times the regular hourly rate for each hour worked on Sunday. How much was the employee paid last week?
- The employee's regular hourly rate is \$10.
 - Last week the employee worked a total of 54 hours but did not work more than 8 hours on any day.
88. What was the revenue that a theater received from the sale of 400 tickets, some of which were sold at the full price and the remainder of which were sold at a reduced price?
- The number of tickets sold at the full price was $\frac{1}{4}$ of the total number of tickets sold.
 - The full price of a ticket was \$25.
89. If \circ represents one of the operations $+$, $-$, and \times , is $k \circ (\ell + m) = (k \circ \ell) + (k \circ m)$ for all numbers k , ℓ , and m ?
- $k \circ 1$ is not equal to $1 \circ k$ for some numbers k .
 - \circ represents subtraction.
90. How many of the 60 cars sold last month by a certain dealer had neither power windows nor a stereo?
- Of the 60 cars sold, 20 had a stereo but not power windows.
 - Of the 60 cars sold, 30 had both power windows and a stereo.
91. By what percent did the median household income in Country Y decrease from 1970 to 1980?
- In 1970 the median household income in Country Y was $\frac{2}{3}$ of the median household income in Country X.
 - In 1980 the median household income in Country Y was $\frac{1}{2}$ of the median household income in Country X.
92. A certain group of car dealerships agreed to donate x dollars to a Red Cross chapter for each car sold during a 30-day period. What was the total amount that was expected to be donated?
- A total of 500 cars were expected to be sold.
 - Sixty more cars were sold than expected, so that the total amount actually donated was \$28,000.
93. While driving on the expressway, did Robin ever exceed the 55-mile-per-hour speed limit?
- Robin drove 100 miles on the expressway.
 - Robin drove for 2 hours on the expressway.

94. In Jefferson School, 300 students study French or Spanish or both. If 100 of these students do not study French, how many of these students study both French and Spanish?

- (1) Of the 300 students, 60 do not study Spanish.
 (2) A total of 240 of the students study Spanish.

95. A certain salesperson's weekly salary is equal to a fixed base salary plus a commission that is directly proportional to the number of items sold during the week. If 50 items are sold this week, what will be the salesperson's salary for this week?

- (1) Last week 45 items were sold.
 (2) Last week's salary was \$405.

96. If Juan had a doctor's appointment on a certain day, was the appointment on a Wednesday?

- (1) Exactly 60 hours before the appointment, it was Monday.
 (2) The appointment was between 1:00 p.m. and 9:00 p.m.

97. What is the value of $5x^2 + 4x - 1$?

- (1) $x(x + 2) = 0$
 (2) $x = 0$

98. At Larry's Auto Supply Store, Brand X antifreeze is sold by the gallon and Brand Y motor oil is sold by the quart. Excluding sales tax, what is the total cost for 1 gallon of Brand X antifreeze and 1 quart of Brand Y motor oil?

- (1) Excluding sales tax, the total cost for 6 gallons of Brand X antifreeze and 10 quarts of Brand Y motor oil is \$58.
 (There is no quantity discount.)
 (2) Excluding sales tax, the total cost for 4 gallons of Brand X antifreeze and 12 quarts of Brand Y motor oil is \$44.
 (There is no quantity discount.)

99. Is $m > n$?

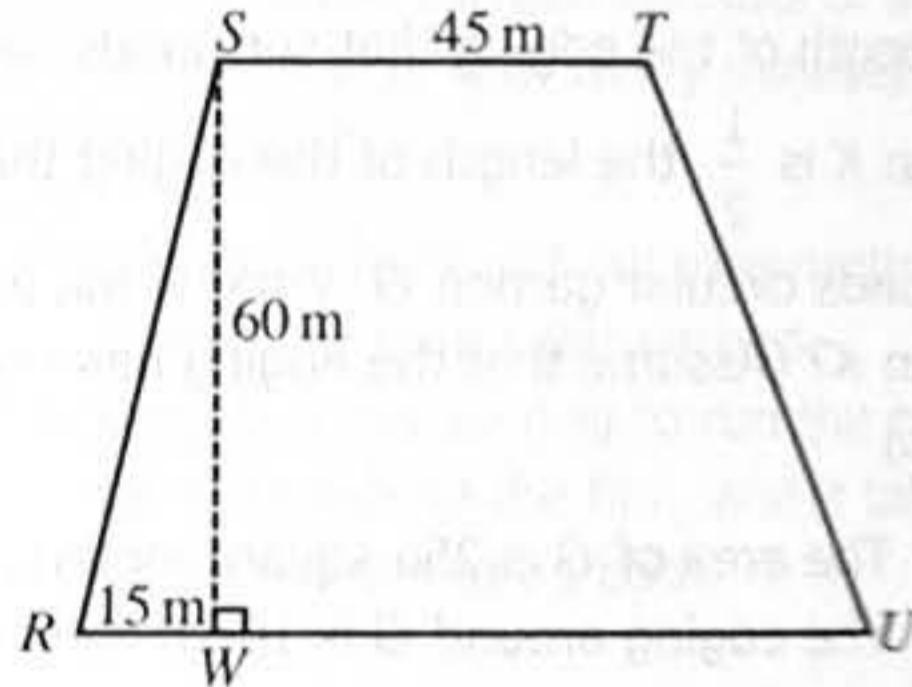
- (1) $m + n < 0$
 (2) $mn < 0$

100. When a player in a certain game tossed a coin a number of times, 4 more heads than tails resulted. Heads or tails resulted each time the player tossed the coin. How many times did heads result?

- (1) The player tossed the coin 24 times.
 (2) The player received 3 points each time heads resulted and 1 point each time tails resulted, for a total of 52 points.

101. If S is the infinite sequence $S_1 = 9, S_2 = 99, S_3 = 999, \dots, S_k = 10^k - 1, \dots$, is every term in S divisible by the prime number p ?

- (1) p is greater than 2.
 (2) At least one term in sequence S is divisible by p .



102. Quadrilateral $RSTU$ shown above is a site plan for a parking lot in which side RU is parallel to side ST and RU is longer than ST . What is the area of the parking lot?

- (1) $RU = 80$ meters
 (2) $TU = 20\sqrt{10}$ meters

103. If n and k are greater than zero, is $\frac{n}{k}$ an integer?

- (1) n and k are both integers.
 (2) n^2 and k^2 are both integers.

104. If the average (arithmetic mean) of six numbers is 75, how many of the numbers are equal to 75?

- (1) None of the six numbers is less than 75.
 (2) None of the six numbers is greater than 75.

105. Is $|x| = y - z$?

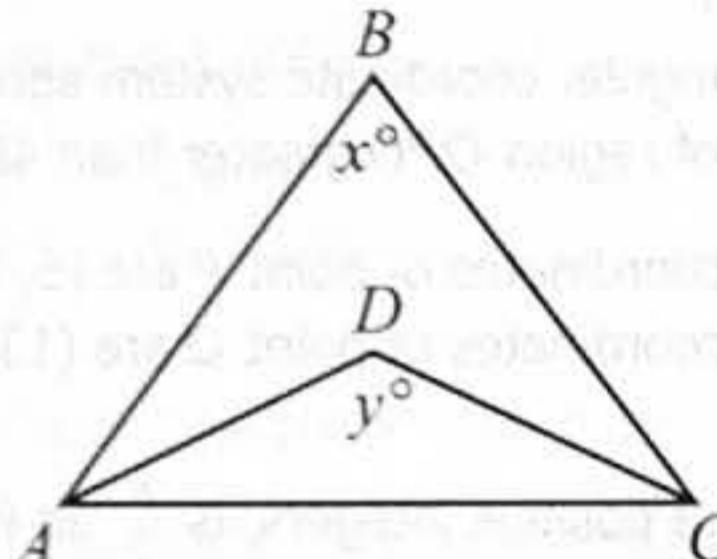
- (1) $x + y = z$
 (2) $x < 0$

106. What was the total amount of revenue that a theater received from the sale of 400 tickets, some of which were sold at x percent of full price and the rest of which were sold at full price?

- (1) $x = 50$
 (2) Full-price tickets sold for \$20 each.

107. Any decimal that has only a finite number of nonzero digits is a terminating decimal. For example, 24, 0.82, and 5.096 are three terminating decimals. If r and s are positive integers and the ratio $\frac{r}{s}$ is expressed as a decimal, is $\frac{r}{s}$ a terminating decimal?

- (1) $90 < r < 100$
 (2) $s = 4$



108. In the figure above, what is the value of $x + y$?

- (1) $x = 70$
 (2) $\triangle ABC$ and $\triangle ADC$ are both isosceles triangles.

109. Are positive integers p and q both greater than n ?

- (1) $p - q$ is greater than n .
 (2) $q > p$

110. Whenever Martin has a restaurant bill with an amount between \$10 and \$99, he calculates the dollar amount of the tip as 2 times the tens digit of the amount of his bill. If the amount of Martin's most recent restaurant bill was between \$10 and \$99, was the tip calculated by Martin on this bill greater than 15 percent of the amount of the bill?

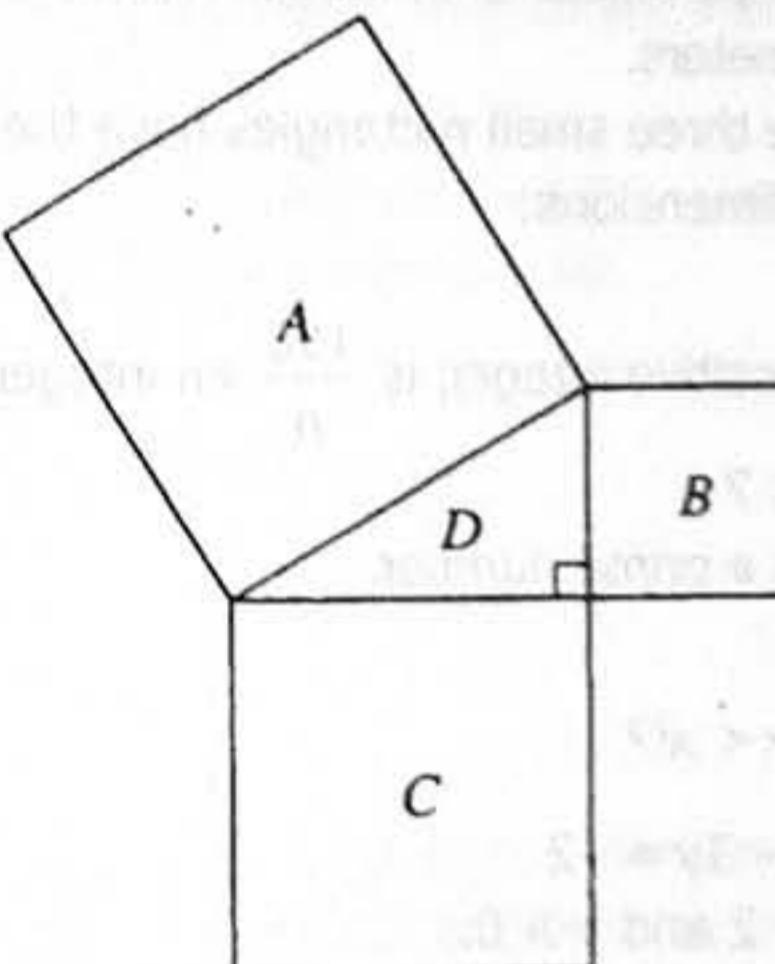
- (1) The amount of the bill was between \$15 and \$50.
 (2) The tip calculated by Martin was \$8.

111. The price per share of stock X increased by 10 percent over the same time period that the price per share of stock Y decreased by 10 percent. The reduced price per share of stock Y was what percent of the original price per share of stock X?

- (1) The increased price per share of stock X was equal to the original price per share of stock Y.
 (2) The increase in the price per share of stock X was $\frac{10}{11}$ the decrease in the price per share of stock Y.

112. Is k greater than t ?

- (1) $kt = 24$
 (2) $k^2 > t^2$



113. In the figure above, if the area of triangular region D is 4, what is the length of a side of square region A ?

- (1) The area of square region B is 9.
 (2) The area of square region C is $\frac{64}{9}$.

114. If x is to be selected at random from set T , what is the probability that $\frac{1}{4}x - 5 \leq 0$?

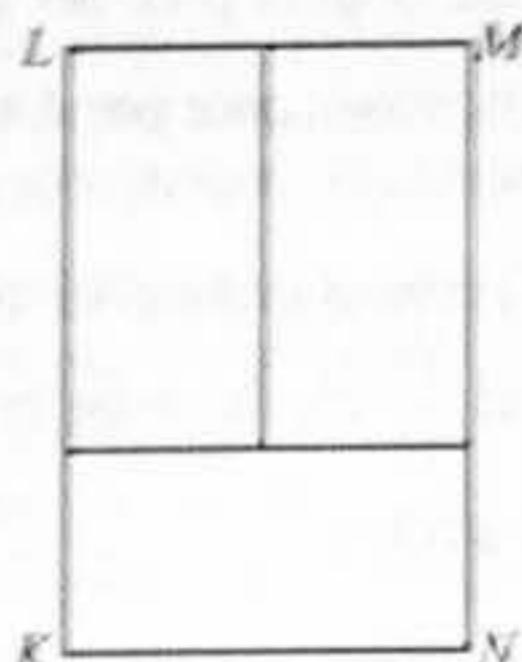
- (1) T is a set of 8 integers.
 (2) T is contained in the set of integers from 1 to 25, inclusive.

115. If Sara's age is exactly twice Bill's age, what is Sara's age?

- (1) Four years ago, Sara's age was exactly 3 times Bill's age.
 (2) Eight years from now, Sara's age will be exactly 1.5 times Bill's age.

116. What is the value of $(a + b)^2$?

- (1) $ab = 0$
 (2) $(a - b)^2 = 36$



117. In the figure above, what is the ratio $\frac{KN}{MN}$?

- (1) The perimeter of rectangle KLMN is 30 meters.
 (2) The three small rectangles have the same dimensions.

118. If n is a positive integer, is $\frac{150}{n}$ an integer?

- (1) $n < 7$
 (2) n is a prime number.

119. Is $2x - 3y < x^2$?

- (1) $2x - 3y = -2$
 (2) $x > 2$ and $y > 0$.

120. A report consisting of 2,600 words is divided into 23 paragraphs. A 2-paragraph preface is then added to the report. Is the average (arithmetic mean) number of words per paragraph for all 25 paragraphs less than 120?

- (1) Each paragraph of the preface has more than 100 words.
 (2) Each paragraph of the preface has fewer than 150 words.

121. If $\frac{x}{2} = \frac{3}{y}$, is x less than y ?

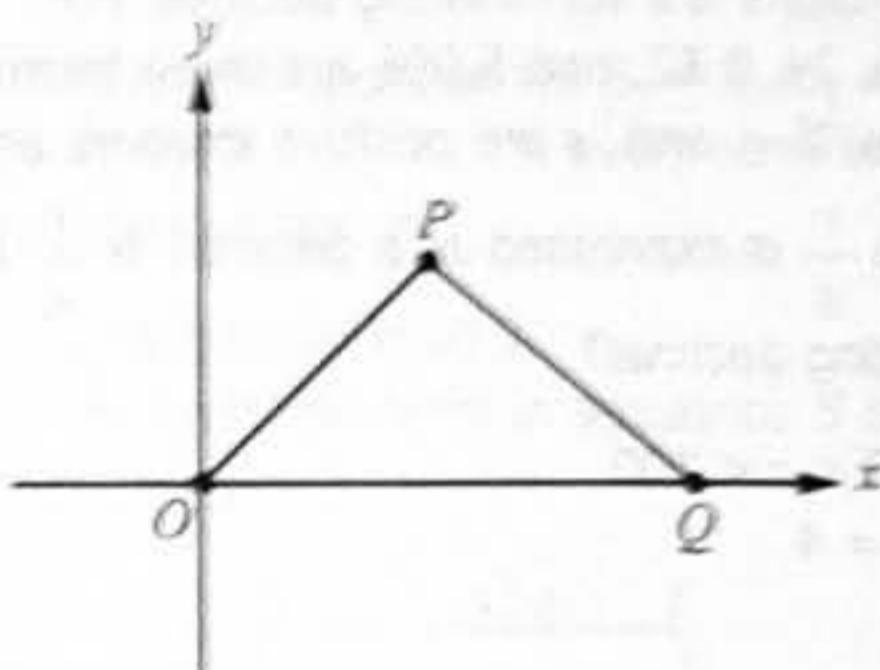
- (1) $y \geq 3$
 (2) $y \leq 4$

122. If v and w are different integers, does $v = w$?

- (1) $vw = v$
 (2) $w = 2$

123. What is the value of $36,500(1.05)^7$?

- (1) $n^2 - 5n + 6 = 0$
 (2) $n - 2 \neq 0$



124. In the rectangular coordinate system above, if $OP < PQ$, is the area of region OPQ greater than 48?

- (1) The coordinates of point P are $(6, 8)$.
 (2) The coordinates of point Q are $(13, 0)$.

125. If r and s are positive integers, is $\frac{r}{s}$ an integer?

- (1) Every factor of s is also a factor of r .
 (2) Every prime factor of s is also a prime factor of r .

126. If $z^n = 1$, what is the value of z ?

- (1) n is a nonzero integer.
 (2) $z > 0$

$$S = \frac{\frac{2}{n}}{\frac{1}{x} + \frac{2}{3x}}$$

127. In the expression above, if $xn \neq 0$, what is the value of S ?

- (1) $x = 2n$
 (2) $n = \frac{1}{2}$

128. If x is an integer, is $x|x| < 2^x$?

- (1) $x < 0$
 (2) $x = -10$

129. If n is a positive integer, is the value of $b - a$ at least twice the value of $3^n - 2^n$?

- (1) $a = 2^{n+1}$ and $b = 3^{n+1}$
 (2) $n = 3$

130. The inflation index for the year 1989 relative to the year 1970 was 3.56, indicating that, on the average, for each dollar spent in 1970 for goods, \$3.56 had to be spent for the same goods in 1989. If the price of a Model K mixer increased precisely according to the inflation index, what was the price of the mixer in 1970?

- (1) The price of the Model K mixer was \$102.40 more in 1989 than in 1970.
 (2) The price of the Model K mixer was \$142.40 in 1989.

131. Is 5^k less than 1,000?

- (1) $5^{k+1} > 3,000$
 (2) $5^{k-1} = 5^k - 500$

132. If the integer n is greater than 1, is n equal to 2?

- (1) n has exactly two positive factors.
 (2) The difference of any two distinct positive factors of n is odd.

133. Every member of a certain club volunteers to contribute equally to the purchase of a \$60 gift certificate. How many members does the club have?

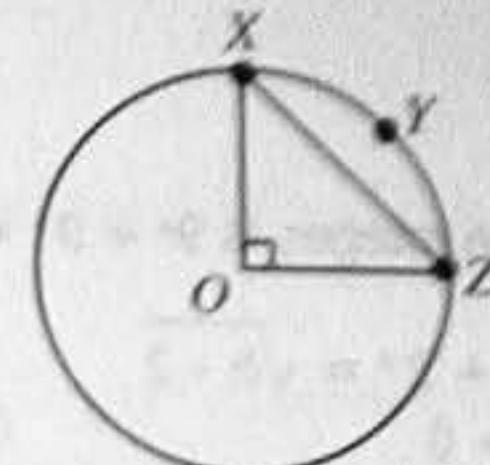
- (1) Each member's contribution is to be \$4.
 (2) If 5 club members fail to contribute, the share of each contributing member will increase by \$2.

134. If m and n are positive integers, is $\sqrt{n-m}$ an integer?

- (1) $n > m + 15$
 (2) $n = m(m + 1)$

135. If $x < 0$, is $y > 0$?

- (1) $\frac{x}{y} < 0$
 (2) $y - x > 0$



136. What is the circumference of the circle above with center O ?

- (1) The perimeter of $\triangle OXZ$ is $20 + 10\sqrt{2}$.
 (2) The length of arc XYZ is 5π .

137. What is the value of $a^4 - b^4$?

- (1) $a^2 - b^2 = 16$
 (2) $a + b = 8$

138. In a certain business, production index p is directly proportional to efficiency index e , which is in turn directly proportional to investment index i . What is p if $i = 70$?

- (1) $e = 0.5$ whenever $i = 60$.
 (2) $p = 2.0$ whenever $i = 50$.

139. If $x \neq -y$, is $\frac{x-y}{x+y} > 1$?

- (1) $x > 0$
 (2) $y < 0$

140. In the rectangular coordinate system, are the points (r, s) and (u, v) equidistant from the origin?

- (1) $r + s = 1$
 (2) $u = 1 - r$ and $v = 1 - s$.

141. On Jane's credit card account, the average daily balance for a 30-day billing cycle is the average (arithmetic mean) of the daily balances at the end of each of the 30 days. At the beginning of a certain 30-day billing cycle, Jane's credit card account had a balance of \$600. Jane made a payment of \$300 on the account during the billing cycle. If no other amounts were added to or subtracted from the account during the billing cycle, what was the average daily balance on Jane's account for the billing cycle?

- (1) Jane's payment was credited on the 21st day of the billing cycle.
 (2) The average daily balance through the 25th day of the billing cycle was \$540.

142. If x is an integer, is $9^x + 9^{-x} = b$?

- (1) $3^x + 3^{-x} = \sqrt{b+2}$
 (2) $x > 0$

143. If $m > 0$ and $n > 0$, is $\frac{m+x}{n+x} > \frac{m}{n}$?

- (1) $m < n$
 (2) $x > 0$

144. If n is a positive integer, is $\left(\frac{1}{10}\right)^n < 0.01$?

- (1) $n > 2$
 (2) $\left(\frac{1}{10}\right)^{n-1} < 0.1$

145. Is $\frac{1}{p} > \frac{r}{r^2 + 2}$?

- (1) $p = r$
 (2) $r > 0$

146. Is n an integer?

- (1) n^2 is an integer.
 (2) \sqrt{n} is an integer.

147. If n is a positive integer, is $n^3 - n$ divisible by 4?

- (1) $n = 2k + 1$, where k is an integer.
 (2) $n^2 + n$ is divisible by 6.

148. What is the tens digit of positive integer x ?

- (1) x divided by 100 has a remainder of 30.
 (2) x divided by 110 has a remainder of 30.

149. If x , y , and z are positive integers, is $x - y$ odd?

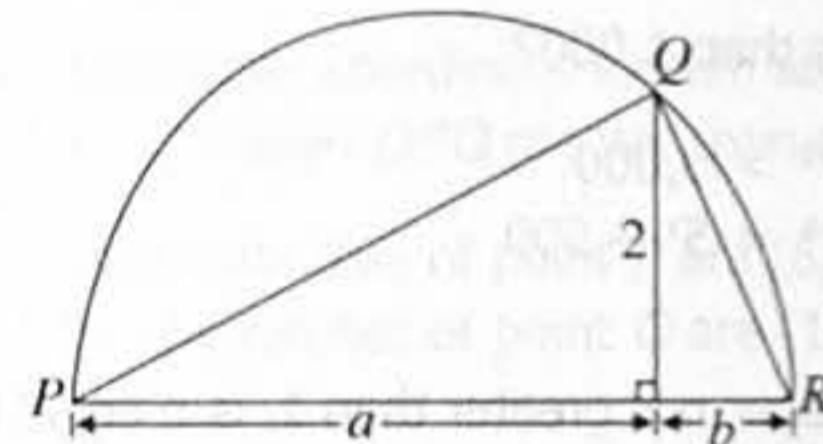
- (1) $x = z$
 (2) $y = (z - 1)^2$

150. Henry purchased 3 items during a sale. He received a 20 percent discount off the regular price of the most expensive item and a 10 percent discount off the regular price of each of the other 2 items. Was the total amount of the 3 discounts greater than 15 percent of the sum of the regular prices of the 3 items?

- (1) The regular price of the most expensive item was \$50, and the regular price of the next most expensive item was \$20.
 (2) The regular price of the least expensive item was \$15.

151. If x and y are positive, is the ratio of x to y greater than 3?

- (1) x is 2 more than 3 times y .
 (2) The ratio of $2x$ to $3y$ is greater than 2.



152. If arc PQR above is a semicircle, what is the length of diameter PR ?

- (1) $a = 4$
 (2) $b = 1$

153. Does the integer k have a factor p such that $1 < p < k$?

- (1) $k > 4!$
 (2) $13! + 2 \leq k \leq 13! + 13$

154. Is x negative?

- (1) $x^3(1 - x^2) < 0$
 (2) $x^2 - 1 < 0$

155. Marcia's bucket can hold a maximum of how many liters of water?

- (1) The bucket currently contains 9 liters of water.
 (2) If 3 liters of water are added to the bucket when it is half full of water, the amount of water in the bucket will increase by $\frac{1}{3}$.

6.4 Data Sufficiency Answer Key

- | | | | | |
|-------|-------|-------|--------|--------|
| 1. D | 32. A | 63. C | 94. D | 125. A |
| 2. D | 33. E | 64. A | 95. E | 126. C |
| 3. B | 34. D | 65. B | 96. C | 127. A |
| 4. B | 35. E | 66. A | 97. B | 128. D |
| 5. E | 36. B | 67. C | 98. C | 129. A |
| 6. D | 37. C | 68. D | 99. B | 130. D |
| 7. E | 38. E | 69. A | 100. D | 131. B |
| 8. D | 39. E | 70. D | 101. E | 132. B |
| 9. D | 40. B | 71. A | 102. D | 133. D |
| 10. A | 41. D | 72. E | 103. E | 134. B |
| 11. B | 42. D | 73. E | 104. D | 135. A |
| 12. B | 43. C | 74. A | 105. C | 136. D |
| 13. E | 44. B | 75. E | 106. E | 137. C |
| 14. A | 45. E | 76. A | 107. B | 138. B |
| 15. D | 46. E | 77. D | 108. E | 139. E |
| 16. B | 47. A | 78. C | 109. C | 140. C |
| 17. D | 48. D | 79. D | 110. B | 141. D |
| 18. E | 49. C | 80. C | 111. D | 142. A |
| 19. B | 50. B | 81. D | 112. E | 143. C |
| 20. A | 51. A | 82. B | 113. D | 144. D |
| 21. B | 52. D | 83. D | 114. E | 145. C |
| 22. E | 53. C | 84. D | 115. D | 146. B |
| 23. D | 54. D | 85. C | 116. C | 147. A |
| 24. C | 55. C | 86. D | 117. B | 148. A |
| 25. B | 56. E | 87. E | 118. C | 149. C |
| 26. B | 57. C | 88. E | 119. D | 150. A |
| 27. C | 58. B | 89. D | 120. B | 151. D |
| 28. A | 59. D | 90. E | 121. A | 152. D |
| 29. D | 60. D | 91. E | 122. A | 153. B |
| 30. C | 61. D | 92. C | 123. C | 154. C |
| 31. E | 62. C | 93. E | 124. A | 155. B |