Class- X Exam - 2022-23
Mathematics - Standard

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

General Instructions :

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

Section - A

Section A consists of 20 questions of 1 mark each.

1. If α and β are zeroes and the quadratic polynomial $f(x) = x^2 - x - 4$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is

(a) $\frac{15}{4}$ (b) $\frac{-15}{4}$

(c) 4 (d) 15

2. **Assertion :** If one zero of poly-nominal $p(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of other, then $k = 2$.
Reason : If $(x - \alpha)$ is a factor of $p(x)$, then $p(\alpha) = 0$ i.e. α is a zero of $p(x)$.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

3. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has

(a) a unique solution

(b) exactly two solutions

(c) infinitely many solutions

(d) no solution

4. The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present ages (in year) of the son and the father are, respectively.

(a) 4 and 24 (b) 5 and 30

(c) 6 and 36 (d) 3 and 24

5. If the sum of the zeroes of the quadratic polynomial $kx^2+2x+3k$ is equal to their product, then k equals

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

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

6. **Assertion :** The values of x are $-\frac{a}{2}, a$ for a quadratic equation $2x^2+ax-a^2=0$.
Reason : For quadratic equation $ax^2+bx+c=0$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

7. In an AP, if $a=3.5$, $d=0$ and $n=101$, then a_n will be

(a) 0 (b) 3.5

(c) 103.5 (d) 104.5

8. The famous mathematician associated with finding the sum of the first 100 natural numbers is

(a) Pythagoras (b) Newton

(c) Gauss (d) Euclid

9. It is given that, $\Delta ABC \sim \Delta EDF$ such that $AB=5\,\text{cm}$, $AC=7$ cm, $DF=15$ cm and $DE=12\,\text{cm}$ then the sum of the remaining sides of the triangles is

(a) 23.05 cm (b) 16.8 cm

(c) 6.25 cm (d) 24 cm

10. QP is a tangent to a circle with centre O at a point P on the circle. If ΔOPQ is isosceles, then $\angle OQR$ equals.

(a) 30° (b) 45°

(c) 60° (d) 90°

11. If $\sin\alpha=\frac{1}{2}$ and $\cos\beta=\frac{1}{2}$, then the value of $(\alpha+\beta)$ is

(a) 0° (b) 30°

(c) 60° (d) 90°

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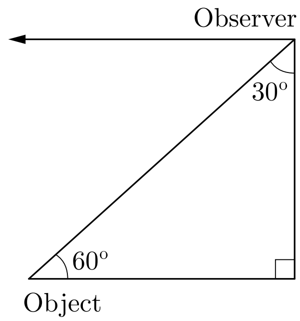
12. In the given figure, the positions of the observer and the object are mentioned, the angle of depression is



(a) 30° (b) 90°

(c) 60° (d) 45°

13. The area of the circle that can be inscribed in a square of side 6 cm is

(a) 36π cm^2 (b) 18π cm^2

(c) 12π cm^2 (d) 9π cm^2

14. Volume of a spherical shell is given by

(a) $4\pi(R^2 - r^2)$

(b) $\pi(R^3 - r^3)$

(c) $4\pi(R^3 - r^3)$

(d) $\frac{4}{3}\pi(R^3 - r^3)$

15. If the difference of mode and median of a data is 24, then the difference of median and mean is

(a) 12 (b) 24

(c) 08 (d) 36

16. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is

(a) 7 (b) 14

(c) 21 (d) 28

17. The distance between the points $(a\cos\theta + b\sin\theta,\ 0)$, and $(0,\ a\sin\theta - b\cos\theta)$ is

(a) $a^2 + b^2$ (b) $a^2 - b^2$

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

18. If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) and (2, y), then the value of y is

(a) 3 (b) -3

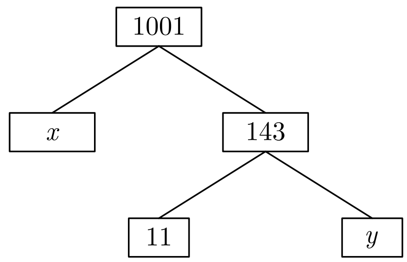
(c) 7 (d) 4

19. The point P on x-axis equidistant from the points $A(-1, 0)$ and $B(5, 0)$ is

(a) (2, 0) (b) (0, 2)

(c) (3, 0) (d) $(-3, 5)$

20. The values of x and y in the given figure are



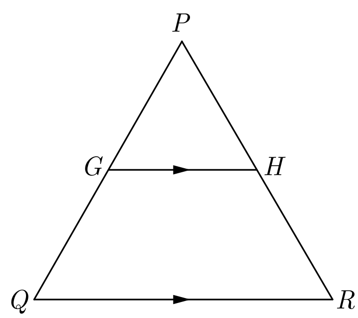
(a) 7, 13 (b) 13, 7

(c) 9, 12 (d) 12, 9

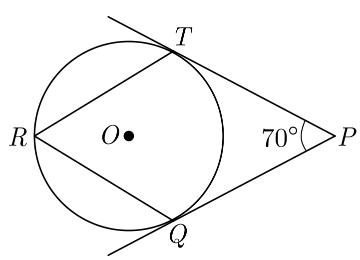
Section - B

Section B consists of 5 questions of 2 marks each.

21. In the given figure, G is the mid-point of the side PQ of ΔPQR and $GH || QR$. Prove that H is the mid-point of the side PR or the triangle PQR.



22. In figure, O is the centre of a circle. PT are tangents to the circle from an external point P. If $\angle TPQ = 70^\circ$, find $\angle TRQ$.



23. Evaluate : $\frac{\cos 45^{\circ}}{\sec 30^{\circ}} + \frac{1}{\sec 60^{\circ}}$

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24. Find the arithmetic mean of the following frequency distribution :

x_i	3	4	5	7	10
f_i	3	4	8	5	10

OR

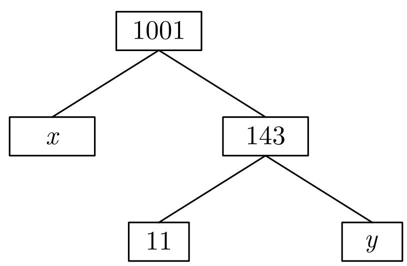
Given below is the distribution of weekly pocket money received by students of a class. Calculate the pocket money that is received by most of the students.

Pocket Money (in Rs.)	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Number of students.	2	2	3	12	18	5	2

25. a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5. Then calculate the least prime factor of $(a+b)$.

OR

What are the values of x and y in the given figure ?



Section - C

Section C consists of 6 questions of 3 marks each.

26. If in an AP, the sum of first m terms is n and the sum of its first n terms is m, then prove that the sum of its first $(m+n)$ terms is $-(m+n)$.

27. Prove that $\dfrac{\sin A-\cos A-1}{\sin A+\cos A-1}=\dfrac{1}{\sec A-\tan A}$

28. Find the area of minor segment of a circle of radius 14 cm, when its centre angle is 60°. Also find the area of corresponding major segment. Use $\pi=\frac{22}{7}$.

OR

In the given figure, $\Delta\, PQR$ is an equilateral triangle of side 8 cm and D, E, F are centres of circular arcs, each of radius 4 cm. Find the area of shaded region. (Use $\pi=3.14$) and $\sqrt{3}=1.732$

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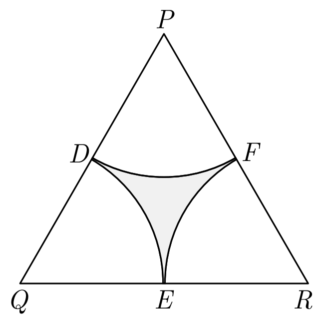


29. The table below shows the daily expenditure on food of 25 households in a locality. Find the mean daily expenditure on food.

Daily expenditure (in ₹)	100-150	150-200	200-250	250-300	300-350
Number of households	4	5	12	2	2

30. If the distance of $P(x, y)$ from $A(6, 2)$ and $B(-2, 6)$ are equal, prove that $y = 2x$.

OR

If (a, b) is the mid-point of the segment joining the points $A(10, -6)$ and $B(k, 4)$ and $a - 2b = 18$, find the value of k and the distance AB.

31. Find HCF and LCM of 16 and 36 by prime factorization and check your answer.

Section - D

Section D consists of 4 questions of 5 marks each.

32. 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.

OR

Draw the graph of the following equations:

$$2x - y = 1, \; x + 2y = 13$$

Find the solution of the equations from the graph and shade the triangular region formed by the lines and the y-axis.

33. Prove that the parallelogram circumscribing a circle is a rhombus.

34. From the top of a 7 m high building the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.

OR

A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5 m. From a point on the ground the angles of elevation of top and bottom of the flagstaff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower. (take $\sqrt{3} = 1.732$)

35. Water is flowing at the rate of 15 km/hr through a cylindrical pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time the level of water in pond rise by 21 cm ?

Section - E

Case study based questions are compulsory.

36. Nidhi and Ria are very close friends. Nidhi's parents own a Maruti Alto. Ria's parents own a Toyota Liva. Both the families decide to go for a picnic to Somnath temple in Gujrat by their own cars.

Nidhi's car travels x km/h while Ria's car travels 5 km/h more than Nidhi's car. Nidhi's car took 4 hrs more than Ria's car in covering 400 km.

(i) What will be the distance covered by Ria's car in two hour?

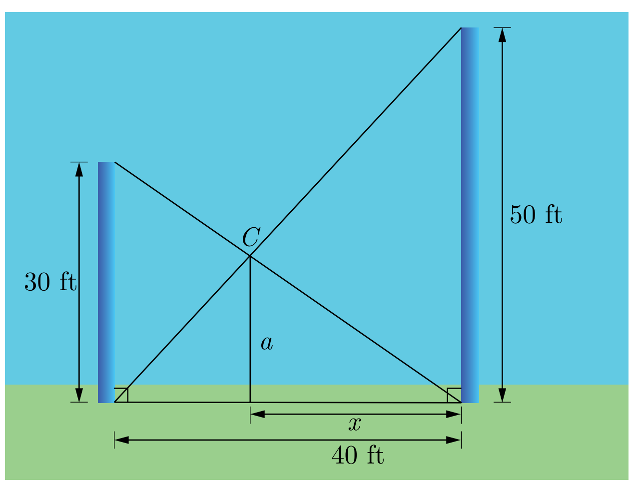
(ii) Write the quadratic equation that describe the speed of Nidhi's car?

(iii) What is the speed of Nidhi's car?

OR

How much time did Ria take to travel 400 km?

37. Two poles, 30 feet and 50 feet tall, are 40 feet apart and perpendicular to the ground. The poles are supported by wires attached from the top of each pole to the bottom of the other, as in the figure. A coupling is placed at C where the two wires cross.

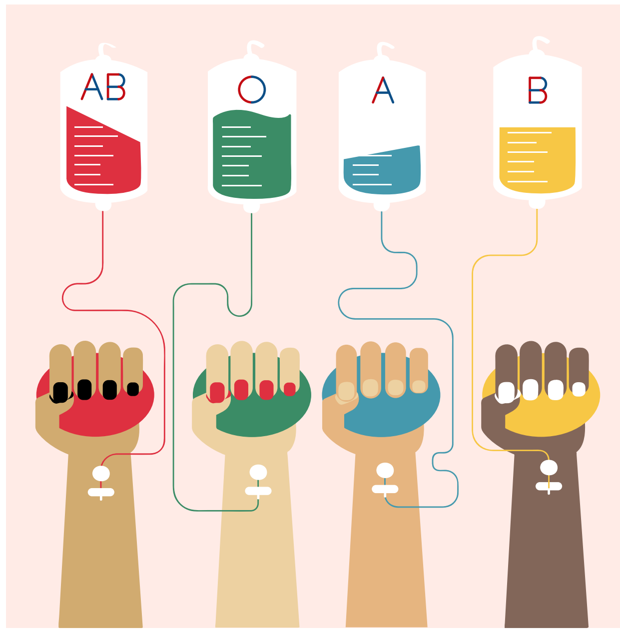


(i) What is the horizontal distance from C to the taller pole?

(ii) How high above the ground is the coupling ?

(iii) How far down the wire from the smaller pole is the coupling ?

38. Blood Group : Blood type or blood group is a medical term. It describes the type of blood a person has. It is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs). Blood types predict whether a serious reaction will occur in a blood transfusion.



In a sample of 50 people, 21 had type O blood, 22 had type A blood, 5 had type B blood, and 2 had type AB blood. Set up a frequency distribution and find the following probabilities.

(i) What is the probability that a person has type O blood ?

(ii) What is the probability that a person has type A or type B blood ?

(iii) What is the probability that a person has neither type A nor type O blood ?

OR

What is the probability that a person does not have type AB blood ?

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