Meghalaya Board Class 10 Question Paper

Total No. of Printed Pages—16

X/15/M

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MATHEMATICS

(CANDIDATES WITH PRACTICALS/INTERNAL ASSESSMENT)

Full Marks : 80
Pass Marks : 24

(CANDIDATES WITHOUT PRACTICALS/INTERNAL ASSESSMENT)

Full Marks : 100
Pass Marks : 30

Time : 3 hours

(For Both Categories of Candidates)

The figures in the margin indicate full marks for the questions

GENERAL INSTRUCTIONS :

(i) The question paper consists of 32 questions divided into six Sections A, B, C, D, E and F.

(ii) Question Nos. **1** to **30** (Section—A to Section—E) are to be answered by all the Candidates.

(iii) Question Nos. **31** and **32** of Section—F are to be answered by Candidates without Practicals/Internal Assessment only.

(iv) In Question Nos. **1** to **8** of Section—A and Question No. **31** sub nos. *(a)* to *(d)*, there are four answers marked (A), (B), (C), (D). Only one of these answers is correct. The letter indicating the correct answer should be written in capital in the answer book.

(v) In question on construction, the drawing should be neat and exactly as per the given measurements.

(vi) Questions which are meant for Visually Handicapped (Blind) Students, should be answered by them only.

(vii) Use of Calculator/Mobile Phone is not permitted.

SECTION—A

(*Marks* : 10)

(Question Nos. ***1*** *to* ***10*** *carry 1 mark each)*

1. The prime factors of 156 are

(A) $2^2 \quad 3^2 \quad 13$

(B) $2 \quad 3 \quad 13^2$

(C) $2 \quad 3^2 \quad 13$

(D) $2^2 \quad 3 \quad 13$

2. The standard form of the polynomial

$$1 \quad 2x \quad \frac{1}{2}x^4 \quad 5x^2$$

is

(A) $\frac{1}{2}x^4 \quad 5x^2 \quad 2x \quad 1$

(B) $\frac{1}{2}x^4 \quad 5x^2 \quad 2x \quad 1$

(C) $\frac{1}{2}x^4 \quad 5x^2 \quad 2x \quad 1$

(D) $\frac{1}{2}x^4 \quad 5x^2 \quad 2x \quad 1$

3. The first four terms of an AP whose first term (a) 3 and common difference (d) 4 are

(A) 3, 1, 5, 9

(B) 3, 7, 11, 15

(C) 3, 1, 5, 9

(D) 3, 1, 5, 9

4. The solutions of the quadratic equation $x^2 \quad x \quad 6 \quad 0$ are

(A) 3, 2

(B) 3, 2

(C) 3, 2

(D) 3, 2

5. If tan 5 1, for 0 90 , then the value of is

(A) 5°

(B) 9°

(C) 45°

(D) 60°

6. The coordinates of the midpoint of the line segment having end points (4, 7) and (4, 3) are

(A) (4, 2)

(B) (4, 5)

(C) (4, 5)

(D) (4, 2)

7. The volume of a right circular cylinder of radius r units and height h units is

(A) rh square units

(B) rh^2 cubic units

(C) r^2h cubic units

(D) 2 rh square units

8. A ladder 13 m long reaches the window of a building 12 m above the ground. The distance of the foot of the ladder from the wall is

(A) 156 m

(B) 25 m

(C) 1 m

(D) 5 m

9. Fill in the blanks : ½+½=1

(a) A —— of a circle is a chord which passes through the centre of the circle.

(b) In a right triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a —— angle.

10. Define median of grouped data.

SECTION—B

(*Marks* : 12)

(Question Nos. ***11*** *to* ***16*** *carry 2 marks each)*

11. Find the sum and product of the zeroes of the quadratic polynomial $24x^2 \quad 37x \quad 5$.

12. Find the discriminant of the quadratic equation $49x^2 \quad 21x \quad \frac{9}{4} \quad 0$ and determine the nature of the roots.

Or

Find the 20th term of an AP whose first term is 2 and common difference is 5.

13. If 30 , verify that

$$\cos 3 \quad 4\cos^3 \quad 3\cos$$

14. Prove that

$$\sec 41 \quad \sin 49 \quad \cos 49 \quad \text{cosec } 41 \quad 2$$

Or

Prove that

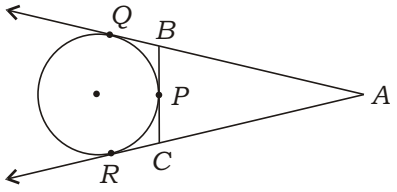
$$\frac{\cos^2}{\sin} \quad \sin \quad \text{cosec}$$

15. The areas of two similar triangles are 36 cm^2 and 100 cm^2. If the length of one side of the smaller triangle is 3 cm, find the length of the corresponding side of the larger triangle.

Or

The perimeters of two similar triangles *ABC* and *PQR* are 32 cm and 24 cm respectively. If *PQ* 12 cm, find *AB*.

16. A circle touches the side *BC* of *ABC* at *P* and touches *AB* and *AC* produced at *Q* and *R* respectively as shown in the adjoining figure. If *AQ* 5 cm, find the perimeter of *ABC*.



[For Visually Handicapped (Blind) Students only, in lieu of Question No. 16 above]

16. *(a)* Define a tangent line. 1

(b) A —— of a circle is a line segment joining any two points on the circumference. (Fill in the blank) 1

SECTION—C

(*Marks* : 18)

(Question Nos. ***17*** *to* ***22*** *carry 3 marks each)*

17. Find the LCM and HCF of the following pair of integers 26 and 91 and verify that HCF LCM = Product of two numbers.

18. Evaluate :

7 11 15 ··· to 29 terms

Or

If 5 times the fifth term of an AP is equal to 10 times the tenth term, find its 15th term.

19. Find the coordinates of the point which divides the line segment joining the points $A(3, 4)$ and $B(8, 7)$ in the ratio 7 : 5.

20. If sin $\quad \sin^2 \quad 1$, then prove that $\cos^2 \quad \cos^4 \quad 1$.

Or

Prove that

$$\frac{1}{(\sec \quad 1)} \quad \frac{1}{(\sec \quad 1)} \quad 2\cot \quad \text{cosec}$$

21. A sector of angle 40° is cut out from a circle. If the area of the sector is $\frac{77}{18}$ m^2, find the radius of the circle. (Use $\frac{22}{7}$)

Or

Wheel of a car makes four revolutions in a second. If the diameter of the wheel be 84 cm, find the speed of the car.
(Use $\frac{22}{7}$)

22. The weights of 100 packets of biscuits labelled as weighing 250 g were as shown in the following table :

Weight (g)	247	248	249	250	251	252	253	254	255
Frequency	5	10	9	14	18	16	15	10	3

(a) How many packets are underweight?

(b) How many packets are overweight?

(c) How many packets are of labelled weight?

SECTION—D

(*Marks* : 16)

(Question Nos. ***23*** *to* ***26*** *carry 4 marks each)*

23. The denominator of a fraction exceeds twice its numerator by 1. If 3 be subtracted from the numerator and 2 from the denominator, the fraction becomes $\frac{1}{3}$. Find the fraction.

24. Find the value of k such that the point (0, 2) is equidistant from the points (3, k) and (k, 5).

Or

Find the ratio in which the point P ($\frac{71}{12}, \frac{21}{12}$) divides the join of the points A (3, 4) and B (8, 7).

25. From a lighthouse, the angles of depression of two ships on opposite sides of the lighthouse were observed to be 30° and 45°. If the lighthouse is 90 m high and the line joining the two ships passes through the foot of the lighthouse, find the distance between the two ships. (Use $\sqrt{3}$ 1 732)

Or

On the same side of a tower two objects are located. Their angles of depression from the top of the tower are 45° and 60°. If the height of the tower is 300 m, find the distance between the two objects. (Use $\sqrt{3}$ 1 732)

[For Visually Handicapped (Blind) Students only, in lieu of Question No. 25 above]

25. *(a)* Prove that

$$\frac{\text{cosec}^2 \quad 1}{\text{cosec}^2} \quad \cos^2 \qquad 2$$

(b) $\sec^2 \quad \tan^2 \quad$ —— (Fill in the blank) 1

(c) If $A \quad B$, then $\tan A \quad \tan B$.
(State whether True or False) 1

26. Draw a line segment *PQ* 7 cm and divide it internally in the ratio 5 : 3 by using ruler and compass only. (Only traces of construction are required.)

[For Visually Handicapped (Blind) Students only, in lieu of Question No. 26 above]

26. *(a)* Define an acute angle. 1

(b) A quadrilateral which has one pair of opposite sides parallel is called a (trapezium/parallelogram). (Choose the correct answer) 1

(c) An arc of a circle is a part of the circumference. (State whether True or False) 1

(d) Define a line segment. 1

SECTION—E

(*Marks* : 24)

(Question Nos. ***27*** *to* ***30*** *carry 6 marks each)*

27. Solve the following system of linear equations graphically :

$$x \quad y \quad 1 \quad 0$$

$$4x \quad 3y \quad 24$$

Also find the points where the lines meet the *x*-axis. (Plot at least three points for each graph.)

[For Visually Handicapped (Blind) Students only, in lieu of Question No. 27 above]

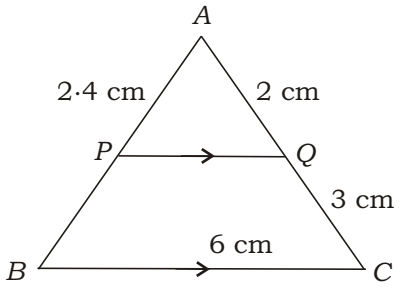
27. Solve the following system of linear equations :

$2x \quad 3y \quad 8$

$x \quad 2y \quad 3$

28. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. 4

Using above, solve the following :



In the figure, $PQ \parallel BC$, $AP \quad 2 \quad 4$ cm, $AQ \quad 2$ cm, $QC \quad 3$ cm and $BC \quad 6$ cm. Find AB. 2

[For Visually Handicapped (Blind) Students only, in lieu of Question No. 28 above]

28. *(a)* Define an isosceles right triangle. 2

(b) If a line divides any two sides of a triangle proportionally, it must be —— to the third side. (Fill in the blank) 1

(c) If two triangles are equiangular, then their corresponding sides are proportional. (State whether True or False) 1

(d) State the Pythagoras theorem. 2

29. The outer and inner diameters of a spherical shell are 10 cm and 9 cm respectively. Find the volume of metal contained in it. (Take $\frac{22}{7}$)

Or

A right circular cone is 3 6 cm high and has base radius 1 6 cm. It is melted and recast into a right circular cone with radius of its base as 1 2 cm. Find its height. (Use $\frac{22}{7}$)

30. Find the mean marks of the following data :

Marks	10–16	16–22	22–28	28–34	34–40
No. of students	5	8	7	3	2

Or

Calculate the mode of the following data :

Class interval	10–30	30–50	50–70	70–90	90–110	110–130
Frequency	6	7	8	11	5	3

SECTION—F

(*Marks* : 20)

[For Candidates without Practicals/Internal Assessment only]

31. Answer the following (any *eight*) : 1×8=8

(a) Any number which cannot be expressed in the form $\frac{p}{q}$, where p and q both are integers and q 0, is called

(A) a composite number

(B) a rational number

(C) an irrational number

(D) a prime number

(b) A polynomial of degree 4 is called a

(A) linear polynomial

(B) quadratic polynomial

(C) cubic polynomial

(D) biquadratic polynomial

(c) If a pair of linear equations $a_1x \quad b_1y \quad c_1 \quad 0$ and $a_2x \quad b_2y \quad c_2 \quad 0$ represents parallel lines, then

(A) $\frac{a_1}{a_2} \quad \frac{b_1}{b_2}$

(B) $\frac{a_1}{a_2} \quad \frac{b_1}{b_2} \quad \frac{c_1}{c_2}$

(C) $\frac{a_1}{a_2} \quad \frac{b_1}{b_2} \quad \frac{c_1}{c_2}$

(D) None of the above

(d) Which of the following is a quadratic equation?

(A) $\sqrt{x} \quad \frac{1}{\sqrt{x}} \quad 4$

(B) $6x^5 \quad 3x^2 \quad 7 \quad 0$

(C) $x^2 \quad \frac{1}{x^2} \quad 3$

(D) $x^2 \quad 5x \quad 7 \quad 0$

(e) The coordinates of any point on the x-axis are of the form $(0, x)$. (State whether True or False)

(f) The line joining the midpoints of any two sides of a triangle is —— to the third side. (Fill in the blank)

(g) Into how many quadrants is the coordinate plane divided?

(h) Prove that

$$\frac{\sec \quad \tan}{\sec \quad \tan} \quad (\sec \quad \tan \ )^2$$

(i) If you look upwards at an object, the angle formed between the horizontal line and your line of sight is called the angle of depression. (State whether True or False)

(j) A —— is a part of a circle whose end points are the end points of a diameter. (Fill in the blank)

(k) Find the area of a rectangle whose length is 12 m and breadth 5 m.

(l) Find the curved surface area of a cylinder whose radius is 7 cm and height 5 cm. (Use $\frac{22}{7}$)

(m) Define cumulative frequency.

(n) A bag contains 6 red balls and 4 green balls. A ball is selected at random. Find the probability of getting a red ball.

32. Answer any *six* from the following : 2×6=12

(a) Given that HCF (1133, 515) = 103, find the LCM.

(b) Divide the polynomial $p(x)$ $6x^2$ x 15 by polynomial $g(x)$ $2x$ 3 and find the quotient and remainder.

(c) Solve x^2 $5x$ 6 0 using quadratic formula.

(d) Find the common difference of the AP

119, 136, 153, 170, ...

and write the next two terms.

(e) In *ABC*, *XY* is drawn parallel to *BC*, intersecting *AB* and *AC* at *X* and *Y* respectively. If *AX* 3 cm, *XB* 5 cm and *AY* 6 cm, find *YC*.

(f) Find the centroid of the triangle whose vertices are (2, 1), (5, 2) and (3, 4).

(g) For $A \quad 60$, prove that

$$\frac{1}{2}\sin A \quad \sin\frac{A}{2} \quad \cos\frac{A}{2}$$

(h) Find the length of the diagonal of a rectangle whose sides are 8 m and 6 m.

(i) The diameter of a cartwheel is 1 4 m. Find the distance to which the cart moves when the wheel makes 1000 revolutions. (Use $\frac{22}{7}$)

(j) A boy tosses a coin three times. List all the possible outcomes of the experiment, using H for head and T for tail.

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