FMS PAPER: (05-12-2010)

SECTION 3

Quantitative Ability (50 questions)

101. If $\dfrac{x^2 - bx}{ax - c} = \dfrac{m-1}{m+1}$ has roots which are numerically equal but of opposite signs, the value of m must be :

(1) $\dfrac{a-b}{a+b}$ (2) $\dfrac{a+b}{a-b}$

(3) c (4) $1/c$

102. If the sum of the first ten terms of an arithmetic progression is four times the sum of the first five terms, then the ratio of the first term to the common difference is :

$\frac{10}{2}[2a + 9d] = 4 \times \frac{5}{2}[2a + 4d] \Rightarrow 2a + 9d = 4a + 8d$

$2a = d$

(1) 1 : 2 (2) 2 : 1

(3) 1 : 4 (4) 4 : 1

103. Two cyclist, k kilometers apart, and starting at the same time, would be together in r hours if they traveled in the same direction, but would pass each other in t hours if they traveled in opposite direction. The ratio of the speed of the faster cyclist to that of the slower is :

$\frac{k}{x-y} = r$

$\frac{k}{x+y} = t$

$x - y = \frac{k}{r}$

$x + y = k/t$

$2x = \frac{k}{r} + \frac{k}{t}$

$\frac{k(t+r)}{2rt}$

(1) $\dfrac{r+t}{r-t}$ (2) $\dfrac{r}{r-t}$

(3) $\dfrac{r+t}{r}$ (4) $\dfrac{r}{t}$

104. If $f(x) = \dfrac{x(x-1)}{2}$, then $f(x+2)$ equals :

(1) $f(x) + f(2)$ (2) $(x+2)\, f(x)$

(3) $x(x+2)\, f(x)$ (4) $\dfrac{(x+2) f(x+1)}{x}$

105. In solving a problem that reduces to a quadratic equation one student makes a mistake only in the constant term of the equation and obtains 8 and 2 for the roots. Another student makes a mistake only in the coefficient of the first degree term and finds –9 and –1 for the roots. The correct equation is :

(1) $x^2 - 10x + 9 = 0$ (2) $x^2 + 10x + 9 = 0$

$x^2 - 9x - x + 9 = 0$

(3) $x^2 - 10x + 16 = 0$ (4) $x^2 - 8x - 9 = 0$

106. Instead of walking along two adjacent sides of a rectangular field, a boy took a short-cut along the diagonal of the field and saved a distance equal to ½ of the longer side. The ratio of the shorter side of the rectangle to the longer side is :

(1) $\frac{3}{2}$ (2) $\frac{2}{3}$

(3) $\frac{1}{4}$ (4) $\frac{3}{4}$

107. If x varies as the cube of y, and y varies as the fifth root of z, then x varies as the nth power of z, where n is :

(1) $\frac{1}{15}$ (2) $\frac{5}{3}$

(3) $\frac{3}{5}$ (4) 15

108. Of the following sets, the one that includes all values of x which will satisfy $2x - 3 > 7 - x$ is :

(1) $x > 4$ (2) $x < \frac{10}{3}$

(3) $x = \frac{10}{3}$ (4) $x > \frac{10}{3}$

109. If $\frac{m}{n} = \frac{4}{3}$ and $\frac{r}{t} = \frac{9}{14}$, the value of $\frac{3mr - nt}{4nt - 7mr}$ is :

(1) $-5\frac{1}{2}$ (2) $-\frac{11}{14}$

(3) $-1\frac{1}{4}$ (4) $\frac{11}{14}$

110. A and B together can do a job in 2 days; B and C can do it in four days; and A and C in $2\frac{2}{5}$ days. The number of days required for A to do the job alone is :

(1) 1 (2) 3

(3) 6 (4) 12

111. The sum of all the roots of $4x^3 - 8x^2 - 63x - 9 = 0$ is :

(1) 8 (2) 2

(3) -8 (4) -2

112. A man born in the first half of the nineteenth century was x years old in the year x^2. He was born in :

(1) 1806 (2) 1836

(3) 1812 (4) 1825

113. A train, an hour after starting, meets with an accident which detains it for a half hour, after which it proceeds at $\frac{3}{4}$ of its former rate and arrives $3\frac{1}{2}$ hours late. Had the accident happened 90 kilometers farther along the line, it would have arrived only 3 hours late. The length of the trip in kilometers was :

(1) 400 (2) 465

(3) 600 (4) 640

114. The times between 7 and 8 o'clock, correct to the nearest minute, when the hands of a clock will form an angle of 84 degrees are :

(1) 7 : 23 and 7 : 53 (2) 7 : 20 and 7 : 50

(3) 7 : 22 and 7 : 53 (4) 7 : 23 and 7 : 52

115. The solution of $\sqrt{5x-1} + \sqrt{x-1} = 2$ is :

(1) $x = 1$ (2) $x = 2$

(3) $x = \frac{2}{3}$ (4) $x = 2, x = 1$

116. If $\log x - 5 \log 3 = -2$, then x equals :

(1) 1.25 (2) 0.81

(3) 2.43 (4) 0.8

117. Three boys agree to divide a bag of marbles in the following manner. The first boy takes one more than half the marbles. The second takes a third of the number remaining. The third boy finds that he is left with twice as many marbles as the second boy. The original number of marbles :

(1) is 8 or 38

(2) cannot be determined from the given data

(3) is 20 or 26

(4) is 14 or 32

118. A three-digit number has, from left to right, the digits h, t, and u with $h > u$. When the number with the digits reversed is subtracted from the original number, the units' digit in the difference is 4. The next two digits, from right to left, are :

(1) 5 and 9 (2) 9 and 5

(3) 5 and 4 (4) 4 and 5

119. In a group of cows and chickens, the number of legs was 14 more than twice the number of heads. The number of cows was :

(1) 5 (2) 7

(3) 10 (4) 12

$2(x+4y) - 2(x+y)$

120. Simplify $\left[\sqrt[3]{\sqrt[6]{a^9}}\right]^4 \left[\sqrt[6]{\sqrt[3]{a^9}}\right]^4$; the result is :

(1) a^{16} (2) a^{12}

(3) a^8 (4) a^4

121. The expression $1 - \frac{1}{1+\sqrt{3}} + \frac{1}{1-\sqrt{3}}$ equals :

(1) $1 - \sqrt{3}$ (2) 1

(3) $-\sqrt{3}$ (4) $\sqrt{3}$

122. Given two positive integers x and y with $x < y$. The percent that x is less than y is :

(1) $\frac{100(y-x)}{x}$ (2) $\frac{100(x-y)}{x}$

(3) $\frac{100(y-x)}{y}$ (4) $100(y-x)$

123. The points A, B and C are on a circle O. The tangent line at A and the secant BC intersect at P, B lying between C and P. If $\overline{BC} = 20$ and $\overline{PA} = 10\sqrt{3}$, then $\overline{PB}$ equals :

(1) 5 (2) 10

(3) $10\sqrt{3}$ (4) 20

124. The sum of three numbers is 98. The ratio of the first to the second is $\frac{2}{3}$, and the ratio of the second to the third is $\frac{5}{8}$. The second number is :

(1) 15 (2) 20

(3) 30 (4) 32

125. Two candles of the same height are lighted at the same time. The first is consumed in 4 hours and the second in 3 hours. Assuming that each candle burns at a constant rate, in how many hours after being lighted was the first candle twice the height of the second ?

(1) $\frac{3}{4}$ hr. (2) $1\frac{1}{2}$ hrs.

(3) 2 hrs. (4) $2\frac{2}{5}$ hrs.

126. In our number system the base is ten. If the base were changed to four, you would count as follows :

1, 2, 3, 10, 11, 12, 13, 20, 21, 22, 23, 30, ...

The twentieth number would be :

(1) 110 (2) 104

(3) 44 (4) 38

127. Hari and Ravi started a race from opposite ends of the pool. After a minute and a half, they passed each other in the center of the pool. If they lost no time in turning and maintained their respective speeds, how many minutes after starting did they pass each other the second time ?

(1) 3 (2) $4\frac{1}{2}$

(3) 6 (4) $7\frac{1}{2}$

128. The numbers x, y, z are proportional to 2, 3, 5. The sum of x, y and z is 100. The number y is given by the equation $y = ax - 10$. Then a is :

(1) 2 (2) $\frac{3}{2}$

(3) 3 (4) $\frac{5}{2}$

129. If the square of a number of two digits is decreased by the square of the number formed by reversing the digits, then the result is not always divisible by :

(1) 9 (2) the product of the digits

(3) the sum of the digits (4) the difference of the digits

130. The expression $2 + \sqrt{2} + \frac{1}{2 + \sqrt{2}} + \frac{1}{\sqrt{2} - 2}$ equals :

(1) 2 (2) $2 - \sqrt{2}$

(3) $2 + \sqrt{2}$ (4) $2\sqrt{2}$

131. The sum of the roots of equation $4x^2 + 5 - 8x = 0$ is equal to :

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

(3) -2 (4) none of the above

132. The values of y which will satisfy the equations

$$2x^2 + 6x + 5y + 1 = 0$$
$$2x + y + 3 = 0$$

may be found by solving :

(1) $y^2 + 14y - 7 = 0$ (2) $y^2 + 8y + 1 = 0$

(3) $y^2 + 10y - 7 = 0$ (4) $y^2 + y - 12 = 0$

133. If the digit 1 is placed after a two digit number whose tens' digit is t, and units' digit is u, the new number is :

(1) $10t + u + 1$ (2) $100t + 10u + 1$

(3) $1000t + 10u + 1$ (4) $t + u + 1$

134. The area of the largest triangle that can be inscribed in a semi-circle whose radius is r, is :

(1) r^2 (2) r^3

(3) $2r^2$ (4) $2r^3$

135. The value of $\log_5 \frac{(125)(625)}{25}$ is equal to :

(1) 725 (2) 6

(3) 3125 (4) 5

136. Two boys A and B start at the same time to ride from Delhi to Meerut, 60 kilometers away. A travels 4 kilometers an hour slower than B. B reaches Meerut and at once turns back meeting A 12 kilometers from Meerut. The rate of A was :

(1) 4 kph (2) 8 kph

(3) 12 kph (4) 16 kph

137. A manufacturer builds a machine which will address 500 envelopes in 8 minutes. He wishes to build another machine so that when both are operating together they will address 500 envelopes in 2 minutes. The equation used to find how many minutes x it would require the second machine to address 500 envelopes alone, is :

(1) $8 - x = 2$ (2) $\frac{1}{8} + \frac{1}{x} = \frac{1}{2}$

(3) $\frac{500}{8} + \frac{500}{x} = 500$ (4) $\frac{x}{2} + \frac{x}{8} = 1$

138. From a group of boys and girls, 15 girls leave. There are then left two boys for each girl. After this 45 boys leave. There are then 5 girls for each boy. The number of girls in the beginning was : $2y - x = 30$

(1) 40 (2) 43

(3) 29 (4) none of these

139. Ajay ordered 4 pairs of black socks and some additional pairs of blue socks. The price of the black socks per pair was twice that of the blue. When the order was filled, it was found that the number of pairs of the two colors had been interchanged. This increased the bill by 50%. The ratio of the number of pairs of black socks to the number of pairs of blue socks in the original order was :

(1) 4 : 1 (2) 2 : 1

(3) 1 : 4 (4) 1 : 2

140. The number of circular pipes with an inside diameter of 1 inch which will carry the same amount of water as a pipe with an inside diameter of 6 inches is :

(1) 6π (2) 12

(3) 36 (4) 36π

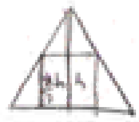
141. The sum to infinity of $\frac{1}{7} + \frac{2}{7^2} + \frac{1}{7^3} + \frac{2}{7^4} + \cdots$ is

(1) $\frac{1}{24}$ (2) $\frac{5}{48}$

(3) $\frac{1}{16}$ (4) none of these

142. A rectangle inscribed in a triangle has its base coinciding with the base b of the triangle. If the altitude of the triangle is h, and the altitude x of the rectangle is half the base of the rectangle, then :

(1) $x = \frac{1}{2}h$ (2) $x = \frac{bh}{h+b}$



(3) $x = \frac{bh}{2h+b}$ (4) $x = \sqrt{\frac{hb}{2}}$

143. Indicate in which one of the following equations y is neither directly nor inversely proportional to x :

(1) $x + y = 0$ (2) $3xy = 10$

(3) $x = 5y$ (4) $3x + y = 10$

144. The values of a in the equation : $\log_a (a^2 - 15a) = 2$ are :

(1) $\frac{15 \pm \sqrt{233}}{2}$ (2) 20, −5

(3) $\frac{15 \pm \sqrt{305}}{2}$ (4) ± 20

145. $\frac{2^{n+4} - 2(2^n)}{2(2^{n+3})}$ when simplified is :

(1) $2^{n+1} - \frac{1}{8}$ (2) -2^{n+1}

(3) $1 - 2^n$ (4) $\frac{7}{8}$

146. A total of 28 handshakes was exchanged at the conclusion of a party. Assuming that each participant was equally polite toward all the others, the number of people present was :

$28 = \frac{n(n+1)}{2} \rightarrow 56 = n^2 + n$

(1) 14 (2) 28

(3) 56 (4) 8

147. A number which when divided by 10 leaves a remainder of 9, when divided by 9 leaves a remainder of 8, by 8 leaves a remainder of 7, etc., down to where, when divided by 2, it leaves a remainder of 1, is :

(1) 59 (2) 419

(3) 1259 (4) 2519

148. The ratio of the area of a square inscribed in a semicircle to the area of the square inscribed in the entire circle is :

(1) 1 : 2 (2) 2 : 3

(3) 2 : 5 (4) 3 : 4

149. The points (6, 12) and (0, −6) are connected by a straight line. Another point on this line is :

(1) (3, 3) (2) (2, 1)

(3) (7, 16) (4) (−1, −4)

150. A merchant bought some goods at a discount of 20% of the list price. He wants to mark them at such a price that he can give a discount of 20% of the marked price and still make a profit of 20% of the selling price. The percent of the list price of which he should mark them is :

(1) 20 (2) 100

(3) 125 (4) 80