# DELHI PUBLIC SCHOOL, JAMMU
## Assignment(2019-20)

**Sub: Mathematics**                                                                 **Class: XI**

Q1.    From 50 students taking examinations in mathematics, physics and chemistry, 37 passed mathematics, 24 physics and 43 chemistry. At most 19 passed mathematics chemistry and at most 20 physics and chemistry. The largest possible number that could have passed all three exams is

a. 10              b. 12              c. 9                    d. None

Q2.    The term independent of x in the expansion of $\left(\frac{1-x}{1+x}\right)^2$ is

a.  4                                          b. 3

c. 1                                           d. None of these

Q3.    The remainder when $27^{40}$ is divided by 12 –

a.  3              b. 7              c. 9              d. 11

Q4.    Maximum value of $^{20}C_r$, is equal to

a.  $^{20}C_{11}$          b. $^{20}C_{12}$          c. $^{20}C_{10}$              d. none of these

Q5.    The middle term in the expansion of $(x + 4)^4$ is –

a.  $96\,x^3$          b. $96x^2$          c. $-96x^2$          d. none of these

Q6.    Equations of circles which pass through the points (1, -2) and (3, -4) and touch the x-. axis is

a. $x^2 + y^2 + 6x + 2y + 9 = 0$ b. $x^2 + y^2 + 10x + 20y + 25 = 0$

c. $x^2 + y^2 - 6x + 4y + 9 = 0$                d. none

Q7.    The equation of circles passing through (3, -6) touching both the axes is

a. $x^2 + y^2 - 6x + 6y + 9 = 0$

b. $x^2 + y^2 + 6x - 6y + 9 = 0$

c. $x^2 + y^2 + 30x - 30y + 225 = 0$

d. $x^2 + y^2 - 30x + 30y + 225 = 0$

Q8.  The sequences $S = i + 2i^2 + 3i^3 + 4i^4 + ....$upto 100 terms simplifies to, where $i = \sqrt{-1}$

a.  $50(1 - i)$          b. $25i$          c. $25(1 + i)$   d. $100(1 - i)$

Q9.  If $(x + iy)^{1/3} = a + ib$, then $\frac{x}{a} + \frac{y}{b}$ is equal to

a.  $4(a^2 + b^2)$                    b. $4(a^2 - b^2)$

c. $4(b^2 - a^2)$                     d. None of these


Q10.  8 Chairs are numbered from 1 to 8. Two women & 3 men wish to occupy one chair each. First the women choose the chairs from amongst the chairs marked 1 to 4, then the men select the chairs from among the remaining. The number of possible arrangements is:

a. $^6C_3, {}^4C_4$          b. $P_2.{}^4P_3$          c. $^4C_3{}^4P_3$          d. $^4P_2.{}^6P_3$

Q11.  Number of words that can be made with the letters of the word "GENIUS" if each word neither begins with G nor ends in S, is:

a. 24          b. 240          c. 480          d. 504

Q12.  5 boys & 3 girls are sitting in a row of 8 seats. Number of ways in which they can be seated so that not all the girls sit side by side, is:

a.  36000          b. 9080          c. 3960          d. 11600

Q13.  A line makes an angles $45^o$ with X – axis and at a distance of $\sqrt{2}$ from the origin. Its equation is

a.  $x + y\sqrt{2} = 1$                    b. $\sqrt{2x} + y = 1$

c. $y - x = 2$                    d. $y - x = \sqrt{2}$

Q14.  A line passes through the point (1, 2) and makes $60^o$ angle with X- axis. A point on this line at a distance 3 from the point (1, 2), is

a.  $\left(\frac{-5}{2}, 2 - \frac{3\sqrt{3}}{2}\right)$                    b. $\left(\frac{3}{2}, 2 + \frac{\sqrt{3}}{2}\right)$

c. $\left(\frac{5}{2}, 2 + \frac{3\sqrt{3}}{2}\right)$                    d. None of these

Q15.  If a line passes through the point P (1, 2) makes an angles of $45^o$ with the

X – axis and meets the line $x + 2y - 7 = 0$ at Q, then PQ equals.

a. $\frac{2\sqrt{2}}{3}$           b. $\frac{3\sqrt{2}}{3}$           c. $\sqrt{3}$           d. $\sqrt{2}$

Q16. The sum of n terms of $1.2.3 + 2.3.4 + 3.4.5 + \ldots$ is

a. $\frac{1}{4}n(n+1)(n+2)$           b. $\frac{1}{4}n(n+1)(n+2)(n+3)$

c. $\frac{1}{2}(n+1)(n+2)(n+3)$           d. none of these

Q17. If $a_1, a_2, a_3 \ldots a_n \ldots$ are in AP such that $a_4 - a_7 + a_{10} = m$, then the sum of first 13 terms of this AP is

a. 15 m           b. 10m           c. 12m           d. 13m

Q18. The equation of the parabola whose focus is (-3, 0) and directrix is, $x + 5 = 0$ is:

a. $y^2 = 4(x-4)$     b. $y^2 = 2(x+4)$     c. $y^2 = 4(x-3)$     d. $y^2 = 4(x+4)$

Q19. If (2, 0) is the vertex & $y - $ axis the diretrix of a parabola, then its focus is:

a. (2, 0)           b. (-2, 0)           c. (4, 0)           d. (-4, 0)

Q20. If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$, find the values of x and y.

Q21. If the set A has 3 elements and the set $B = \{3, 4, 5\}$, then find the number of elements in $(A \times B)$.

Q22. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

(i) 10 cm           (ii) 15 cm           (iii) 21 cm

Q23. The angle of a quadrilateral are in A.P. and the greatest angle is $120^\circ$. Express the angles in radians.

Q24. Find the coefficient of $\frac{1}{x^{17}}$ in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$

Q25. Find the sixth term of the expansion $\left(y^{\frac{1}{2}} + x^{\frac{1}{3}}\right)^n$, if the binomial coefficient of the third term from the end is 45.

Q26. Find the value of r, if the coefficients of $(2r + 4)^{\text{th}}$ and $(r - 2)^{\text{th}}$ terms in the expansion of $(1 + x)^{18}$ are equal.

Q27. Find the equation of the circle whose centre lies on the positive direction of y-axis at a distance 6 from the origin and whose radius is 4.

Q28. If the equation of two diameters of a circle are $2x + y = 6$ and $3x + 2y = 4$ and the radius is 10, find the equation of the circle.

Q29. $\underset{x \to -5}{lt} \dfrac{2x^2+9x-5}{x+5}$

Q30. $\underset{x \to 3}{lt} \dfrac{x^2-4x+3}{x^2-2x-3}$

Q31. If $P(2n - 1, n) : P(2n + 1, n - 1) = 22 : 7$ find n

Q32. If $P(n, 5) : P(n, 3) = 2 : 1$, find n.

Q33. If $P(15, r - 1) : P(16, r - 2) = 3 : 4$, find r.

Q34. Find the sum of all integers between 50 and 500 which are divisible by 7.

Q35. Find the sum of all those integers between 100 and 800 each of which on division by 16 leaves the remainder 7 ?

Q36. The sum of first 7 terms of an A.P. is 10 and that of next 7 terms is 17. Find the progression.

Q37. If $5^{th}$, $8^{th}$ and $11^{th}$ terms of a G.P. are p.q and s respectively, prove that $q^2 = ps$.

Q38. Find three numbers in G.P. whose sum is 38 and their product is 1728.

Q39. Find the image of the point (3, 8) with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.

Q40. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, find the value of m.

Q41. If sum of the perpendicular distances of a variable point P (x, y) from the lines $x + y - 5 = 0$ and $3x - 2y + 7 = 0$ is always 10. Show that P must move on a line.

Q42. Find equation of the line which is equidistant from parallel lines $9x + 6y - 7 = 0$ and $3x + 2y + 6 = 0$.

Find the mean deviation about the mean for the data

.Q43.

| dncome per day | 0-100 | 100-200 | 200-300 | 300-400 | 400-500 | 500-600 | 600-700 | 700-800 |
|---|---|---|---|---|---|---|---|---|
| Number of | 4 | 8 | 9 | 10 | 7 | 5 | 4 | 3 |

| persons | | | | | | | | |
|---------|--|--|--|--|--|--|--|--|

Q44.

| Height in cms | 95-105 | 105-115 | 115-125 | 125-135 | 135-145 | 145-155 |
|---------------|--------|---------|---------|---------|---------|---------|
| Number of boys | 9 | 13 | 26 | 30 | 12 | 10 |

Q45. A rod of length 12 cm moves with its ends always touching the coordinate axes. Determine the equation of the locus of a point P on the rod, which is 3 cm from the end in contact with the x-axis.

Q46. Find the area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus rectum.

**Q47. From the employees of a company, 5 persons are selected to represent them in the managing committee of the company. Particulars of five persons are as follows.**

| S. No. | Name | Sex | Age in years |
|--------|------|-----|--------------|
| 1. | Harish | M | 30 |
| 2. | Rohan | M | 33 |
| 3. | Sheetal | F | 46 |
| 4. | Alis | F | 28 |
| 5. | Salim | M | 41 |

**A person is selected at random from this group to act as a spokesperson. What is the probability that the spokesperson will be either male or over 35 years?**

**Q48. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7, what is the probability of forming a number divisible by 5 when, (i) the digits are repeated? (ii) the repetition of digits is not allowed?**

**Q49. A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in resulting mixture will be more than 15% but less than 18%?**

**Q50. Prove the following by using the principle of mathematical induction for all $n \in N$:**

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

**Q51.** Find the value of $\tan \frac{\pi}{8}$.

**Find the general solution for each of the following equations:**

**Q52.** Cos 4x = cos 2 x

**Q53.** cos 3x + cos x − cos 2x = 0

**Q54.** If $\alpha$ and $\beta$ are different complex numbers with $|\beta| = 1$, then find $\left| \frac{\beta - \alpha}{1 - \bar{\alpha}\beta} \right|$.