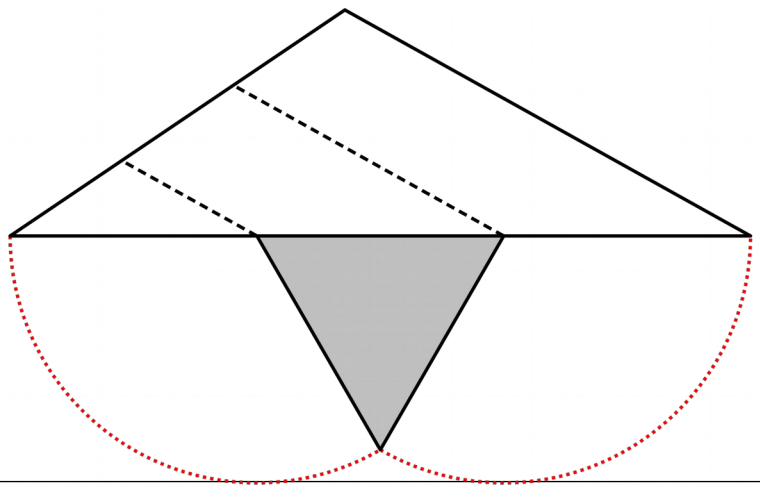
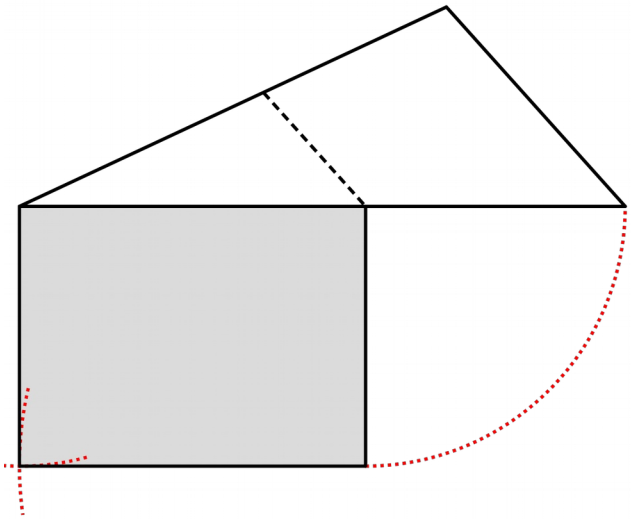
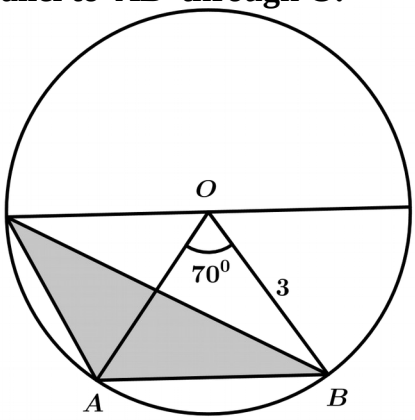
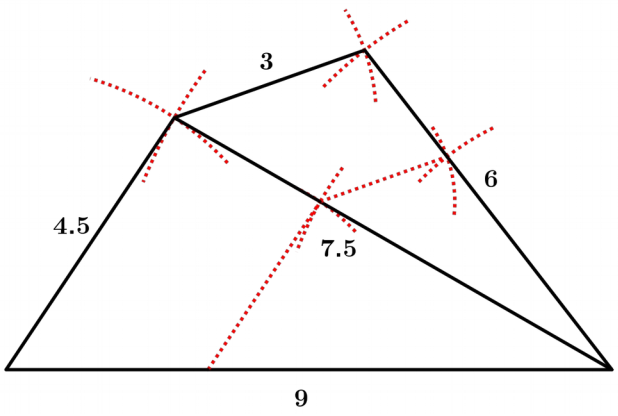
HALF YEARLY EVALUATION 2023 - 2024

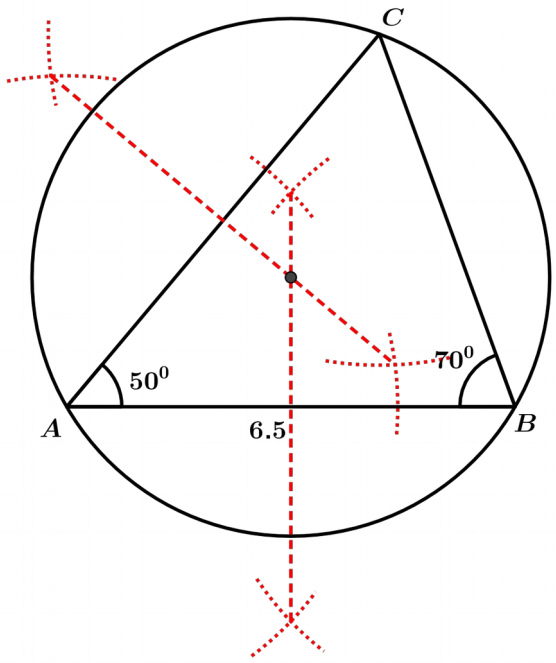
A . **MATHEMATICS EM – ANSWER KEY** **E-903**

Qn no.	Key	Score	
	Each questions from 1 to 4 carries 2 scores. (Answer any 3)		
1	a) $AF = \frac{12}{2} = 6\ cm$ b) $EF : BC = 1 : 2$	1 1	2
2	a) $PQ = 3 \times AB = 15\ cm$ b) $11 : 33 = 1 : 3$	1 1	2
3	a) $x^2 + 2$ b) $p(1) = 2 + 1 = 3$	1 1	2
4	a) $BC = \sqrt{3^2 - 1^2} = \sqrt{8}\ cm$ b) $4 + \sqrt{8}\ cm$	1 1	2
	Each questions from 5 to 10 carries 3 scores. (Answer any 4)		
5	a) $\angle AOC = 60^0$ b) $OC = 2\ cm$ c) $AB = 2AC = 4\sqrt{3}\ cm$	1 1 1	3
6	Fr drawing a line of length 11 cm and divide it into 3 equal parts. 	1 2	3
7	a) B b) Side of the regular hexagon $= 2\ cm$ Area $= 6\sqrt{3} \times \frac{2^2}{4} = 6\sqrt{3}\ sq.cm$	1 1 1	3

8	a) $\angle AED = 50^0$ b) $\angle C = 50^0$ c) $\frac{BC}{DE} = \frac{12}{4} = 3$	1 1 1	3
9	a) $0.333\ldots = \frac{3}{9}$ b) $\sqrt{0.4444\ldots} \times \sqrt{0.1111\ldots} = \sqrt{\frac{4}{9}} \times \sqrt{\frac{1}{9}} = \sqrt{\frac{4}{81}} = \frac{2}{9} = 0.2222\ldots$	1 2	3
10	a) $BD = 2 \times 2 = 4\ cm$ b) Area of $\Delta BDC = 12 \times \frac{2}{3} = 8\ sq.cm$ Area of $\Delta ADC = 12 + 8 = 20\ sq.cm$	1 1 1	3
	Each questions from 11 to 21 carries 4 scores. (Answer any 8)		
11	a) $AP = \frac{16}{2} = 8\ cm$ b) $CQ = \frac{30}{2} = 15\ cm$ $OQ = \sqrt{17^2 - 15^2} = 8\ cm$ c) $OP = \sqrt{17^2 - 8^2} = 15\ cm$ Distance between the chords $= OP + OQ = 15 + 8 = 23\ cm$	1 1 1 1	4
12	length + breadth $= \frac{18}{2} = 9\ cm$ For dividing a line of length in the ratio 4 : 3 	1 1 2	4

13	a) $a + b = 2$ $2a + b = 5$ b) $a = 5 - 2 = 3$ $b = 2 - 3 = -1$	1 1 1 1	4
14	a) $BD = \sqrt{5^2 - 4^2} = 3\ cm$ b) $BC = 3 + 3 = 6\ cm$ Perimeter of $\Delta ABC = 5 + 5 + 6 = 16\ cm$ c) ..... (Question is not clear)	1 1 2 ---	4
15	Fr drawing a line parallel to AB through O.  	1 3	4
16	a) If the numbers are taken as x and y , $x - y = 6$, $x^2 - y^2 = 48$ b) $x + y = \frac{x^2 - y^2}{x - y} = \frac{48}{6} = 8$ c) $x = \frac{8 + 6}{2} = 7$, $y = \frac{8 - 6}{2} = 1$	 2 1 1	4
17	a) $AM = \frac{24}{2} = 12\ cm$ b) $OM = r - 8$ c) Join OM and OA . $12^2 + (r - 8)^2 = r^2$ ==> $144 + r^2 - 16r + 64 = r^2$ $r = \frac{208}{16} = 13\ cm$	1 1 1 1	4
18	a) $AC = \sqrt{20^2 - 12^2} = 16\ cm$ b) $AN = CN = \frac{16}{2} = 8\ cm$ $AM = BM = \frac{20}{2} = 10\ cm$	1 1	

	$MN = \frac{BC}{2} = 6\ cm$ Perimeter of the small right triangle $= 6 + 8 + 10 = 24\ cm$	1 1	4
19	a) $PA = 6 - 4 = 2\ cm$ b) $OB : OQ = 4 : 6 = 2 : 3$ c) Triangles AOB and POQ are similar . $PQ = 3 \times \frac{3}{2} = 4.5\ cm$	1 1 1 1	4
20	a) length $= x + 2\ cm$ b) $p(x) = 2(x+2) + 2x = 4x + 4$ c) $a(x) = (x+2)\,x = x^2 + 2x$	1 2 1	4
21	a) Radius $= \frac{4\sqrt{2}}{2} = 2\sqrt{2}\ cm$ b) Area of the circle $= \pi \times (2\sqrt{2})^2 = 8\pi\ sq.cm$ c) Length of a side of the square $= 8\ cm$ Area of the square $= 8 \times 8 = 64\ sq.cm$	1 1 1 1	4
	Each questions from 22 to 29 carries 5 scores. (Answer any 6)		
22		4	4
23	a) $\angle ACD = 30^0$ b) $CD = \sqrt{3}\ cm$ c) $AD = 1\ cm$, $BD = CD = \sqrt{3}\ cm$ $BC = \sqrt{3} \times \sqrt{2} = \sqrt{6}\ cm$ Perimeter of $\Delta ABC = 3 + \sqrt{3} + \sqrt{6}\ cm$	1 1 1 1 1	5

24	a) length + breadth $= \frac{60}{2} = 30\ cm$ b) breadth $= 30 - x$ $a(x) = x(30 - x) = 30x - x^2$ c) $a(25) = 25(30 - 25) = 25 \times 5 = 125$ $a(5) = 5(30 - 5) = 5 \times 25 = 125$	1 1 1 1 1	5
25	a) $R + r = 12$ b) Area of the sector OAB $= \frac{45}{360} \times \pi R^2$ Area of the sector OCD $= \frac{45}{360} \times \pi r^2$ c) $\frac{45}{360} \times \pi R^2 - \frac{45}{360} \times \pi r^2 = 12\pi$ $R^2 - r^2 = 12\pi \times \frac{360}{45\pi} = 96$ $R - r = \frac{R^2 - r^2}{R + r} = \frac{96}{12} = 8$ $R = \frac{12 + 8}{2} = 10\ cm$, $r = \frac{12 - 8}{2} = 2\ cm$	1 1 1 1 1	5
26			5
27	a) $AQ : QC = AP : PD = 12 : 4 = 3 : 1$ b) $AR : BR = AP : PD = 3 : 1$ $AR = 3 \times BR = 9\ cm$	1 1 1	

	$AB = 9 + 3 = 12\ cm$ c) Perimeter of the parallelogram APQR $= 12 + 9 + 12 + 9 = 42\ cm$	1 1	5
28	a) Area of the square $= 4^2 = 16\ sq.cm$ b) Perimeter of the outer part $= 4 \times \frac{270}{360} \times 2\pi r = 12\pi\ cm$ c) Area of the shaded part $= 4 \times \frac{270}{360} \times \pi r^2$ $= 12\pi\ sq.cm$ **Another method** (Draw circles at the vertices of the square with the radius of the given sector . If we join the sectors lie inside the square , we get a full circle . So the perimeter of the outer part is the difference of the perimeters of the four circles and the perimeter of a circle. Also the area of the shaded part is the difference of the areas of the four circles and the area of a circle.) b) Perimeter of the outer part $= 4 \times 2\pi r - 2\pi r = 6\pi r = 6\pi \times 2 = 12\pi\ cm$ c) Area of the shaded part $= 4 \times \pi r^2 - \pi r^2 = 3\pi r^2 = 3\pi \times 2^2 = 12\pi\ sq.cm$	1 2 2	5
29	a) $\frac{1}{16} + \frac{1}{32} = \frac{3}{32} = \frac{3}{2^5}$ b) $\frac{3}{64}$ c) $\frac{3}{2^7}$ d) $\frac{3}{2^{11}}$ e) $\frac{3}{2^{n+1}}$	1 1 1 1 1	5