

APEEJAY COMMON PREBOARD EXAMINATION
CLASS – X (SESSION-2022-23)
SUBJECT: MATHEMATICS

TIME: 3 Hours

Max. 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 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

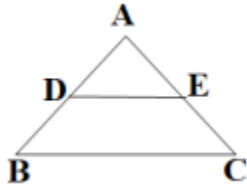
Section- A

(consists of 20 questions of 1 mark each)

- Q1 P and Q are two positive integers such that $P = p^3q$ and $Q = (pq)^2$, where p and q are prime numbers. Then LCM (P, Q) is
(a) pq (b) p^2q^2 (c) p^3q^2 (d) p^5q^3
- Q2 The roots of the equation $x^2 - 3x - m(m + 3) = 0$, where m is constant, are
(a) m, m+3 (b) -m, m+3 (c) m, -(m+3) (d) -m, -(m+3)
- Q3 If α and β are zeros of the polynomial $kx^2 + 2x + 3k$ and $\alpha + \beta = \alpha\beta$ then k is
(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{3}{4}$ (d) $-\frac{3}{4}$
- Q4 For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent coincident lines
(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2 (d) -2
- Q5 The vertices of a parallelogram in order are A (1,2), B (4, y), C (x, 6) and D (3,5). Then (x, y) is
(a) (6,3) (b) (3,6) (c) (5,4) (d) (1,4)
- Q6 ΔABC is such that AB = 3cm, BC = 2cm, CA = 2.5 cm. If $\Delta ABC \sim \Delta DEF$ and EF = 4cm, then perimeter of ΔDEF is
(a) 7.5cm (b) 15cm (c) 22.5cm (d) 30cm
- Q7 If $\sin^2\theta + \sin\theta = 1$, then the value of $\cos^2\theta + \cos^4\theta$ is
(a) -1 (b) 1 (c) 0 (d) 2
- Q8 In ΔABC right angled at B, if $\angle C : \angle A = 1 : 2$, What is tan C?

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

Q9 In the figure, if $DE \parallel BC$, $AD = 3$ cm, $BD = 4$ cm and $BC = 14$ cm, then DE equals



- (a) 7cm (b) 6cm (c) 4cm (d) 3 cm
- Q10 $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of the ΔABC and ΔPQR respectively and $AB^2 : PQ^2 = 4 : 9$, then $AM : PN =$
- (a) 16: 81 (b) 4: 9 (c) 3: 2 (d) 2: 3
- Q11 If two tangents inclined at an angle of 120° are drawn to a circle of radius 6 cm, then the length of each tangent is equal to
- (a) $\sqrt{3}$ cm (b) $6\sqrt{3}$ cm (c) $\sqrt{2}$ cm (d) $2\sqrt{3}$ cm
- Q12 If the circumference of the circle is equal to the perimeter of the square then the ratio of their areas is
- (a) 22:7 (b) 14: 11 (c) 7 : 22 (d) 7: 11
- Q13 The sum of the length, breadth and height of a cuboid is 19 cm and the length of its diagonal is $5\sqrt{5}$ cm. The surface area of the cuboid is
- (a) 361cm^2 (b) 125cm^2 (c) 236cm^2 (d) 256cm^2
- Q14 If x_i 's are the mid - points of the class intervals of grouped data , f_i 's are the corresponding frequencies and \bar{x} is the mean , then $\sum f_i (x_i - \bar{x})$ is equal to
- (a) 0 (b) -1 (c) 1 (d) 2
- Q15 For the following distribution:

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
Frequency	10	15	12	20	9

The difference of the upper limit of the modal class and lower limit of median class is

- (a) 5 (b) 10 (c) 15 (d) 20
- Q16 The area swept by 7 cm long minute hand of a clock in 10 minutes is
- (a) 77cm^2 (b) $12\frac{5}{6}\text{cm}^2$ (c) $7\frac{1}{12}\text{cm}^2$ (d) $25\frac{2}{3}\text{cm}^2$
- Q17 From the numbers 3, 5, 5, 7,7,7, 9,9,9,9 one number is selected at random. The probability that the selected number is mean of the data is given by
- (a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) $\frac{7}{10}$ (d) $\frac{9}{10}$

Q18 If $\tan x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$, then x equals:

- (a) 45° (b) 30° (c) 60° (d) 90°

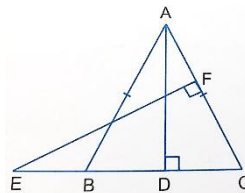
DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- Q19 Statement A (Assertion): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340
Statement R (Reason): HCF is always a factor of LCM
(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 and 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.
- Q20 Statement A (Assertion): If the co-ordinates of the mid-points of the sides AB and AC of ΔABC are D (3,5) and E (-3,-3) respectively, then $BC = 20$ units
Statement R (Reason) : The line joining the mid points of two sides of a triangle is parallel to the third side and equal to half of it.
(a) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion
(b) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
(c) assertion is true but the reason is false.
(d) both assertion and reason are false.

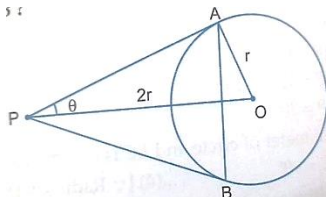
SECTION B
(consists of 5 questions of 2 marks each)

Q21 Solve: $152x - 378y = -74$, $-378x + 152y = -604$

Q22 In figure, E is a point on CB produced of an isosceles ΔABC , with side $AB = AC$. If $AD \perp BC$ and $EF \perp AC$, prove that $\Delta ABD \sim \Delta ECF$.



Q23 From a point P, two tangents PA and PB are drawn to a circle C(O, r). If $OP = 2r$, then find $\angle APB$. What type of triangle is APB?



Q24 The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?

OR

In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find

- (i) The length of the arc.
(ii) The area of the sector formed by the arc (Use $\pi = \frac{22}{7}$)

Q25 If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$, $0^\circ < A+B \leq 90^\circ$, $A > B$. Find A and B .

OR

If $5 \tan \theta = 4$, find the value of $\frac{5 \sin \theta - 3 \cos \theta}{5 \sin \theta + 2 \cos \theta}$.

SECTION C
(consists of 6 questions of 3 marks each)

Q26 Prove that $2 + \sqrt{5}$ is an irrational.

Q27 Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.

Q28 In a competitive examination, 1 mark is awarded for each correct answer while $\frac{1}{2}$ mark is deducted for each wrong answer. Jayanti answered 120 questions and got 90 marks. How many questions did she answer correctly?

OR

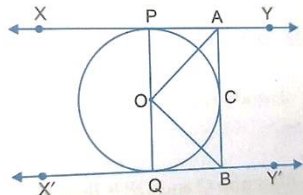
A bus covered a certain distance at a uniform speed. If the bus would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And, if the bus were slower by 6 km/hr ; It would have taken 6 hours more than the scheduled time. Find the length of the journey.

Q29 Prove that: $(1 + \tan A + \sec A)(1 + \cot A - \operatorname{cosec} A) = 2$

Q30 Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

OR

In figure, 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 $\angle AOB = 90^\circ$



Q31 Two different dice are thrown together. Find the probability that the numbers obtained

- (i) have a sum less than 7 (ii) have a product less than 16 (iii) is a doublet of odd numbers

SECTION D
(consists of 4 questions of 5 marks each)

Q32 A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hr less for the same journey. Find the speed of the train.

OR

A and B working together can do a work in 6 days. If A takes 5 days less than B to finish the work, in how many days can B alone do the work?

Q33 In trapezium ABCD, $AB \parallel DC$, $DC = 2 AB$. EF drawn parallel to AB cuts AD in F and BC in E such that $\frac{BE}{EC} = \frac{3}{4}$. Diagonal DB intersects EF at G.

Prove that $7 FE = 10 AB$

Q34 A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find mass of the pole, given that 1cm^3 of iron has approximately 8g mass. (use $\pi = 3.14$)

OR

From a solid cylinder whose height is 8 cm and radius 6 cm, a conical cavity of same height and same base radius is hollowed out. Find the total surface area and volume of the remaining solid. (use $\pi = 3.14$)

Q35 Pocket expenses of the students of a class in a college are shown in the following frequency distribution:

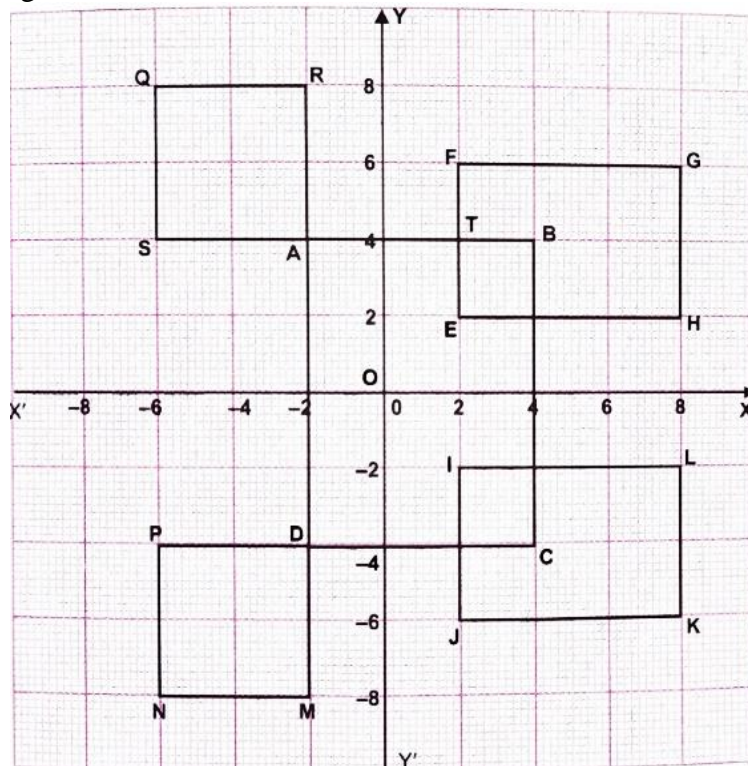
Pocket expenses	0-200	200-400	400-600	600-800	800-1000	1000-1200	1200-1400
Number of students	33	74	170	88	76	44	25

Find the mean and median for the above data.

SECTION E

(Case study-based questions are compulsory)

Q36 Shivani is an interior decorator. To design her own living room, she designed wall shelves. The graph of intersecting wall shelves is given below:



- (i) Find the coordinates of the mid-point of the line -segment joining D and H. (1)
- (ii) Find the ratio in which the x-axis divides the line segment joining the points A and C? (1)
- (iii) Check if points B and Q are equidistant from D. (2)

OR

- (iv) What is the area of trapezium APCB.

Q37 In our daily life, we often come across many things which follow a definite pattern or sequence. Arrangement of leaves on the stem of a tree or the arrangement of grains on a cob of maize are few examples of pattern in nature. A peacock's feather is in the sequence such that the number of leaves in a feather are 3 more than the preceding feather. First feather contains 2 leaves. Keeping the above situation in mind, answer the following questions:



- (i) Find the number of leaves in 5th feather. (1)
- (ii) Find the total number of leaves in n feathers. (1)
- (iii) Find the total number of leaves if there are 8 feathers.

OR

How many feathers are there if number of leaves are 155 in all? (2)

Q38 Read the following and answer the questions.

ATC finds that the angle of elevation of an aeroplane from a point on the ground is 60° and after a flight of 30 seconds he finds that the angle of elevation becomes 30° . The aeroplane is flying at a constant height of $3000\sqrt{3}$ m above the horizontal line ABC. Points P and Q show the positions of two planes from the point of observation A and their angles of elevation from A are 60° and 30° respectively.

- (i) Draw a neat labelled figure to show the above situation. (1)
- (ii) Find the distance travelled by the plane in 30 seconds. (1)
- (iii) Find the speed of the plane in km/hr. (2)

OR

Find the speed of the plane if angle of elevation changes from 60° to 30° in 15 seconds instead of 30 seconds.