

Target Mathematics by- Dr.Agyat Gupta

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Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

- i. This question paper contains two parts A and B.
- ii. Both Part A and Part B have internal choices.

Part – A consists 20 questions

- i. Questions 1-16 carry 1 mark each. Internal choice is provided in 5 questions.
- ii. Questions 17-20 are based on the case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B consists 16 questions

- i. Question No 21 to 26 are Very short answer type questions of 2 mark each,
- ii. Question No 27 to 33 are Short Answer Type questions of 3 marks each
- iii. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
- iv. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

Part-A

1. State whether $\frac{35}{50}$ will have terminating decimal expansion or a non-terminating repeating decimal expansion.

OR

If the product of two numbers is 1080 and their HCF is 30, find their LCM.

2. Find the values of k for which the given equation has real and equal roots:

$$9x^2 + 3kx + 4 = 0$$

3. For what value of k, the following pair of linear equations has infinitely many solutions?

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$$10x + 5y - (k - 5) = 0$$

$$20x + 10y - k = 0$$

4. How many tangents can a circle have?
5. Write 5th term from the end of the A.P. 3, 5, 7, 9, ..., 201.

OR

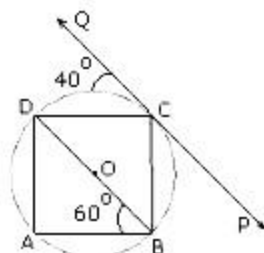
Find 18th term of the A.P. $\sqrt{2}, 3\sqrt{2}, 5\sqrt{2}, \dots$

6. The nth term of an AP is $(3n + 5)$. Find its common difference.
7. Solve the equation, $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x \neq -4, 7$ for x.

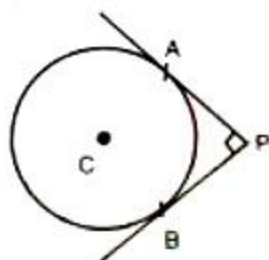
OR

State whether the quadratic equation $3x^2 - 4x + 1 = 0$ has two distinct real roots. Justify your answer.

8. In the given figure, ABCD is a cyclic quadrilateral and PQ is a tangent to the circle at C. If BD is a diameter, $\angle OCQ = 40^\circ$ and $\angle ABD = 60^\circ$, find $\angle BCP$



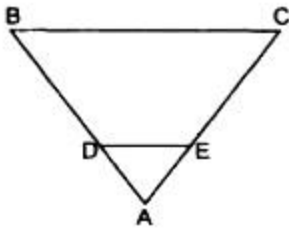
9. In fig., PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then find the length of each tangent.



OR

At which point a tangent is perpendicular to the radius?

10. In figure, $DE \parallel BC$ in $\triangle ABC$ such that $BC = 8$ cm, $AB = 6$ cm and $DA = 1.5$ cm. Find DE.



11. Is 184 a term of the AP 3,7,11,15,.....?
12. Evaluate $(\cos 0^\circ + \sin 45^\circ + \sin 30^\circ)(\sin 90^\circ - \cos 45^\circ + \cos 60^\circ)$.
13. Evaluate $\cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$ in the simplest form
14. Volumes of two spheres are in the ratio 64:27, find the ratio of their surface areas.
15. If 10 times the 10th term of an AP is equal to 15 times the 15th term, show that its 25th term is zero.
16. The probability of getting a bad egg in a lot of 800 eggs is 0.125. Find the number of bad eggs in the lot.
17. **CASE STUDY: CARTESIAN- PLANE**

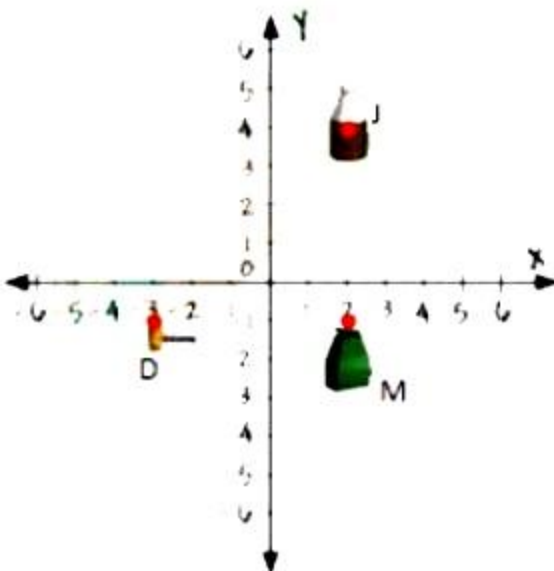
Using Cartesian Coordinates we mark a point on a graph by **how far along** and **how far up** it is.

The *left-right (horizontal)* direction is commonly called X-axis.

The *up-down (vertical)* direction is commonly called Y-axis.

Based on these facts a case study is provided below. Read the information and answer the questions that follow.

A team of archaeologists is studying the ruins of Lignite, a small mining town from the 1800's. They plot points on a coordinate plane to show exactly where each artefact is found.



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They are using this coordinate plane as a map of a section of the town. It shows the location of a medicine bottle (M), a doorknob (D), and a pottery jug (J). Notice that each unit on the grid is equal to 5 meters.

- i. How far apart are the doorknob and the medicine bottle?
 - a. 5 m
 - b. 25 m
 - c. 15 m
 - d. 3 m
 - ii. How far apart are the medicine bottle and pottery jugs?
 - a. 20 m
 - b. 15 m
 - c. 25 m
 - d. 5 m
 - iii. How far apart are the doorknob and the pottery jug?
 - a. 5.07 m
 - b. 3.07 m
 - c. 6.07 m
 - d. 7.07 m
 - iv. The co-ordinates of jug and medicine bottle respectively are
 - a. (2, 4), (2, -1)
 - b. (2, -1), (2, 4)
 - c. (4,2), (2, -1)
 - d. (2, 4), (-1, 2)
 - v. The location of the doorknob is
 - a. (-3, -1)
 - b. (-3, 1)
 - c. (-1, -3)
 - d. (3, -1)
18. There is some fire incident in the house. The fireman is trying to enter the house from the window as the main door is locked. The window is 6 m above the ground. He places a ladder against the wall such that its foot is at a distance of 2.5 m from the wall and its top reaches the window.



- i. Here, _____ be the ladder and _____ be the wall with the window.
- CA, AB
 - AB, AC
 - AC, BC
 - AB, BC
- ii. We will apply Pythagoras Theorem to find length of the ladder. It is:
- $AB^2 = BC^2 - CA^2$
 - $CA^2 = BC^2 + AB^2$
 - $BC^2 = AB^2 + CA^2$
 - $AB^2 = BC^2 + CA^2$
- iii. The length of the ladder is _____.
- 4.5 m
 - 2.5 m
 - 6.5 m
 - 5.5 m
- iv. What would be the length of the ladder if it is placed 6 m away from the wall and the window is 8 m above the ground?
- 12 m
 - 10 m
 - 14 m
 - 8 m
- v. How far should the ladder be placed if the fireman gets a 9 m long ladder?
- 6.7 m (approx.)
 - 7.7 m (approx.)
 - 5.7 m (approx.)
 - 4.7 m (approx.)

19.

1000m HORSE-RACE

A stopwatch was used to find the time that it took a group of jockey to run 1000 m. race.



Time (in sec.)	0-20	20-40	40-60	60-80	80-100
No. of participants(jockey)	8	10	13	6	3

- i. Estimate the mean-time taken by a jockey to finish the race.
 - a. 54
 - b. 63
 - c. 43
 - d. 50
- ii. What will be the upper limit of the modal class?
 - a. 20
 - b. 40
 - c. 60
 - d. 80
- iii. The construction of the cumulative frequency table is useful in determining the:
 - a. Mean
 - b. Median
 - c. Mode
 - d. All of the above
- iv. The sum of lower limits of the median class and modal class is:
 - a. 60
 - b. 100
 - c. 80
 - d. 140
- v. How many participants finished the race within 1 minute?
 - a. 8
 - b. 37

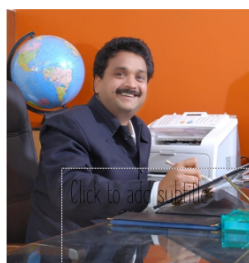
c. 31

d. 18

20. Mathematics teacher of a school took her 10th standard students to show Red fort. It was a part of their educational trip. The teacher had interest in history as well. She narrated the facts of Red fort to students. Then the teacher said in this monument one can find a combination of solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical. 7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.



- i. How much cloth material will be required to cover 2 big domes each of radius of 2.5 meters? (Take $\pi = 22/7$)
- 75 m^2
 - 78.57 m^2
 - 87.47 m^2
 - 25.8 m^2
- ii. Write the formula to find the volume of a cylindrical pillar.
- $\pi r^2 h$
 - $\pi r l$
 - $\pi r(l + r)$
 - $2\pi r$
- iii. Find the lateral surface area of two pillars if the height of the pillar is 7m and the radius of the base is 1.4m.
- 112.3 cm^2
 - 123.2 m^2
 - 90 m^2
 - 345.2 cm^2
- iv. How much is the volume of a hemisphere if the radius of the base is 3.5m?
- 85.9 m^3



- b. 80 m^3
- c. 98 m^3
- d. 89.83 m^3

- v. What is the ratio of the sum of volumes of two hemispheres of radius 1cm each to the volume of a sphere of radius 2 cm?
- a. 1:1
 - b. 1:8
 - c. 8:1
 - d. 1:16

Part-B

21. Find the condition that zeroes of polynomial $p(x) = ax^2 + bx + c$ are reciprocal of each other.
22. If P and Q are the points of trisection of the line segment joining the points A(2, -2) and B(-7, 4) such that P is nearer to A. Find the coordinates of P and Q.

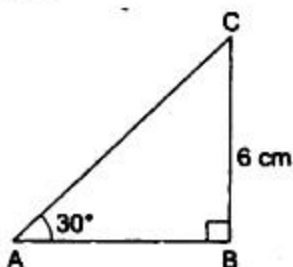
OR

If A(3, y) is equidistant from points P(8, -3) and Q(7, 6), find the value of y and find the distance AQ.

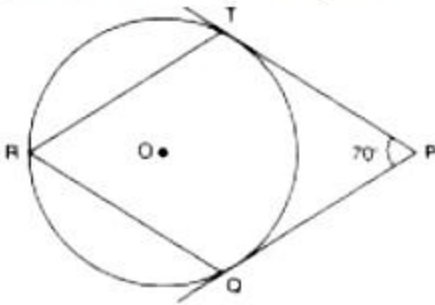
23. If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate:
 $\frac{1}{\alpha} - \frac{1}{\beta}$.
24. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 45° .
25. If $\theta = 30^\circ$, verify that $\sin 3\theta = 3\sin \theta - 4\sin^3 \theta$

OR

In the adjoining figure, $\triangle ABC$ is right-angled at B and $\angle A = 30^\circ$. If BC = 6 cm, find AB and AC.



26. In figure, O is the centre of a circle. PT and PQ are tangents to the circle from an external point P. If $\angle TPQ = 70^\circ$, find $\angle TRQ$



27. Prove that $2 + 5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.
28. Solve: $\frac{x}{x-1} + \frac{x-1}{x} = 4\frac{1}{4}$, $x \neq 2, 0$

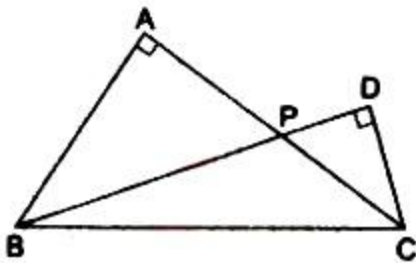
OR

Find the values of p for which the quadratic equation $(p + 1)x^2 - 6(p + 1)x + 3(p + 9) = 0$, $p \neq -1$ has equal roots. Hence, find the roots of the equation.

29. If α, β are the zeros of the polynomial $2x^2 - 4x + 5$. find the value of (i) $\alpha^2 + \beta^2$ (ii) $(\alpha - \beta)^2$.
30. $\triangle ABD$ is a right triangle right-angled at A and $AC \perp BD$. Show that $AC^2 = BC \cdot DC$.

OR

Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, Prove that $AP \times PC = BP \times PD$.



31. In a game, the entry fee is Rs 5. The game consists of tossing a coin 3 times. If one or two heads show, Shweta gets her entry fee back. If she throws 3 heads, she receives double the entry fees. Otherwise, she will lose. For tossing a coin three times, find the probability that she
- loses the entry fee.
 - gets double entry fee.
 - just gets her entry fee.

32. The angle of elevation of the top of a vertical tower from a point on the ground is 60° . From another point 10 m vertically above the first, its angle of elevation is 45° . Find the height of the tower.
33. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table:

Length (in mm)	Number of leaves
118-126	3
127-135	5
136-144	9
145-153	12
154-162	5
163-171	4
172-180	2

Find the median length of the leaves.

(Hints: The data needs to be converted to continuous classes for finding the median, since the formula assumes continuous classes. The classes then change to 117.5 – 126.5, 126.5–135.5, ... , 171.5 -180.5).

34. The sides of a triangle are in the ratio 5:12:13, and its perimeter is 150 m. Find the area of the triangle.
35. The path of a train A is given by the equation $x + 2y - 4 = 0$ and the path of another train B is given by the equation $2x + 4y - 12 = 0$. Represent this situation graphically.
36. The angle of elevation of the top of a tower as observed from a point in a horizontal plane through the foot of the tower is 32° . When the observer moves towards the tower a distance of 100 m, he finds the angle of elevation of the top to be 63° . Find the height of the tower and the distance of the first position from the tower. [Take $\tan 32^\circ = 0.6248$ and $\tan 63^\circ = 1.9626$]

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