

BLUE BELLS MODEL SCHOOL
SESSION 2025-26
MID TERM EXAMINATION
CLASS X
MATHEMATICS (041)
Set 2

TIME: 3 hours

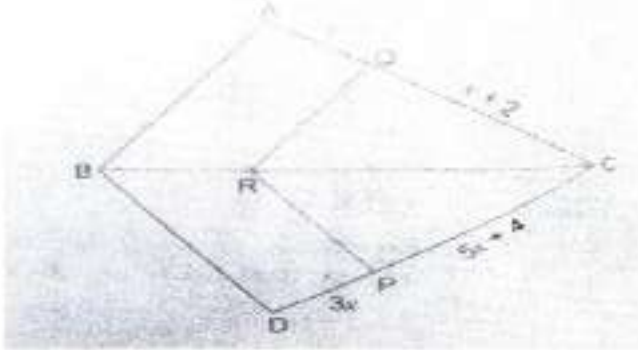
MM: 80

General Instructions:

- All Questions are compulsory.
- This Question Paper has 5 Sections A-E.
- Section A has 20 MCQs carrying 1 mark each.
- Section B has 5 questions carrying 2 marks each.
- Section C has 6 questions carrying 3 marks each.
- Section D has 4 questions carrying 5 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.

SECTION A
Section A consists of 20 questions of 1 mark each.

S.N O		MAR KS
1	If the one root of polynomial $(k-1)x^2 + kx + 1$ is -3 then value of k is a. $\frac{4}{3}$ b. $-\frac{4}{3}$ c. $\frac{2}{3}$ d. $-\frac{2}{3}$	1
2	Gunjan has only Rs.1 and Rs.2 coins only with her. If the total number of coin that she has is 50 and the amount of money that she has with her is Rs.70, then number of Rs.1 and Rs.2 coins are a. 25 & 25 b. 15 & 35 c. 35 & 15 d. 35 & 20	1
3	If -3 and 2 are roots of equation $x^2 - (p+2)x - q = 0$, then value of p and q are a. 3, -6 b. -3, 6 c. -3, -6 d. 3, 6	1
4	If a kite is flying at height of $40\sqrt{3}$ m from the ground level, attached to a string inclined at 60° to the horizontal, then the length of string is a. 80m b. $60\sqrt{3}$ m c. $80\sqrt{3}$ m d. 120m	
5	The vertices of parallelogram are taken in order $(3,4)(-2,3)(-3,-2)$ then the coordinate of fourth vertex is a. $(-2,-1)$ b. $(-2,-3)$ c. $(2,-1)$ d. $(1,2)$	1
6	If $\sin A + \cos A = \sqrt{2}$ then the value of $\tan A$ is a. $\sqrt{2} - 1$ b. $\sqrt{2} + 1$ c. $\sqrt{2}$ d. $-\sqrt{2}$	1
7	In triangle ABC if AD=2cm, BD=AE=3cm and EC=X cm, then X is a. 2 b. 3 c. 5 d. 4.5	1
8	If $(-1)^n + (-1)^n = 0$ then n is a a. any positive integer b. any negative integer c. any odd number d. any even number	1
9	The value of k for which the equations $kx + 3y = k - 3$ and $12x + ky = k$ has infinite solution	1

	a. -6 only b. 6 only c. ± 6 d. Any real number except ± 6	
10.	If a and b are odd prime numbers such that $a > b$, then which of the following is correct a. $a^2 - b^2$ is an odd number b. $a^2 - b^2$ is a prime number c. $a^2 - b^2$ is an odd prime number d. $a^2 - b^2$ is an even number	1
11.	Sum of 16 terms of an AP 10, 6, 2 is. a. -320 b. 320 c. -352 d. -400	1
12.	$\sin \alpha = \frac{\sqrt{3}}{2}$ and $\cos \beta = \frac{\sqrt{3}}{2}$ then the value of $(\alpha + \beta)$ is a. 0° b. 30° c. 60° d. 90°	1
13.	In adjoining figure, $QR \parallel AB$ and $RP \parallel BD$ then value of x is 	1
14.	The value of k for which $p(x) = x^2 + 4x + k$ is a perfect square a. 16 b. 9 c. 1 d. 4	1
15.	$(\cos A + \sin A)^2 + (\cos A - \sin A)^2$ is equal to a. -2 b. 0 c. 1 d. 2	1
16.	Consider the quadratic polynomial $p(x) = x^2 - 7x + 10$ which of the following statements are true about the sum and product of its zeroes. (i) The sum of the zeroes is 7 (ii) The product of the zeroes is 10 (iii) Zeroes are $x=2$ and $x=5$ (iv) Zeroes are $x=-2$ and $x=-5$ a. (i) & (ii) only b. (i) & (iv) c. Only (iii) & (iv) d. Only (i) (ii) & (iii)	1
17.	The ratio in which x axis divides the line segment joining $(-2, 3)$ and $(6, -7)$ is a. 1:3 b. 3:7 c. 7:3 d. 1:2	1
18.	The value of k for which the roots of equation $4x^2 + 4x + k = 0$ are real is a. $k \geq 1$ b. $k \leq 1$ c. $k \geq -1$ d. $k \leq -1$	1
19.	Assertion: if the angle of Elevation of the Sun above the tower decreases, then the shadow of the tower increases. Reason: due to decrease in slope of line of sight, where θ is an acute angle between the line of sight and the horizontal (a) Both A and R are true, and R is the correct explanation of A (b) Both A and R are true, but R is not the correct explanation of A	1

- (c) A is true but R is false.
(d) A is false but R is true.

Assertion(A): The sum of first n terms of an AP is given as $S_n = 3n^2 - 4n$, then the n th term is $a_n = 6n - 7$

Reason(R): n th term of an AP whose sum to n term is S_n is given as $a_n = S_n - S_{n-1}$.

- (a) Both A and R are true, and R is the correct explanation of A
(b) Both A and R are true, but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true.

SECTION B

Section B consists of 5 questions of 2 mark each.

Find the value of a for which polynomial $p(x) = x^2 - 8x + a$ and $\alpha^2 + \beta^2 = 40$ where α and β are roots of polynomial.

OR

Find the zeroes of polynomial $p(x) = x^2 - (2a+b)x + 2ab$ and verify relationship between zeroes and coefficient.

Find the roots of quadratic equations $2x^2 - x + \frac{1}{8} = 0$

Prove that $6 + \sqrt{2}$ is an irrational number given that $\sqrt{2}$ is irrational number.

$\sin(A+B)=1$, $\cos(A-B)=1$ then find A and B where $0 < A + B \leq 90$ and $A \geq B$.

OR

If $A=60^\circ$ and $B=30^\circ$ then verify $\sin(A+B)=\sin A \cos B + \cos A \sin B$.

Points $P(x,y)$ are equidistant from $A(5,1)$ and $B(1,5)$ Prove that $x=y$

SECTION C

Section C consists of 6 questions of 3 mark each.

The diagonals of a quadrilateral ABCD intersect each other at point O such that $\frac{AO}{BO} = \frac{CO}{DO}$
OR [Prove that ABCD is a trapezium.]

If AB, BC and median AD of triangle ABC are respectively proportional to the sides PQ, QR and median PM of triangle PQR. Show that $\Delta ABC \sim \Delta PQR$.

A student scored total 32 marks in a class test of Mathematics and Science. Had he scored 2 marks less in Science and 4 marks more in Mathematics, the product of his marks would have been 253. Find his marks in Mathematics and Science.

OR

A train cover certain distance at uniform speed. If the train would have been 10 km/h faster it would have taken 2 hours less than the schedule time and if the train was slower by 10 km/h it would have been 3 hours more than the scheduled time. Find the distance covered by the train.

The ratio of the sum of the first m terms and the sum of the first n terms of an AP is $m^2 : n^2$. Show that the ratio of its m^{th} and n^{th} term is $(2m-1) : (2n-1)$

The traffic light at three different road crossing changes every 48 seconds, 72 seconds and 108 seconds. If they change simultaneously at 7 am, at what time will they change together next?

A straight Highway leads to the foot of a tower. A man standing on the top of the tower observes a car is at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. 10 seconds later, the angle of depression of the car to be 60° . Find the time taken by the car to reach the foot of tower from this point.

If α and β are zeros of polynomial $p(x) = 3x^2 - 5x - 2$ then find the polynomial whose zeroes are $(3\alpha - 2)$ and $(3\beta - 2)$.

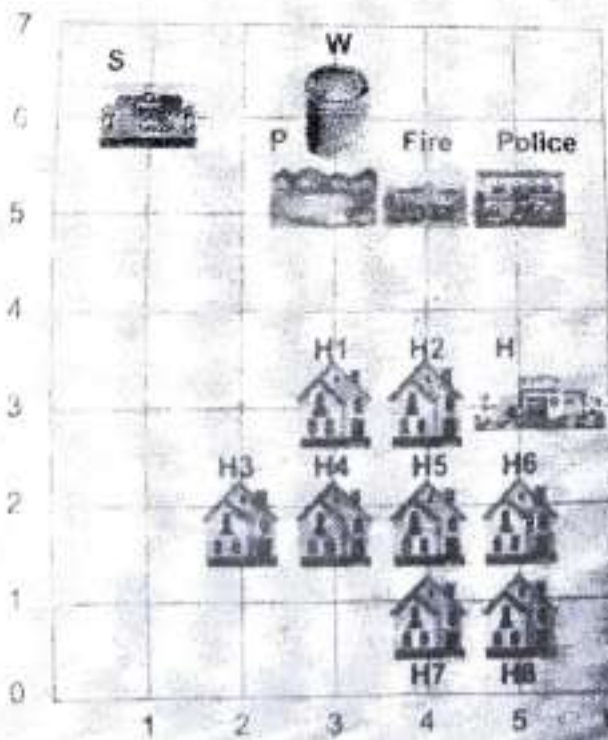
SECTION D

Section D consists of 4 questions of 5 mark.

	Prove that $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$	5
32.	OR	
	If $(2A+B)$ and $(A+2B)$ are acute angles such that $\sin(2A+B) = \frac{\sqrt{3}}{2}$ and $\tan(A+2B) = 1$. Find the value of $\cot(4A-7B)$	
33.	State and prove Basic Proportionality Theorem.	5
34.	The sum of a two digit number and the number obtained by interchanging the digits is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of digits in the first number. Find the original number.	5
35.	The ratio of 11 th term to 17 th term of an AP is 3:4. Find the ratio of the 5 th term to 21 st term of the same AP. Also find the sum of the first 5 terms to that of 21 st term. OR Show that sum of all terms of an AP whose first term is a , second term is b and the last term is c is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$	5

SECTION E

Section E consists of 3 Case based question

	Shown below is a town planning on a Cartesian plane where 1 unit=1km. Consider the coordinates of each building to be the point of intersection of the respective grid lines.	1+1+2
36.	 S - School W - Water Tank P - Pond Fire - Fire Station Police - Police Station H - Hospital H1 - House 1 H2 - House 2 H3 - House 3 H4 - House 4 H5 - House 5 H6 - House 6 H7 - House 7 H8 - House 8 Based on above information find the answer of following question (a) Write the coordinates of the hospital.	

- (b) Find value y coordinate of H2.
 (c) Find distance between S and the H1 along the path shown.

OR

Find the ratio in which H1 divides the path joining H3 and the Police Station.

A man is standing on a lighthouse situated ships on the cliff near the sea shore, watching towards ships that coming towards the light house. Angle of depression of depression of the ship was observed to be 30° and 45° respectively as it moves from point P to Q if the height of the light house is 50 meter.

1+1+
2



Based on the information, answer the following questions:

- (a) Find the distance of the ship from the base of the light house when it is at Q.
 (b) find the distance travelled by the ship between P and Q.

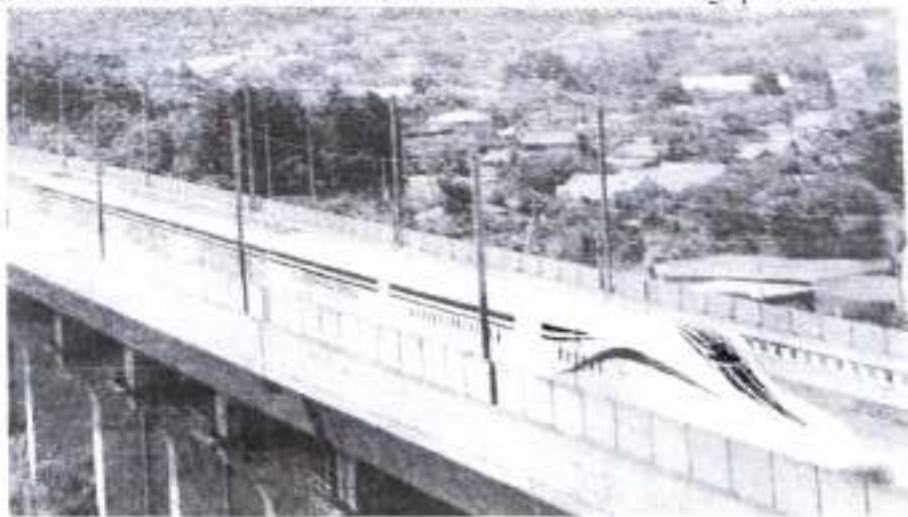
Or

If the ship is moving continuously towards the shore and takes 10 minutes to travel from Q to A, the speed of the ship in km/h from Q to A?

- (c) Find the measure of $\angle PBA$ and $\angle QBA$.

Japan's LO series Maglev is the fastest train in the world, with a speed record of 602 km/h. It could go the distance from New York City to Montreal in less than an hour. China has half of the eight fastest trains and the world's largest high speed railway network. Suppose a fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/h less than that of the fast train, then answer the following questions:

2+1+
1



Based on the information, answer the following questions:

- (a) Find the speed of slow train.
 (b) Find the speed of fast train.

(c) How much time taken by the slow train to cover the distance 600 km?	
---	--

OR

How much time taken by the fast train to cover the distance 600 km?	
---	--