Pre-Board Examination, 2019-20
Mathematics - 041
Class – X

Max. Marks: 80
Time Allowed: 3 Hours

General Instructions:

1. *The question paper consists of **40** questions divided into four sections A, B, C and D printed in 8 **pages**.*
2. *Section **A** comprises **20** questions of one mark each. Section - **B** comprises **6** questions of **2** marks each. Section - C comprises of **8** questions of **3** marks each and Section - D comprises of **6** questions of **4** marks each.*
3. *All questions are compulsory. However, internal choices are given for two questions in Section-A, two questions in Section – B, four questions in Section – C and three questions in Section – D.*
4. *Write the proper question number for all the questions as per the question paper.*
5. *Draw figures wherever necessary. If proper steps/ units/ figures missing, it shall result in loss of marks.*
6. *Use of **calculators** is not permitted.*

SECTION-A

*Question numbers **1** to **20** carry **one** mark each.*

1. What is the HCF of smallest composite number and smallest prime number? [1]

(a) 1 (b) 2 (c) 4 (d) 5

2. A solid is hemispherical at the bottom and conical (of same radius) above it. If the surface area of the two parts are equal, then the ratio of its radius and the slant height of the conical part is [1]

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

3. The value of ***k*** for which the equation $x^2 + 2(k+1)x + k^2 = 0$ has equal roots is [1]

(a) -1 (b) $\frac{-1}{2}$ (c) 1 (d) 2

OR

If the sum of the zeros of the quadratic polynomial $f(t) = kt^2 + 2t + 3k$ is equal to their product, then value of k is

(a) $\frac{-2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{-1}{3}$

4. If the mean of 26, 19, 15, 24 and x is x, then find the median of the data [1]

(a) 23 (b) 22 (c) 20 (d)21

5. The pair of linear equations $x = y$ and $x + y = 0$ has [1]

(a)no common solution (b) infinitely many solution

(c) unique solution (d) inconsistent

6. $\frac{1}{1+\ \sin\theta} + \frac{1}{1-\ \sin\theta}$ is equal to [1]

(a) $2\,sec^2\theta$ (b) $2\,cos^2\theta$ (c) 0 (d) 1

7. If $\sin 3\,\theta = \cos(\theta - 6°)$, where 3θ and $(\theta - 6°)$ are acute angles, then the value of θ is [1]

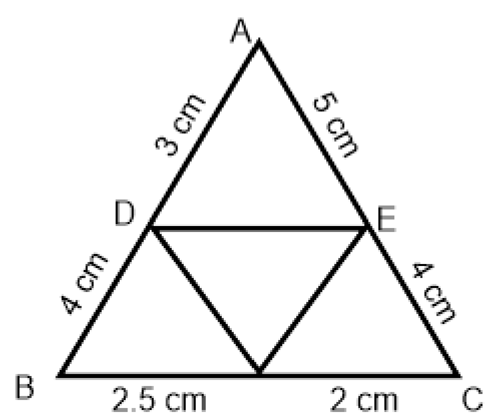
(a) $42\,°$ (b) 24° (c) 12° (d) 26

8. Two arithmetic progressions have equal common differences. The first term of one of these is 3 and that of the other is 8, then the difference between their 100th term is [1]

(a) 4 (b) 5 (c) 6 (d) 3

9. In the given figure, $AD = 3\ cm,\ AE = 5\ cm,$ $BD = 4\ cm,\ CE = 4cm,\ CF = 2\ cm,$ [1]

$BF = 2.5cm,$ then



(a) $DE \parallel BC$ (b) $DF \parallel AC$ (c) $EF \parallel AB$ (d) no lines are parallel

10. A card is drawn from a well-shuffled deck of 52 playing cards. The probability that the card will not be an ace is [1]

$(a)\ \frac{1}{13}$ $(b)\ \frac{1}{4}$ $(c)\ \frac{12}{13}$ $(d)\ \frac{3}{4}$

11. A pendulum swings through an angle of 30° and describes an arc 8.8 cm in length. Find the length of the pendulum. $\left(Use\ \pi = \frac{22}{7}\right)$ [1]

12. Find mode of the data, using an empirical relationship, when it is given that its mean and median are 10.5 and 9.6 respectively. [1]

13. If one zero of the quadratic polynomial $2x^2 - 3x + p$ is 3, then find the value of p. [1]

14. Find the 4th term from the end of the A.P., $-11, -8, -5, \ldots\ ,\ 49$. [1]

OR

Which term of the AP $21,\ 18,\ 15, \ldots,$ is zero.

15. The angle of elevation of the top of a tower from a point 20 m away from the base is 45°. Find the height of the tower. [1]

16. If the areas of two similar triangles are in the ratio 25 : 64, then find the ratio of their corresponding sides. [1]

17. If the mid-point of the line segment joining the points $P\,(6,\ b-2)$ and $Q\,(-2, 4)$ is $P\,(2,\ -3)$, find the value of b. [1]

18. The radii of the circular ends of a bucket of height 40 cm are 24 cm and 15 cm. Find the slant height of the bucket. [1]

19. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought? [1]

20. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the following pair of linear equations is consistent or inconsistent: [1]

$2x - 3y = 8 \quad and \quad 4x - 6y = 9$

SECTION-B

*Question numbers **21** to **26** carry **two** marks each.*

21. If HCF of 144 and 180 is expressed in the form $13m - 3$, find the value of m. [2]

22. Which term of the Arithmetic progression 3, 10, 17, … will be 84 more than its 13^{th} term? [2]

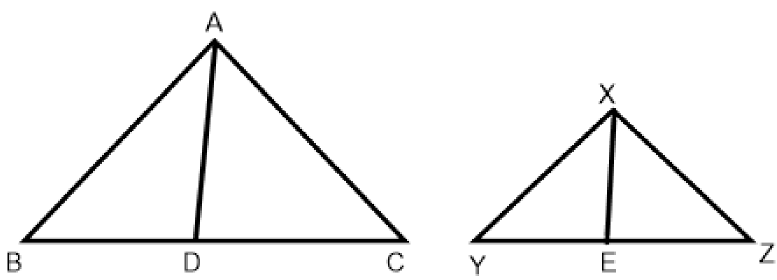
OR

If the sum of first ***n*** terms of an AP is given by $S_n = 3n^2 + 2n$, find the nth term of the AP.

23. Evaluate: [2]

$$\frac{sec^2 54° - cot^2 36°}{cosec^2 57° - tan^2 33°} + 2\, sin^2 38°\ sec^2 52° - sin^2 45°$$

24. In given figure ΔABC is similar to ΔXYZ and AD and XE are angle bisectors of $\angle A$ and $\angle X$ respectively such that AD and XE in centimetres are 4 and 3 respectively, find the ratio of area of ΔABD and area of ΔXYE. [2]



25. For what value of k will the following pair of linear equations have no solution? [2]
$2x + 3y = 9$; $6x + (k - 2)y = (3k - 2)$

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

OR

Find the ratio in which the y-axis divides the line segment joining the points $(5, -6)$ and $(-1, -4)$.

SECTION-C

*Question numbers **27** to **34** carry **three** marks each.*

27. Show that $3 + 5\sqrt{2}$ is an irrational number, given $\sqrt{2}$ is an irrational number. [3]

OR

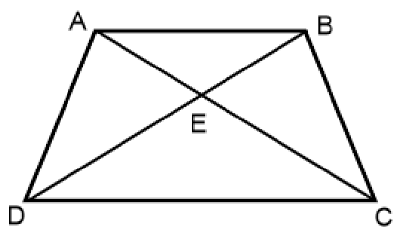
An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

28. From a point P on the ground, the angle of elevation of the top of a 10m tall building and a helicopter, hovering at some height vertically over the top of the building are 30º and 60º respectively. Find the height of the helicopter above the ground. [3]

29. In $\Delta ABC,\ AD \perp BC$ and $AD^2 = BD \times DC$. Prove that $\angle BAC = 90°$. [3]

OR

In the given figure, ABCD is a trapezium with $AB \parallel DC$. If ΔAED is similar to ΔBEC, prove that $AD = BC$.



30. If two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $\left(2 + \sqrt{3}\right)$ and $\left(2 - \sqrt{3}\right)$, find other zeroes. [3]

OR

On dividing $(x^3 - 3x^2 + x + 2)$ by a polynomial $g(x)$, the quotient and remainder are $(x - 2)$ and $(-2x + 4)$ respectively. Find $g(x)$.

31. Solve the quadratic equation: [3]

$$\frac{x+1}{x-1} + \frac{x-2}{x+2} = 3, \ (x \neq 1, -2)$$

OR

Solve for $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$.

32. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are $A\ (2, 2\ ),\ \ B\ (4,\ \ 4\ )$ and $C\ (2, 6\ )$. [3]

33. One card is drawn from a well-shuffled pack of 52 cards. Find the probability of drawing: [3]
    (i) An ace
    (ii) '2' of spades
    (iii) '10' of black suit.

34. Circumference of the edge of hemispherical bowl is 132 cm. Find the capacity of the bowl. [3]

SECTION-D

*Question numbers **35** to **40** carry **four** marks each.*

35. Draw a circle of radius 5 cm. Draw a pair of tangents to this circle, which are inclined to each other at an angle of 60º. [4]

36. Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and the x-axis. Find the area of the shaded region. [4]

OR

Solve for x and y :

$$\frac{1}{2(2x+3y)} + \frac{12}{7(3x-2y)} = \frac{1}{2};$$

$$\frac{7}{(2x+3y)} + \frac{4}{(3x-2y)} = 2;$$ where $2x + 3y \neq 0;\ \ and\ \ 3x - 2y \neq 0.$

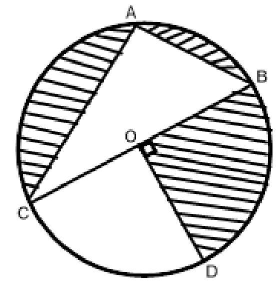
37. Show that: [4]

$$\frac{tan^3\theta}{1 + \ tan^2\theta} + \frac{cot^3\theta}{1 + \ cot^2\theta} = \sec\theta \operatorname{cosec}\theta - 2sin\theta\ cos\theta.$$

OR

A bird is sitting on the top of a tree, which is 80 m high. The angle of elevation of the bird, from a point on the ground is 45º. 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 30º. Find the speed of flying of the bird.

38. In the given figure, O is the centre of the circle with AC =24 cm, AB= 7cm and $\angle BOD = 90°$. Find the area of the shaded region. $(Use\ \pi = 3.14)$ [4]

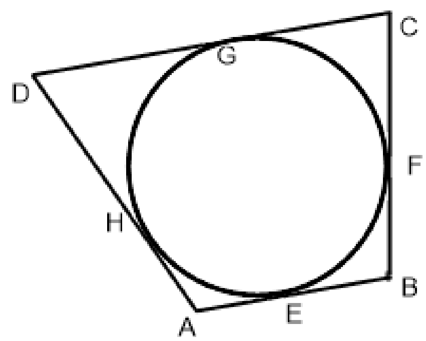


OR

The diameters of lower and upper ends of a bucket in the form of a frustum of a cone are 10 cm and 30 cm respectively. If its height is 24 cm, find the area of the metal sheet used to make the bucket. $(Use\ \pi = 3.14)$

39. Prove that length of the tangents drawn from an external point to the circle are equal in length. [4]

Using above theorem, solve the following:
In given figure, quadrilateral ABCD is inscribed.
If $GC = 3cm,\ BC = 7cm,\ AH = 6cm.$
Find AB.



40. If the mean of the following frequency distribution is 65.6, find the missing frequencies f_1 and f_2. [4]

Class Interval	**Frequency**
10 – 30	5
30 – 50	8
50 – 70	f_1
70 – 90	20
90 – 110	f_2
110 – 130	2
Total	50

-o0o0o0o-