MINIMUM STUDY MATERIALS FOR QUARTERLY EXAM

11th Standard

Maths

60 x 2 = 120

1) Write the following in roster form.
$\{x \in N : x^2 < 121 \text{ and } x \text{ is a prime}\}$

2) Write the following in roster form.
The set of all positive roots of the equation $(x-1)(x+1)(x^2-1) = 0$.

3) Write the following in roster form $\{x \in N : 4x + 9 < 52\}$

4) Write the following in roster form.
$$\left\{x : \frac{x-4}{x+2} = 3, x \in R - \{-2\}\right\}$$

5) By taking suitable sets A, B, C, verify the following results:
$A \times (B \cap C) = (A \times B) \cap (A \times C)$

6) If $n(p(A)) = 1024$, $n(A \cup B) = 15$ and $n(p(B)) = 32$, then find $n(A \cap B)$.

7) Discuss the following relations for reflexivity, symmetricity and transitivity :
On the set of natural numbers, the relation R is defined by "xRy if x + 2y = 1".

8) Find the number of subsets of A if $A = \{x : x = 4n + 1, 2 \le n \le 5, n \in N\}$.

9) If A = {1, 2, 3, 4} and B = {3, 4, 5, 6}, find $n((A \cup B) \times (A \cap B) \times (A \triangle B))$

10) If p(A) denotes the power set of A, then find $n(P(P(P(\phi))))$.

11) Check the relation R = {(1, 1) (2, 2) (3, 3) ... (n, n)} defined on the set S = {1, 2,3, .. n} for the three basic relations.

12) Evaluate $$\left(\left[(256)^{\frac{-1}{4}}\right]^{\frac{-1}{4}}\right)^3$$

13) Solve for x $|x| - 10 < -3$

14) Solve $\frac{1}{|2x-1|} < 6$ and express the solution using the interval notation.

15) Solve $2|x + 1| - 6 \le 7$ and graph the solution set in a number line.

16) Discuss the nature of roots of $-x^2 + 3x + 1 = 0$

17) Discuss the nature of roots of $4x^2 - x - 2 = 0$

18) Discuss the nature of roots of $9x^2 + 5x = 0$.

19) Solve $3x - 5 \le x + 1$ for x.

20) Rationalize the denominator of $\frac{\sqrt{5}}{(\sqrt{6}+\sqrt{2})}$

21) Find the logarithm of 1728 to the base $2\sqrt{3}$

22) If the logarithm of 324 to base a is 4, find a.

23) Find the value of cos 105^o

24) Find the value of sin 105^o

25) Prove that $\cos(30+x) = \frac{\sqrt{3}\cos x-\sin x}{2}$

26) Find the principal value of $sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$.

27) Show that tan (45^o + A) = $\frac{1+\tan A}{1-\tan A}$

28) Show that tan (45^o - A) = $\frac{1-\tan A}{1+\tan A}$

29) Find the value sin (480^0)

30) Find the value sin (-1110^0)

31) Express each of the following as a sum or difference. sin 35^o cos 28^o

32) Express each of the following as a sum or difference. cos 5θ cos 2θ

33) Express each of the following as a sum or difference. sin 5θ sin 4θ

34) Express each of the following as a product.
sin 75^o - sin 35^o

35) Express each of the following as a product.
cos 65^o + cos 15^o

36) Express each of the following as a product.
cos 35^o - cos 75^o

37) Show that cos 10° cos 30° cos 50° cos 70° = $\frac{3}{16}$.

38) Find (1 + tan A + sec A) (1 + cot A -cosec A).

39) If A + B = 45°, find tan 22 $\frac{1^o}{2}$

40) Solve: sin 2x + sin 6x + sin 4x = o

41) cot B - cot A = b, tan A - tan B = a, find cot (A - B).

42) Simplify: cos A + cos (120° + A) + cos (120° - A)

43) Find the values of sin(-1110°).

44) Find the values of tan(1050°).

45) Find the value of $\frac{12!}{9!\times 3!}$

46) Find the value of n if $\frac{1}{8!}+\frac{1}{9!}=\frac{n}{10!}$

47) If ${}^{(n-1)}P_3 : {}^{n}P_4 = 1 : 10$, find n

48) If ${}^{n}C_{12} = {}^{n}C_9$ find ${}^{21}C_n$.

49) If ${}^{15}C_{2r-1} = {}^{15}C_{2r+4}$, find r.

50) Find the middle terms in the expansion of $(x + y)^7$.

51) Find the equation of the lines passing through the point (1, 1)

(i) with y-intercept (-4)

(ii) with slope 3

(iii) and (-2, 3)

(iv) and the perpendicular from the origin makes an angle 60° with x- axis.

52) Show that the lines are 3x + 2y + 9 = 0 and 12x + 8y - 15 = 0 are paralle llines.

53) Write the equation of the lines through the point (1,-1)

(i) parallel to x + 3y - 4 = 0

(ii) perpendicular to 3x + 4y = 6

54) Find the values of k for which the line $(k - 3)x-(4-k^2)y+(k^2-7k + 6) = 0$ passes through the origin.

55) Find the distance between the parallel lines

12x + 5y = 7 and 12x + 5y + 7 = 0.

56) Find the acute angle between the pair of lines given by $2x^2- 5xy - 7y^2 = 0$.

57) Find the equation of straight line joining the points of intersection of the lines 3x + 2y + 1 = 0 and x + y = 3 to the intersection of the lines y - x = 1 and 2x + y +2 = 0.

58) Find the value of a for which the straight lines x + y - 4 = 0, 3x + 2 = 0 and x - y + 3a = 0 are concurrent.

59) Find the angle between the lines $3x^2 + 10xy + 8y^2 + 14x + 22y + 15 = 0$.

60) Evaluate: $lim_{n\to\infty}\frac{1+2+3+...+n}{n^2}$

ANSWERS FOR THIS MATERIALS COST RS.50 ONLY. 60 x 3 = 180

WHATSAPP - 8056206308

61) If n(A ∩ B) = 3 and n(A ∪ B) = 10 then find n(P(A Δ B))

62) Find the domain of $\frac{1}{1-2sinx}$

63) If X = {1, 2, 3, .. 10} and A = {1, 2, 3, 4, 5}, find the number of sets $B \subseteq X$ such that A - B = {4}.

64) If A and B are two sets so that n(B - A) = 2n(A - B) = $4n(A \cap B)$ and if $n(A \cup B) = 14$, then find n(P (A)).

65) If n(A) = 10 and $n(A \cap B) = 3$, find $n((A \cap B') \cap A)$.

66) Find the domain of $f(x) = \frac{1}{1-2\cos x}$.

67) Let f = {(1, 2), (3,4), (2, 2)} and s = {(2, 1), (3, 1), (4, 2)}. Find g o f and f o g.

68) Let f and g be the two functions from R to R defined by f(x) = 3x - 4 and g(x) = x^2+ 3. Find g o f and f o g.

69) Consider the functions:

i) $f(x) = |x|$,

ii) $f(x) = |x - 1|$

iii) $f(x) = |x + 1|$

70) Consider the functions:

i) $f(x) = x^2$,

ii) $f(x) = x^2 + 1$,

iii) $f(x) = (x + 1)^2$

71) Consider the functions:

(i) f(x) = |x|

(ii) f(x) = |x| − 1

(iii) f(x) = |x| + 1

72) Simplify by rationalising the denominator $\frac{7+\sqrt{6}}{3-\sqrt{2}}$

73) Compute $log_9^{27} - log_{27}^{9}$

74) Solve $\log_8 x + \log_4 x + \log_2 x = 11$

75) Solve $\log_4 2^{8x} = 2 \log_2{}^8$

76) If $a^2+b^2 = 7ab$. Show that log $\frac{a+b}{3} = \frac{1}{2}$ (log a + log b)

77) Prove $log\frac{a^2}{bc} + log\frac{b^2}{ca} + log\frac{c^2}{ab} = 0$

78) If $\frac{log\, x}{y-z} = \frac{log\, y}{z-x} = \frac{log\, z}{x-y}$, then prove that xyz= 1

79) Solve |2x- 3| = |x - 5|.

80) Resolve into partial fractions: $\frac{x}{(x+3)(x-4)}$

81) Prove $log\frac{75}{16} - 2log\frac{5}{9} + log\frac{32}{243} = log2$

82) Compute $\log_3 5 \log_{25} 27$

83) **Solve:**

(i) $\frac{3(x-2)}{5} \le \frac{5(2-x)}{3}$

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

84) Show that $\sin^2\frac{\pi}{18} + \sin^2\frac{\pi}{9} + \sin^2\frac{7\pi}{18} + \sin^2\frac{4\pi}{9} = 2$

85) Show that $\frac{sin8x \quad cosx - sin6x \quad cos3x}{cos2x \quad cosx - sin3x \quad sin4x} = tan2x$

86) If $\sin x = \frac{15}{17}$ and $\cos y = \frac{12}{13}$, $0 < x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$, find the value of sin (x + y)

87) Prove that $cos(30^0 - A)cos(30^0 + A)cos(45^0 - A)cos(45^0 + A) = cos2A + \frac{1}{4}$

88) Prove that $\frac{sin(4A-2B)+sin(4B-2A)}{cos(4A-2B)+cos(4B-2A)} = tan(A+B)$

89) Prove that $\sin(45^o + \theta) - \sin(45^o - \theta) = \sqrt{2}\sin\theta$

90) Show that $\tan 75^o + \cot 75^o = 4$

91) Prove that $\cos(A + B)\cos(A - B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

92) Prove that $(1 + \tan 1^o)(1 + \tan 2^o)(1 + \tan 3^o) \ldots (1 + \tan 44^o)$ is a multiple of 4.

93) Solve sin x + sin 5x = sin 3x.

94) In a $\triangle ABC$, a = 3, b = 5 and c = 7. Find the values of cos A, cos B and cos C.

95) In $\triangle ABC$, A = 30°, B = 60° and c = 10, Find a and b.

96) If ${}^{10}P_{r-1} = 2 \times {}^{6}P_r$, find r.

97) A test consists of 10 multiple choice questions. In how many ways can the test be answered if

(i) Each question has four choices?

(ii) The first four questions have three choices and the remaining have five choices?

(iii) Question number n has n + 1 choices?

98) Find the distinct permutations of the letters of the word MISSISSIPPI?

99) If ${}^{n}P_r = 720$. If ${}^{n}C_r = 120$, find n, r = ?

100) If ${}^{(n+2)}P_4 = 42 \times {}^{n}P_2$, find n.

101) How many 'letter strings' together can be formed with the letters of the word "VOWELS" so that

(i) the strings begin with E

(ii) the strings begin with E and end with W.

102) In how many ways 5 boys and 4 girls can be seated in a row so that no two girls are together.

103) If ${}^{n}P_r = 11880$ and ${}^{n}C_r = 495$, Find n and r.

104) Expand the following in ascending powers of x and find the condition on x for which the binomial expansion is valid.

$$\frac{2}{(3+4x)^2}$$

105) Expand the following in ascending powers of x and find the condition on x for which the binomial expansion is valid.

$$\left(5 + x^2\right)^{\frac{2}{3}}$$

106) Find the coefficient of x^6 in the expansion of $(3 + 2x)^{10}$.

107) Prove that if a, b, c are in HP, if and only if $\frac{a}{c} = \frac{a-b}{b-c}$.

108) If the 5^{th} and 9^{th} terms of a harmonic progression are $\frac{1}{19}$ and $\frac{1}{35}$, find the 12^{th} term of the sequence.

109) Find the sum : $1 + \frac{4}{5} + \frac{7}{25} + \frac{10}{125} + \ldots\ldots$

110) Find the equation of the lines passing through the point of intersection lines 4x - y + 3 = 0 and 5x + 2y + 7 = 0

(i) through the point (-1, 2)

(ii) Parallel to x - y + 5 = 0

(iii) Perpendicular to x - 2y + 1 = 0.

111) Find the equations of two straight lines which are parallel to the line 12x + 5y + 2 = 0 and at a unit distance from the point (1, -1).

112) Find the length of the perpendicular and the coordinates of the foot of the perpendicular form (-10, -2) to the line x + y - 2 = 0

113) Find the equation of the line passing through the point (1, 5) and also co-ordinate axes in the ratio 3: 10.

114) Find the family of straight lines

(i) Perpendicular

(ii) Parallel to 3x + 4y -12 = 0.

115) Show that $2x^2 + 3xy - 2y^2 + 3x + y + 1 = 0$ represents a pair of perpendicular lines.

116) Find the equation of the straight lines passing through (8, 3) and having intercepts whose sum is 1.

117) Find the value of λ for which the equation $12x^2-10xy+2y^2+11x-5y+\lambda=0$ represents a pair of straight lines.

118) Find the equation to the bisectors of the angle between 5x+12y-7=0 and 4x-3y+1=0

119) If the slope of one of the lines given by $ax^2+2hxy+by^2 = 0$ is k times the other, prove that $4Kh^2 = ab\ (HK)^2$

120) Find $\sqrt[3]{65}$.

65 x 5 = 325

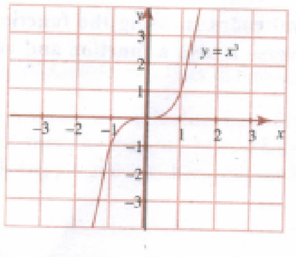
121) For the given curve $y = x^3$ given in figure draw, try to draw with the same scale

(i) $y = -x^3$

(ii) $y = x^3+1$

(iii) $y = x^3-1$

(iv) $y = (x + 1)^3$



122) From the curve y = sin x, graph the functions.

(i) y = sin(-x)

(ii) y = -sin(-x)

(iii) $y = sin\left(\frac{\pi}{2} + x\right)$ which is cos x

(iv) $y = sin\left(\frac{\pi}{2} - x\right)$ which is also cos x (refer trigonometry)

123) From the curve y = |x|, draw

(i) y = |x + 1| + 1

(ii) y = |x - 1| - 1

(iii) y = |x + 2| - 3

124) Find the range of the function $f(x) = \frac{1}{1-3\cos\ x}$.

125) Find the largest possible domain for the real valued function given by $f(x) = \frac{\sqrt{9-x^2}}{x^2-1}$.

126) Let A = {0,1, 2, 3}. Construct relations on A of the following types:

(i) reflexive, not symmetric, not transitive.

(ii) reflexive, not symmetric, transitive.

127) Simplify $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$

128) Prove that $log2 + 16log\frac{16}{15} + 12log\frac{25}{24} + 7log\frac{81}{80} = 1$

129) Solve : $log_2 x - 3log_{\frac{1}{2}} x = 6$

130) Solve $\log_{5-x}(x^2-6x+65)=2$

131) Resolve the following rational expressions into partial fractions.

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

132) Resolve the following rational expressions into partial fractions.

$\frac{x^2+x+1}{x^2-5x+6}$

133) Determine the region in the plane determined by the inequalities.

$2x + y \geq 8,\ \ x + 2y \geq 8,\ \ x + y \leq 6$

134) Resolve the following rational expressions into partial fractions.

$$\frac{x+12}{(x+1)^2(x-2)}$$

135) Resolve the following rational expressions into partial fractions.

$$\frac{7+x}{(1+x)(1+x^2)}$$

136) Find the square root of $7-4\sqrt{3}$

137) Show that $cot(A+15^0)-tan(A-15^0)=\frac{4cos2A}{1+2sin2A}$

138) If A + B + C = 180^0, prove that sin 2A + sin 2B + sin 2C = 4sin A sin B sin C

139) If A + B + C = 180^0, prove that $cosA+cosB-cosC=-1+4\frac{A}{2}cos\frac{B}{2}sin\frac{C}{2}$

140) If A + B + C = 180^0, prove that $\sin^2 A+\sin^2 B+\sin^2 C = 2+2\cos A\cos B\cos C$

141) If A + B + C = 180^0, prove that $tan\frac{A}{2}tan\frac{B}{2}+tan\frac{B}{2}tan\frac{C}{2}+tan\frac{C}{2}tan\frac{A}{2}=1$

142) Prove that $\cos 5\theta = 16\cos^2\theta - 20\cos^3\theta + 5\cos\theta$.

143) If A + B = 45°, shows that (1 + tan A) (1 + tan B) = 2.

144) Prove that $32\left(\sqrt{3}\right)\sin\frac{\pi}{48}\cos\frac{\pi}{48}\cos\frac{\pi}{24}\cos\frac{\pi}{12}\cos\frac{\pi}{6}=3.$

145) Solve the following equation $2\cos^2x-7\cos x+3=0$

146) In a △ABC, prove that a cosA+bcos B+c cos C=2a sin B sin C

147) Solve cos x + sin x = cos 2x + sin 2x.

148) In △ABC; we have

$(i)\tan\frac{A-B}{2}=\frac{a-b}{a+b}\cot\frac{C}{2}$

$(ii)\tan\frac{B-C}{2}=\frac{b-c}{b+c}\cot\frac{A}{2}$

$(iii)\tan\frac{C-A}{2}=\frac{c-a}{c+a}\cot\frac{B}{2}$

149) The Law of Cosines

$\cos A=\frac{b^2+c^2-a^2}{2bc};\cos B=\frac{c^2+a^2-b^2}{2ca};\cos C=\frac{a^2+b^2-c^2}{2ab}$

150) In a △ABC, we have

(i) a = b cosC + c cosB, (ii) b = c cosA + a cosC, (iii) c = a cosB + b cosA

151) How many three-digit numbers, which are divisible by 5, can be formed using the digits 0, 1, 2, 3, 4, 5 if

(i) repetition of digits are not allowed?

(ii) repetition of digits are allowed?

152) By the principle of mathematical induction, prove that for n $\geq$ 1

$$1^3+2^3+3^3+..+n^3=\left[\frac{n(n+1)}{2}\right]^2$$

153) By the principle of mathematical induction, prove that for n $\geq$ 1,

$$1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

154) By the principle of mathematical induction, prove that for n $\geq$ 1

$$1 \cdot 2 + 2 \cdot 3 + \ldots + n(n+1) = \frac{n(n+1)(n+2)}{3}$$

155) Using the mathematical induction, show that for any natural number n,

$$\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \ldots + \frac{1}{n(n+1)(n+2)} + = \frac{n(n+3)}{4(n+1)(n+2)}$$

156) Use induction to prove that n^3 -7n + 3 is divisible by 3, for all natural numbers n.

157) Use induction to prove that $5^{n+1} + 4 \times 6^n$ when divided by 20 leaves a remainder 9 for all natural numbers n.

158) Use induction to prove that $10^n + 3 \times 4^{n+2} + 5$ is divisible by 9 for all natural numbers n

159) 8 women and 6 men are standing in a line.

(i) How many arrangements are possible if any individual can stand in any position?

(ii) In how many arrangements will all 6 men be standing next to one another?

(iii) In how many arrangements will no two men be standing next to one another?

160) If $(n + 1)C_8 : (n - 3) P_4 = 57:16$, find n.

161) If the letters of the word GARDEN are permuted in all possible ways and the strings thus formed are arranged in the dictionary order, then find the ranks of the words

(i) GARDEN

(ii) DANGER

162) Prove that $^{2n}C_n = \frac{2^n \times 1 \times 3 \times \ldots (2n-1)}{n!}$

163) A committee of 7 peoples has to be formed from 8 men and 4 women. In how many ways can this be done when the committee consists of

(i) exactly 3 women?

(ii) at least 3 women?

(iii) at most 3 women?

164) Prove that $\frac{(2n)!}{n!} = 2^n (1.3.5\ldots(2n-1))$.

165) If $^{(n+2)}C_7 : {}^{(n-1)}P_4 = 13 : 24$ find n.

166) By the principle of mathematical induction, prove that, for all integers n ≥ 1,

$$1^2 + 2^2 + 3^2 + \ldots n^2 = \frac{n(n+1)(2n+1)}{6}.$$

167) If a, b, c are respectively the p^{th} q^{th} and r^{th} terms of a GP. show that (q - r) log a + (r - p) log b + (p - q) log c = 0.

168) Compute the sum of first n terms of the following series 8 + 88 + 888 + ...

169) Find the Co-efficient of x^6 and the co -efficient of x^2 in $\left(x^2 - \frac{1}{x^3}\right)^6$

170) Prove that $\sqrt[3]{x^3+6} - \sqrt[3]{x^3+3}$ is approximately equal to $\frac{1}{x^2}$ when x is sufficiently large.

171) Prove that $\sqrt{\frac{1-x}{1+x}}$ is approximately equal to 1 - x + $\frac{x^2}{2}$ when x is very small.

172) If n is a postive integer, show that 9^{n+1} - 8n - 9 is always divisible by 64

173) Prove that $\sqrt[3]{x^3+7} - \sqrt[3]{x^3+4}$ is approximately equal to $\frac{1}{x^2}$ when x is large.

174) Prove that the straight lines joining the origin to the points of intersection of $3x^2+5xy-3y^2+2x + 3y = 0$ and $3x - 2y - 1 = 0$ are at right angles.

175) Show that the equation $2x^2 - xy - 3y^2 - 6x + 19y - 20 = 0$ represents a pair of intersecting lines. Show further that the angle between them is $\tan^{-1}(5)$

176) Show that the points (1, 3), (2, 1) and $(\frac{1}{2}, 4)$ are collinear, by using

(i) concept of slope

(ii) a straight line

(iii) any other method.

177) The slope of one of the straight lines $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, show that $8h^2 = 9ab$.

178) The slope of one of the straight lines $ax^2 + 2hxy + by^2 = 0$ is three times the other, show that $3h^2 = 4ab$.

179) Find p and q, if the following equation represents a pair of perpendicular lines $6x^2 + 5xy - py^2 + 7x + qy - 5 = 0$.

180) Find the value of k if the following equation represents a pair of straight lines. Further, find whether these lines are parallel or intersecting $12x^2 + 7xy - 12y^2 - x + 7y + k = 0$.

181) For what value of k does the equation $12x^2 + 2kxy + 2y^2 + 11x - 5y + 2 = 0$ represent two straight lines.

182) Show that the equation $9x^2 -24xy +16y^2 +12x + 16y -12 = 0$ represents a pair parallel lines. find the distance between them

183) Show that the equation $4x^2 +4xy +y^2 -6x - 3y -4 = 0$ represents a pair of parallel lines. Find the distance between them

184) Find the equation of the line through the intersection of the lines $3x + 2y + 5 = 0$ and $3x - 4y + 6 = 0$ and the point (1, 1).

185) Prove that $\sqrt[3]{x^3+7} - \sqrt[3]{x^3+4}$ is approximately equal to $\frac{1}{x^2}$ when x is large.

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