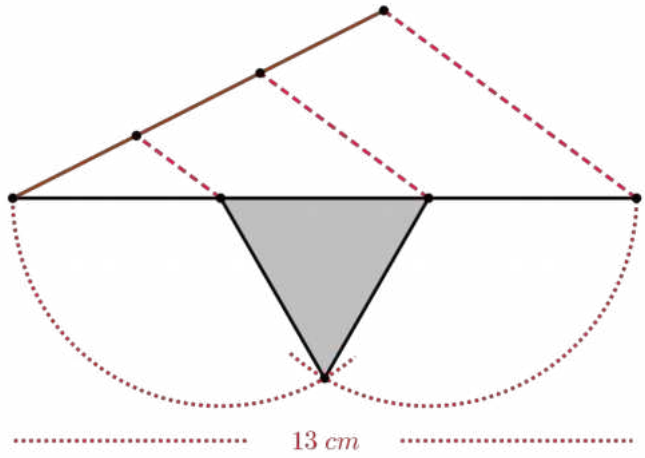
ANNUAL EVALUATION 2024 - 2025

A | **MATHEMATICS EM – ANSWER KEY** | **E-903**

Qn no.	Key	Score	
	Each questions from 1 to 4 carries 2 scores. (Answer any 3)		
1	Mean mark $= \frac{70+65+45+54+72+66+58+50}{8} = \frac{480}{8} = 60$	2	2
2	Numbers $= \frac{21+5}{2}$, $\frac{21-5}{2}$ $= 13$, 8	1 1	2
3	$r^2 = \frac{4\pi}{\pi} = 4$ $r = \sqrt{4} = 2\ cm$	1 1	2
4	Area of the shaded region is $\frac{40+50+30}{360} = \frac{120}{360} = \frac{1}{3}$ of the total area of the circle. Area of the unshaded region is $\frac{2}{3}$ of the total area of the circle.	1 1	2
	Each questions from 5 to 10 carries 3 scores. (Answer any 4)		
5	a) $BC = \sqrt{2^2 - 1^2} = \sqrt{3}$ b) Perimeter of the square having side $= 4 \times \sqrt{3} = 4 \times 1.73 = 6.92\ m$	1 2	3
6	a) Base area $= 6 \times \frac{\sqrt{3}}{4} \times 8^2 = 96\sqrt{3}\ sq.cm$ [∵ Area of the regular hexagon $= 6 \times \frac{\sqrt{3}}{4} \times a^2$] b) Volume $= 96\sqrt{3} \times 15 = 1440\sqrt{3}\ cubic\ cm.$ [∵ Volume = Base area × Height]	2 1	3
7	a) $AB = 2 \times 2 = 4\ cm$ [∵ $h = \frac{a}{2}\sqrt{3}$] b) Area of the triangle ABC $= \frac{\sqrt{3}}{4} \times 4^2 = 4\sqrt{3}\ sq.cm$ [∵ Area of the equilateral triangle $= \frac{\sqrt{3}}{4} \times a^2$]	1 2	3
8	a) $\frac{1}{4} \times 12 = 3\ cm$ [∵ Length of an arc of a circle is proportional to its central angle] b) $1\frac{1}{2} \times 3 = 4.5\ cm$ [∵ Lengths of the arcs of same central angle are proportional to the radii of the circles]	1 2	3
9	For drawing a line of length 13 cm . For dividing this line into three equal parts . For completing the equilateral triangle using one part of above as side.	1 1 1	3

			
10	a) $2\pi r$ b) Circumference of the circle proportional to the radius. Proportionality constant $= 2\pi$	1 1 1	3
	Each questions from 11 to 21 carries 4 scores. (Answer any 8)		
11	a) If we take radii as r and $2r$, heights as $4h$ and $3h$, then Ratio of the lateral surface areas $= 2\pi \times r \times 4h : 2\pi \times 2r \times 3h = 4 : 6$ $= 2 : 3$ b) Lateral surface area of the cylinder $= \frac{30}{2} \times 3 = 45\ sq.cm$	2 2	4
12	a) $p(0) = 2$ b) $p(1) = 1^2 + 3 \times 1 + 2 = 6$ c) $p(-1) = (-1)^2 + 3 \times (-1) + 2 = 0$ $\frac{p(1) + p(-1)}{p(0)} = \frac{6 + 0}{2} = 3$	1 1 1 1	4
13	a) Radius of the small semicircle $= \frac{4}{2} = 2\ cm$ b) Area of the large semicircle $= \frac{1}{2}\pi \times 4^2 = 8\pi\ sq.cm$ c) Area of the shaded region = Area of the large semicircle $- 2 \times$ Area of the small semicircle $= 8\pi - 2 \times \frac{1}{2} \times \pi \times 2^2 = 4\pi\ sq.cm$	1 1 1 1	4
14	a) $x = -2 + 5 = 3$ OR $x = -2 - 5 = -7$ b) $x = \frac{6 + (-2)}{2} = \frac{4}{2} = 2$	2 2	4
15	a) Area of the rectangle $= 6 \times 4 = 24\ sq.cm$ b) Area of the sector $= \frac{90}{360} \times \pi \times 4^2 = 4\pi\ sq.cm$	1 1	

	c) Area of the shaded region = Area of the rectangle − Area of the sector $= 24 - 4\pi \ \ sq.cm$	1 1	4
16	a) Base perimeter $= 5 + 12 + 13 = 30 \ cm$ b) Lateral surface area $= 30 \times 20 = 600 \ sq.cm$ [∵ Lateral surface area = Base perimeter × Height] c) Area of the triangle $= \frac{1}{2} \times 5 \times 12 = 30 \ sq.cm$ OR [$s = \frac{5 + 12 + 13}{2} = 15$ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{15 \times 10 \times 3 \times 2}$ $= 30 \ sq.cm$] Total surface area $= 2 \times 30 + 30 \times 20 = 660 \ sq.cm$ [∵ Total surface area = 2 × Base area + Lateral surface area]	1 1 1 1	4
17	a) If we take length of the rectangle as x and the breadth as y , then $(x-1)(y-1) = 99 \ ===> \ xy - x - y + 1 = 99 \ ===> \ xy - x - y = 98 \quad (1)$ $(x+1)(y+1) = 143 \ ===> \ xy + x + y + 1 = 143 \ ===> \ xy + x + y = 142 \quad (2)$ $(1) + (2) \ ===> \ xy = \frac{98 + 142}{2} = 120$ = Area of the rectangle b) $(2) \ ===> \ 120 + x + y = 142 \ ===> \ x + y = 22 \quad (3)$ $x - y = \sqrt{22^2 - 4 \times 120} = \sqrt{484 - 480} = \sqrt{4} = 2 \quad (4)$ From the equations (3) and (4) , we get $x = \frac{22 + 2}{2} = 12$, $y = \frac{22 - 2}{2} = 10$	1 1 1 1	4
18	a) Central angle of a sector $= \frac{4 \times 180}{6} = 120^0$ [∵ Sum of the angles of a regular hexagon $= 4 \times 180 = 720^0$] b) Perimeter of the regular hexagon $= 6 \times 6 = 36 \ cm$ c) Arc length of a sector $= \frac{120}{360} \times 2\pi \times 3 = 2\pi \ cm$ Perimeter of the shaded region = Perimeter of the regular hexagon + 6 × Arc length of a sector $= 36 + 12\pi \ cm$	1 1 1 1	4

19 a)

Length (cm)	Breadth (cm)
10	$\frac{100}{10} = 10$
4	$\frac{100}{4} = 25$

1 1

b) $xy = 100$ OR $x = \frac{100}{y}$ 1

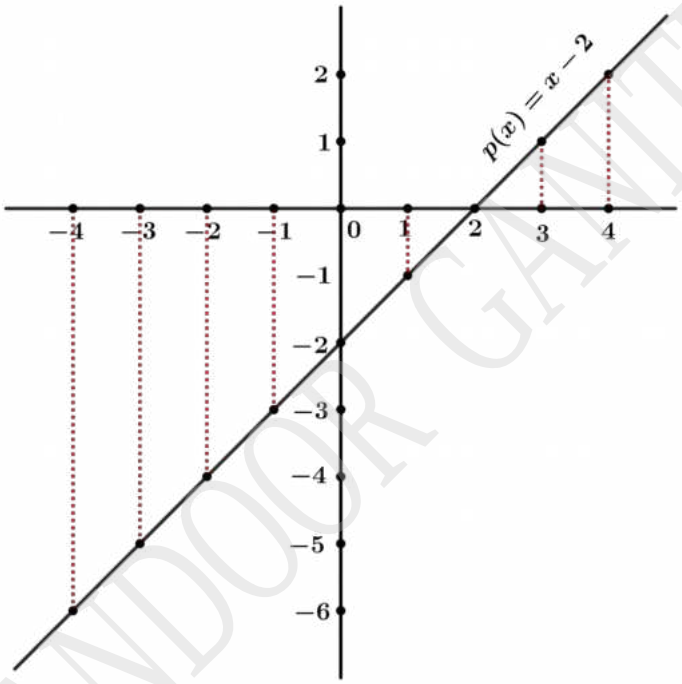
c) $x = \frac{100}{y}$ OR $y = \frac{100}{x}$ OR x and y are in inverse proportion. 1

4

20

x	-4	-3	-2	-1	0	1	2	3	4
$p(x)$	-6	-5	-4	-3	-2	-1	0	1	2

2



2

4

21

Age	Number of members	Total age
40	8	$40 \times 8 = 320$
45	6	$45 \times 6 = 270$
47	10	$47 \times 10 = 470$
50	7	$50 \times 7 = 350$
55	4	$55 \times 4 = 220$
58	5	$58 \times 5 = 290$
Total	40	1920

1 1 1 1

a) 40

b) Mean age $= \frac{1920}{40} = 48$

4

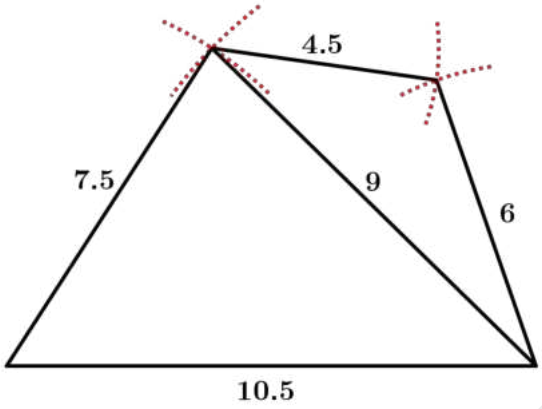
Each questions from 22 to 29 carries 5 scores. (Answer any 6)			
22	a) $\angle BAC = 60^0$ b) Area of the unshaded sector $= \frac{60}{360} \times \pi \times 6^2 = 6\pi \; sq.cm$ c) Area of the equilateral triangle $= \frac{\sqrt{3}}{4} \times \pi \times 10^2 = 25\sqrt{3}\pi \; sq.cm$ Area of the shaded region of the triangle = Area of the equilateral triangle - Area of the unshaded sector $= 25\sqrt{3} - 6\pi \; sq.cm$ Area of the shaded sector = Area of the circle - Area of the unshaded sector $= \pi \times 6^2 - 6\pi = 30\pi \; sq.cm$ OR [Area of the shaded sector $= \frac{300}{360} \times \pi \times 6^2 = 30\pi \; sq.cm$] Area of the shaded region = Area of the shaded sector + Area of the shaded region of the triangle $= 30\pi + 25\sqrt{3} - 6\pi = 24\pi + 25\sqrt{3} \; sq.cm$	1 1 1 1 1 1	5
23	a) Radius of the cylinder $= \frac{12}{2} = 6 \; cm$ b) Volume of the cylinder $= \pi \times 6^2 \times 25 = 900\pi \; cubic \; cm$ c) Volume of the remaining wax = Volume of the square prism - Volume of the cylinder $= 12^2 \times 25 - 900\pi = 3600 - 900\pi \; cubic \; cm$ Volume of the cube $= 1^3 = 1 \; cubic \; cm$ Number of the cubes $= \frac{Volume \; of \; the \; remaining \; wax}{Volume \; of \; a \; cube} = \frac{3600 - 900\pi}{1}$ $= 3600 - 900 \times 3.14 = 3600 - 2826 = 774$	1 1 1 1 1 1	5
24	a) $p(0) = 4$, $p(2) = 0$ b) Take $p(x) = ax^2 + bx + c$, then $p(0) = 4$ ==> $c = 4$ $p(1) = 0$ ==> $a \times 1^2 + b \times 1 + c = 0$ ==> $a + b = -4$ $p(2) = 0$ ==> $a \times 2^2 + b \times 2 + c = 0$ ==> $4a + 2b = -4$ $b = -6$, $a = 2$ $p(x) = 2x^2 - 6x + 4$	2 1 1 1	5
25	a) Lateral surface area of a pillar $= 4 \times \frac{40}{100} \times 4 = \frac{64}{10} \; sq.m$ b) Total cost $= 15 \times \frac{64}{10} \times 90 = 8640 \; Rs$	2 3	5

26

For calculating the sides as $1\frac{1}{2}$ times of the sides and diagonal of the given quadrilateral — 1

For drawing a triangle with sides 10.5 , 7.5 , 9 cm . — 2

For drawing another triangle with sides 9 , 4.5 , 6 cm and completing the quadrilateral. — 2



5

27

a) $\angle BCQ = 45^0$ — 1

b) $AC = \frac{2}{3} \times 12 = 8\ cm$ — 1

c) $CB = 12 - 8 = 4\ cm$ — 1

d) Area of the shaded region = Area of the large sector + Area of the small sector

$= \frac{90}{360} \times \pi \times 8^2 + \frac{45}{360} \times \pi \times 4^2$ — 1

$= 16\pi + 2\pi = 18\pi\ sq.cm$ — 1

5

28

Electricity consumption (Unit)	Number of households	Class mark	Total consumption
100 − 150	4	$\frac{100+150}{2} = 125$	$125 \times 4 = 500$
150 − 200	2	$\frac{150+200}{2} = 175$	$175 \times 2 = 350$
200 − 250	5	$\frac{200+250}{2} = 225$	$225 \times 5 = 1125$
250 − 300	6	$\frac{250+300}{2} = 275$	$275 \times 6 = 1650$
300 − 350	3	$\frac{300+350}{2} = 325$	$325 \times 3 = 975$
Total	20		4600

4

Mean consumption $= \frac{4600}{20} = 230\ unit$ — 1

5

29	a) $\left(\frac{1}{4}+\frac{1}{5}\right)\div\left(\frac{1}{4}-\frac{1}{5}\right)=9$	1	5
	b) 31 $\left[\left(\frac{1}{15}+\frac{1}{16}\right)\div\left(\frac{1}{15}-\frac{1}{16}\right)=31\right]$	1 1	
	c) $\left(\frac{1}{25}+\frac{1}{26}\right)\div\left(\frac{1}{25}-\frac{1}{26}\right)=51$	1	
	d) $P=\frac{1}{30}$ $\left[\left(\frac{1}{29}+\frac{1}{30}\right)\div\left(\frac{1}{29}-\frac{1}{30}\right)=59\right]$	1	
	e) $n+(n+1)=2n+1$ $\left[\left(\frac{1}{n}+\frac{1}{n+1}\right)\div\left(\frac{1}{n}-\frac{1}{n+1}\right)=2n+1\right]$		