CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-4

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

General Instructions :

(i)   All questions are compulsory.
(ii)   The questions paper consists of 40 questions divided into 4 sections A, B, C and D.
(iii)   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 of 6 questions of 4 marks each.
(iv)   There is no overall choice. However, an internal choices have been provided 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.   If n is an even natural number, then the largest natural number by which $n(n+1)(n+2)$ is divisible, is   [1]
(a) 6   (b) 8
(c) 12   (d) 24

Q2.   The value of x, for which the polynomials $x^2 - 1$ and $x^2 - 2x + 1$ vanish simultaneously, is   [1]
(a) 2   (b) -2
(c) -1 (d) 1

Q3. X's salary is half that of Y's. If X got a 50% rise in his salary and Y got 25% rise in his salary, then the percentage increase in combined salaries of both is   [1]
(a) 30   (b) $33\frac{1}{3}$
(c) $37\frac{1}{2}$ (d) 75

Q4.   If the equation $(m^2 + n^2)x^2 - 2(mp + nq)x + p^2 + q^2 = 0$ has equal roots, then   [1]
(a) $mp = nq$ (b) $mq = np$
(c) $mn = pq$ (d) $mq = \sqrt{np}$

Q5.   If the common difference of an AP is 5, then what is $a_{18} - a_{13}$?   [1]
(a) 5   (b) 20
(c) 25   (d) 30

Q6.   If $x = p\sec\theta$ and $y = q\tan\theta$, then   [1]
(a) $x^2 - y^2 = p^2 q^2$ (b) $x^2 q^2 - y^2 p^2 = pq$
(c) $x^2 q^2 - y^2 p^2 = \dfrac{1}{p^2 q^2}$ (d) $x^2 q^2 - y^2 p^2 = p^2 q^2$

Q7.   The area of a circular ring formed by two concentric circles whose radii are 5.7 cm and 4.3 cm respectively is (Take $\pi = 3.1416$)   [1]
(a) 43.98 sq. cm.   (b) 53.67 sq. cm.
(c) 47.24 sq. cm.   (d) 38.54 sq. cm.

Q8.   The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is   [1]
(a) 2 : 1   (b) 1 : 2
(c) 1 : 3   (d) 3 : 1

Q9. For finding the popular size of ready-made garments, which central tendency is used? [1]
    (a) Mean   (b) Median
    (c) Mode   (d) Both Mean and Mode

Q10. Out of one digit prime numbers, one number is selected at random. The probability of selecting an even number is [1]
    (a) $\frac{1}{2}$ (b) $\frac{1}{4}$

    (c) $\frac{4}{9}$ (d) $\frac{2}{5}$

(Q.11-Q.15) Fill in the blanks.

Q11. L.C.M. of 96 and 404 is .... [1]

Q12. $(1, 2)$, $(4, y)$, $(x, 6)$ and $(3, 5)$ are the vertices of a parallelogram taken in order, then the value of x and y are .... [1]

OR

If $x - y = 2$ then point (x, y) is equidistant from $(7,1)$ adn (...........)

Q13. In a right triangle ABC, right angled at B, if $\tan A = 1$, $\sin A \cos A =$ .... [1]

Q14. If the area of a circle is 154 cm^2, then its circumference is .... [1]

Q15. If the volume of a cube is 64 cm^3, then its surface area is .... [1]

(Q.16-Q.20) Answer the following

Q16. In $\triangle ABC$, $DE \parallel BC$, find the value of x. [1]
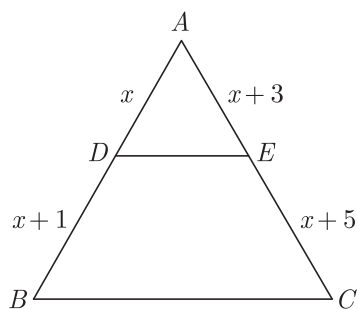
Q17. If PQ and PR are two tangents to a circle with center O. If $\angle QPR = 46^\circ$ then find $\angle QOR$. [1]
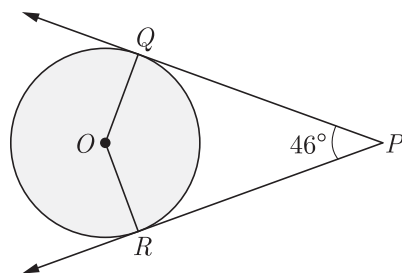

Q18. To divide a line segment AB in the ratio $5:7$, first AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distance, points are marked on the ray AX, find the minimum number of these points. [1]

OR

To divide a line segment AB in the ratio $2:5$, a ray AX is drawn such that $\angle BAX$ is acute. Then points are marked at equal intervals on AX. What is the minimum number of these points ?

Q19. In figure, a tower AB is 20 m high and BC, its shadow on the ground, is $20\sqrt{3}$ m long. find the Sun's altitude. [1]
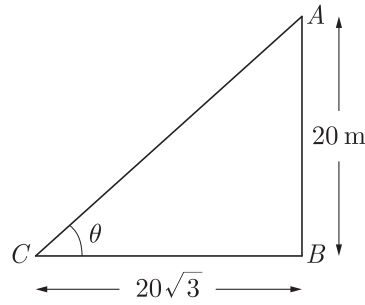
Q20. The radius of sphere is r cm. It is divided into two equal parts. Find the whole surface of two parts. [1]

SECTION B

Q21. Is the system of linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ consistent? Justify your answer. [2]

Q22. Find the ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Also find the value of k. [2]

Q23. In the given figure, PQR is a triangle right angled at Q and $XY \| QR$. If $PQ = 6$ cm, $PY = 4$ cm and $PX{:}XQ = 1{:}2$. Calculate the length of PR and QR. [2]
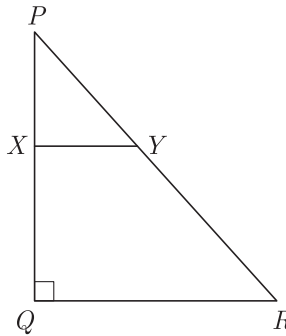

OR

In an equilateral triangle ABC, AD is drawn perpendicular to BC meeting BC in D. Prove that $AD^2 = 3BD^2$.

Q24. One tends to become lazy. Also, starting at your mobile screen for long hours can affect your eyesight and give you headaches . Those who are addicted to playing PUBG can get easily stressed out or face anxiety issues in public due to lack of social interaction.

To raise social awareness about ill effects of playing PUBG, a school decided to start "BAN PUBG" campaign, students are asked to prepare campaign students are asked to prepare campaign board in the shape of rectangle (as shown in the figure).
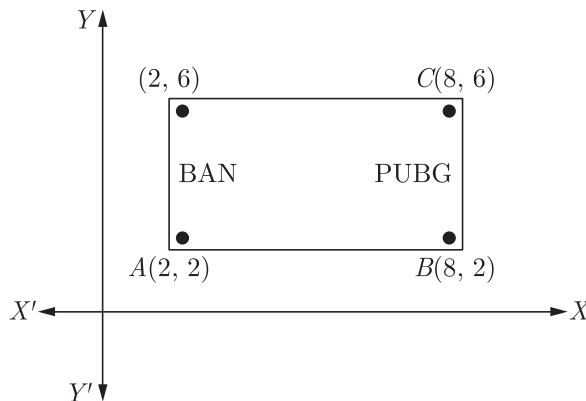
(i) Find the area of the board.
(ii) If cost of $1 \, \text{cm}^2$ of board is ₹8, then find the cost of board. [2]

Q25. Find the number of plates, 1.5 cm in diameter and 0.2 cm thick, that can be fitted completely inside a right circular of height 10 cm and diameter 4.5 cm. [2]

OR

A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel ?

Q26. Milk in a container, which is in the form of frustum of a cone of height 30 cm and the radii of whose lower an upper circular ends are 20 cm and 40 cm respectively, is to be distributed in a camp for flood victims. If this milk is available at the rate of ₹35 per litre and 880 litre of milk is needed daily for a camp, find how many such containers of milk are needed for a camp and what cost will it put on the donor agency for this. What value is indicated through this by the donor agency? [2]

SECTION C

Q27. If one the zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k. [3]

OR

Show that $\frac{1}{2}$ and $\frac{-3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$ and verify relationship between zeroes and coefficients of the polynomial.

Q28. The tenth term of an A.P., is -37 and the sum of its first six terms is -27. Find the sum of its first eight terms. [3]

Q29. The vertices of ΔABC are $A(6, -2)$, $B(0, -6)$ and $C(4, 8)$. Find the co-ordinates of mid-points of AB, BC and AC. [3]

OR

Find the ratio in which the point $p(m, 6)$ divides the line segment joining the points $A(-4, 3)$ and $B(2, 8)$. Also find the value of m.

Q30. In the given figure, OP is equal to the diameter of a circle with center O and PA and PB are tangents. Prove that ABP is an equilateral triangle. [3]
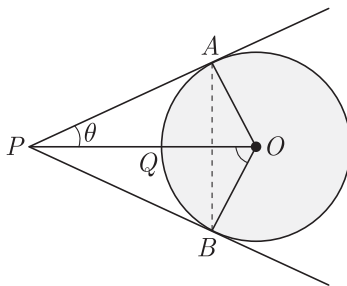
Q31. To conduct Sport Day activities, in your rectangular shaped school ground $ABCD$, lines have been draw with chalk power at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in figure. Niharika runs $\frac{1}{4}^{th}$ the distance AD in the 2nd line and posts a green flag. Preet runs $\frac{1}{5}^{th}$ the distance AD on the eights line and posts a red flag. [3]
(i) What is the distance between both the flags?
(ii) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?
(iii) Which mathematical concept is used in the above problem?
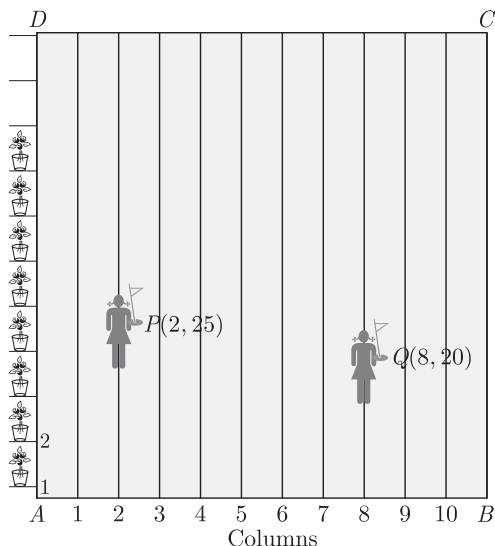
Q32. An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60º and 45º respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$) [3]

OR

Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30º and 60º. find the distance between the two men. (Use $\sqrt{3} = 1.73$)

Q33. In the fig., PSR, RTQ and PAQ are three semi-circles of diameters 10 cm, 3 cm and 7 cm region. Use $\pi = \frac{22}{7}$. [3]
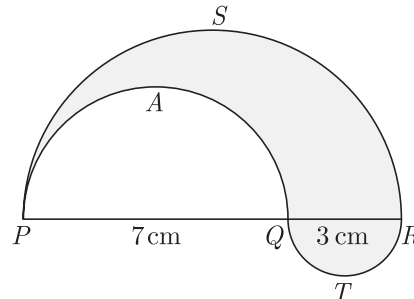
Q34. In class 10 A, there are 20 boys and 20 girls. In 10 B, there are 15 boys and 25 girls. One student is to be selected from each class. [3]
   (i) What is the probability of both being girls?
   (ii) What is the probability of both being boys?
   (iii) What is the probability of one boy and one girl?

SECTION D

Q35. Prove that $n^2 - n$ is divisible by 2 for every positive integer n. [4]

OR

If d is the HCF of 30 and 72, find the value of x and y satisfying $d = 30x + 72y$.

Q36. For Uttarakhand flood victims two sections A and B of class contributed Rs. 1,500. If the contribution of X-A was Rs. 100 less than that of X-B, find graphically the amounts contributed by both the sections. [4]

Q37. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank, find the time in which each pipe would fill the tank separately. [4]
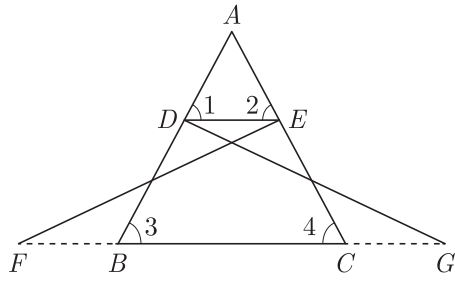
OR

The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.

Q38. In $\triangle ABC$, if $\angle ADE = \angle B$, then prove that $\triangle ADE \sim \triangle ABC$. Also, if $AD = 7.6$ cm, $AE = 7.2$ cm, $BE = 4.2$ cm and $BC = 8.4$ cm, then find DE. [4]
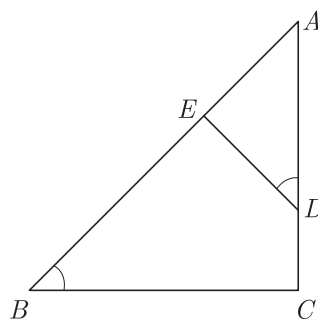
OR

In the following figure, $\triangle FEC \cong \triangle GBD$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \cong \triangle ABC$.

Q39. If $\cos\theta + \sin\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, prove that $q(p^2 - 1) = 2p$ [4]

Q40. Find the value of x and y, if the median for the following data is 31. [4]

Classes	0- 10	10- 20	20- 30	30- 40	40- 50	50- 60	Total
Frequency	5	x	6	y	6	5	40