SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

ALGEBRA

Class 10 - Mathematics - I

Time Allowed: 2 hours **Maximum Marks: 40**

General Instructions:

1. All questions are compulsory.
2. Use of a calculator is not allowed.
3. The numbers to the right of the questions indicate full marks.
4. In case of MCQs Q. No. 1(A) only the first attempt will be evaluated and will be given credit.

1. **[8]**

(a) **Choose the correct alternative from given :**

i. From the following equations, which one is the quadratic equation ? **[1]**

a) $\frac{1}{x^2}(x+2)=x$ b) $\frac{5}{x}-3=x^2$

c) $n-1=2n$ d) $x(x+5)=2$

ii. For simultaneous equations in variables x and y, if $D_x=49, D_y=-63, D=7$, then what is the value of x? **[1]**

a) 7 b) -7

c) $\frac{-1}{7}$ d) $\frac{1}{7}$

iii. First four terms of an A.P. are _____, whose first term is -2 and common difference is -2. **[1]**

a) $-2,-4,-6,-8$ b) $-2,4,-8,16$

c) $-2,-4,-8,-16$ d) $-2,0,2,4$

iv. In the format of GSTIN, there are _____ alpha-numerals. **[1]**

a) 9 b) 16

c) 10 d) 15

(b) i. If $15x+17y=21$ and $17x+15y=11$, then find the value of $x+y$. **[1]**

ii. Given sequence is an A.P. Find the next two terms of this A.P.: **[1]**

5, 12, 19, 26, ...

iii. **Pawan Medicals** supplies medicines. On some medicines the rate of GST is 12%, then what is the rate of CGST and SGST? **[1]**

iv. Which number cannot represent a probability? **[0]**

a) 1.5 b) 0.7

c) $\frac{2}{3}$ d) 15%

2. **[12]**

(a) **Complete the following activities and rewrite it (any two) :**

i. Find the 23^{rd} term of the following A.P.: $9, 4, -1, -6, -11, ...$ **[2]**

ii. Find the value of the discriminant of the quadratic equation $2y^2 - y + 2 = 0$. **[2]**

iii. Two coins are tossed simultaneously. Complete the following activity of writing the sample space (S) and expected outcomes of the events: **[2]**

i. Event A : to get at least one head.

ii. Event B : to get no head.

Activity:

If two coins are tossed simultaneously

$\therefore$ S = { $\square$, HT, TH, $\square$}

i. Event A : at least getting one head.

$\therefore A = \{HH, \square, TH\}$.

ii. Event B : to get no head.

$B = \{\square\}$

(b) **Solve the following subquestions (any four) :**

i. Activity: **[2]**

$\begin{vmatrix} 3 & 2 \\ 4 & 5 \end{vmatrix} = 3 \times \square - \square \times 4$

$= \square - 8$

$= \square$

ii. Complete the following activity to find the value of discriminant of the equation **[2]**

$x^2 + 10x - 7 = 0$.

Comparing $x^2 + 10x - 7 = 0$ with $ax^2 + bx + c = 0$

$a = 1,\ b = 10, c = \square$

$\therefore b^2 - 4ac = \square - 4 \times 1 \times (-7)$

$= 100 + \square$

$= \square$

iii. First term and common difference of an A.P. are 6 and 3 respectively. Find S_{27}. **[2]**

First term $= a = 6$, common difference $= d = 3$,

$S_{27} =$?

$S_n = \frac{n}{2}[\square + (n-1)d] -$ formula

$S_{27} = \frac{27}{2}[12 + (27-1)\square]$

$= \frac{27}{2} \times \square$

$= 27 \times 45$

$\therefore\ S_{27} = \square$

iv. A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue? **[2]**

v. Observe the following table and find Mean: **[2]**

Assumed mean $A = 300$

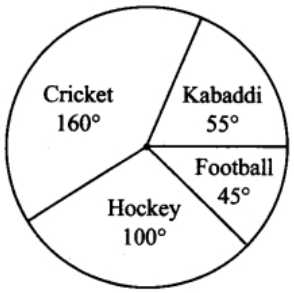
Class	**Class mark** x_i	$d_i - x_i - A$ $d_i - x_i - 300$	**Frequency** f_i	**Frequency $\times$ Deviation** $f_i d_i$

200 - 240	220	-80	5	-400
$240-280$	260	-40	10	-400
$280-320$	$300 \rightarrow$ A	0	15	0
$320-360$	340	40	12	480
$360-400$	380	80	8	640
Total			$\Sigma f_i = 50$	$\Sigma f d_i = 320$

3. **[9]**

(a) **Complete the following activity and rewrite it (any one) :**

i. In the given figure, the pie diagram represents the amount spent on different sports by a school administration in a year. If the money spent on football is ₹$9,000$, answer the following questions: **[3]**



i. What is the total amount spent on sports?

ii. What is the amount spent on cricket?

ii. The total value (with GST) of remote controlled toy car is ₹2360. Rate of GST is 18% on toys. Complete the following activity to find the taxable value for the toy car: **[3]**

Total value for toy car with GST = ₹ 2360

Rate of GST = 18%

Let taxable value for toy car be ₹x

$\therefore$ GST = $\frac{18}{100} \times x$

$\therefore$ Total value for toy car (taxable value for toy car) + $\square$ ...Formula

$\therefore 2360 = \square + \frac{\square}{100} \times x$

$\therefore 2360 = \frac{\square}{100} \times x$

$\therefore 2360 \times 100 = 118x$

$\therefore x = \frac{2360 \times 100}{\square}$

$\therefore$ Taxable value for toy car is ₹ $\square$

(b) **Solve the following subquestions (any two) :**

i. Solve the given equation by factorisation: $5m^2 = 22m + 15$ **[3]**

ii. A two digit number and the number with digits interchanged add up to 143. In the given number the digit in units place is 3 more than the digit in the tens place. Find the original number. **[3]**

iii. 50 shares of face value ₹ 10 were purchased for market value of ₹ 25. Company declared 30% dividend on the shares, then find: **[3]**

i. Sum invested

ii. Dividend received

iii. Rate of return.

iv. If one die is rolled once, then find the probability of each of the following events: **[3]**

a. Number on the upper face is prime.

b. Number on the upper face is even.

Activity:

S is the sample space

S = {1, 2, 3,4,5, 6}

$\therefore$ n(S) = $\square$

a. Event A : Prime number on the upper face

A = {2, 3, 5}

$\therefore$ n (A) = $\square$

$P(A) = \frac{n(A)}{n(S)}$

$\therefore P(A) = \frac{3}{\square} = \square$

b. Event B : Even number on the upper face

B = {2,4, 6}

$\therefore$ n(B) = $\square$

$P(B) = \frac{n(B)}{n(S)}$

$\therefore P(B) = \square = \frac{1}{2}$

4. **Solve the following subquestions (any two) :** **[8]**

(a) Two taps together can fill a tank completely in $3\frac{1}{13}$ minutes. The smaller tap takes 3 minutes more than the bigger tap to fill the tank. How much time does each tap take to fill the tank completely? **[4]**

(b) The following frequency distribution table shows marks obtained by 180 students in Mathematics examination: **[4]**

Marks	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$
Number of Students	25	x	30	$2x$	65

Find the value of x.

Also draw a histogram representing the above information.

(c) If the sum of the first p terms of an A.P. is equal to the sum of first q terms, then show that the sum of its first $(p+q)$ terms is zero $(p \neq q)$. **[4]**

5. **Solve the following subquestions (any one) :** **[3]**

(a) **[3]**

Age	**No of person**	**Measurement of central angle**
$20-25$	80	$\frac{\square}{200} \times 360 = \square$
$25-30$	60	$\frac{60}{200} \times 360 = \square$
$30-35$	35	$\frac{35}{200} \times \square = 63^\circ$
$35-40$	25	$\frac{25}{200} \times 360 = \square$
Total	200	$\square$

(b) Solve the following equations: $3x - 2y = \frac{5}{2}, \frac{1}{3}x + 3y = -\frac{4}{3}$. **[3]**