SUNCITY SCHOOL

sadaiva agrani

SECTOR 37 D, GURUGRAM

PRE-BOARD EXAMINATION-1

SESSION: 2023-2024

SUBJECT: STANDARD MATHEMATICS (041)

CLASS X

MAX. MARKS: 80 **TIME: 3 HOURS**

NAME: Kaashvi **ROLL NO.:** 7

General Instructions:

1. This question paper has 5 Sections: A, B, C, D and E.
2. Section A has 20 MCQs carrying 01 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 3 case-based integrated units of assessment (04 marks) with sub-parts of the values of 2, 1 and 1 marks each respectively.
6. Section E has 4 questions carrying 05 marks each.
7. All questions are compulsory. However, an internal choice in 2 Q of 4 marks, 2 Q of 3 marks and 2 Q of 2 marks has been provided.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

SECTION A

1 The product of two numbers is 1600 and their HCF is 5. The LCM of the numbers is: [1]

(i) 1600 (ii) 8000 (iii) 1605 (iv) 320

2 If a is rational and $\sqrt{b}$ is irrational, then $a + \sqrt{b}$ is: [1]

(i) an irrational number (ii) an integer

(iii) a natural number (iv) a rational number

3 If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and –3, then: [1]

(i) a = 0, b = – 6 (ii) a = 5, b = –1 (iii) a = –7, b = –1 (iv) a = 2, b = – 6

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

4 The pair of equations ax + 2y = 9 and 3x + by = 18 represent parallel lines, where a, b are integers, if: [1]

(i) a = b (ii) 2a = 3b (iii) 3a = 2b (iv) ab = 6

5 The discriminant of the quadratic equation $2x^2 + x - 1 = 0$ is: [1]

(i) 9 (ii) -9 (iii) - 7 (iv) 7

6 Match the following. [1]

Column - I	Column - II
(a) In $\triangle$ ABC and $\triangle$ PQR $\frac{AB}{PQ} = \frac{AC}{PR}$, $\angle A = \angle P \Rightarrow \triangle ABC \sim \triangle PQR$	(i) AA similarity criterion
(b) In $\triangle$ ABC and $\triangle$ PQR $\angle A = \angle P$, $\angle B = \angle Q \Rightarrow \triangle ABC \sim \triangle PQR$	(ii) SAS similarity criterion
(c) In $\triangle$ ABC and $\triangle$ PQR $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{QR} \Rightarrow \triangle ABC \sim \triangle PQR$	(iii) SSS similarity criterion
(d) In $\triangle$ ABC, DE || BC $\Rightarrow \frac{AD}{BD} = \frac{AE}{EC}$	(iv) BPT

SAS

(ii) (i) (iii) (iv)

(i) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii) (ii) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)

(iii) (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii) (iv) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)

7 If in $\triangle$ ABC and $\triangle$ DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then $\triangle ABC \sim \triangle DEF$ when: [1]

(i) $\angle B = \angle E$ (ii) $\angle B = \angle D$ (iii) $\angle A = \angle F$ (iv) $\angle A = \angle DE$

8 Find the value of $\sin^2 30^o + 4\cot^2 45^o - \sec^2 60^o$. [1]

(i) 0 (ii) 1 (iii) $\frac{1}{4}$ (iv) 4

9 $9\sec^2 A - 9\tan^2 A =$ $9(\sec^2 A - \tan^2 A) = 9$ [1]

(i) 1 (ii) 9 (iii) 0 (iv) 8

10 If $\cos\theta = \frac{2}{3}$, then $2\sec^2\theta + 2\tan^2\theta - 7$ is equal to: [1]

(i) 1 (ii) 4 (iii) 0 (iv) 3

11 If the area of a sector POK is 100π sq.units and angle POK = 49^o, then find the radius of the sector. [1]

(i) $\frac{60\sqrt{10}}{7}$ units (ii) $\frac{5\sqrt{10}}{7}$ units (iii) $\frac{6\sqrt{10}}{9}$ units (iv) $\frac{9\sqrt{10}}{7}$ units

12 Find the area of the segment if the area of the sector is 44 m^2 and the part of a triangle in the sector is 12 m^2. [1]

(i) 39 m^2 (ii) 31 m^2 (iii) 32 m^2 (iv) 22 m^2

$44 - 12 = 32$

13 The most frequent value in the data is known as: [1]

(i) mean (ii) mode (iii) all the three (iv) median

14 Consider the following frequency distribution: [1]

The difference of the upper limit of the median class and the lower limit of the modal class is:

Class	65-85	85-105	105-125	125-145	145-165	165-185	185-205
Frequency	4	5	13	20	14	7	4
cf	4	9	22	42	56	63	67

(i) 19 (ii) 38 (iii) 0 (iv) 20

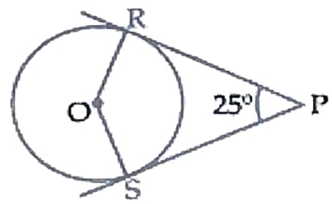
15 From a well shuffled pack of 52 cards, one card is drawn at random. The probability of getting a diamond is: [1]

(i) $\frac{3}{4}$ (ii) $\frac{1}{4}$ (iii) $\frac{12}{52}$ (iv) $\frac{1}{2}$

16 From a point P which is at a distance 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is: [1]

(i) 65 cm^2 (ii) 32.5 cm^2 (iii) 30 cm^2 (iv) 60 cm^2

17 In the given figure, if $\angle RPS = 25°$, the value of $\angle ROS$ is: [1]



(i) 135° (ii) 145° (iii) 165° (iv) 155°

18 sin2B = 2sin B is true when B is equal to: [1]

(i) 90° (ii) 60° (iii) 30° (iv) 0°

19 **Assertion (A):** Arithmetic mean between 8 and 12 is 10. [1]

Reason (R): Arithmetic mean between two numbers a and b is given as $\frac{a+b}{2}$.

8+12

$\frac{20}{2}$ 10

(i) Both A and R are true and R is the correct explanation of A.
(ii) Both A and R are true but R is not the correct explanation of A.
(iii) A is true but R is false.
(iv) A is false but R is true.

20 **Assertion (A):** Two identical solid cubes of side 5 cm are joined end-to-end. The total surface area of the resulting cuboid is 300 cm^2. [1]

Reason (R): Total surface area of a cuboid is 2(lb + bh + lh).

(i) Both A and R are true and R is the correct explanation of A.

(ii) Both A and R are true but R is not the correct explanation of A.

(iii) A is true but R is false.

(iv) A is false but R is true.

~~2(50+25+50)~~

2×125

250

SECTION B

Ignore

2(50+25+50)

21 By the graphical method, find whether the pair of equation is consistent or not. If consistent, solve it. [2]

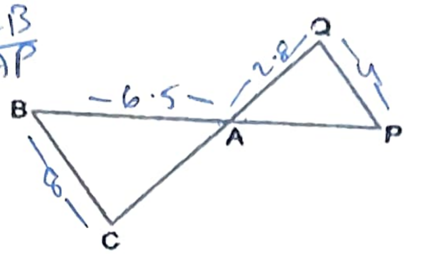
$3x + y + 4 = 0$, $6x - 2y + 4 = 0$

22 Determine whether the given points are vertices of a right triangle: [2]

(8, 4),(5, 7) and (–1,1)

23. In the given figure, $\triangle ACB \sim \triangle AQP$. If $BC = 8$ cm, $PQ = 4$ cm, $BA = 6.5$ cm, $AQ = 2.8$ cm, find CA and PA. [2]

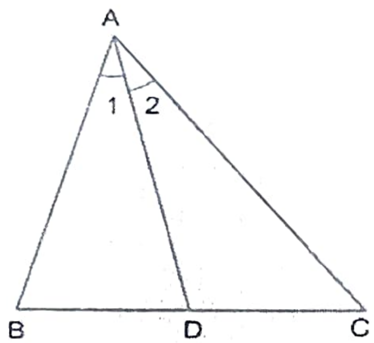
$\frac{AC}{AQ} = \frac{BC}{PQ} = \frac{AB}{AP}$



OR

In Fig., AD bisects $\angle A$, AB = 12 cm, AC = 20 cm and BD = 5 cm. Determine CD.

Note → $5x = xy$



$\frac{1}{1} + \frac{1}{2} = \frac{2+1}{2} = \frac{3}{2}$

24 If $\sin\theta = \frac{a}{\sqrt{a^2+b^2}}, 0 < \theta < 90°$, find the values of $\cos\theta$ and $\tan\theta$. [2]

OR

Using the formula, $\cos A = \sqrt{\frac{1+\cos 2A}{2}}$ find the value of cos 30°, it being given that $\cos 60° = \frac{1}{2}$

25 A tangent PQ at a point P on a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Find the length PQ. [2]

Section C

26 Lenin is preparing dinner plates. He has 12 pieces of chicken and 16 rolls. If he wants to make all the plates identical without any food left over, what is the greatest number of plates Lenin can prepare? [3]

27 Find the zeroes of the quadratic polynomial $3x^2 - 2$ and verify the relationship between the zeroes and the coefficients. [3]

a c

OR

Find the zeroes of the given quadratic polynomials and verify the relationship between the zeroes and the coefficients: $6x^2 - 3 - 7x$.

$(\sin\theta + 2\cos\theta)^2 = (1)^2$

28 Solve: $\frac{x}{x-1} + \frac{x-1}{x} = 4\frac{1}{4}, x \neq 2,0$. [3]

$\sin^2\theta + 4\cos^2\theta + 4\sin\theta\cos\theta = 1$

29 If $\sin\theta + 2\cos\theta = 1$ prove that $2\sin\theta - \cos\theta = 2$. [3]

$4\sin\theta\cos\theta = 1 - \sin^2\theta - 4\cos^2\theta$

OR

$(2\sin\theta - \cos\theta)^2$

$\sqrt{2} \cdot \sqrt{3} = \frac{\sqrt{6}}{2}$

Prove: $\frac{1}{(\cot A)(\sec A)-\cot A} - \operatorname{cosec}A = \operatorname{cosec}A - \frac{1}{(\cot A)(\sec A)+\cot A}$

30 Two dice are thrown simultaneously. What is the probability that: [3]

1. 5 will not come on either of them?
2. 5 will come up on at least one?
3. 5 will come up on both dices?

36-11 = 25/36

2+2+0+0+6+0

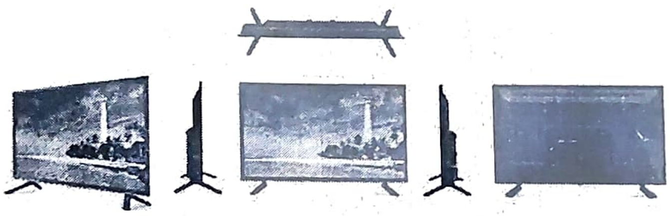
11/36

31 If a hexagon ABCDEF circumscribes a circle, prove that: [3]
AB + CD + EF = BC + DE + FA.

Section D

[This section comprises of 1 case-study/passage-based question of 4 marks each with sub parts (i), (ii), (iii) of marks 2, 1, 1 respectively.)

32 Elpis Technology is a TV manufacturer company. It produces smart TV sets not only for the Indian market but also exports them to many foreign countries. Their TV sets have been in demand every time but due to the Covid - 19 pandemic, they are not getting sufficient spare parts, especially chips to accelerate the production. They have to work in a limited capacity due to the lack of raw materials.



(i) They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find an increase in the production of TV every year. [2]

(ii) They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find in which year production of TV is 1000. [1]

OR

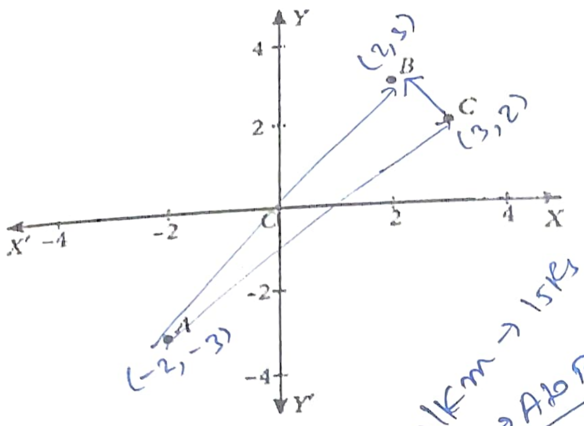
They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the total production in first 7 years.

(iii) They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the production in the 10^{th} year. [1]

33 There are two routes to travel from source A to destination B by bus. The first bus reaches at B via point C and the second bus reaches from A to B directly. The positions of A, B and C are represented in the following graph:

Based on the above information, answer the following questions.

Scale: x - axis : 1 unit = 1 km y - axis: 1 unit = 1 km



(i) If the fare for the second bus is₹ 15/km, what will be the fare to reach the destination by this bus? [2]

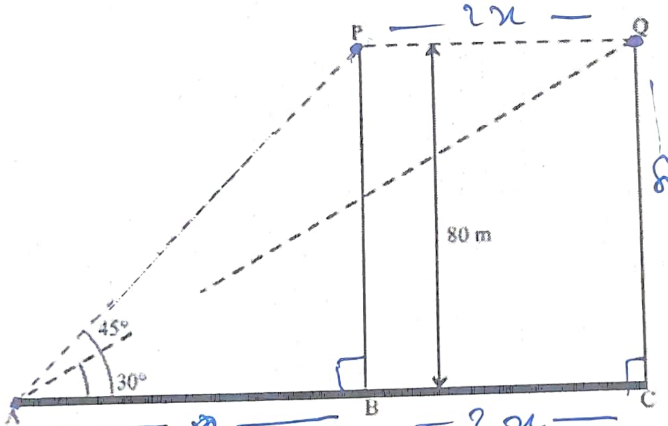
(ii) What is the distance between A and B? [1]

(iii) What is the distance between A and C? [1]

OR

If it is assumed that both buses have same speed, then by which bus do you want to travel from A to B?

34 A bird is sitting on the top of a tree, which is 80m high. The angle of elevation of the bird, from a point on the ground is 45^o. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes 30^o.



(i) Find the distance between the observer and the bottom of the tree. [2]

(ii) Find the speed of the bird. [1]

OR

Find the distance between the initial position of the bird and the observer.

(iii) Find the distance between the second position of the bird and the observer. [1]

Section E

35 If x = - 4 is a root of the equation $x^2 + 2x + 4p = 0$, find the values of k for which the equation $x^2 + px(1 + 3k) + 7(3 + 2k) = 0$ has equal roots. [5]

OR

If x = - 2 is a root of the equation $3x^2 + 7x + p = 0$, find the value of k so that the roots of the equation $x^2 + k(4x + k - 1) + p = 0$ are equal.

36 PQRS is a trapezium with PQ‖ SR. Diagonals PR and SQ intersect at M and $\Delta PMS \sim \Delta QMR$. Prove that PS = QR. [5]

37 An iron pillar consists of a cylindrical portion 2.8 m high and 20 cm in diameter and a cone 42 cm high is surmounting it. Find the weight of the pillar, given that $1 cm^3$ of iron weighs 7.5 g. [5]

OR

A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter of the hemisphere is equal to the edge(a) of the cube. Determine the surface area of the remaining solid in terms of "a".

38 During the medical check-up of 35 students of a class, their weights were recorded as follows: [5]

Weight(in kg)	38-40	40 - 42	42 - 44	44 - 46	46 - 48	48 - 50	50 - 52
Number of students	3	2	4	5	14	4	3

$\frac{Pm}{Qm} = \frac{MS}{mR}$

Calculate the mean and median for the above data.

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