RASHTRIYA MILITARY SCHOOL, BANGALORE

PRACTICE PAPER 1

EXAMINATION 2023-24

CLASS: X **Max Marks:80**

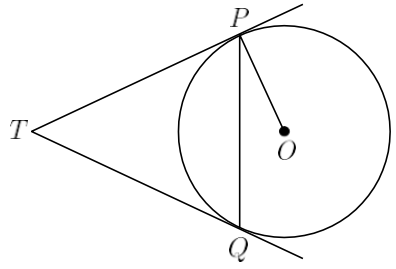
SUB: Mathematics **Time: 3 Hrs**

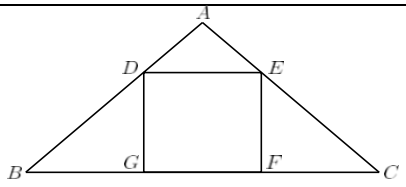
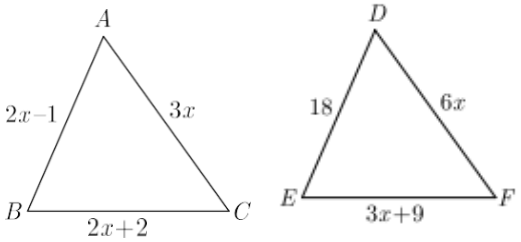
General Instructions:

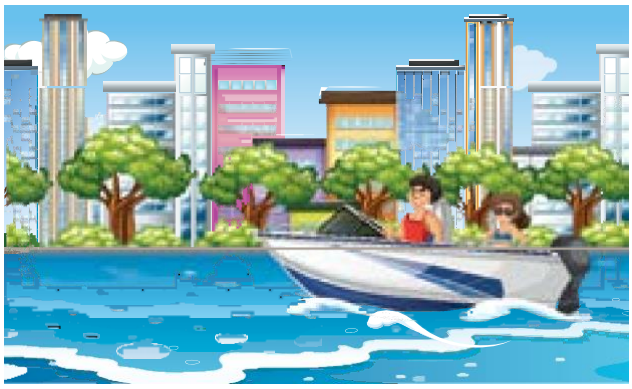
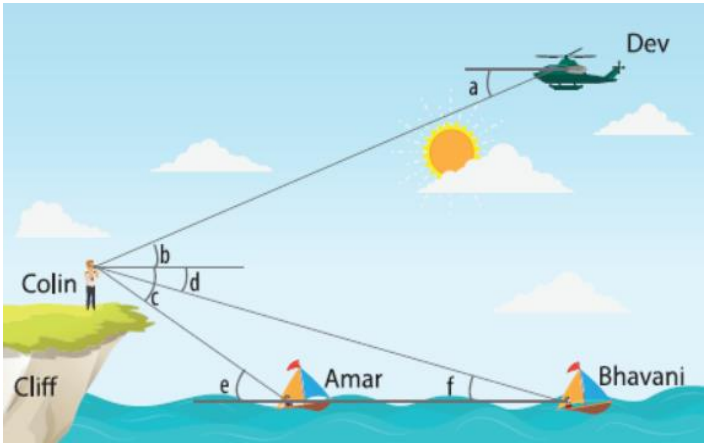
- This Question Paper has 5 Sections A, B, C, D and E.
- Section A has 20 MCQs carrying 1 mark each
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 questions carrying 05 marks each.
- Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E.
- Draw neat figures wherever required.

	MULTIPLE CHOICE QUESTIONS (20x1=20)	
1	There are 30 cards of the same size in a bag in which the numbers 1 to 30 are written. One card is taken out of the bag at random. What is the probability that the number on the selected card is not divisible by 3? a) $\frac{1}{15}$ b) $\frac{2}{3}$ c) $\frac{1}{10}$ d) $\frac{1}{3}$	1
2	If the mid-point of the line segment joining the points $A(3, 4)$ and $B(k, 6)$ is $P(x, y)$ and $x + y - 10 = 0$, the value of k will be (a) 4 (b) 5 (c) 6 (d) 7	1
3	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	1
4	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 $(a + b)$ is a) 2 b) 3 c) 5 d) None of the above	1
5	A tree is broken by the wind. The top struck the ground at an angle of 30° and at distance of 10 m from its root. The whole height of the tree is ($\sqrt{3}$ = 1.732) a) $10\sqrt{3}$ b) $3\sqrt{10}$ c) $20\sqrt{3}$ d) $3\sqrt{20}$	1
6	The zeroes of the polynomial $p(x) = 4x^2 - 12x + 9$ will be a) $\frac{3}{2}$ and $\frac{3}{2}$ b) $\frac{2}{3}$ and $\frac{1}{3}$ c) $\frac{3}{2}$ and $\frac{1}{3}$ d) $\frac{1}{3}$ and $\frac{1}{3}$	1

7	If the equations $kx - 2y = 3$ and $3x + y = 5$ represent two intersecting lines at unique point, then the value of k is (a) $k = -6$ (b) $k \neq 6$ (c) $k = 4$ (d) $k \neq 4$	1
8	What do you say about the lines represented by $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ (a)lines are parallel (b) lines are coincident (c) lines are intersecting (d) can't say anything	
9	What are the values of x and y for the following system of equations $\frac{21}{x} + \frac{47}{y} = 110$ and $\frac{47}{x} + \frac{21}{y} = 162, x, y \neq 0$ (a) $\frac{1}{3}$ and $\frac{1}{2}$ (b) $\frac{1}{3}$ and 1 (c) $\frac{1}{2}$ and $\frac{1}{3}$ (d) $\frac{1}{2}$ and 1	1
10	If $\Delta ABC \sim \Delta PQR$, and $\frac{AB}{PQ} = \frac{1}{3}$, then $\frac{ar(\Delta ABC)}{ar(\Delta PQR)}$ (a)1/3 (b) 1/9 (c) 8/9 (d)5/9	1
11	The quadratic equation $x^2 - 4x - 3\sqrt{2} = 0$ has (a)two distinct real roots (b) two equal real roots (c) no real roots (d) more than 2 real roots	1
12	Two concentric circles are of radii 10 cm and 8 cm, then the length of the chord of the larger circle which touchesthe smaller circle is (a)6 cm (b) 12 cm (c) 18 cm (d) 9 cm	1
13	Consider the following frequency distribution The upper limit of the median class is Class | 0-5 | 6-11 | 12-17 | 18-23 | 24-29 Frequency | 13 | 10 | 15 | 8 | 11 (a) 17 (b) 17.5 (c) 18 (d) 18.5	1
14	If $\sec\theta . \sin\theta = 0$, then value of θ will be (a) 0 (b) 90° (c)45° (d)∞	1
15	$\tan^4\theta + \tan^2\theta = ?$ (a)$\sec^2\theta - 2\sec^4\theta$ (b) $2\sec^2\theta - \sec^4\theta$ (c) $\sec^2\theta - \sec^4\theta$ (d) $\sec^4\theta - 2\sec^2\theta$	1
16	Ratio of volumes of two cylinders with equal height is (a)$H : h$ (b) $R : r$ (c) $R^2 : r^2$ (d) None of these	1
17	Which of the following are the zeroes of the polynomial $P(x) = 2x^3 - 11x^2 + 17x - 6$. (a)2 (b)3 (c)1/2 (d)Above all	1
18	If a and b are the zeroes of the polynomial $x^2 + 2x + 1$, then what is the value of 1/a + 1/b ? (a)1 (b) -1 (c)-2 (d)2	1
19	**Assertion (A) :** Common difference of the AP $-5, -1, 3, 7, \ldots$is 4 **Reason (R) :** Common difference of the AP $a, a + d, a + 2d \ldots$is given by $d = a_2 - a_1$ (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1

	(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.	
20	**Assertion(A) :** If the circumference of a circle is 176 cm, then its radius is 28 cm. **Reason(R) :** Circumference $= 2\pi \times$radius (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.	1
	SECTION B (2*5=10)	
21	Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?	2
22	Find the sum of first ten multiple of 5. OR If the sum of n terms of an AP is $2n^2 + 5n$, then find the 4^{th} term.	2
23	If the points $A(4, 3)$ and $B(x, 5)$ are on the circle with centre $O(2, 3)$, then what is the value of x ?	2
24	From an external point Q, the length of tangent to a circle is 12 cm and the distance of Q from the centre of circle is 13 cm. What is the radius of circle? OR QP is a tangent to a circle with center O at a point P on the circle. If ΔOPQ is isosceles, then find $\angle OQR$?	2
25	A bag contains 3 red, 4 green and 5 white candles, one candle is drawn at random from the bag, find the probability that candle is not red.	2
	SECTION C (3*6=18)	
26	If *p and q* are co-prime number, then prove that $\sqrt{p} + \sqrt{q}$ is an irrational.	3
27	In ΔABC, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}$,AY=5 and YC=9, the state whether XY and BC parallel or not.	3
28	In figure, two tangents TP and TQ are drawn to circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. 	3

29	A road which is 7 m wide surrounds a circular park whose circumference is 88 m. Find the area of the road. **OR** Three horses are tied each with 7 m long rope at three corners of a triangular field having sides 20 m, 34 m and 42 m. Find the area of the plot which can be grazed by the horses.	3
30	An integer is chosen between 70 and 100. Find the probability that it is (i)a prime number (ii) divisible by 7 **OR** Find the probability that 5 Sundays occur in the month of November of a randomly selected year.	3
31	Prove that $\sqrt{\frac{1-COSA}{1+COSA}} = CosecA - CotA$.	3
	SECTION D (5*4=20)	
32	Determine graphically the coordinates of the vertices of triangle, the equations of whose sides are given by $2y - x = 8$, $5y - x = 14$ and $y - 2x = 1$. **OR** Aftab tells his daughter, '7 years ago, I was seven times as old as you were then. Also, 3 years from now, I shall be three times as old as you will be.' Represent this situation algebraically and graphically.	5
33	Show that the points (a, a), $(-a, -a)$ and $(-\sqrt{3}a, \sqrt{3}a)$ are the vertices of an equilateral triangle.	5
34	A toy is in the form of a cylinder of diameter $2\sqrt{2}$ m and height 3.5 m surmounted by a cone whose vertical angle is 90°. Find total surface area of the toy.	5
35	In the given figure, *DEFG* is a square and $\angle BAC = 90°$. Show that $FG^2 = BG \times FC$.  *OR* In Figure, if ΔABC~ΔDEF and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle.  	5
	SECTION E (4*3=12)	

36	***CASE SUTDY 1:*** John and Priya went for a small picnic. After having their lunch Priya insisted to travel in a motor boat. The speed of the motor boat was 20 km/hr. Priya being a Mathematics student wanted to know the speed of the current. So she noted the time for upstream and downstream. She found that for covering the distance of 15 km the boat took 1  hour more for upstream than downstream. 1)Let speed of the current be x km/hr. What will be the speed of the motorboat in upstream ? 2)What is the relation between speed distance and time? 3)Write the correct quadratic equation for the speed of the current ?What is the speed of current ? **OR** 4) How much time boat took in downstream ?	1+1 +2
37	***CASE SUTDY 2 :*** Navy officer Mr. Colin is tasked with planning a coup on the enemy at a certain date. Currently he is inspecting the area standing on top of the cliff. Agent Dev is on a chopper in the sky. When Mr. Colin looks down below the cliff towards the sea, he has Bhawani and Amar in boats positioned to get a good vantage point. Bhawani boat is behind the Amar boat. Following angle have been measured : From Colin to Bhawani : 30° From Dev to Colin : 60° From Amar to Colin : 60°  (i) Which of the following is a pair of angle of depression? (ii) If angle of elevation of Amar to Colin is 60° , what is the distance of Amar boat from the base of hill? (iii) If angle of depression of Colin to Bhawani is 30°, what is the distance of Amar boat from the Bhawani boat?	1+1 +2

<table>
<tr><td></td><td>OR

(iv) If angle of depression of Dev to Colin is 60° , what is the height of Dev from base of hill ?</td><td></td></tr>
<tr><td>38</td><td>CASE STUDY 3 :
Electric scooters are plug-in electric vehicles with two or three wheels. The electricity is stored on board in a rechargeable battery, which drives one or more electric motors. Leading manufacturer of electric scooter, Hero Scooter Pvt Ltd wants to declare the mileage of their electric scooters. For this, they recorded the mileage (km/ charge) of 50 scooters of the same model. Details of which are given in the following table.

<table>
<tr><td>Mileage (km/charge)</td><td>100-120</td><td>120-140</td><td>140-160</td><td>160-180</td></tr>
<tr><td>Number of scooters</td><td>7</td><td>12</td><td>18</td><td>13</td></tr>
</table>
Based on the above information, answer the following questions.
i)What is the average mileage.
(ii)What is the modal value of mileage ?
(iii)What is the median value of mileage ?
OR
(iv)What about the mileage can be claimed by the manufacturer for his scooter ?</td><td>1+1 +2= 4</td></tr>
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