2023 E Math 4NA PRELIM Paper 2 Marking Scheme

Soluti	ons	T	
1a	$(2)^{-2}$, $\sqrt{-1}$		
	$\left[\left(\frac{3}{3} \right)^{+} \sqrt[3]{3} \right]$		
	-4.10(3sf)		
11	- 4.19 (381)		
10	3		
	$\frac{7.53-3.25}{2.71^{4}} = -1.4327 = -1.43$		
	2+4.3		
2a	Mean = fx/f		
	$= (1)(5) + (2)(3) + \dots / 25$		
	= 3.4		
26	$\frac{6}{3} \times 360$		
	25		
	$= 86.4^{\circ}$		
3	2160		
	$=2^4 \times 3^3 \times 5$		
3bi	$2160 = 2^4 \times 3^3 \times 5$		
	$2520 = 2^3 \times 3^2 \times 5 \times 7$		
	$\frac{10000}{1000} = \frac{10000}{1000} \times 10$		
	$HCI = 2^{2} \times 3^{3} \times 3$		
	= 360		
3bii	$2520 = 2^3 \times 3^2 \times 5 \times 7$		
	$2520 \text{ k} = 2^3 \times 3^2 \times 5 \times 7 \times 2 \times 5 \times 7$		
	$k = 2 \times 5 \times 7 = 70$		
49	3r 2r+1		
	$\frac{3N}{4} - \frac{2N+1}{5}$		
	4 5		
	$-\frac{(5)(3x)-4(2x+1)}{2}$		
	20		
	15r - 8r - 4		
	$=\frac{15x+5x+1}{20}$		
	$=\frac{7x-4}{1}$		
	20		
4 b	$\frac{7x^6}{2}$ \div $\frac{49x^3}{2}$		
	$2 \cdot 10$		
	$7x^6$ 10 (1 1 3)		
	$=\frac{1}{2} \times \frac{1}{49r^3}$ {keep, change, flip}		
	$5 x^3$		
	$=\frac{3x}{-}$		
1	7		

Soluti	ons	
5a	(H,1) (H,2) (H,3) (H,4) (H,5) (H,6)	
	(T,1) (T,2) (T,3) (T,4) (T,5) (T,6)	
5bi	4/12 = 1/3	
bii	3/12 = 1/4	
6a	a : b	
	8:6	
	b: c	
	9:3	
	a : b : c	
	× 3 24:18	
	$\times 2$ 18.6	
	$a \cdot b \cdot c$	
	$a \cdot b \cdot c$	
	24.18.0	
	4:3:1	
a :		
6D1	$5x \le 26$	
	$x \le 26/5$	
	$x \leq 5.2$	
ii	$\mathbf{x} = 5$	
7ai	$203000 = 2.03 \times 10^5$	
ii	$0.0001894 - 1.894 \times 10^{-4}$	
	0.0001074 - 1.074 × 10	
7h	$(5.2 \times 10^{a}) \times (2.5 \times 10^{b}) = k \times 10^{n}$ where $1 \le k \le 10^{n}$	
70	$(3.3 \times 10^{\circ}) \times (2.3 \times 10^{\circ}) = k \times 10^{\circ}$, where $1 \le k < 10^{\circ}$.	
	-13.23×10	
	$= 1.325 \times 10 \times 10^{a+b}$	
	$= 1.325 \times 10^{41011}$	
	$\mathbf{n} = \mathbf{a} + \mathbf{b} + 1$	
8 a	$a^2 = b^2 + c^2 - 2bc \cos A$ EU2 = $c^2 + 7^2 - 2(c)(7) = -5.50$	
	$\Gamma \Pi = 0^{-} + 7^{-} - 2(0)(7) \cos 55^{\circ}$	
	$EH^2 - 36.810$	
	FH = 6.0679	
	FH = 6.07 (3sf)	

Soluti	ons	
8b	sin PQR sin 100°	
	$\frac{1}{81} = \frac{122}{122}$	
	0.1 : 1000	
	$\sin POR = \frac{8.1 \sin 100^\circ}{100^\circ}$	
	2 12.2	
	$\sin POR = 0.6538$	
	DOP = 40.0% or 180.40.0% = 120.2% (roiset)	
	PQR = 40.8 of 180-40.8 - 139.3 (leject)	
	hence angle $PQR = 40.8^{\circ}$	
9	100% + 3.5% = 103.5%	
	103.5%	
	1% \$120	
	$100\% \implies 1200	
Oh		
90	$I = \frac{PRI}{m}$	
	100	
	(1000)(R)(2)	
	$50 = \frac{100}{100}$	
	50 = 20R	
	B = 50/20 = 2.5	
	K = 50/20 = 2.5	
9c	$\mathbf{T}_{r} = \left[\mathbf{r}_{r} \right]^{n}$	
	$P\left(1+\frac{1}{100}\right)$	
	$= 25000 \left(1 + \frac{3.7}{3.7} \right)^{3}$	
	(1 + 100)	
	= 29980.149	
	I = A - P	
	= 29980.149 - 25000	
	= 4980.149	
	$=4980.15$ {2 decimal place for \$ c)	
100	$P = (-1)^2 + (-1) + 4$	
IVa	$ \begin{array}{c} 1 - (-1) + (-1) + + \\ - 4 \end{array} $	
	- 4	
В		

Soluti	ons	
10 ci		
ii	Min point =(-0.5, 3.8) y =7.75 [7.6 to7.8]	
10d	Draw a line at $x = -1$ to the curve Gradient = 3 [2.8 to 3.2]	
11 a	$c^{2} = a^{2} + b^{2}$ (Pythagoras thm) $XY^{2} = XN^{2} + NY^{2}$ $XN^{2} = XY^{2} - NY^{2}$ $= 8^{2} - 3^{2}$ = 55 XN = 7.4162 = 7.42 (3 sf) (shown)	
11b	$\tan 40^{\circ} = \frac{XN}{NZ}$ $\tan 40^{\circ} = \frac{7.4161}{NZ}$ $NZ = \frac{7.4161}{\tan 40^{\circ}}$ $= 8.8382$ $= 8.84 (3sf)$	
11c	Area = $\frac{1}{2} \times base \times height [for rt-angled triangle]$ Base YZ = 3 + 8.8382 = 11.838 {don't use round off values} Area= $\frac{1}{2} \times 11.838 \times 7.4161$ = 43.895 = 43.9 cm ² (3 sf)	
11d	Volume of prism = area \times length = 43.895 \times 15	

Soluti	ons	
	$= 658.45 = 658 \text{ cm}^3 (3 \text{ sf})$	
12a	Area pf regular pizza	
	with radius = $22.5/2 = 11.25$ cm	
	$\frac{1}{4 - \pi r^2}$	
	$n = n - 2 + 42 + (11 + 25)^2$	
	= 3.142 (11.23)	
	$= 397.039 = 398 \text{ cm}^2$	
12b	<u>Compare Size (area)</u>	
	Area of large pizza = πr^2 = 3.142 (15) ² =706.95	
	Area of personal pizza = $3.142 (7.5)^2 = 176.737$	
	Area of regular pizza (from part a) = 397.659	
	I otal area of personal & regular	
	$= 176.737 + 397.659 = 574.40 \text{ cm}^2$	
	Hence the large pizza is bigger than both the	
	regular and personal pizza by 132.55 cm ²	
	compare cost	
	cost of one large pizza = $$36.30$	
	$\cos t$ of one personal + one regular	
	= \$[12 20 + 26 40]= \$38 60	
	The large pizza is cheaper by \$2.30	
	The large pizza is cheaper by \$2.50	
	Ans: was the waitress is correct A large $nizze$ cost	
	Alls. yes, the wattess is confect. A large pizza cost	
	iess and is bigger than both regular & personal	
	pizza	
12c	Area of regular pizza (from part a) = 397.659	
	Total area of 10 regular pizza (as needed)	
	$= 397.659 \times 10 = 3976.59 \text{ cm}^2$	
	Combo A	
	No. of personal pizza needed	
	=3976.59 ÷ 176.737	
	=22.5 = 24	
	{not 23 as package comes in 2 per set, must be even number}	
	Cost: 2 personal pizza cost \$22	
	24 personal pizza cost = $22 \times 24 + 2 = \$264$	
	Combo B	
	No. of large pizze needed	
	no. or large pizza needed	

Soluti	ons	
	$=3976.59 \div 706.95$	
	$=5.62 = 6$ {even number as package comes in 2 per set}	
	Cost: 2 large pizza cost \$66	
	6 large pizza cost = $6 \times 66 \div 2 = \$198$	
	$0 1 arge pizza cost = 0.000 \cdot 2 - 0.000$	
	Ange combo D is charge (by \$66)	
	Ans. combo B is cheaper (by \$00)	
13 ai	51	
	[scale: $10 \ sq = 20, 1 \ sq = 2 \ unit.$	
12	note the line is between 50 and 52, hence 51]	
13	$IQR = 62 - 41 = 21$ {61-41= 20 accepted}	
aii		
13	Cars slower than $80 \text{ km/h} = 94$	
aiii	Hence $100 - 94 = 6$ cars faster	
13bi	Road B . the median spped is faster than A	
	[median of A is 51, B is 60]	
ii		
	Road A. Its interquartile range is smaller	
	[IQR of A = 21, B = 70-20 = 50. Smaller IQR = more	
	consistent]	
14a	$4r = 2\pi r$	
	$4r - 2\pi$ (5)	
	4r = 31.4159	
	r = 7.8530 - 7.85 (3sf)	
14b	$r^2 - \pi r^2$	
140	i = kr	
	$l = \sqrt{\pi r^2}$	
14ci	Angle BAC = 60°	
	[angle at centre 120 is twice of circumference]	
14cii	Obtuse angle BOC = $360^{\circ} - 120^{\circ} = 240^{\circ}$	
	[angle at a point is 360]	
	major arc length	
	$= 240 / 360 \times 2 \pi$ (8)	
	=33.514 [do not round off]	
	Perimeter = 33.514 +8 +8	
	= 49.514	
	= 49.5 cm	
	{perimeter is arc length + 2 radius}	