Total printed pages:- 06

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DELHI PUBLIC SCHOOL VINDHYANAGAR
PRE-BOARD EXAMINATION 1 (2019-20)

CLASS - X   Max. Marks: 80
SUBJECT - Mathematics   (Standard)   Time: 3 Hrs

General Instructions:

i)   *All Questions are compulsory.*
ii)   *The Question paper consists of 40 questions divided into 4 sections A,B,C,D.*
iii)   *Section A comprises of 20 questions of **one mark** each, Section B comprises of 6 questions of **two marks** each, Section C comprises of 8 questions of **three** marks each and Section D comprises of 6 questions of **four marks** each.*
1v)   *There is no overall choice. However, an internal choice has been given in **two** questions of 1 mark each, **two** questions of 2 marks each, **three** questions of 3 marks each and **three** questions of 4 marks each . You have to attempt only one of the alternatives in all such questions.*
v)   *Use of calculators is **not** permitted.*

Section A

Q1- Q 10 are MCQ type questions . Select the most appropriate answer from the given options.

1. Find the value of k if $P(4, -2)$ is the mid-point of the line segment joining the points $A(5k, 3)$ and $B(-k, -7)$.

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

2. If A and B are the points (-6,7) and (-1,-5) respectively then the distance 2AB is
    A) 26   b) 16   c) 36   d) none of these.

3. The points which divides the line segment joining the points (9,-8) and (3,3) in the ratio 2:3 internally lies in the
    a) I quadrant   b) III quadrant   c) II quadrant   d) IV quadrant

4. If A and B are complementary angles , then
    a) $\sin A = \sin B$ b) $\cos A = \sec B$ c) $\sec A = \csc B$ d) $\tan A = \tan B$

5. If $\tan^2 45^0 - \cos^2 30^0 = x \sin 45^0 \cos 45^0$, then x =
    a) 2   b) -2   c) $\frac{-1}{2}$ d) $\frac{1}{2}$

6. If $\tan \theta = \frac{a}{b}$, then $\frac{a \sin\theta + b \cos\theta}{a \sin\theta - b \cos\theta}$ is equal to

    a) $\frac{a^2+b^2}{a^2-b^2}$ b) $\frac{a^2-b^2}{a^2+b^2}$ c) $\frac{a+b}{a-b}$ d) $\frac{a-b}{a+b}$

7. If $am \neq bl$, then the system of equations
    $ax + by = c$ and $n - my = lx$
    a) has a unique solution   b) has no solution   c) has infinitely many solutions   d) may or may not have a solution

Page 1

8. If the system of equations $2x + 3y = 5, 4x + ky = 10$, has infinitely many solutions then k=

   a) 1   b) $\frac{1}{2}$ c) 3   d) 6

9. If the median of the data : $6, 7, x - 2, x, 17, 20$ written in ascending order is 16 , then $x =$

   A) 15   b) 16   c) 17   d) 18

10. The decimal expansion of the rational number $\frac{14587}{1250}$ will terminate after

    a) one decimal place   b) two decimal place   c) three decimal place d) four decimal place

Q(11 – 15) Fill in the blanks :

11 A solid is hemispherical at the bottom and conical above . If the surface areas of the two parts are equal , then the ratio of its radius and height of its conical part is_____.

12. The probability of guessing the correct answer to a certain question is $\frac{x}{12}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$, then x is _____.

13. If the sum of the roots of the equation $x^2 - x = k(2x - 1)$ is zero , then value of k is

    _____.

14. The value of p for which $2p+1$, 13 , $5p - 3$ are three consecutive terms of an AP is_____.

   OR

   If the sum of first p terms of an AP is $ap^2 + bp$, then its common difference is _____.

15. $\triangle ABC$, is such that AB=3 cm, BC=2 cm, and CA = 2.5 cm. If $\triangle DEF \sim \triangle ABC$ and EF=4 cm, perimeter of $\triangle DEF$ is _____.

(Q 16 – 20) Answer the following

16. If one root of the polynomial $f(x) = 5x^2 + 13x + k$ is reciprocal of the other , then find the value of k.

17. PQ is tangent to a circle with centre O at the point P. If $\triangle OPQ$ is an isosceles triangle, then find $\angle OQP$.

   OR

   PQ is a tangent drawn from a point P to a circle with centre O and QOR is a diameter of the circle such that $\angle POR = 120^0$. Find $\angle OPQ$.

18. ABC is an equilateral triangle of side $\frac{a}{3}$. Find each of its altitude.

19. Find the 13th term of the AP : $-3, \frac{-1}{2}, 2 \ldots \ldots$

20. Write the value of k for which $4x^2 + 4x + k$ is a perfect square.

Section B

21. The decorative block shown in the figure is made of two solids , a cube and a hemisphere . The base of the block is a cube with edge 5 cm . and the hemisphere fixed on the top has a diameter of 4.2 cm. Find the total surface area of the block.$\left(\pi = \frac{22}{7}\right)$
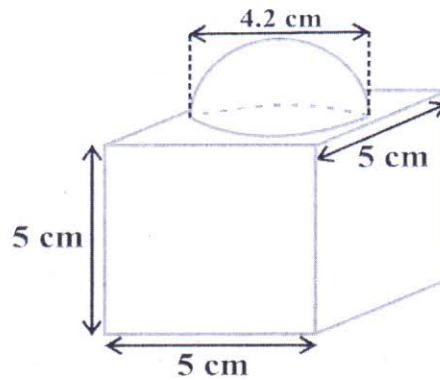
22. The King , Queen and Jack of clubs are removed from a pack of 52 cards and then the remaining cards are well shuffled . A card is selected from the remaining cards . Find the probability of getting a card i) of club , ii) of black king .

OR

Two dice are numbered 1, 2, 3, 4, 5, 6 and 1, 2, 2, 3, 3, 4 respectively. They are thrown and the sum of the numbers on them is noted . Find the probability of getting (i) sum 7 , (ii) sum is a perfect square.

23. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m . Find the height of the tree.

24. In the given fig., $\dfrac{PS}{SQ} = \dfrac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that PQR is an isosceles triangle.
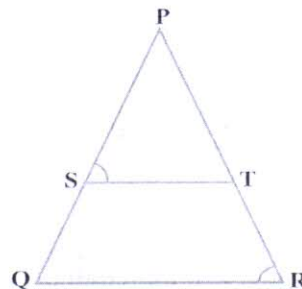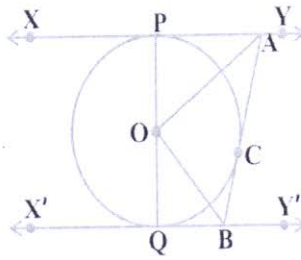

OR

In the given fig., E is a point on side CB produced of an isosceles triangle ABC with AB=AC . If AD $\perp$ BC and EF $\perp$ AC , prove that $\triangle ABD \sim \triangle ECF$.
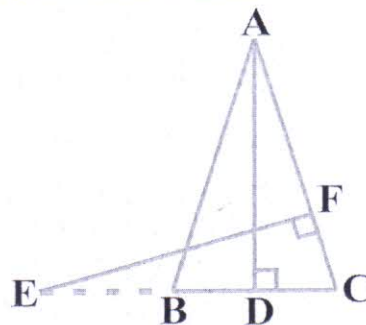
25. In the given fig., XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^0$.
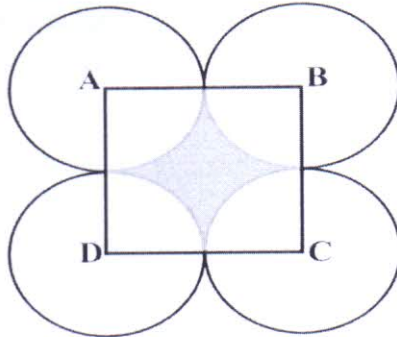
26. The HCF of two numbers is 29 and other two factors of their LCM are 16 and 19. Find the larger of the two numbers.

Section C

27. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarized it in the table given below . Find the mode of the data :

Number of cars	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	14	13	12	20	11	15	8

28. In the given fig., ABCD is a square of side 14 cm . With centres A , B , C , and D , four circles are drawn such that each circle touch externally two of the remaining three circles. Find the area of the shaded region .


29. Evaluate without using trigonometric table :

$$\frac{cosec^2(90^0-\theta)-tan^2\theta}{4(cos^248^0+cos^242^0)} - \frac{2tan^230^0sec^252^0sin^238^0}{cosec^270^0-tan^220^0}$$

OR

If $x = a\,sec\theta + b\,tan\,\theta$ and $y = a\,tan\,\theta + b\,sec\,\theta$, then prove that $x^2 - y^2 = a^2 - b^2$

30. If two zeroes of the polynomial $f(x) = 3x^4 + 6x^3 - 2x^2 - 10x - 5$ are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$, then find the other zeroes.

31. To conduct sports day activities, in your rectangular shaped school ground ABCD , lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD , as shown in the given fig. Ayush runs $\frac{1}{4}$ th the distance AD on the 2nd line and post a green flag. Sanju runs $\frac{1}{5}$ th the distance AD on the eighth line and posts a red flag. What is the distance between both the flags ? If Arpan has to post a blue flag exactly halfway between the line segment joining the two flags , where should he post his flag?
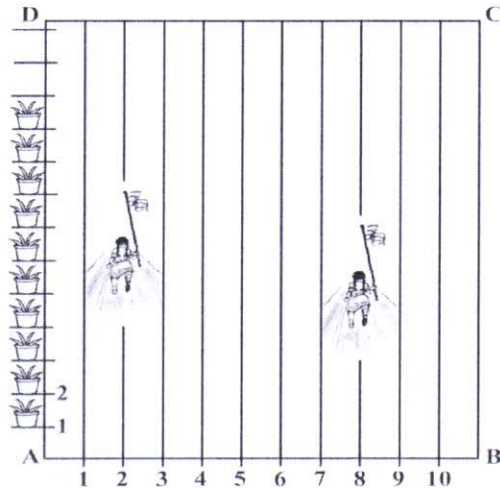
32. Solve the following system of equations by reducing them to a pair of linear equation :
$$\frac{5}{x-1} - \frac{1}{2-y} = 2 , \quad \frac{6}{x-1} - \frac{3}{y-2} = 1$$

OR

The ratio of incomes of two persons is 9:7 and the ratio of their expenditure is 4:3. If each of them manages to save Rs 2000 per month , then find their monthly incomes.

33. Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.

OR

Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12.

34. Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m+1 for some integer m.

Section D

35. If the median of the distribution given below is 28.5 , find the values of x and y.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	x	20	15	y	5	60

36. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60^0. After some time , the angle of elevation reduces to 30^0 . Find the distance travelled by the balloon during the interval.

OR

A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower , the angle of elevation of the top of the tower is 60^0 . From another point 20 m away from this point on the line joining this point to the foot of this tower is 30^0. Find the height of the tower and the width of the canal.

37. A metallic right circular cone $20cm$ high and whose vertical angle is 60^0 is cut into two parts at the middle of its height by a plane parallel to its base . If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm, find the length of the wire.

38. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

OR

A motor boat whose speed is 18km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

39. BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5 BC^2$

OR

In the given fig., the line segment XY is parallel to side AC of $\triangle$ABC and it divides the triangle into two parts of equal areas . Find the ratio $\dfrac{CY}{BC}$.
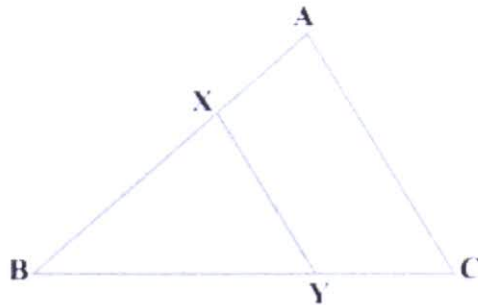
40. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\dfrac{5}{3}$ times the corresponding sides of the given triangle.

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