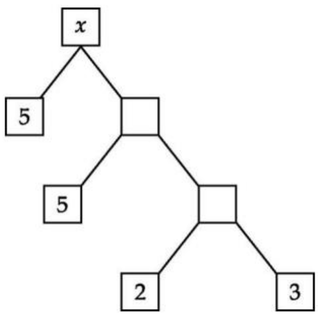
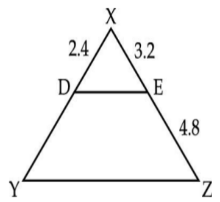
COMMON PRE-BOARD EXAMINATION
SUBJECT: MATHEMATICS (STANDARD) (041)
CLASS: X – SESSION 2022-23

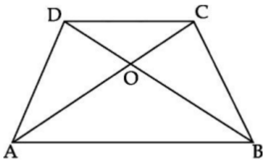
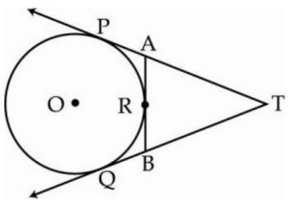
Time Allowed: 3 Hours **Maximum Marks: 80**

General Instructions:

1. The Question Paper has 5 Sections A – E.
2. Section **A** has 20 MCQs carrying 1 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 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each) with sub – parts of the values 1,1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
Q. No		**Marks**
1	The value of “x” in the factor tree is:  (a) 30 (b) 150 (c) 100 (d) 50	1
2	The discriminant of the equation $6x^2 - bx + 2 = 0$ is 1. The value of ‘b’ is (a) 7 (b) -7 (c) ± 7 (d) $\pm\sqrt{7}$	1
3	The graph of the polynomial p(x) intersects the x-axis three times in distinct points, then which of the following could be an expression for p(x): (a) 4 - 4x - x^2 + x^3 (b) $3x^2 + 3x - 3$ (c) 3x + 3 (d) $x^2 - 9$	1
4	The pair of linear equations x-2y = 5 and 2x – 4y = 10 has (a) Infinitely many solutions (b) No solutions (c) One solution (d) Two solutions	1

5	The distance of the point (2,3) from the y-axis is (a) 2units (b) 3 units (c) 4 units (d) 1 unit	1
6	In the given figure, in ΔXYZ, DE || YZ, so that the lengths of sides XD, XE and EZ (in centimeters) are 2.4, 3.2 and 4.8 respectively. Then the length of XY (in centimeters) is: (a) 1.6 (b) 6 (c) 6.4 (d) 3.6 	1
7	If sin α = $\frac{\sqrt{3}}{2}$ and cos β = $\frac{\sqrt{3}}{2}$, then the value of β – α is (a) 0° (b) 90° (c) 60° (d) 30°	1
8	If cos A = $\frac{3}{5}$ then the value of tan A is (a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c) $\frac{4}{3}$ (d) $\frac{5}{4}$	1
9	In Δ ABC and Δ DEF, $\frac{AB}{DE} = \frac{BC}{FD}$,then they will be similar when (a) ∠B = ∠E (b) ∠B = ∠D (c) ∠A = ∠D (d) ∠ A = ∠F	1
10	In Δ ABC and Δ DEF, ∠B = ∠E, ∠F = ∠C and AB = 3DE, then the triangles are (a) similar but not congruent (b) congruent but not similar (c) neither congruent nor similar (d) congruent as well as similar	1
11	A quadrilateral ABCD is drawn to circumscribe a circle. If AB = 12 cm, BC = 15 cm and CD = 14 cm, then AD is (a) 10 cm (b) 11 cm (c) 12 cm (d) 14 cm	1
12	If the ratio of the circumference of two circles is 4:9, then the ratio of their areas is (a) 9:4 (b) 4:9 (c) 2:3 (d) 16:81	1
13	If the edge of a cube is increased by 50%, then the percentage increase in their surface area is (a) 25% (b) 50% (c) 75% (d) 125%	1
14	If the mode of the following data is 7, then the value of 'k' in 2, 4, 6, 7, 5, 6, 10, 6, 7, 2k+1, 9, 7, 13 is (a) 3 (b) 7 (c) 4 (d) 2	1
15	The area of a circle that can be inscribed in a square of side 6 cm is (a) 36π cm^2 (b) 18π cm^2 (c) 12π cm^2 (d) 9π cm^2	1
16	A data has 25 observations (arranged in descending order). Which observation represents the median? (a) 12^{th} (b) 13^{th} (c) 14^{th} (d) 1^{st}	1
17	An event is likely to happen. Its probability is closest to (a) 0.999 (b) 0.990 (c) 0.909 (d) 0.099	1
18	The value of (sin 45°cos30° + cos45°sin30°) is (a) $\frac{\sqrt{3}+1}{\sqrt{2}}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}$ (c) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (d) $\frac{\sqrt{3}-1}{2\sqrt{2}}$	1

19	**Assertion:** If the HCF of two numbers is 5 and their product is 150, then their LCM is 30. **Reason:** For any two positive integers a and b, HCF (a, b) + LCM (a, b) = a x b (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 but 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.	1
20	**Assertion (A):** The value of 'y' is 3, if the distance between the points P (2, -3) and Q (10, y) is 10 **Reason (R):** Distance between any 2 points is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ (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 but 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.	1
	SECTION B	
Section B consists of 5 questions of 2 marks each.		
21	For which values of *p* does the pair of equations given below has unique solution? 4*x* + *py* + 8 = 0 2*x* + 2*y* +2 = 0	2
22	In the given figure, ABCD is a trapezium in which AB ‖ DC. The diagonals AC and DB intersect at O. Prove that $\frac{AO}{CO} = \frac{OB}{OD}$ 	2
23	In the given figure, TP and TQ are tangents from T to the circle with centre O and R is any point on the circle. If AB is a tangent to the circle at R, Prove that: TA + AR = TB + BR 	2
24	If $tan\theta = \frac{1}{\sqrt{5}}$, then find the value of $\frac{cosec^2\theta - sec^2\theta}{cosec^2\theta + sec^2\theta}$ **OR** If $\sin\theta - \cos\theta = 0$, then find the value of $(sin^4\theta + cos^4\theta)$	2
25	The length of the minute hand of a clock is 5 cm. Find the area swept by it during the time from 6: 05 a.m. and 6: 40 a.m. OR Area of a sector of a circle of radius 36 cm is $54\pi cm^2$. Find the length of the corresponding arc of the sector.	2

	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26.	Find the largest number that divides 2053 and 967 and leaves a remainder of 5 and 7 respectively.	3
27.	If one zero of the polynomial $3x^2 - 8x + (2k+1)$ is seven times the other, find both the zeroes of the polynomial and the value of k.	3
28.	Solve for x: $\frac{1}{a} + \frac{1}{b} + \frac{1}{x} = \frac{1}{a+b+x}$ **OR** Solve for x: $2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5$; given that $x \neq 3, \frac{1}{2}$	3
29.	Prove that $\sqrt{\frac{1+sin\theta}{1-sin\theta}} + \sqrt{\frac{1-sin\theta}{1+sin\theta}} = 2\ sec\theta$	3
30.	A circle touches the side BC of a Δ ABC at point P and touches AB and AC when produced at Q and R respectively. Show that AQ = $\frac{1}{2}$ perimeter of Δ ABC. **OR** Prove that the lengths of tangents drawn from an external point to a circle are equal.	3
31	Two different dice are rolled together. Find the probability of getting (i) the sum of numbers on two dice as 5 (ii) even numbers on both dice	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each	
32	A student scored a total of 32 marks in class tests in Mathematics and Science. If he would have scored 2 marks less in Science and 4 more in Mathematics, the product of his marks would have been 253. Find his marks in both the subjects. **OR** A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.	5
33	Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.	5
34	A gulab jamun contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm. **OR** The height of the cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ of the volume of the given cone, at what height above the base is the section made.	5

35 The following table shows the marks obtained by 100 students of class X in a school during a particular academic session. Find the mode of this distribution. **5**

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70	Less than 80
fi	7	21	34	46	66	77	92	100

SECTION E

Case study-based questions are compulsory

36 Amit wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹1,18,000 by paying every month starting with the first instalment of ₹1000. If he increases the instalment by ₹100 every month, answer the following:

(i) Find the amount paid by him in 30th instalment. 1

(ii) If total instalments are 40 then find amount paid in the last instalment? 1

(iii) Calculate the amount paid by him in 30 instalments. 2

OR

Find the ratio of the 1st instalment to the last instalment.

37 In a city, a circular park is situated with center O (3, 3). There are two diametrically opposite exit gates P and Q. The location of exit gate ‘P’ is (5, 3).

(i) Find the location of exit gate ‘Q’ 1

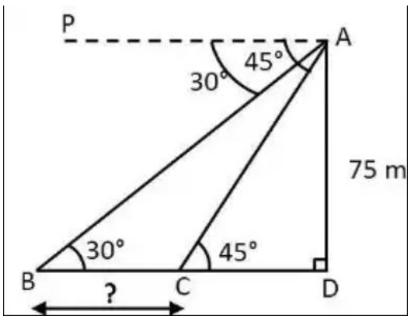
(ii) In what ratio does the center O (3, 3) divide the line segment joining the points P and Q? 1

(iii) What will be the distance between two exit gates P and Q?

OR 2

What will be the distance between O and P?

38



A lighthouse is a tower with a bright light at the top and serves as a navigational aid and warns ships of dangerous areas. In the given figure, a man on top of a 75 m high lighthouse is observing two ships approaching towards its base. Observe the figure carefully and answer the following.

(i) Find the distance of ship C from the foot of the lighthouse. 1

(ii) Find the distance of ship B from the foot of the lighthouse. 1

(iii) Find the distance between the two ships.

OR 2

What would have been the distance between the two ships if the ships were on either side of the lighthouse?

************THE END*************