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Time : 3 Hours

MATHEMATICS BASIC LEVEL 2 (E)

Subject Code

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Total No. of Questions : 42

(Printed Pages : 15)

Maximum Marks : 80

INSTRUCTIONS : Read the following instructions very carefully and strictly follow them :

- (i) This question paper consists of **42** questions. *All* questions are compulsory.
- (ii) This question paper is divided into four Sections-**A, B, C** and **D**.
- (iii) In Section **A**, Questions Nos. **1** to **16** are multiple choice questions (MCQs) and question Nos. **17** to **20** are very short answer type questions (VSA) of **1** mark each.
- (iv) In Section **B**, Question Nos. **21** to **28** are short answer type I (SA-I) questions carrying **2** marks each.
- (v) In Section **C**, Question Nos. **29** to **40** are short answer type II (SA-II) questions carrying **3** marks each.
- (vi) In Section **D**, Question Nos. **41** and **42** are long answer (LA) questions carrying **4** marks each.
- (vii) There is no overall choice. However, an internal choice has been provided in two questions of **2** marks each in Section **B** and two questions of **3** marks each in Section **C**.
- (viii) In question on constructions, the drawing should be clear and exactly as per the given measurements. The construction lines and arcs should also be maintained.
- (ix) Graph page is provided on the answer booklet.
- (x) Use of calculator and mathematical tables is not permitted.

SECTION-A

Select and write the correct alternative from those given below each statement :

1. Which of the following is a rational number ? 1
 - $3\sqrt{2}$
 - $\sqrt{49}$
 - π
 - $\frac{\sqrt{7}}{2}$
2. The quadratic polynomial whose zeroes are $\sqrt{7}$ and $-\sqrt{7}$ is : 1
 - $x^2 + 7$
 - $x^2 - 7$
 - $x^2 - \sqrt{7}$
 - $x^2 - 49$
3. The pair of linear equations which represent two parallel lines has : 1
 - no solution
 - one solution
 - two solutions
 - infinitely many solutions

4. If $12x + 11y = 57$ and $11x + 12y = 58$, then $x - y$ is : 1

• -1

• 0

• 1

• 3

5. If one root of the quadratic equation $2x^2 + kx - 6 = 0$ is 2, then the value of k is : 1

• -2

• -1

• 1

• 2

6. The 16th term of an Arithmetic Progression is 79. If the common difference is 5, then the first term is : 1

• 1

• 4

• 9

• 14

7. $\triangle ABC \sim \triangle PQR$, if $25 \text{ ar}(\triangle ABC) = \text{ar}(\triangle PQR)$ and $QR = 15 \text{ cm}$, then BC is : 1

- 3
- 10
- 15
- 75

8. If $\sin^2 2p + \cos^2 60^\circ = 1$, then the value of p is : 1

- 0
- 30
- 60
- 90

9. If $\sin (B - 15)^\circ = 0$, then the value of B is : 1

- 0
- 15
- 75
- 90

10. If $\sec 4A = \operatorname{cosec} (A + 40^\circ)$, where $4A$ is an acute angle, then the value of A is :

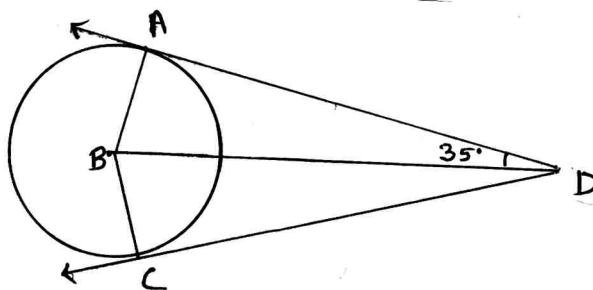
1

- 10°
- 30°
- 50°
- 90°

11. In the given figure, B is the centre of the circle, DA and DC are tangent segments. If $\angle ADB = 35^\circ$, then $\angle ABC$ is :

1

- 70°
- 90°
- 110°
- 180°



12. A circle is inscribed in a square whose side is 12 cm. therefore the radius of the circle is :

1

- 3 cm
- 6 cm
- 12 cm
- 24 cm

13. The curved surface area of a hemisphere whose radius is 5 cm is : 1

- $5\pi \text{ cm}^2$
- $10\pi \text{ cm}^2$
- $25\pi \text{ cm}^2$
- $50\pi \text{ cm}^2$

14. The curved surface area of a cone is 176 cm^2 . If the radius of the base of cone is 4 cm, then the slant height of the cone is : 1

$$\left(\pi = \frac{22}{7} \right)$$

- 8 cm
- 14 cm
- 44 cm
- 56 cm

15. The class-size of class interval 80 – 100 is : 1

- 10
- 20
- 80
- 90

16. The probability of a sure event is : 1
- 0
 - 0.5
 - 1
 - 1.5
17. Find the polynomial $p(x)$ which when divided by the polynomial $g(x) = (x - 1)$ gives $4x$ as quotient and 9 as remainder. 1
18. The pair of linear equations $4x + ky = 6$ and $2x + y = -1$ has a unique solution. Find the value of k . 1
19. Find the area of a semicircle whose radius is 12 cm. (Do not substitute for π). 1
20. Five cards of diamond are lost from a pack of 52 playing cards. From the remaining cards, one card is drawn at random. Find the probability that the card drawn is of red colour. 1

SECTION-B

21. Without actually performing long division show that $\frac{17}{250}$ has a terminating decimal expansion and hence find its decimal expansion. 2

Or

Assuming that $\sqrt{5}$ is an irrational number, prove that $3+\sqrt{5}$ is an irrational number.

22. Using Euclid's division algorithm, find the HCF of 102 and 150. 2

Or

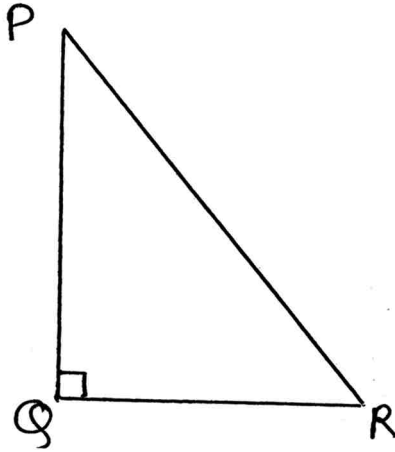
Find LCM of 24 and 180 by prime factorisation method.

23. The following table shows the ages of 45 members of a Village Library : 2

Ages in Years	Number of Members
0–20	11
20–40	6
40–60	18
60–80	10

Find the mode of the given data.

24. In right $\triangle PQR$, $\angle Q = 90^\circ$. If $\sin R = \frac{12}{13}$, then find QR and the value of $\tan P$: 2



25. Evaluate the following expression by substituting the known values of trigonometric ratios 2

$$3 \tan^2 30^\circ - \sin^2 60^\circ$$

26. The shorter side of a rectangular plot ABCD is 10 m. If its diagonal is 26 m, calculate the perimeter of the rectangular plot. 2
27. Find the distance between the points A (3, 0) and B (6, 4). 2
28. Find the value of p for which the points A (– 2, 2), B (5, 3) and C (3 p , 4) are collinear. 2

SECTION-C

29. Divide the polynomial $2x^3 + 9x^2 - 3x - 20$ by $x + 3$ and write the quotient and the remainder. 3

Hence express the result in the form,

$$\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}.$$

30. Find the solution of the pair of linear equation $5x - 3y = 1$ and $2x + 5y = 19$ by Elimination Method. 3

Or

Find the solution of the pair of linear equations $4x - y = 6$ and $x + y = 9$ by substitution method.

31. Find the roots of the quadratic equation $6x^2 + 13x + 5 = 0$ by factorisation method. 3

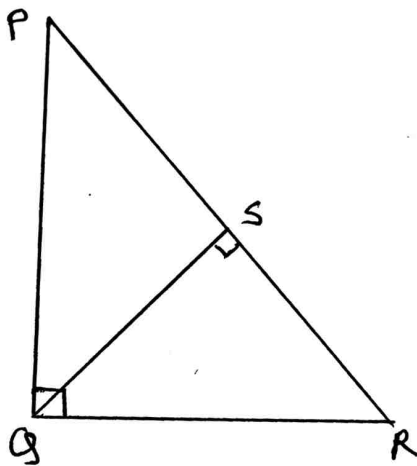
32. Find the roots of quadratic equation $2x^2 + 3x - 2 = 0$ by using Quadratic Formula. 3

33. Given an Arithmetic Progression 4, 9, 14, 19 3
find the 25th term and the sum of first 25 terms.

34. Draw a circle with centre A and radius 3 cm. Take a point P at a distance of 7.5 cm from the centre of the circle. Using a pair of compasses and ruler, construct two tangents PM and PN from the point P to the circle.
Measure and state the length of the tangent segments. 3

35. Construct $\triangle APR$, such that $PR = 8$ cm, $\angle P = 60^\circ$, $AP = 6.5$ cm., then using a pair of compasses and ruler construct $\triangle A'P'R'$ whose sides are $\frac{4}{5}$ of the corresponding sides of $\triangle APR$. 3

36. Given : In $\triangle PQR$, $\angle PQR = 90^\circ$ and $QS \perp PR$ where $P - S - R$: 3



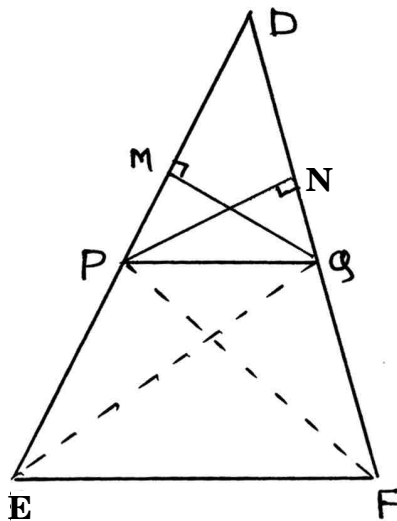
Prove that : $PR^2 = PQ^2 + QR^2$

(Write only the proof with reasons)

Or

In $\triangle DEF$, $PQ \parallel EF$ where points P and Q lie on DE and DF respectively.

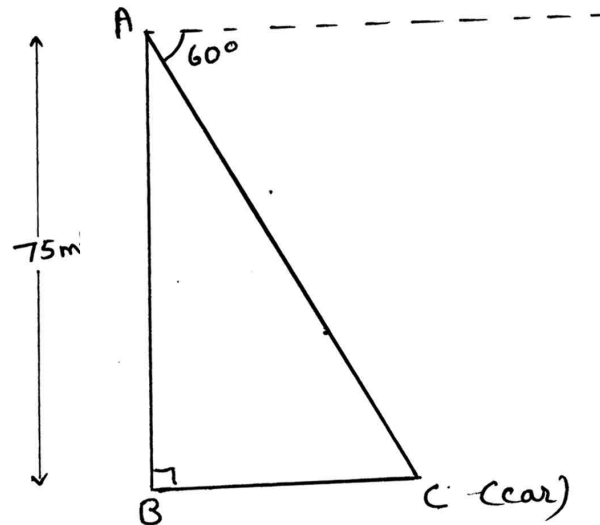
$QM \perp DE$ and $PN \perp DF$



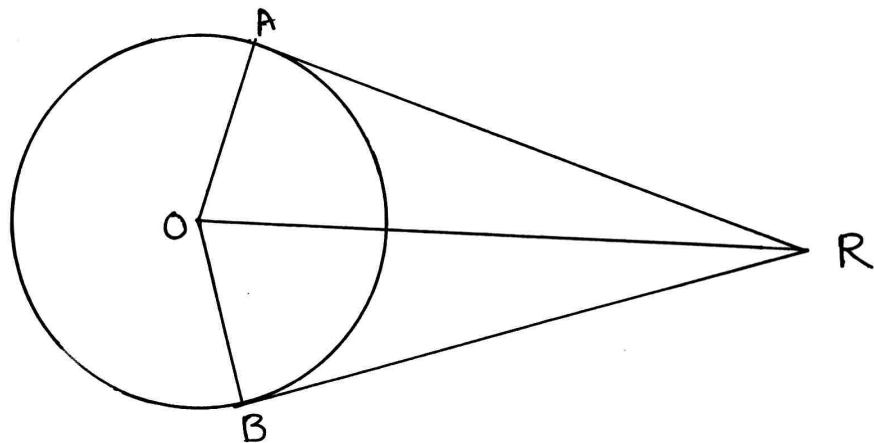
Prove that : $\frac{DP}{PE} = \frac{DQ}{QF}$

(Write only the proof with reasons)

37. The angle of depression of the Car C standing on the ground from the top of a 75 m high building AB is 60° . Find the distance of the Car from the foot of the building ($\sqrt{3}=1.73$) 3



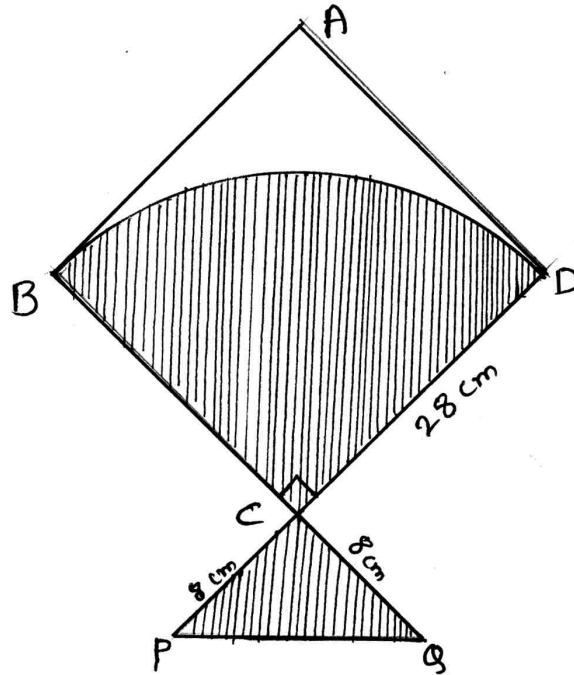
38. Given : Point O is the centre of a circle. RA and RB are two tangent segments drawn from an external point R to the circle at A and B respectively. 3



Prove that $RA = RB$

(Write only the proof with reasons)

39. The figure given below shows a kite in which $\square ABCD$ is a square and $\triangle CPQ$ is an isosceles right-angled triangle whose equal sides are 8 cm. If sector C – BD is in the shape of a quadrant of a circle of radius 28 cm., then find the area of the shaded region. $\left(\text{use } \pi = \frac{22}{7} \right)$ 3



40. A cuboidal container of internal dimensions 16 cm $\times$ 10 cm $\times$ 8 cm, contains 7 solid spherical balls each of radius 3 cm packed in it. 3

Find the volume of the water required to fill the container upto the brim.

$\left(\text{use } \pi = \frac{22}{7} \right).$

SECTION-D

41. The following table shows the number of plants grown in 40 houses in a locality. Rewrite and complete the table and find the mean number of plants grown per house by using Direct Mean Method. 4

Number of Plants (CI)	Number of Houses (f_i)	Class Mark (x_i)	$f_i \times x_i$
3–5	5	.....	.....
5–7	10	.....	.....
7–9	8	.....	.....
9–11	9	.....	.....
11–13	5	.....	.....
13–15	3	.....	.....
	$\Sigma f_i = 40$		$\Sigma f_i x_i = \dots$

42. Find the solution of the following pair of linear equations graphically : 4

$$x + y = 5 \quad \text{and} \quad 2x - y = 4$$

Rewrite and complete the following tables :

$$x + y = 5$$

x			
y			

$$2x - y = 4$$

x			
y			

(Plot at least *three* points for each line using a graph paper.)