4NA 2020 Preliminary Exam PAPER 2

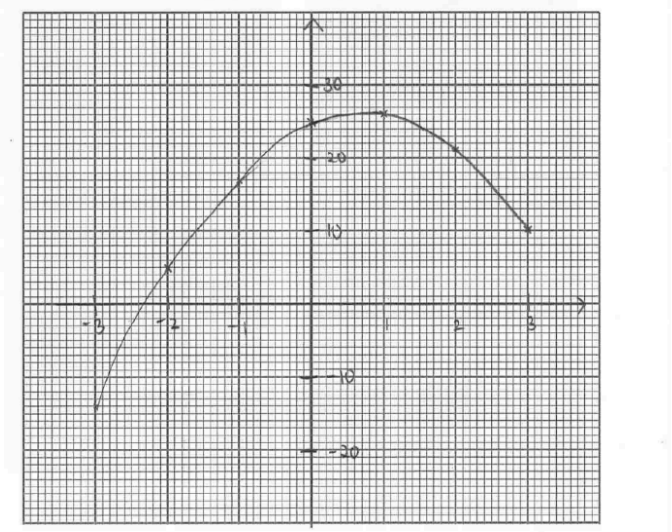
ANSWERS

Question	Answer	Marks
1	(a) 2.3×10^5	B1
	(b) $7.5\times1000\times1000\times1000$ $=7.5\times10^9$	M1 (correct conversion) A1
	(c) $\frac{distance}{time}$ $=\frac{36.2}{1.15}$ $=31\frac{11}{23}h=31.5\ (3s.f.)$	B1
2	(a) 0.130 (3 s.f.)	B1
	(b) $\frac{0.005\times3^2}{10}$ $=0.0045$	M1 A1
3(a)	$Exterior$ angle $=180-156$ $=24$ $Number$ of sides $=\frac{360}{24}$ $=15$ $n+7=15$ $n=8$	M1 (find ext angle) M1 A1

3(b)	$6x+5y=7--(1)$ $6x+2y=10--(2)$ $(2)-(1)$ $(6x+2y)-(6x+5y)=10-7$ $-3y=3$ $y=-1$ $sub\ \ y=-1\ \ \text{int}\, o\ \ (1)$ $6x+5(-1)=7$ $6x=7+5$ $x=2$	M1 A1 A1
4(a)	$\frac{24190}{102.5}\times 100$ $=23600$	M1 A1
4(b)	$24190-20000$ $=4190$ $\frac{2}{100}\times 4190$ $=83.80$	M1 A1
5(a)	$\left(m-\frac{6}{2}\right)^2-\left(\frac{-6}{2}\right)^2-20$ $=(m-3)^2-9-20$ $=(m-3)^2-29$	M1 A1

5(b)	$m^2 - 6m - 20 = 0$ $(m-3)^2 - 29 = 0$ $(m-3)^2 = 29$ $m - 3 = \pm\sqrt{29}$ $m = 3 + \sqrt{29} \quad or \quad 3 - \sqrt{29}$ $m = 8.39 \ or \ -2.39$	M1 A1
6(a)	$x^2 - 4^2$ $= (x-4)(x+4)$	B1
6(b)	$\frac{x^2 - x - 12}{x^2 - 16} \div \frac{x-6}{x+4}$ $= \frac{x^2 - x - 12}{x^2 - 16} \times \frac{x+4}{x+6}$ $= \frac{(x-4)(x+3)}{(x-4)(x+4)} \times \frac{(x+4)}{(x+6)}$ $= \frac{x+3}{x+6}$	M1 (KFC for division) M1 (factorise denominator A1
7(a)	$\tan x = \frac{27}{24}$ $x = 48.366$ $x = 48.4^o$ By Alternate angle, angle of depression is 48. 4°.	M1 A1
(b)	$\tan 48.4 = \frac{60}{AC}$ $AC = 53.270$ $AC = 53.3$	M1 A1

8(a)	$150 = \frac{1}{3}\pi(3)^2 h$ $h = \frac{450}{9\pi}$ $h = 15.9 \ \ (shown)$	M1 (sub into the equation) A1
(b)	$l = \sqrt{3^2 + 15.9^2}$ $= 16.181$ $SA \ of \ \ cone = \pi(3)(16.181)$ $= 152.50$ $SA \ of \ \ sphere = 2\pi(3)^2$ $= 56.549$ $TSA = 152.50 + 56.549$ $= 209.05$ $= 209$	M1 (PT) M1 (surface area of either one) A1
9(a)	$\frac{1.5}{BC} = \frac{2.1}{8.4}$ $BC = 6$	M1 A1
(b)	$300 \times 0.2306 = 69.18$ $25 \times 0.0961 = 2.4025$ $0.55 \times 20 = 11.00$ $0.85 \times 10 = 8.5$ $total = 2.4025 + 11 + 8.5 + 69.18 = 91.0825$ $\frac{107}{100} \times 91.0825$ $= 97.46$	 M1 (finding water correctly) M1 (total before gst) A1
10 (a)	$p = 18$ $q = 10$	B1 B1

(b)		M1 – scale M1- all points M1-smooth curve
(c)	$y = 26.3$	
11(a)	X=14 , y=47	B1, B1
(b)	25th March	B1
(c)	266-114=152	B1
(d)	$\frac{631-345}{345}\times 100$ $= 82\frac{62}{69}\%$	
(e)	$\frac{12+14+17+23+47+32+40+47+23+54+49+73}{12}$ $= 35\frac{11}{12}$	
12(a)	(i) $160-126=34$	B1
	(ii) $P = \frac{34}{160} = \frac{17}{80}$	

	$\frac{25}{100}\times 160 = 40$ $LQ = 38$ $\frac{75}{100}\times 160 = 120$ $UQ = 58$ $IQ = 58 - 38$ (ii) $= 20$	M1 (finding wither UQ or LQ correctly) A1
(b)	(i) $mean = 52.1$ $s\tan dard\ \ deviation = \sqrt{\frac{94250}{34} - \left(\frac{1770}{34}\right)^2}$ $= 7.87$	B1 M1 A1
	(ii) The students in 4H were heavier as they had a larger mean weight. The weight of the students in 4H were more consistent as they had a lower standard deviation.	B1 B1
13(a)	$180 - 105 = 75$ $\angle ABC = 30 + 75 = 105\ \ (shown)$	M1 A1
(b)	$AC^2 = 187^2 + 232^2 - (187)(232)\text{Cos}105$ $AC^2 = 100021.6055$ $AC = 316$	M1 (use cosine rule) M1 A1
(c)	$area\ \ of\ \text{sec}tor = \frac{1}{2}(7)(7)(1.75)$ $= 42.875$ $area\ \ of \Delta = \frac{1}{2}(7)(7)\sin 1.75$ $= 24.108$ $area\ \ of\ \ \ shaded = 42.875 - 24.108$ $= 18.767$	M1 M1 A1