Pre - Board Examination (Ist Shift)

Class - X

Mathematics

Time :- 3 Hrs. M.M. - 80

General Instruction :-

(a) All questions are compulsory.

(b) Section A - 20 questions of 1 mark each.

Section B - 6 questions of 2 marks each.

Section C - 8 questions of 3 marks each.

Section D - 6 questions of 4 marks each.

Section - A

Q.1- 10 are multiple choice questions. Select the most appropriate answer from the given options.

1. HCF of 168 and 126 is -

(a) 21 (b) 42 (c) 14 (d) 1

2. 325 can be expressed as a product of its primes as -

(a) $5^2 \times 7$ (b) $5^2 \times 17$ (c) $5^2 \times 13$ (d) $2 \times 3^2 \times 5^2$

3. Which of the following is the decimal expansion of an irrational number.

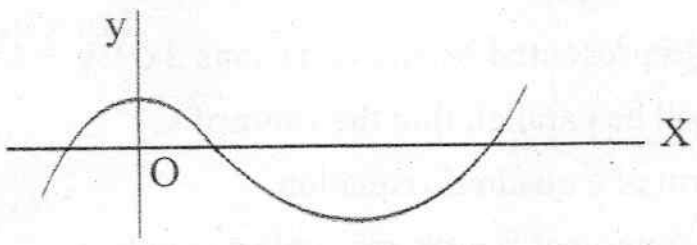
(a) 4.561 (b) $0.\overline{12}$ (c) 5.010010001..... (d) 6.03

4. The sum of the zeroes of the polynomial $2x^2 - 8x + 6$ is

(a) - 3 (b) 3 (c) - 4 (d) 4

5. The following figure shows the graph of $y = p(x)$, where $p(x)$ is a polynomial in variable x. The number of zeroes of the polynomial $p(x)$ is.

(a) 1 (b) 2 (c) 3 (d) 4



Contd....2.....

Q.6 In the following A P : 3 ,8 ___, 18 , ... missing number will be

(a) 5 (b) 13 (c) 10 (d) 15

Q.7 All equilateral triangles are

(a) similar (b) congruent (c) equal (d) None of these

Q.8 The distance of the point p (3, -4) from the origin is -

(a) 7 units (b) 5 units (c) 4 units (d) 3 units

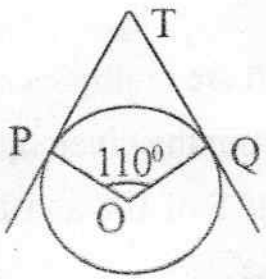
Q.9 The midpoint of the line segment joining the points (-5 , 7) and (-1, 3) is.

(a) (-3 , 7) (b) (-3 , 5) (c) (-1 , 5) (d) (5 , -3)

Q.10 In the given figure, if TP and TQ are tangents to a circle with centre O, so that $\angle POQ = 110^0$, then $\angle PTQ$ is

(a) 110^0 (b) 90^0

(c) 80^0 (d) 70^0



(11-15) Fill in the blanks :-

11. If the quadratic equation $x^2 - 2x + k = 0$ has equal roots , then value of k is _____.

12. The sides of two similar triangles are in the ratio 2:3, then the area of these triangles are in the ratio _____.

13. The point which divides the line segment joining the points A (0 , 5) and B (4 , 0) internally in the ratio 2:3 is _____

14. The value of $\text{Sin } 60^0 \text{ Cos } 30^0 + \text{Sin } 30^0 \text{ Cos } 60^0$ is _____.

15. Value of $\text{Sin}0^0.\text{Cos } 30^0. \text{ Sin } 45^0. \text{ Cos}60^0. \text{ Sin } 90^0$ is _____.

(16 - 20) Answer the following :-

16. The pair of lines represented by the equations $2x + y + 3 = 0$ and $4x + ky + 6 = 0$ will be parallel, find the value of k.

17. Write standard form of a quadratic equation.

18. State whether the congruent figures are similar or not.

Contd...3....

Q.19 Evaluate :- $\frac{1 - \tan^2 45^0}{1 + \tan^2 45^0}$

Q.20 If $\text{Sec}^2\theta\ (1+\text{Sin}\theta)\ (1-\text{Sin}\theta) = k$, then find the value of k.

Section - B

Q.21 Find the HCF of 135 and 225 by Euclid's division algorithm.

Q.22 Find the 31st term of an AP whose 11th term is 38 and 16th term is 73.

Q.23 Find the co-ordinates of a points A, where AB is the diameter of a circle whose centre is (2 , -3) and B is (1 , 4).

Q.24 Show that $\tan 48^0 \tan 23^0 \tan 42^0 \tan 67^0 = 1$

Or

Evaluate $\cos 48^0 \cos 42^0 - \text{Sin}\ 48^0\ \text{Sin}\ 42^0$.

Q.25 Find the area of circle whose circumference is 22 cm.

Q.26 Draw a line segment of length 6cm. Using composses and ruler, find a point P on it which divides it in the ratio 3:4.

Section - C

Q.27 Prove that $5 - \sqrt{3}$ is irrational, given that $\sqrt{3}$ is irrational.

Or

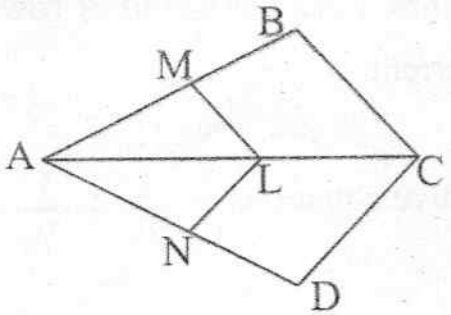
Use Euclid's division lemma to show that the cube of any positive integer is of the form 9 m, 9m + 1, or 9m + 8 for some integer m.

Q.28 Find the zeroes of the quadratic polynomial $x^2 - 3x - 10$ and verify the relationship between the zeroes and coefficient.

Q.29 Solve $2x + 3y = 11$ and $x - 2y = -12$.

Q.30 Find the value of 'k' if the points (7 , -2) , (5 , 1), (3 , k) are collinear.

Q.31 In the given figure, if LM | | CB and LN | | CD, prove that AM x AD = AB x AN.



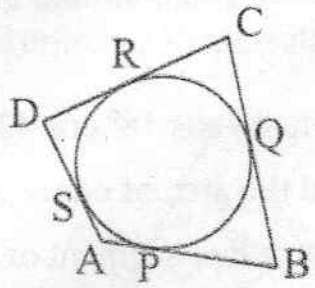
Contd....4.....

Or

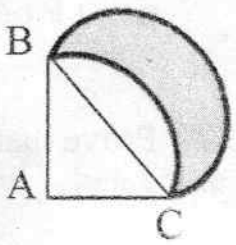
ΔABC is right angled at C, If p is the length of the parendicular from C to AB and a, b, c are the lengths of the sides opposite $\angle A$, $\angle B$, $\angle C$ respectively then prove that :- $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

Q.32 Draw a circle of radius 4 cm. From the point 7 cm away from its centre, construct the pair of tangents to the circle.

Q.33 A quadrilateral ABCD is drawn to circumecribe a circle (in given figure) Prove that : AB + CD = AD + BC

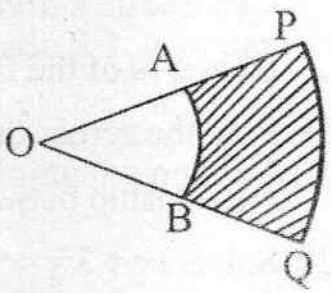


Q.34 In figure , ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.



Or

In figure, PQ and AB are respectively the arcs of two concentric circles of radii 7 cm and 3.5 cm and centre O. If $\angle POQ = 30^0$, then find the area of the shaded region.



Section - D

Q.35 Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

Or

Solve equations :- $\frac{1}{2x} + \frac{1}{3y} = 2$, $\frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$

Contd....5...

Q.36 Find two consecutive positive integers sum of whose squares is 365.

Q.37 Find the sum of the odd numbers between 0 and 50.

Q.38 If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

Or

State and prove the Pythagoras thearem.

Q.39 From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60^0 and angle of depression of its foot is 45^0. Determine the height of the tower.

Or

The angles of elvation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6 m.

Q.40 Prove the following identity :-

$(\text{Sin A} + \text{Cosec A})^2 + (\text{Cos A} + \text{Sec A})^2 = 7 + \tan^2 \text{A} + \text{Cot}^2 \text{A}$.

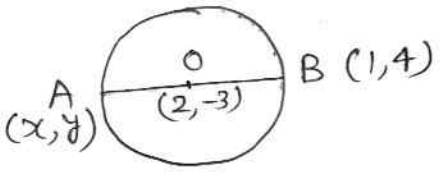
Class - X

Mathematics
Marking Scheme (Pre-Board Exam - 1st Shift)

Max Marks : 80 | Duration : 3 hrs.

Qu.	Value Points.	Marks
1.	(b) 42	1
2.	(b) $5^2 \times 13$	1
3.	(c) 5.0100100001.....	1
4.	(d) 4	1
5.	(c) 3	1
6.	(b) 13	1
7.	(a) similar	1
8.	(b) 5 units	1
9.	(b) (-3, 5)	1
10.	(d) 70°	1
11.	1	1
12.	4:9	1
13.	$(\frac{8}{5}, 3)$	1
14.	1	1
15.	0	1
16.	$k=2$	1
17.	$ax^2+bx+c=0$	1
18.	Similar	1
19.	0	1
20.	$k=1$	1
21.	$\because$ 225 > 135, apply the division lemma $225 = 135 \times 1 + 90$ $135 = 90 \times 1 + 45$ $90 = 45 \times 2 + 0$ $\therefore$ HCF (225, 135) = 45	1 1
22.	$a_{31} = a + 30d = ?$ $a_{11} = a + 10d = 38$ $a_{16} = a + 15d = 73$ On solving $a = -12$, $d = 7$ $\therefore$ $a_{31} = 178$	1 1

23.



$\left(\frac{x+1}{2}, \frac{y+4}{2}\right) = (2, -3)$ — 1

$x = 3$, $y = -10$ — 1

24. L.H.S. $= \tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ$

$= \cot(90^\circ - 48^\circ) \cot(90^\circ - 23^\circ) \tan 42^\circ \tan 67^\circ$ — 1

$= \cot 42^\circ \cot 67^\circ \tan 42^\circ \tan 67^\circ$ — 1

$= 1$

OR

L.H.S. $= \cos 48^\circ \cos 42^\circ - \sin 48^\circ \sin 42^\circ$

$= \sin(90^\circ - 48^\circ) \sin(90^\circ - 42^\circ) - \sin 48^\circ \sin 42^\circ$ — 1

$= \sin 42^\circ \sin 48^\circ - \sin 48^\circ \sin 42^\circ = 0$ — 1

25. $r = \frac{7}{2}$ — 1

Area of circle $= \pi r^2 = \frac{77}{2}\ cm^2$ — 1

26. Line of given length — 1

correct position of point which divides the line segment in the given ratio — 1

27. Let $5 - \sqrt{3}$ is a rational — $\frac{1}{2}$

$\therefore 5 - \sqrt{3} = \frac{a}{b}$ a & b are co-primes, $b \neq 0$

$5 - \frac{a}{b} = \sqrt{3}$ — 1

$\frac{5b - a}{b} = \sqrt{3}$ — $\frac{1}{2}$

$\because$ a & b are integers, $\frac{5b-a}{b}$ is rational and so $\sqrt{3}$ is rational, But $\sqrt{3}$ is an irrational number which contradicts our statement — 1

$\therefore 5 - \sqrt{3}$ is irrational

OR

By Euclid's algorithm.

Let (for any positive integer) $a = 3q + r$, $r = 0, 1, 2$ — 1

$\therefore a^3 = (3q)^3 = 27q^3 = 9m$, where $m = 3q^3$ — 1

or $a^3 = (3q+1)^3 = (27q^3 + 27q^2 + 9q) + 1 = 9m + 1$ — $\frac{1}{2}$

or $a^3 = (3q+2)^3 = (27q^3 + 54q^2 + 36q) + 8 = 9m + 8$ — $\frac{1}{2}$

Hence proved.

28. $x^2-3x-10=0$ — $\frac{1}{2}$

we get $x=5,-2$; $\alpha=5$ and $\beta=-2$ — 1

Sum of roots $=\frac{-b}{a}=3=\alpha+\beta$ — 1

product of roots $=\frac{c}{a}=-10=\alpha.\beta$ verified — $\frac{1}{2}$

29. For correct value of $x=-2$ — $1\frac{1}{2}$

correct " $y=5$ — $1\frac{1}{2}$

30 Area of Δ formed by given points $=0$ — $\frac{1}{2}$

$=\frac{1}{2}[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)]=0$ — $\frac{1}{2}$

$7(1-k)+5(k+2)+3\times(-3)=0$ — 1

$8-2k=0$

$k=4$ — 1

31. In given figure: Using B.P.T

$\frac{AL}{LC}=\frac{AM}{MB}$ or $\frac{LC}{AL}+1=\frac{MB}{AM}+1$ — 1

$\frac{AC}{AL}=\frac{AB}{AM}$ ——— (1) — $\frac{1}{2}$

and In ΔACD, $LN \parallel DC$

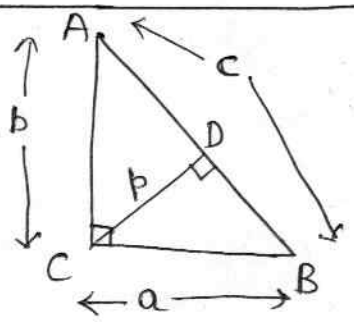
$\therefore \frac{AC}{AL}=\frac{AD}{AN}$ ——— (2) — $\frac{1}{2}$

From (1) and (2)

$\frac{AB}{AM}=\frac{AD}{AN}$ — $\frac{1}{2}$

$\therefore AM\times AD=AB\times AN$ — $\frac{1}{2}$

OR



Area of ΔABC

$=\frac{1}{2}ab=\frac{1}{2}cp$ — (1)

$\Rightarrow \frac{ab}{p}=c$

$\frac{a^2b^2}{p^2}=c^2$ ——— (1)

$a^2+b^2=c^2$ ——— (2) — (1)

$\therefore a^2+b^2=\frac{a^2b^2}{p^2}$

$\frac{a^2+b^2}{a^2b^2}=\frac{1}{p^2}$ — (1)

$\Rightarrow \frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}$

32.	correct construction of given circle	1
	correct construction of two tangents	2
33.	In figure $\because$ $AP = AS$	1
	$BP = BQ$	
	$CR = CQ$	1
	$DR = DS$	
	On adding: $(AP+BP)+(CR+DR) = (AS+DS)+(BQ+CQ)$	
	$AB + CD = AD + BC$	1
34.	Area of quadrant $= \frac{1}{4}\pi r^2 = \frac{1}{4} \times \frac{22}{7} \times 14 \times 14$	
	$= 154\ cm^2$	(1)
	Area of semi-circle $= \frac{1}{2} \times \frac{22}{7} \times R^2 = \frac{1}{2} \times \frac{22}{7} \times \frac{14}{2} \times \frac{14}{2}$ (where $2R = 14\sqrt{2}$) $= 154\ cm^2$	$(\frac{1}{2})$
	Area of $\Delta ABC = \frac{1}{2} \times 14 \times 14 = 98\ cm^2$	
	$\therefore$ Area of segment $= 154 - 98 = 56\ cm^2$	$(\frac{1}{2})$
	$\therefore$ Required area $= 154 - 56$ (Ar of semi-circle − Segment) $= 98\ cm^2$	1
	OR	
	Area of sector $OPQ = \frac{30^\circ}{360^\circ}\pi r^2 = \frac{30}{360} \times \frac{22}{7} \times 7 \times 7$	1
	$= \frac{77}{6}\ cm^2$	
	Area of sector $OAB = \frac{30}{360} \times \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10}$	1
	$= \frac{19.25}{6}\ cm^2$	
	$\therefore$ Required area $= \frac{77 - 19.25}{6} = \frac{57.75}{6}$	1
	$= 9.625\ cm^2$	
35.	$u+v = 10$	1
	$u-v = 2$ where u and v are speeds of rowing and current respectively	1
	on solving $u = 6$, $v = 4$ KM/h	1+1

OR

Taking $\frac{1}{x} = u$ and $\frac{1}{y} = v$ — $\frac{1}{2}$

$\frac{u}{2} + \frac{v}{3} = 2$ or $3u + 2v = 12$ — 1

$\frac{u}{3} + \frac{v}{2} = \frac{13}{6}$ or $2u + 3v = 13$ — $\frac{1}{2}$

on solving $u = 2$ — 1

$v = 3$ — $\frac{1}{2}$

$\therefore x = \frac{1}{2}$, $y = \frac{1}{3}$ — $\frac{1}{2}$

36. Let two consecutive positive integers be x and $x+1$ — $\frac{1}{2}$

$\therefore x^2 + (x+1)^2 = 365$ — $1\frac{1}{2}$

$x^2 + x - 182 = 0$

$(x+14)(x-13) = 0$ — (1)

$\therefore x = 13$

$\therefore$ two consecutive positive integers are 13 and 14 — 1

37. $S_n = 1 + 3 + 5 + 7 + \cdots + 49$ — $\frac{1}{2}$

$a_n = 49 = 1 + (n-1).2 \Rightarrow n = 25$ — 1

$a = 1$, $d = 2$, $n = 25$ — $\frac{1}{2}$

$\therefore S_n = S_{25} = \frac{25}{2}\{1 + 49\} = 625$ — 1+1

38. For correct, Given, To prove, construction and Figure — $4 \times \frac{1}{2}$

For correct proof — 2

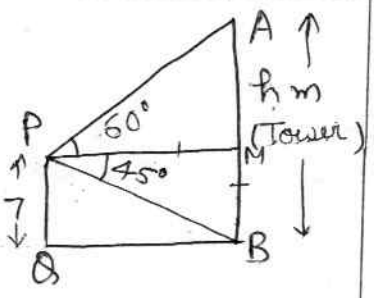
OR

For correct statement, Given, to prove, construction and Figure — $5 \times \frac{1}{2}$

For correct proof — $1\frac{1}{2}$

39. $\because$ In ΔPMB, $\angle MPB = 45°$

$\therefore BM = PM = 7$ m. — $1\frac{1}{2}$



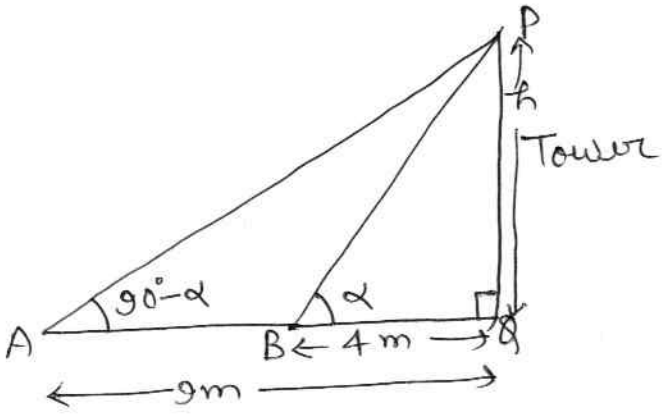
In ΔAPM

$\frac{AM}{PM} = \tan 60°$ — $1\frac{1}{2}$

$AM = 7 \times \sqrt{3} = 7\sqrt{3}$ m.

$\therefore$ Height, $h = AM + BM = 7(\sqrt{3} + 1)$ m. — 1

OR



1

In ΔPQB

$$\tan\alpha = \frac{h}{4} \quad \text{——— (1)}$$

1

In ΔPQA

$$\tan(90°-\alpha) = \cot\alpha = \frac{h}{9} \quad \text{——— (2)}$$

$\frac{1}{2}$

From (1) and (2)

$$\tan\alpha \cdot \frac{1}{\tan\alpha} = \frac{h}{4} \times \frac{h}{9}$$

1

$$h^2 = 36$$

$\frac{1}{2}$

$$h = 6 \text{ m}$$

40. L.H.S. $= \sin^2A + \text{cosec}^2A + 2\sin A \,\text{cosec}A + \cos^2A + \sec^2A + 2\cos A \cdot \sec A$

1

$= (\sin^2A + \cos^2A) + (\text{cosec}^2A + \sec^2A) + 2 \times 1 + 2 \times 1$

1

$= 1 + 4 + (1 + \tan^2A) + (1 + \cot^2A)$

1

$= 7 + \tan^2A + \cot^2A$

1