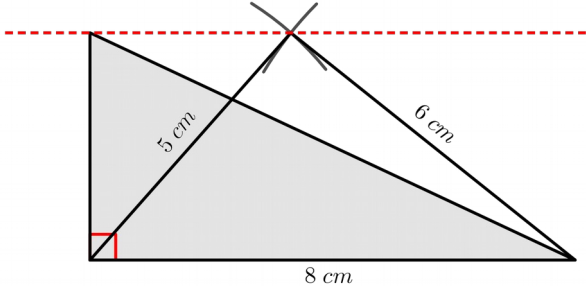


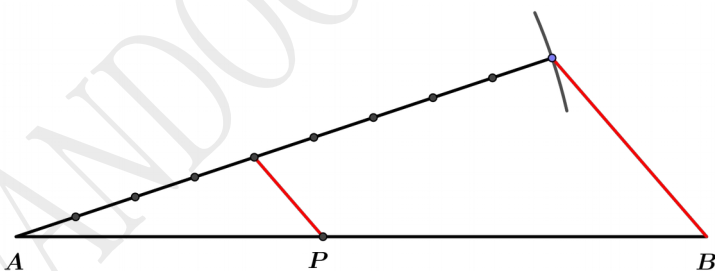
FIRST TERM EVALUATION 2024 - 2025

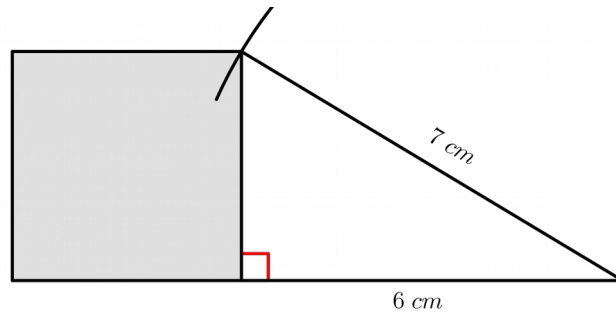
A

MATHEMATICS EM – ANSWER KEY

E-903

Qn no.	Key	Score
Each questions from 1 to 4 carries 2 scores. (Answer any 3)		
1	<p>Price of a pencil = $30 - 24 = 6$ Rs</p> <p>Price of a pen = $24 - 6 = 18$ Rs</p> <p><u>Algebraic method</u></p> <p>If we take the price of a pencil as x rupees and the price of a pen is y , then</p> $x + y = 24 \quad (1)$ $x + 2y = 30 \quad (2)$ <p>Subtracting equation (1) from equation (2) , we get $y = 30 - 24 = 6$</p> <p>Putting $y = 6$ in equation (1) ,we get $x + 6 = 24 \implies x = 24 - 6 = 18$</p>	<p>1</p> <p>1</p> <p>2</p>
2	<p>a) Length of the diagonal of the small square = 4 cm</p> <p>b) Area of the small square = $\frac{16}{2} = 8$ sq.cm</p> <p>[Area of the square drawn on the diagonal of the small circle = $4 \times 4 = 16$ sq.cm</p> <p>Area of the square drawn on the diagonal of the small circle twice the area of the small square]</p>	<p>1</p> <p>1</p> <p>2</p>
3	<p>a) $\frac{3}{10} = 0.3$</p> <p>b) $0.003 = \frac{3}{1000}$</p>	<p>1</p> <p>1</p> <p>2</p>
4	$(x + 1)(y + 1) = xy + x + y + 1 = 315 + 36 + 1 = 352$	<p>2</p> <p>2</p>
Each questions from 5 to 10 carries 3 scores. (Answer any 4)		
5	<p>For drawing triangle of sides 5,6 and 8 cm.</p> <p>For drawing a line parallel to 8 cm long side through its opposite vertex.</p> <p>For drawing a line perpendicular to 8cm long side and completing the triangle .</p> 	<p>1</p> <p>1</p> <p>1</p> <p>3</p>
6	<p>Numbers = $\frac{29 + 5}{2}$, $\frac{29 - 5}{4}$</p> <p>= $\frac{34}{2}$, $\frac{24}{4}$ = 17 , 12</p>	<p>2</p> <p>1</p> <p>3</p>

	<p><u>Algebraic method</u></p> <p>If we take the numbers as x and x, then</p> $x + y = 29 \quad (1)$ $x - y = 5 \quad (2)$ <p>Adding equation (1) and equation (2), we get</p> $x + y = 29 \quad +$ $x - y = 5$ $2x + 0 = 34 \quad \implies x = \frac{34}{2} = 17$ <p>Putting $x = 17$ in equation (1), $17 + y = 29 \implies y = 29 - 17 = 12$</p> <p>Numbers = 17, 12</p>		
7	<p>a) $AP : AB = 2 : 6 = 1 : 3$</p> <p>b) $AP : AB = AQ : AC \implies \frac{1}{3} = \frac{AQ}{9}$</p> $AQ = \frac{9}{3} = 3 \text{ cm}$	1 1 1	3
8	<p>a) $0.333 \dots + 0.777 \dots = \frac{3}{9} + \frac{7}{9} = \frac{10}{9}$</p> <p>b) $\sqrt{0.444 \dots} = \sqrt{\frac{4}{9}} = \frac{2}{3}$</p>	2 1	3
9	<p>For drawing a line of length 11 cm .</p> <p>For drawing a slanted line of length 9 cm at one end of the above line.</p> <p>For dividing the above line in the ratio 4 : 5</p>  <p>$AP : PB = 4 : 5$</p>	1 1 1	3
10	<p>a) $\sqrt{12} \times \sqrt{27} = \sqrt{2 \times 2 \times 2} \times \sqrt{3 \times 3 \times 3} = 2\sqrt{3} \times 3\sqrt{3} = 2 \times 3 \times 3 = 18$</p> <p>b) $\sqrt{\frac{1}{12}} \times \sqrt{\frac{4}{27}} = \frac{\sqrt{4}}{\sqrt{12} \times \sqrt{27}} = \frac{2}{18} = \frac{1}{9} = 0.111 \dots$</p>	1 2	3
Each questions from 11 to 21 carries 4 scores. (Answer any 8)			
11	<p>a) $13 = 7^2 - 6^2$</p> <p>b) Draw a right triangle as one of the perpendicular side is 6 cm and hypotenuse 7cm</p> <p>Draw a square with side as another perpendicular side of the above triangle.</p>	1 1 2	4



12

	Age	
	Present	After 6 years
Rajan	x	$x + 6$
Babu	y	$y + 6$

$$x + y = 60 \quad (1)$$

$$x + 6 = 3(y + 6) \implies x + 6 = 3y + 18 \implies x = 3y + 12 \quad (2)$$

Putting $x = 3y + 12$ in equation (1), then

$$3y + 12 + y = 60 \implies 4y + 12 = 60 \implies 4y = 48 \implies y = \frac{48}{4} = 12$$

$$\text{Putting } y = 12 \text{ in equation (2), } x = 3 \times 12 + 12 = 36 + 12 = 48$$

Present age of Rajan = 48 years

Present age of Babu = 12 years

Another method

	Age	
	Present	After 6 years
Rajan	x	$x + 6$
Babu	$60 - x$	$66 - x$

$$x + 6 = 3(66 - x) \implies x + 6 = 198 - 3x \implies x + 3x = 192 - 6$$

$$\implies 4x = 192 \implies x = \frac{192}{4} = 48$$

Present age of Rajan = 48 years

Present age of Babu = $60 - 48 = 12$ years

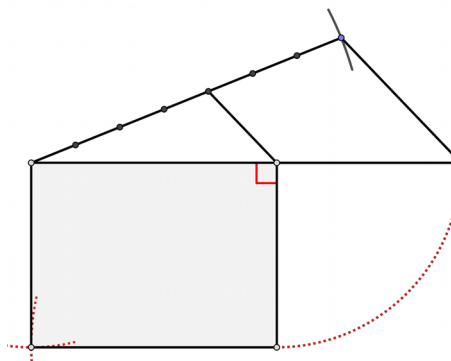
13

For drawing a line of length 9 cm .

For drawing a slanted line of length 7 cm at one end of the above line.

For dividing the above line in the ratio 4 : 3

For completing the rectangle. .



14	<p>a) 1 (36 = 5 × 7 + 1)</p> <p>b) 5n + 2</p> <p>c) (5n + 1)(5n + 2) = 5n × 5n + 5n × 2 + 5n × 1 + 1 × 2</p> <p style="text-align: center;">$= 25n^2 + 10n + 5n + 2 = 25n^2 + 15n + 2$</p> <p style="text-align: center;">$= 5(5n^2 + 3n) + 2$</p> <p>Remainder obtained on dividing by 5 = 2</p>	1 1 1 1	4								
15	<p>a) $BD = \frac{4}{2} = 2\text{ cm}$</p> <p>In right triangle ADB ,</p> <p style="text-align: center;">$AD^2 = 4^2 - 2^2 = 16 - 4 = 12 \implies AD = \sqrt{12} = \sqrt{2 \times 2 \times 3} = 2\sqrt{3}\text{ cm}$</p> <p>b) Perimeter of triangle ADB = 4 + 2 + 2√3 = 6 + 2√3</p> <p style="text-align: center;">$= 6 + 2 \times 1.732 = 6 + 3.464 = 9.464\text{ cm}$</p>	1 1 1 1	4								
16	<p>a) Area of triangle APD = Area of triangle BPC</p> <p>b) If the area of triangle APD is taken as x sq.cm ,</p> <p style="text-align: center;">$\frac{\text{Area of triangle APD}}{\text{Area of triangle APB}} = \frac{DP}{PB} \implies \frac{x}{12} = \frac{DP}{PB}$</p> <p style="text-align: center;">$\frac{\text{Area of triangle DPC}}{\text{Area of triangle BPC}} = \frac{DP}{PB} \implies \frac{3}{x} = \frac{DP}{PB}$</p> <p style="text-align: center;">$\frac{x}{12} = \frac{3}{x} \implies x \times x = 3 \times 12 \implies x^2 = 36 \implies x = \sqrt{36} = 6$</p> <p>∴ Area of triangle APD = 6 sq.cm</p> <p>c) Total area of the trapezium = 6 + 12 + 6 + 3 = 27 sq.cm</p>	1 1 1 1	4								
17	<p>a)</p> <table border="1" style="margin: auto;"><tr><td>2</td><td>3</td></tr><tr><td>9</td><td>10</td></tr></table> <p>b)</p> <table border="1" style="margin: auto;"><tr><td>x</td><td>x + 1</td></tr><tr><td>x + 7</td><td>x + 8</td></tr></table> <p>c) (x + 1)(x + 7) = x × x + x × 7 + x × 1 + 1 × 7 = x² + 7x + x + 7 = x² + 8x + 7</p> <p style="text-align: center;">$x(x + 8) = x \times x + x \times 8 = x^2 + 8x$</p> <p>Difference of the diagonal products = 7</p>	2	3	9	10	x	x + 1	x + 7	x + 8	1 1 1 1	4
2	3										
9	10										
x	x + 1										
x + 7	x + 8										
18	<p>a) 29 × 49 = (30 − 1)(50 − 1) = 30 × 50 − (30 + 50) + 1 = 1500 − 80 + 1 = 1421</p> <p>b) If we take the natural numbers as x and y , then</p> <p style="text-align: center;">$(x - 1)(y - 1) = xy - (x + y) + 1 = 112 - 23 + 1 = 90$</p>	2 2	4								

19	<p>a) $AB = 2 \times 14 = 28 \text{ cm}$</p> <p>b) $AC = 2 \times 13 = 26 \text{ cm}$, $BC = 2 \times 15 = 30 \text{ cm}$ Perimeter of triangle ABC = $28 + 26 + 30 = 84 \text{ cm}$</p> <p>c) Area of triangle ABC = $4 \times$ Area of triangle PQR = $4 \times 84 = 336 \text{ sq.cm}$</p> <p>[Since $AP = BP = QR$, $BQ = CQ = PR$, $AR = CR = PQ$, triangles APR , BPQ , CQR and PQR are equal . So their areas are equal]</p>	1 1 1 1	4
20	<p>a) $x + y = \frac{34}{2} = 17$ (1)</p> <p>b) $5x + 3y = \frac{142}{2} = 71$ (2)</p> <p>c) Multiplying equation (1) by 5 ,then $5x + 5y = 17 \times 5 = 85$ (3) Subtracting equation (1) from equation (3) ,</p> $\begin{array}{r} 5x + 5y = 85 \\ - 5x + 3y = 71 \\ \hline 0 + 2y = 14 \end{array} \implies y = \frac{14}{2} = 7$ <p>Putting $y = 7$ in equation (1) ,then $x + 7 = 17 \implies x = 10$ Length of the class room = 10 m , breadth = 7 m</p>	1 1 1 1	4
21	<p>a) $\angle ACD = 180^\circ - (90^\circ + 45^\circ) = 180^\circ - 135^\circ = 45^\circ$</p> <p>b) $CD = 4 \text{ cm}$ In right triangle BDC , $BD^2 = BC^2 - CD^2 = 8^2 - 4^2 = 64 - 16 = 48$ $BD = \sqrt{48} \text{ cm}$</p> <p>c) Area of triangle ABC = $\frac{1}{2} \times (4 + \sqrt{48}) \times 4 = 8 + 2\sqrt{48} \text{ sq.cm}$</p>	1 1 1 1	4
Each questions from 22 to 29 carries 5 scores. (Answer any 6)			
22	<p>a) $x + y = \frac{30}{2} = 15$</p> <p>b) $(x - 2)(y - 2) = xy - 2(x + y) + 4 = 36 - 2 \times 15 + 4 = 36 - 30 + 4 = 10 \text{ sq.cm}$</p> <p>c) $(x + 1)(y + 1) = xy + x + y + 1 = 36 + 15 + 1 = 52 \text{ sq.cm}$</p>	1 2 2	5
23	<p>If we take first number as x and the second number as y , then</p> <p>$3x + 4y = 37$ (1)</p> <p>$5x - 2y = 27$ (2)</p> <p>Multiplying 2 by equation (2) , then $10x - 4y = 27 \times 2 = 54$ (3)</p> <p>Adding equation (1) and equation (3) , then</p>	1 1 1	5

	$\begin{array}{r} 3x + 4y = 37 \quad + \\ 10x - 4y = 54 \\ \hline 13x + 0 = 91 \end{array} \implies x = \frac{91}{13} = 7$ <p>Putting $x = 7$ in equation (1), then $3 \times 7 + 4y = 37$</p> $\implies 21 + 4y = 37 \implies 4y = 16 \implies y = \frac{16}{4} = 4$ <p>Numbers = 7, 4</p>	1	
24	<p>a) $AG : GP = 2 : 1$</p> <p>b) $AG = \frac{2}{3} \times 12 = 8 \text{ cm}$</p> <p>$GP = \frac{1}{3} \times 12 = 4 \text{ cm}$</p> <p>c) In triangle ABC, $PQ = \frac{18}{2} = 9 \text{ cm}$ [AQ = CQ, BP = CP]</p> <p>In triangle ABG, $XY = \frac{18}{2} = 9 \text{ cm}$ [AX = XG, BY = YG]</p>	1 1 1 1 1	5
25	<p>a) Length of the second rectangle = $x + 1$ and breadth = $y - 1$</p> <p>b) $(x + 1)(y - 1) = xy - 19$</p> <p>c) $xy - (x - y) - 1 = xy - 19 \implies xy - [(x - y) + 1] = xy - 19$</p> <p>$(x - y) + 1 = 19 \implies x - y = 18$</p> <p>d) $(x - 1)(y + 1) = xy + x - y - 1 = xy + 18 - 1 = xy + 17$</p> <p>Increment in area = 17 sq. cm</p>	1 1 1 1 1	5
26	<p>a) Length of the hypotenuse of the smallest right triangle = $\sqrt{2}$</p> <p>b) Length of the sides of the fourth right triangle = $2, 1, \sqrt{5}$</p> <p>c) Perimeter of the first right triangle = $1 + 1 + \sqrt{2} = 2 + \sqrt{2}$</p> <p>Perimeter of the fourth right triangle = $2 + 1 + \sqrt{5} = 3 + \sqrt{5}$</p> <p>Sum of the perimeters = $2 + \sqrt{2} + 3 + \sqrt{5} = 5 + \sqrt{2} + \sqrt{5} = 5 + 1.414 + 2.236 = 8.650$</p>	1 1 1 1 1	5
27	<p>a) $FD = 10 - 4 = 6 \text{ cm}$</p> <p>b) $AE : EC = AF : FD = 4 : 6 = 2 : 3$</p> <p>c) $AD : DB = AE : EC = 2 : 3$</p> <p>$\frac{2}{5} \times AB = AD \implies \frac{2}{5} \times AB = 10 \implies AB = 10 \times \frac{5}{2} = 25 \text{ cm}$</p> <p>d) Ratio of the areas of the triangles ADC and BDC = $AD : DB = AE : EC = 2 : 3$</p>	1 1 1 1 1	5
28	<p>a) Fraction = $\frac{x}{y}$</p> <p>b) $\frac{x-1}{y} = \frac{1}{2} \implies y = 2(x-1) \implies y = 2x - 2 \quad (1)$</p>	1 1	

	$\frac{x}{y+7} = \frac{1}{3} \implies y+7 = 3x \quad (2)$ <p>c) Putting $y = 2x - 2$ in equation (2) , then</p> $y+7 = 3x \implies 2x-2+7 = 3x \implies 2x+5 = 3x \implies x = 5$ <p>Putting $x = 5$ in equation (2) , then</p> $y = 2x - 2 \implies y = 2 \times 5 - 2 = 10 - 2 = 8$ <p>Fraction = $\frac{5}{8}$</p>	1 1 1	5
29	<p>a) $3^2 + 7 = 16 = 4^2$</p> <p>b) $15^2 = 225$</p> <p>c) $784 + 57 = 841$</p> <p>d) $1225 + (2 \times 35 + 1) = 36^2 \implies 1225 + 71 = 36^2$</p> <p>e) $n^2 + (2n + 1) = (n + 1)^2$</p>	1 1 1 1 1	5