

Class - X Session- 2022-23  
 Subject- Mathematics (Standard)  
 CBSE Model Sample Question Paper – 01  
 Math Magic - CBSE

Time Allowed: 3 Hrs.

Maximum Marks : 80

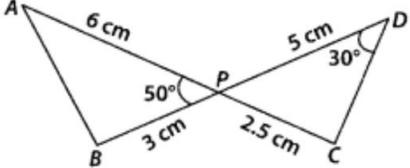
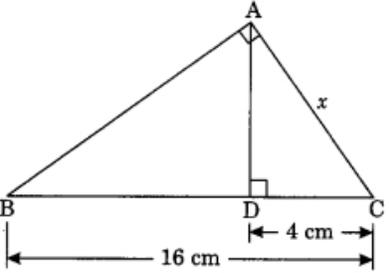
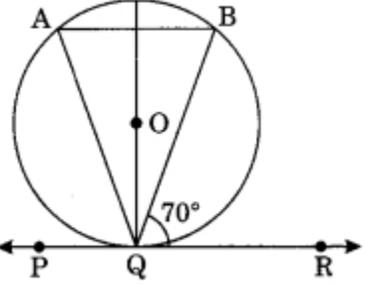
*General Instructions:*

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 subparts 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  $\pi = 22/7$  wherever required if not stated

**Section - A**

*“Section A consists of 20 questions of 1 mark each”*

Q1.	The largest number which divides 70 and 125, leaving remainders 5 and 8, respectively, is (A) 13                                      (B) 65 (C) 875                                      (D) 1750	1
Q2.	If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1, then the product of the other two zeroes is (A) $b - a + 1$ (B) $b - a - 1$ (C) $a - b + 1$ (D) $a - b - 1$	1
Q3.	If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then (A) $a = -7, b = -1$ (B) $a = 5, b = -1$ (C) $a = 2, b = -6$ (D) $a = 0, b = -6$	1
Q4.	The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in city comprises of fixed charges together with the charge for the distance covered. For a journey of 12 km, the charge paid is 789 and for journey of 20 km, the charge paid is ₹145. What will a person have to pay for travelling a distance of 30 km? (A) Rs. 415                                  (B) Rs. 215 (C) Rs. 345                                  (D) Rs. 325	1
Q5.	The area of triangle ABC (in sq. units) is : <div style="text-align: center;"> </div> (A) 15 sq units                              (B) 5 sq units (C) 7.5 sq units                              (D) 12.5 sq units	1

Q6.	<p>In the figure, two-line segments AC and BD intersect each other at the point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm, <math>\angle APB = 50^\circ</math> and <math>\angle CDP = 30^\circ</math>. Then, <math>\angle PBA</math> is equal to</p>  <p>(A) <math>50^\circ</math>                      (B) <math>30^\circ</math> (C) <math>60^\circ</math>                      (D) <math>100^\circ</math></p>	1
Q7.	<p>The value of <math>\cos 0^\circ \cdot \cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 89^\circ \cos 90^\circ</math> is</p> <p>(A) 1                              (B) -1 (C) 0                              (D) <math>1/\sqrt{2}</math></p>	1
Q8.	<p>If <math>x \tan 45^\circ \sin 30^\circ = \cos 30^\circ \tan 30^\circ</math>, then x is equal to</p> <p>(A) <math>\sqrt{3}</math>                          (B) <math>1/2</math> (C) <math>1/\sqrt{2}</math>                      (D) 1</p>	1
Q9.	<p>In <math>\triangle ABC</math>, <math>AB = 6\sqrt{3}</math> cm, <math>AC = 12</math> cm and <math>BC = 6</math> cm. The angle B is</p> <p>(a) <math>120^\circ</math>                      (b) <math>60^\circ</math> (c) <math>90^\circ</math>                      (d) <math>45^\circ</math></p>	1
Q10.	<p>In the given figure the value of x is</p>  <p>(a) 4 cm                          (b) 5 cm (c) 8 cm                          (d) 3 cm</p>	1
Q11.	<p>If <math>\sec\theta + \tan\theta = x</math>, then <math>\tan\theta</math> is:</p> <p>(A) <math>(x^2-1) / 2x</math>              (B) <math>(x^2+1) / 2x</math> (C) <math>(x^2-1) / x</math>                (D) <math>(x^2+1) / x</math></p>	1
Q12.	<p>In Fig., if PQR is the tangent to a circle at Q whose centre is O, AB is a chord parallel to PR and <math>\angle BQR = 70^\circ</math>, then <math>\angle AQB</math> is equal to</p>  <p>(a) <math>20^\circ</math>                          (b) <math>40^\circ</math> (c) <math>35^\circ</math>                          (d) <math>45^\circ</math></p>	1
Q13.	<p>If the radius of the base of a right circular cylinder is halved, keeping the height the same, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is:</p> <p>CBSE 2012, Delhi (30/1/1)</p> <p>(A) 1 : 2                          (B) 2 : 1 (C) 1 : 4                          (D) 4 : 1</p>	1

Q14. The mean of the following data is 18.75. Find the value of P

Class marks ( $x_i$ )	Frequency ( $f_i$ )
10	5
5	10
P	7
25	8
30	2

- (A) 34.3 (B) 36.6  
(C) 39.8 (D) 32.9

Q15. The area of the largest square that can be inscribed in a circle of radius 12 cm is  
(a) 24 cm<sup>2</sup> (b) 249 cm<sup>2</sup>  
(c) 288 cm<sup>2</sup> (d)  $196\sqrt{2}$  cm<sup>2</sup>

Q16. Find the median of the data, when it is given that mode = 35.3 and mean = 30.5.  
(A) 32.3 (B) 32.6  
(C) 32.1 (D) 32.9

Q17. A school has five houses A, B, C, D and E. A class has 23 students, 4 from house A, 8 from house B, 5 from house C, 2 from house D and rest from house E. A single student is selected at random to be the class monitor. The probability that the selected student is not from A, B and C is  
(a)  $\frac{4}{23}$  (b)  $\frac{6}{23}$  (c)  $\frac{8}{23}$  (d)  $\frac{17}{23}$

Q18. Given that  $\sin\theta = \frac{a}{b}$ , then  $\cos\theta$  is equal to

- (A)  $\frac{b}{\sqrt{b^2-a^2}}$  (B)  $\frac{b}{a}$   
(C)  $\frac{\sqrt{b^2-a^2}}{b}$  (D)  $\frac{a}{\sqrt{b^2-a^2}}$

**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):** The trigonometric functions sin and cos have ranges from -1 to 1

**Statement R( Reason) :** The trigonometric identity  $\sin^2\theta + \cos^2\theta = 1$  is valid for all angles, including angles greater than 90.

- (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.

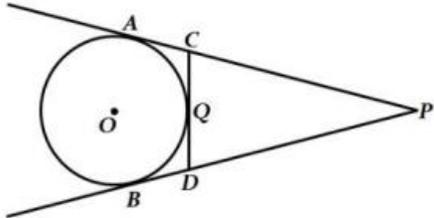
Q20. **Statement A (Assertion):** Mid-point of a line segment divides line in the ratio 1 : 1.

**Statement R( Reason) :** The ratio in which the point (-3, k) divides the line segment joining the points (-5, 4) and (-2, 3) is 1 : 2.

- (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.

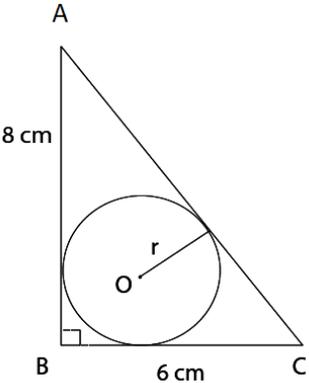
## Section – B

*“Section A consists of 5 questions of 2 mark each”*

21	Find the value(s) of $k$ for which the pair of linear equations $kx + 3y = k - 2$ and $12x + ky = k$ has no solution.	2
22	$E$ is a point on the side $AD$ produced of a parallelogram $ABCD$ and $BE$ intersects $CD$ at $F$ . Show that $\triangle ABE \sim \triangle CFB$ . CBSE 2008 (30/2/1), (30/2/2), (30/2/3)	2
23	In the given figure, $PA$ and $PB$ are tangents to the circle from an external point $P$ . $CD$ is another tangent touching the circle at $Q$ . If $PA = 12$ cm, $QC = QD = 3$ cm, then find $PC + PD$ .	2
		
24	Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm $\times$ 7 cm. Find the area of the remaining card board.	2
25	Prove that $\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - \sin 2\theta$	2

## Section – C

*“Section C consists of 6 questions of 3 mark each”*

26	Prove that $\sqrt{3}$ is irrational, hence prove $3 + 2\sqrt{3}$ is an irrational number.	3
27	If two zeroes of polynomial $x^4 + 3x^3 - 20x^2 - 6x + 36$ are $\sqrt{2}$ and $-\sqrt{2}$ , find the other zeroes of the polynomial.	3
28	From a pair of linear equations in two variables using the following information and solve it graphically: Five years ago, Sagar was twice as old as Tiru. Ten year later Sagar's age will be ten years more than Tiru's age. Find their present ages. What was the age of Sagar when Tiru was born?	3
29	Prove that $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{1 - 2 \cos^2 A}$	3
30	In figure, a right triangle $ABC$ , circumscribes a circle of radius $r$ . If $AB$ and $BC$ are of lengths 8 cm and 6 cm respectively, find the value of $r$ .	3
		
31	A number $x$ is selected at random from the numbers 1, 4, 9, 16 and another number $y$ is selected at random from the numbers 1, 2, 3, 4. Find the probability that the value of $xy$ is more than 16	3

## Section – D

*“Section D consists of 4 questions of 5 mark each”*

- 32 i. Solve the following pair of linear equations:  
 $y - 4x = 1$   
 $6x - 5y = 9$   
ii. In a two-digit number, the digit in the unit place is twice of the digit in the tenth place. If the digits are reversed, the new number is 27 more than the given number. Find the number.

- 33 Prove  
If a line is drawn parallel to one side of a triangle and intersects the other two sides, then the other two sides are divided in the same ratio  
  
OR  
Prove Pythagoras Theorem

- 34 A container (open at the top) made up of metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find  
I. the cost of milk when it is completely filled with milk at the rate of Rs. 15 per litre.  
II. the cost of metal sheet used, if it costs Rs. 5 per 100 cm<sup>2</sup>

- 35 Find the mean, median and mode of the following data:
- | Class Interval | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 | 120-140 |
|----------------|------|-------|-------|-------|--------|---------|---------|
| Frequency      | 6    | 8     | 10    | 12    | 6      | 5       | 3       |
- State and Verify the Empirical Relation

## Section – E

*“Case based questions are compulsory” Attempt any 4 parts in each question*

- 36 World No Tobacco day is observed every year on the 31<sup>st</sup> May. Smoking is injurious to health, Smoking causes Cancer. To raise social awareness about hazards of smoking, a school decided to start 'No smoking' campaign. 10 students are asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangle are P(-3,4), Q(3, 4) and R(-2, -1).



(i) The coordinates of centroid of  $\Delta PQR$  are

(a)  $\left(\frac{2}{3}, \frac{7}{3}\right)$  (b)  $\left(\frac{1}{3}, \frac{1}{3}\right)$  (c)  $\left(\frac{-2}{3}, \frac{7}{3}\right)$  (d)  $\left(\frac{7}{3}, \frac{2}{3}\right)$

(ii) If S be the mid-point of line joining P and Q, then coordinates of S are

(a) (4,0) (b) (2,0) (c) (0,2) (d) (0,4)

(iii) If T be the mid-point of line joining R and Q, then coordinates of T are

(a)  $\left(\frac{1}{2}, \frac{1}{2}\right)$  (b)  $\left(\frac{3}{2}, \frac{1}{2}\right)$  (c)  $\left(\frac{1}{2}, \frac{3}{2}\right)$  (d) none of these

(iv) If U be the mid-point of line joining R and P, then coordinates of U are

(a)  $\left(-\frac{5}{2}, \frac{3}{2}\right)$  (b)  $\left(\frac{3}{2}, -\frac{5}{2}\right)$  (c)  $\left(\frac{3}{2}, \frac{5}{2}\right)$  (d)  $\left(\frac{5}{2}, \frac{3}{2}\right)$

(v) The coordinates of centroid of  $\Delta STU$  are

(a)  $\left(\frac{2}{3}, \frac{7}{3}\right)$  (b)  $\left(\frac{1}{3}, \frac{1}{3}\right)$  (c)  $\left(-\frac{2}{3}, \frac{7}{3}\right)$  (d)  $\left(\frac{7}{3}, \frac{2}{3}\right)$

37 Joy is much worried about his upcoming assessment on A.P. He was vigorously practicing for the exam but unable to solve some questions. One of these questions is as shown below. If the 3rd and the 9th terms of an A.P. are 4 and - 8 respectively, then help Joy in solving the problem.

4

(i) What is the common difference?

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

(ii) What is the first term?

(a) 6 (b) 2 (c) -2 (d) 8

(iii) Which term of the A.P. is -160?

(a) 80<sup>th</sup> (b) 85<sup>th</sup> (c) 81<sup>th</sup> (d) 84<sup>th</sup>

(iv) Which of the following is not a term of the given A.P.?

(a) -123 (b) -100 (c) 0 (d) -200

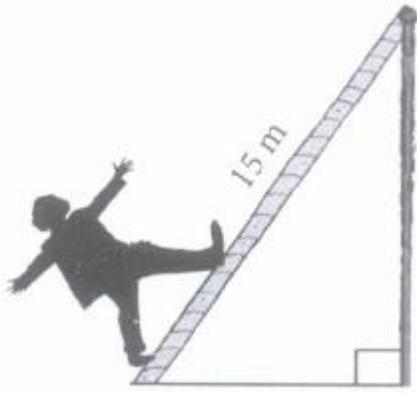
(v) What is the 75<sup>th</sup> term of the A.P.?

(a) -140 (b) -102 (c) -150 (d) -158



38 A circus artist is climbing through a 15 m long rope which is highly stretched and tied from the top of a vertical pole to the ground as shown below. Based on the above information, answer the following questions.

4



(i) Find the height of the pole, if angle made by rope to the ground level is  $45^\circ$ .

(a) 15 m                      (b)  $15\sqrt{2}$  m

(c)  $\frac{15}{\sqrt{3}}$  m                      (d)  $\frac{15}{\sqrt{2}}$  m

(ii) If the angle made by the rope to the ground level is  $45^\circ$ , then find the distance between artist and pole at ground level.

(a)  $\frac{15}{\sqrt{2}}$  m      (b)  $15\sqrt{2}$  m      (c) 15 m      (d)  $15\sqrt{3}$  m

(iii) Find the height of the pole if the angle made by the rope to the ground level is  $30^\circ$ .

(a) 2.5 m      (b) 5 m      (c) 7.5 m      (d) 10 m

(iv) If the angle made by the rope to the ground level is  $30^\circ$  and 3 m rope is broken, then find the height of the pole

(a) 2m      (b) 4m      (c) 5m      (d) 6m

(v) Which mathematical concept is used here?

(a) Similar Triangles                      (b) Pythagoras Theorem

(c) Application of Trigonometry      (d) None of these

----- END OF QUESTION PAPER -----

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*All the Best!*