**DBS ALAKNANDA** **PRE- BOARDS (2025 - 26)** **DATE: 17 -11-2025**
**CLASS: X** **SUBJECT: MATHEMATICS STANDARD (041)** **TIME: 3 Hrs**
**M M: 80 Marks**

**NAME: _____ SECTION: _____ROLL NO:_____**

**General Instructions:**
**1. This question paper has 38 questions divided into 5 Sections – A, B C, D and E.**
**2. Section - A Q1 - Q20 has 20 MCQs carrying 1 mark each.**
**3. Section - B Q21 -Q25 (VSA – very short answers) has 5 questions carrying 2 marks each.**
**4. Section - C Q26 – Q31 (SA – short answers) has 6 questions carrying 3 marks each.**
**5. Section - D Q32 - Q35 (LA – long answers) has 4 questions carrying 5 marks each.**
**6. Section - E Q36 – 38 has 3 case based integrated units of assessment (4 marks each) with sub-part of the value of 1, 1 and 2 marks each respectively.**
**7. All Questions are compulsory.**
**8. Draw neat figures wherever required. Take $\pi$ =22/7 wherever required if not stated.**
**9. Use of calculators, digital watches or any electronic device is not permitted.**

## SECTION A (OBJECTIVE) 20 X 1 = 20 MARKS

**Q 1- Q 20 are multiple choice questions. Select the most appropriate answer from the given options.**

Q1) If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM $(a, b, c) = 3780$, then x is equal to
A) 1 B) 2 C) 3 D) 0

Q2) The graph of a quadratic polynomial p(x) passes through the points (-2, 0), (0, -30), (4, -20) and (2,0). The zeroes of the polynomial are
A) 4,2 B) -2,2 C) -30, -20 D) -6,6

Q3) The zeroes of $5x^2 + 10x$ are
A) 5 and 10 B) 0 and -2 C) 5 and -10 D) 0 and -10

Q4) For which value of k, will the lines represented by the following pair of linear equations be parallel:
$-4x + k y = 20$ and $6x + 3y = 30$
A) 1 B) 2 C) -2 D) no value

Q5) $x + y = 10$, $x – y = 16$ the y =
A) 13 B) -13 C) -3 D) 3

Q6) The value of k for which (-2) is the zero of the polynomial $x^2 - 3x – (k +1)$ is
A) 7 B) 9 C) 14 D) 15

Q7) For what value of k, the equation $6x^2 + kx + 6 = 0$ has equal roots?
A) = 6 B) k = 12 C) k = -12 D) Both (b) and (c)

Q8) Which term of the AP: 21, 18, 15 … is - 9
A)11 B)25 C)35 D) 45

Q9) If k + 7, 2k -2 and 2k + 6 are three consecutive terms of an AP then the value of k is
A) 1 B) 5 C) 15 D) 17

Q10) If $\Delta ABC \sim \Delta DEF$, AB=6cm, DE=9cm, EF=6cm and FD=12cm, then the perimeter of $\Delta ABC$ is
A) 18cm B) 21cm C) 24cm D) 27cm

Q11) The distance between the mirror image of point P (3, 5) in y – axis and mirror image of point Q (5, 3) in x – axis is…….
A)$8\sqrt{2}$ cm B) 4 cm C) $4\sqrt{2}$ cm D) $2\sqrt{2}$ cm

Q12) The points A(9,0), B(9, -6) ,C(-9,0) and D(-9,6) are the vertices of a

A) Square B) Rectangle C) Parallelogram D) Trapezium

Q13) If $\sec\theta + \tan\theta = x$, then $\sec\theta - \tan\theta$ will be

A) x B) $1/x$ C) 2x D) 1

Q14) If $2\sin 5x = \sqrt{3}$ ,$0^\circ \leq x \leq 90^\circ$, then $x$ is equal to

A) $10^\circ$ B) $12^\circ$ C) $20^\circ$ D) $50^\circ$

Q15) If a pole 6 m high casts a shadow $2\sqrt{3}$m long on the ground, then the Sun's elevation is

A) 60° B) 45° C) 30° D) 90°

Q16) The length of a tangent drawn to a circle of radius 9 cm from a point at a distance of 41cm from the centre of the circle is

A) 40cm B) 9cm C) 41cm D) 50cm

Q17) The median class is ……

| CI | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|
| fi | 6 | 12 | 2 | 18 | 12 |

A)10-20 B) 20-30 C) 30-40 D) 40-50

Q18) If the area of the base of a right circular cone is $51cm^2$ and it's volume is $85cm^3$, then the height of the cone is given as

A) 5/6 cm B) 5/3 cm C) 5/2 cm D) 5cm

**DIRECTIONS: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option**

Q19) **Statement A (Assertion):** Probability of getting at most 2 Heads on tossing 3 coins = 7/8

**Statement R( Reason)** : It's an equally likely event so probability should be 1/2

A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
C) Assertion (A) is true but reason (R) is false.
D) Assertion (A) is false but reason (R) is true.

Q 20) **Statement A (Assertion):** If the area of a quadrant of a circle is $38.5cm^2$, then its radius is 7 cm

**Statement R (Reason)**: Area of quadrant of a circle = $2\pi r^2$

A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
C) Assertion (A) is true but reason(R) is false.
D) Assertion (A) is false but reason(R) is true.

**SECTION B: (5 x 2 = 10 marks)**

Q21) Prove that $\sqrt{5}$ is an irrational number

**OR**

Find the HCF and LCM of 567 and 648.

Q22) A circle is inscribed in a right-angled triangle ABC, right angled at B. If BC = 7cm and AB = 24cm, find the radius of the circle

Q23) Find the area of the major segment (in terms of $\pi$) of a circle of radius 5cm, formed by a chord subtending an angle of 90° at the centre.

Q24) Find the probability of getting a doublet on throwing a pair of dice.

**OR**

Find the probability of getting 53 Sundays in a leap year.

Q25) A solid is in the shape of a cone standing on a hemisphere, with both their radii equal to 2 cm and height of the cone being equal to its radius. Find the volume of the solid in terms of π.

**SECTION C: (6 x 3 = 18marks)**

Q26) In a workshop, the number of teachers of English, Hindi and Science are 36, 60 and 84 respectively. Find the minimum number of rooms required, if in each room the same number of teachers are to be seated and all of them being of the same subject.

Q27) Solve the following system of equations graphically: $2x + y = 6$, $2x – y – 2 = 0$.
Find the area of the triangle so formed by two lines and x - axis.

**OR**

Five years hence, Ajay's age will be three times the age of son. Five years ago, Ajay was seven times as old as his son. Find their present ages.

Q28) Using converse of Basic Proportionality Theorem, prove that the line joining the mid points of any 2 sides of a triangle is parallel to the third side.

Q29) Find the values of y for which the distance between the points P (2, -3) and Q (10, y) is 10 units.

**OR**

The points A (10, -6), B (-4,2) and C (-2,0) are the vertices of a triangle. The points P and Q are the mid-points of AB and AC respectively. Show that the length of PQ is half of the length BC

Q30) Two tangents PA and PB are drawn to a circle with centre O from an external point P.

Prove that ∠APB= 2(∠OAB)

Q31) Find the missing frequencies in the following frequency distribution table, if N = 100 and median is 32

| MARKS OBTAINED | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | TOTAL |
|---|---|---|---|---|---|---|---|
| NUMBER OF STUDENTS | 10 | x | 25 | 30 | y | 10 | 100 |

**SECTION D: (4 x 5 = 20 marks)**

Q32) A train travels at a certain average speed for a distance of 63km and then travels at a distance of 72km at an average speed of 6km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original average speed?

Q33) State and prove Basic Proportionality theorem

Q34) Prove that: $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta \operatorname{cosec}\theta$

**OR**

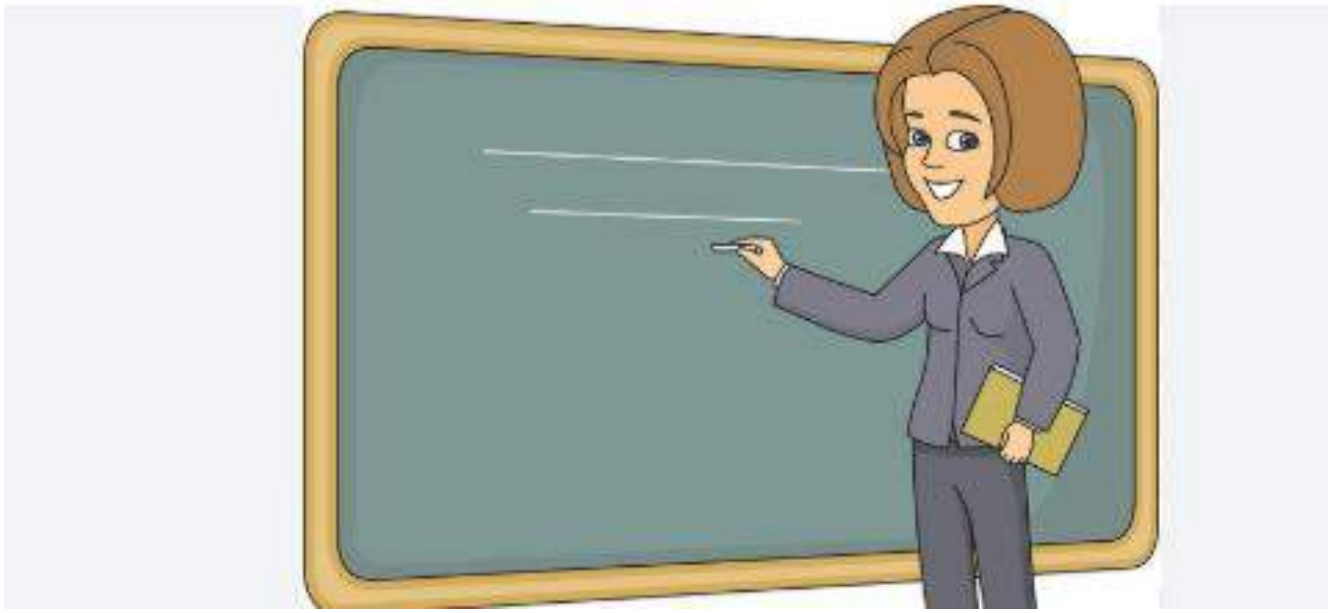
Prove that: $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$

Q35) Find the mean, mode and median number of letter in the surnames.

| Number of letters | 1 - 4 | 4 -7 | 7 - 10 | 10 - 13 | 13 - 16 | 16 - 19 |
|---|---|---|---|---|---|---|
| No. of surnames | 6 | 30 | 40 | 16 | 4 | 4 |

**SECTION E: (CASE STUDIES- 3 X 4 =12 marks)**

Q36) In a class, the teacher asks every student to write an example of A.P. Two boys Aryan and Roshan writes the progression as −5, −2,1,4, …… and 187, 184, 181, …. respectively.
Now the teacher asks his various students the following questions on progression. Help the students to find answers for the following:

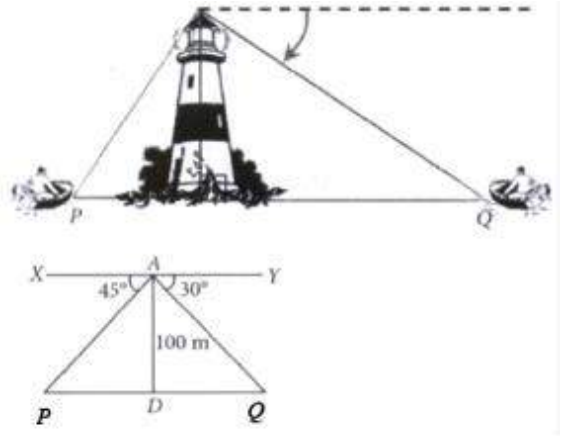


a) Find the sum of the common difference of two progressions (1)
b) Find the 34th term of progression written by Roshan. (1)
c) Find the sum of first 10 terms of the progression written by Aryan. (2)

**OR**

Which term of the progressions will have the same value? (2)

Q37) A boy is standing on the top of light house. He observed that boat P and boat Q are approaching the light house from opposite directions. He finds that angle of depression of boat P is 45° and angle of depression of boat Q is 30°. He also knows that height of the light house is 100 m.




**Based on the above information, answer the following questions.**

(a) Find distance of the boy from the first boat. (1)
(b) Find the distance of the boy from the second boat (1)
(c) Find the distance between the boats. (2)

**OR**

Find the time taken by boat Q to reach the lighthouse at a speed of 2m/sec. (2)

Q38) Rinku was very happy to receive a pencil from his best friend Rohan. Pencil is a basic writing tool, when sharpened its shape is a combination of cylinder & cone as given in the picture. Cylindrical pencil with conical head is a common shape worldwide since ages. Commonly pencils are made up of wood & plastic but we should promote pencils made up of eco-friendly material (many options available in the market these days) to save environment. The dimensions of Rinku's pencil are given as follows: Length of cylindrical portion is 21cm. Diameter of the base is 1 cm and height of the conical portion is 1.2 cm

**Based on the above information, answer the following questions:**

a) Find the slant height of the sharpened part. (1)
b) Find curved surface area of sharpened part (in terms of $\pi$). (1)
c) Find the total surface area of the pencil (in terms of $\pi$). (2)

**OR**

The pencil's total height decreases by 8.2 cm after sharpening it many times, what is the volume of the cylindrical part of the shortened pencil (in terms of $\pi$)? (2)