## Marking Scheme 4NA PRELIM 2023 EM Paper 2 4045/02

Qn	Working	Note
1a	342 - 9050	
	$\frac{36}{36} = 39.50$ [B1]	
1bi	$1.5 \times \$9.50 = \$14.25$ for 10 hours = \$142.50	
	$2 \times $9.50 = $19.00 \text{ for } 2 \text{ hours} = $38.00$	
	Total = 342 + 142.50 + 38 = \$522.50  [M1, A1]	
1bii	636.50 - 342 = \$294.50	
	\$294.50-\$142.50=\$152 [M1]	
	$152 \div 19 = 8hours$	
	36+10+8=54 [A1]	
2a	$9.2 \times \frac{350}{100} = 32.2$ [M1, A1]	
2b	$\frac{48}{8} = 5.5$ [M1]	
	$5.5 \times 100 = 550 km$ [A1]	
2c	200 km: $9.2 \times 2 = 18.4l$	
	160 km: $8.0 \times 1.6 = 12.8l$	
	360 km: 31.2 <i>l</i> [M1]	
	1 km: $\frac{31.2}{360} = 0.0867l$ [A1]	Minus one mark for 0.087 (less than 3sf)
2.1	10 loss [04]	
381 30jj	10  km [B1]	
Jan	$1 \text{ cm}^2$ $4 \text{ lm}^2$ [N41]	
	1cm =4km [[VI]]	
30111	$\frac{3cm^2 12km^2 [A1]}{1km 0.5cm}$	
Jam	1000m 0.5cm [M1]	
	$1000000m^20.25cm^2$	
	$1800000m^2$ $4.5 cm^2$ [A1]	
3h	$(-5)^{10}$	
00	$A = 50000 \left( 1 + \frac{5}{100} \right) = \$81444.73 \text{ [M1]}$	
	81444.73 - 50000 = \$31444.73 [M1,A1]	
4ai		
4aii	$\left \frac{2}{5}\right $ [B1]	

4aiii	$\frac{3}{[B1]}$	
	$\frac{1}{5}$	
4bi	08 26 [B1]	
4bii	484000 [M1]	Conversion from 484
	5h49 min	km to 484000m [M1]
	$-\frac{484000}{[M1]}$	
	20940	
	$= 23.1 \ m / s \ [A1]$	
		1
5ai	(x-9y)(x+9y)[B1]	
5aii	10 px - 15 qx + 6 py - 9 qy	
	=5x(2p-3q)+3y(2p-3q) [M1]	
	=(5x+3y)(2p-3q) [A1]	
5b	$\frac{3}{5} = 1$	
	x-2 $2x+1$	
	3(2x+1)-5(x-2)=(x-2)(2x+1)[M1]	
	$6x + 3 - 5x + 10 = 2x^2 + x - 4x - 2$	
	$2x^2 - 4x - 15 = 0$ [M1]	
	$4 \pm \sqrt{136}$ [M1]	Must show this step
	$x = \frac{1}{4}$	with $\sqrt{136}$ for M1
	=3.92  or  -1.92  [A1, A1]	
<u>6a</u>	Volume of hemisphere	<b>Did not</b> deduct marks for
<u>6</u> a	Volume of hemisphere = $\frac{1}{2} \times \frac{4}{2} \times \pi \times 3^3$ [M1]	<b>Did not</b> deduct marks for those who went to convert to cm <sup>2</sup> but did
<u>6</u> a	Volume of hemisphere = $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3^3$ [M1]	<b>Did not</b> deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct
<u>6</u> a	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$	<b>Did not</b> deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed
6a	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$	<b>Did not</b> deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= 1 - (2)^{2}$	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{3}  [M1]$	<b>Did not</b> deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
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6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1  M1]$	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$	<b>Did not</b> deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
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6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole $= 2\pi \times 0.25 \times 2  [M1]$ $= 3.141592654$	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole $= 2\pi \times 0.25 \times 2  [M1]$ $= 3.141592654$ Total surface area	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole $= 2\pi \times 0.25 \times 2  [M1]$ $= 3.141592654$ Total surface area = 87.76824476	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle – small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole $= 2\pi \times 0.25 \times 2  [M1]$ $= 3.141592654$ Total surface area = 87.76824476	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.
6a 6b	Volume of hemisphere $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 3^{3}  [M1]$ $= 56.54866776$ $= 56.5  [A1]$ Curve surface of hemisphere $= \frac{4\pi (3)^{2}}{2}  [M1]$ $= 56.54866776$ Big circle - small circle $= \pi (3)^{2} - \pi (0.25)^{2}  [M1, M1]$ $= 28.07798434$ Curved surface of pole $= 2\pi \times 0.25 \times 2  [M1]$ $= 3.141592654$ Total surface area = 87.76824476 Disagree because he would need more than 8 litres of paint to	Did not deduct marks for those who went to comvert to cm2 but did wrongly. Marked correct so long as they showed 56.5 in working.

7	$180 - 144 = 36^{\circ}$ [M1]	
	2x + 1 = 130 [M1]	
	2x = 129	
	$x = 64.5^{\circ}$ [A1]	
80		
oa	y = 1 [B1]	
8bi	$\frac{1}{2}$ [B1]	
8hii	2	
0011	$y = \frac{1}{2}x + 1$ [B1]	
	У	
	10-	
	9	
	8-	
	7	
	6-	
	5	
	3	
	2	
	$0^{1}$ 1 2 3 4 5 6 7 8 9 10 x	
9a	When $x = 3$ , $y = -2$ [B1]	
	When $x = 6$ , $y = 6.5$ [B1]	
9b	points [5 points B1, all points B2]	Graph at bottom
9c	$x = 4.7 \pm 0.1$ [B2, or M1, A1]	Draw $y = 2$ [M1]
9d	Draw tangent [M1] Cradient = 2.088 ± 0.5 [A1]	Drawing tangent [M1]
	Graaieni = 2.066±0.5 [A1]	

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10	$\frac{20}{100} \times 4990 = \$998$ [M1]	
	$212 \times 24 = $5088$ [M1]	
	Total = 998 + 5088 = \$6086	
	Extra amount	
	= 6086 - 4990	
	=\$1096	
	1096 1000/ 21.06 22.00/ [041.04]	
	$\frac{1}{4990} \times 100\% = 21.96 = 22.0\%$ [M1,A1]	Accept 22%
		-
11ai	0.7 [B1]	
11aii	1 4 [B1]	
11411	Angle and centre = 2 angles at circumference [B1]	
11bi	Area of minor sector	
	$=\frac{1}{-1}\times 6^2 \times 1.4$ [M1]	
	= 25.2  [A1]	
11bii	Area of triangle	
	$=\frac{1}{2} \times 10.76 \times 12 \times \sin 0.7$ [M1]	
	-415906	
	- +1.0 [AI]	
12ai	80-26	
	= 54 [B1]	
12aii	550 [B1]	
12aiii	680-420 = 260 [M1, A1 or B2]	
12b	$\frac{10}{10} \times \frac{26}{10} = \frac{13}{10}$ [M1 A1]	
	80 79 316	
12c	The <b>interquartile range</b> for Factory B is <b>higher</b> at \$620 than Factory	Must indicate the
	A mulcaung a greater spread. [B1]	bolded words.
	The <b>median</b> wage of Factory B is <b>higher</b> at \$600 than Factory A at	and median one mark
	\$550 indicating the workers are <b>paid better</b> at Factory B. [B1]	given
	1	

