PRE-BOARD 2019-20 (second shift)

CLASS- X

MATHEMATICS

Max. Marks: 80 **Duration: 3hrs.**

General instructions

a) All questions are compulsory.
b) The question paper consists of 40 questions divided into four sections A, B, C and D.
c) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises 6 questions 6 questions of 4 marks each.
d) Use of calculator is not permitted.

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) 18

2- 325 can be expressed as a product of its primes as
(a) 5^2x7
(b) 5^2x13
(c) $5x13^2$
(d) $2x3^2x5^2$

3- For which value(s) of p, will the lines represented by the following pair of linear equations be parallel
3x-y-5=0
6x-2y-p=0
(a) All real values except 10
(b) 10
(c) 5/2
(d) ½

4- The sum of the zeroes of the polynomial $2x^2-8x+6$ is
(a) -3

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

5- the distance of the point P(-3,-4) from the x- axis (in units) is
(a) 3
(b) -3
(c) 4
(d) 5

6- The mid point 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)

7- Given that sin $\propto = \sqrt{3}/2$ and cosβ =0 , then the value of $\beta - \alpha$
(a) 0^0
(b) 90^0
(c) 60^0
(d) 30^0

8- If the perimeter and area of a circle are numerically equal, then radius of the circle is
(a) 2
(b) 4
(c) 6
(d) 8

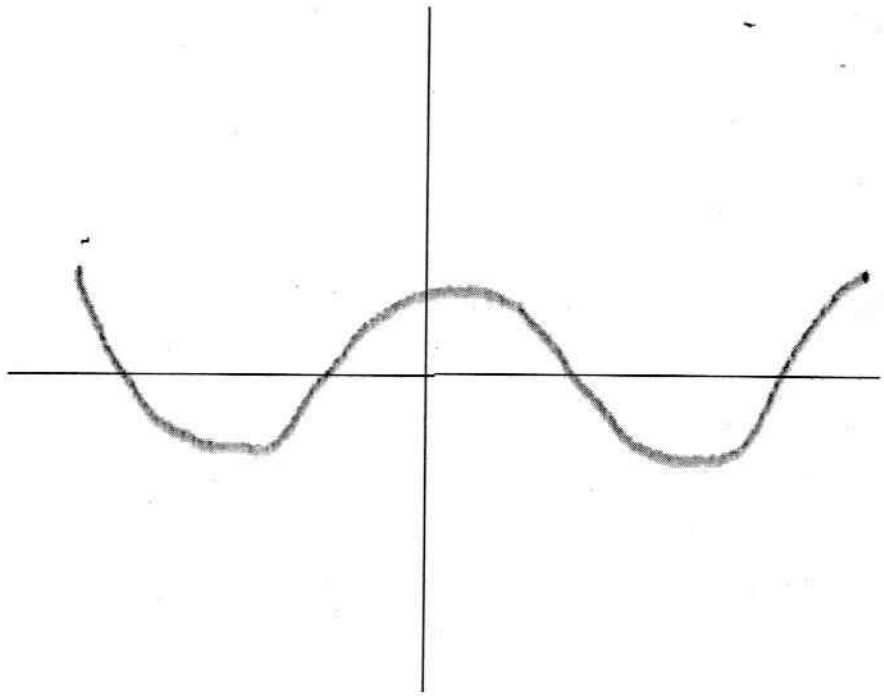
9- The surface area of a sphere is 616cm2. Then its radius is
(a) 7 cm
(b) 14 cm
(c) 49 cm
(d) 7/2 cm

10- If triangle ABC is right angled at C, then the value of sec(A+ B) is
(a) 0
(b) 1
(c) $2/\sqrt{3}$
(d) Not defined

(11-15) fill in the blanks:

11-If one root of the equation $(k-1)x^2 - 10x + 3 = 0$ is the reciprocal of the other, then the value of k is _____

12- The graph of y=p(x) , where p(x) is a polynomial in variable x, is as follows:



The number of zeroes of p(x) is _____

13- The perimeter of two similar triangles ΔABC and ΔPQR are 35 cm and 45 cm respectively , then the ratio of the areas of the two triangles is _____

14- The value of $\sin 60^0 \cos 30^0 + \sin 30^0 \cos 60^0$ is _____

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

(16 -20) Answer the following:

16- If area of quadrant of a circle is 38.5 cm2 then find its diameter .(use $\pi = 22/7$)

17- Find the common difference of the A.P. whose first term is 12 and fifth term is 0.

18- ΔPQR is right angled isosceles triangle, right angled at R. find value of sinP.

19- Write quadratic polynomial whose zeroes are 3 and 2.

20- The base radius and height of a right circular cylinder is 7 cm and 14 cm, find its volume.

SECTION B

21- Find the area of circle whose circumference is 22 cm,

22- Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

23- Show that $\tan 48^0 \tan 23^0 \tan 42^0 \tan 67^0 = 1$

24- Read the following passage and answer the questions that follows:

A teacher told 10 students to write a polynomial on the black board. Student wrote

(a) X^2+2

(b) $2x+3$

(c) X^3+x^2+1

(d) X^3+2x^2+1

(e) $X-3$

(f) X^4+x^2+1

(g) X^2+2x+1

(h) $2x^3-x^2$

(i) X^2-2x+1

(j) X^4-1

(i) How many students wrote cubic polynomial.

(ii) Divide the polynomial (x^2+2x+1) by (x+1).

25- Find the perimeter of a square circumscribing a circle of radius 'a ' cm.

26- If the point P (4, a) lies on the line 4x-3y=10 then find the value of a.

SECTION C

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

28- Draw a circle of radius 4 cm. from the point 7 cm away from its centre construct the pair of tangents to the circle.utu

29- Given that $\sqrt{5}$ is irrational, prove that $2\sqrt{5}$ -3 is an irrational number.

30- Solve the following system of equations:

$$\frac{21}{x} + \frac{47}{y} = 110$$

$$\frac{47}{x} + \frac{21}{y} = 162$$

31- Solve 2x+3y=11 and x-2y=-12 algebraically and hence find the value of m for which y=mx+3.

32- If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$

33- The volume of a cuboid is 550 cm^3 and the area of its base is 110 cm^2. Find the height of the cuboid.

34- If the difference between the circumference and the radius of a circle is 37 cm , then use $\pi=22/7$ to find the circumference of the circle.

SECTION D

35- Find two consecutive positive integers sum of whose squares is 365.

36- If the sum of first 14 terms of an AP is 1050 and its first term is 10. Find the 20^{th} term.

37- State and prove Pythagoras theorem.

38- Solve the following equation:

$$\frac{1}{x} - \frac{1}{x-2} = 3, \quad x \neq 0, 2$$

OR

A train covers a distance of 360 km at a uniform speed. Had the speed been 5km/hour more, it would have taken 48 minutes less for the journey. Find the original speed of the train.

39- The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60m high, are 30^0 and 60^0 respectively. Find the difference between the heights of the building the heights of the building and the tower and the distance between them.

40- A petrol tank is in the form of a frustum of a cone of height 20m with diameters of its lower and upper ends as 20m and 50 m respectively. Find the cost of petrol which can fill the tank completely at the rate of Rs. 70 per litre . Also find the surface area of the tank.

OR

Sides of a right triangular field are 25m, 24m and 7 m. At the three corners of the field, a cow, a buffalo and a horse are tied separately with ropes of 3.5 m each to graze in the field. Find the area of the field that cannot be grazed by these animals.

PRE-BOARD 2019-20

CLASS-X

MATHEMATICS

MARKING SCHEME - SOP.

Max. Marks - 80 | Duration - 3 Hrs.

1. (b) 42 (1)
2. (b) $5^2 \times 13$ (1)
3. (a) All real values except 10 (1)
4. (a) 4 (1)
5. (c) 4 units (1)
6. (b) (-3, 5) (1)
7. (d) 30° (1)
8. (a) 2 (1)
9. (a) 7 cm (1)
10. (d) not defined (1)
11. 4 (1)
12. 4 (1)
13. 49:81 (1)
14. 1 (1)
15. 2, 3 $\frac{1}{2} + \frac{1}{2}$
16. Area of quadrant $= \frac{\pi r^2}{4} = 38.5$ $\frac{1}{2}$

$r = 7$ cm.

diameter $= 14$ cm $\frac{1}{2}$

17. $a_1 = 12$, $a_5 = 0$

$a + 4d = 0$ $\frac{1}{2}$

$12 + 4d = 0$

$d = -3$ $\frac{1}{2}$

18. $\sin P = \frac{1}{\sqrt{2}}$ (1)

19. $x^2 - 5x + 6$ (1)

20. Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times (7)^2 \times 14$ 1/2

$= 2156 \text{ cm}^3$ 1/2

SECTION - 'B'

21. $2 \times \frac{22}{7} \times r = 22$

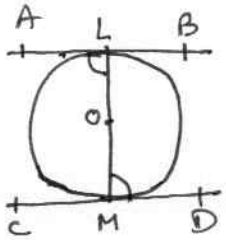
$r = \frac{7}{2}$ (1)

Area of circle $= \pi r^2$.

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{2}$

$= 38.5 \text{ cm}^2$ (1)

22.



(1)

$\angle OLA = 90^\circ$

$\angle OMD = 90^\circ$

$\angle OLA = \angle OMD$ (alt. int. $\angle$s)

$\therefore AB \parallel CD$ (1)

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

$= \tan(90^\circ - 42^\circ) \cdot \tan(90^\circ - 67^\circ) \cdot \tan 42^\circ \tan 67^\circ$ (1)

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

$= 1$ (1)

(24). (i) 3 students (1)

(ii) $\frac{(x+1)^2}{x+1} = x+1$ (1)

25. diameter $= 2a$, side of square $= 2a$ (1)

perimeter $= 4 \times 2a = 8a$ (1)

26. $4x - 3y = 10$

$4 \times 4 - 3a = 10$ (1)

$\therefore a = 2$ (1)

SECTION - C'

27.

Zeroes are 5 and -2 (1)

Sum of zeroes $= -\frac{b}{a}$

$5 + (-2) = \frac{3}{1}$

$3 = 3$ (1)

Product of zeroes $= \frac{c}{a}$

$5 \times (-2) = -10$

$-10 = -10$ (1)

28. for correct construction (3)

29. Let $2\sqrt{5} - 3$ be a rational no. $\frac{1}{2}$

$2\sqrt{5} - 3 = \frac{p}{q}$, $p, q \rightarrow$ integers , $q \neq 0$. $\frac{1}{2}$

$2\sqrt{5} = \frac{p}{q} + 3$ 1

$\sqrt{5} = \frac{p + 3q}{2q}$

$\because \frac{p+3q}{2q}$ is rational

$\therefore \sqrt{5}$ is rational which is contradiction to our assumption. 1

$\therefore$ $2\sqrt{5} - 3$ is an irrational no.

30. $21u + 47v = 110$ — ①

$47u + 21v = 162$ — ②

Adding eqⁿ ① & ②

$68u + 68v = 272$

$u + v = 4$ — ③ (1)

Subtracting eqⁿ ① from eqⁿ ②

$26u - 26v = 52$

$u - v = 2$ — ④ (1)

Solving eqⁿ ③ & eqⁿ ④

$u = 3 \Rightarrow x = \frac{1}{3}$

$v = 1 \Rightarrow y = 1$ (1)

31. $x = -2, \ y = 5$ (1) + (1)

$5 = -2m + 3$

$m = -1$ (1)

32. $1 + 2\sin\theta\cos\theta = 3$ $1\frac{1}{2}$

$\sin\theta \cdot \cos\theta = 1$

$L.H.S. = \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{1} = 1$ $1\frac{1}{2}$

33. Volᵐ of cuboid = base area × height $1\frac{1}{2}$

$550 = 110 \times h$

$h = \frac{550}{110}$ (1)

$h = 5$ $\frac{1}{2}$

34. $2\pi r - r = 37$ (1)

$r\left(2 \times \frac{22}{7} - 1\right) = 37$

$r\left(\frac{44-7}{7}\right) = 37$

$r \times \frac{37}{7} = 37$

$r = 7$ cm (1)

Circumference of Circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7$

$= 44$ cm (1)

SECTION 'D'

35. Let the integers be x and $x+1$ $\frac{1}{2}$

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

$x^2 + x - 182 = 0$

$(x+14)(x-13) = 0$ (1)

$x = 13$

$\therefore$ integers are 13 and 14 (1)

36. $\frac{14}{2}[2 \times 10 + (n-1)d] = 1050$ (2)

$d = 10$

$a_{20} = a + 19d$

$= 10 + 19 \times 10$ (2)

$= 200$

37. for correct statement $\frac{1}{2}$

for correct Given, to prove, fig $1\frac{1}{2}$

for correct proof (2)

38. $3x^2 - 6x + 2 = 0$ (2)

$x = \frac{+6 \pm \sqrt{36 - 4 \times 3 \times 2}}{6}$

$= \frac{3 \pm \sqrt{3}}{3}$ (2)

OR

Let original speed of train be x.

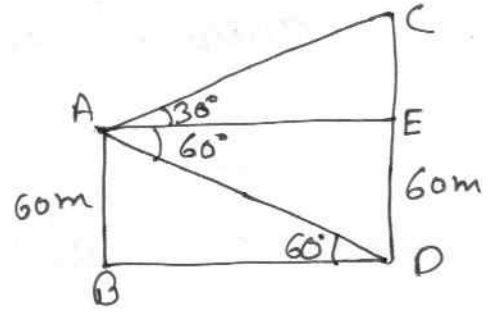
$\frac{360}{x} - \frac{360}{x+5} = \frac{48}{60}$ $1\frac{1}{2}$

$x^2 + 5x - 2250 = 0$

$(x+50)(x-45) = 0$ 1

$x = 45$ km/h. $\frac{1}{2}$

39.



In ΔABD,

$\tan 60^\circ = \frac{AB}{BD}$ (1)

$BD = \frac{60}{\sqrt{3}} = 20\sqrt{3}$ m $1\frac{1}{2}$

In ΔCEA,

$\tan 30^\circ = \frac{CE}{AE}$

$\frac{1}{\sqrt{3}} \times 20\sqrt{3} = CE$ $1\frac{1}{2}$

$CE = 20$ m

40. Capacity of tank $= \frac{1}{3}\pi \times 20 \times (10^2 + 25^2 + 10 \times 25)$

$= \pi \times 20 \times 325 \text{ m}^3$

Cost of petrol $= \pi \times 20 \times 325 \times 70$

$= ₹\ 1430000$

$l = \sqrt{(20)^2 + (25-10)^2} = 25$ m

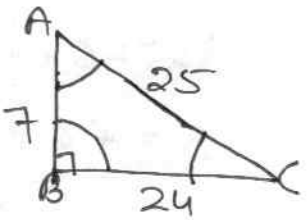
Surface area of tank $= \pi \times 25\,(10 + 25)\text{ m}^2$

$= 2750 \text{ m}^2$

or

Area of quadrant $= \frac{\pi r^2}{4}$

$= \frac{\pi \times (3.5)^2}{4}$ 1



Area of two sectors at vertex A & C

$= \pi (3.5)^2 \cdot \left[\frac{\angle A + \angle C}{360^\circ}\right]$

$= \pi \times (3.5)^2 \frac{\times 90^\circ}{360^\circ}$ 1

$= \frac{\pi \times (3.5)^2}{4}$

Total grazed area $= \frac{2\pi\,(3.5)^2}{4} = 19.25 \text{ cm}^2$ 1

Area of remaining part $= 84 - 19.25$ 1

$= 64.75 \text{ m}^2$