2024 4NA Mathematics Prelim **Paper 1**

Marking Scheme

Qns	Workings	Mark Allocation
1a	0.00220	B1
1b	2.195×10^{-3}	B1
2	$2^5\times32=2^x$ $2^5\times2^5=2^x$ $5+5=x$ $x=10$	M1 convert $32=2^5$ A1
3	$-3y>15$ $y<\frac{15}{-3}$ $y<-5$ Largest integer: $y=-6$	 M1 A1
4a	$y=(2x+1)(x-1)$ $y=2x^2-x-1$ $a=2$	 B1
4b	$\frac{-0.5+1}{2}=0.25$ $x=0.25$	 B1
5	$\$35.90-\$29.90=\$6$ $\frac{6}{35.90}\times100\%$ $=16.7130919\%$ $=16.7\%$	 M1 A1 Accept $16\frac{256}{359}\%$
6	$\sqrt{(4-0)^2+(-2-6)^2}$ $=8.94427191$ $=8.94$	M1 A1
7a	$3780=2^2\times3^3\times5\times7$	B1
7b	$3780m=2^2\times3^3\times5\times7\times m$ $m=2\times5^2\times7^2$ $m=2450$	 B1
8	$LCM=3^2\times5$ $LCM=45$ After 45 minutes, the next timing will be 0815.	M1 A1

9	$5x-2y=19-----(1)$ $x+3y=-3-----(2)$ $(2)\times 5:$ $5x+15y=-15-----(3)$ $(3)-(1)$ $(5x+15y)-(5x-2y)=-15-19$ $17y=-34$ $y=-2$ $x+3(-2)=-3$ $x-6=-3$ $x=3$	M1 Substitution/Elimination B1 B1
10	$70\times 0.5+\frac{1}{2}(70+90)(t)=51$ $35+80(t)=51$ $80(t)=16$ $t=0.2$ $0.2+0.5=0.7$	M1 M1 A1
11a	$1:35000$ $20:700000$ $\frac{700000}{100000}=7$ km	B1
11b	1 cm : 0.35 km 1 cm^2 : 0.1225 km^2 $\frac{2.1}{0.1225}=17.142857=17.1$ cm^2 or $17\frac{1}{7}$ cm^2	M1 A1
12	$7-5x=(x+1)(3-2x)$ $7-5x=3x-2x^2+3-2x$ $2x^2-6x+4=0$ $(2x-2)(x-2)=0$ $2x-2=0$ *OR* $x-2=0$ $x=1$ *OR* $x=2$	M1 expansion M1 factorise A1

13a	$R = \frac{k}{C^2}$ $10 = \frac{k}{(0.5)^2}$ $k = 2.5$ $R = \frac{2.5}{C^2}$	 M1 A1
13b	$R = \frac{2.5}{C^2}$ $40 = \frac{2.5}{C^2}$ $C^2 = \frac{2.5}{40}$ $C^2 = 0.0625 / \frac{1}{16}$ $C = 0.25 / \frac{1}{4}$	 B1
14	$P\left(1+\frac{r}{100}\right)^n = 1685.40$ $P\left(1+\frac{6}{100}\right)^2 = 1685.40$ $P(1.1236) = 1685.40$ $P = \frac{1685.40}{1.1236}$ $P = 1500$	 M1 M1 A1
15	Let x m be the distance from cliff to A and y m be the distance from cliff to B. $\tan 60° = \frac{350}{x}$ $x = \frac{350}{\tan 60°}$ $x = 202.0725942$ $\tan 42° = \frac{350}{y}$ $y = \frac{350}{\tan 42°}$ $y = 388.7143802$ 388.7143802 – 202.0725942 = 186.641786	 M1 tangent M1

	= 187 m	A1
16a	$\frac{180(8-2)}{8}=135$	B1
16b	$\frac{180-135}{2}=22.5$	B1
16c	$\frac{360}{8}=45$	B1
17a	20 members	B1
17b	35%	B1
17c	$1-\frac{9}{20}=\frac{11}{20}$	B1
18a	$89250\div750=119$	B1
18b	$33201\div119=279$ 349 – 279 = 70 I do not agree with Jen. The same luggage cost \$70 cheaper (or 8330 ¥ more expensive) in Japan than in Singapore.	M1 ecf/convert \$349 to JPY M1 difference A1 disagree
19a	5 : 4 = 15 : 12 6 : 1 = 12 : 2 15 : 12 : 2	 M1 for either ratio A1
19b	$\frac{6}{2}\times29=87$	M1 for 1 unit – 3 A1
20a	$x^2+4x+3=(x+2)^2-2^2+3$ $x^2+4x+3=(x+2)^2-1$ $a=2, b=-1$	 B1 each
20b	$x^2+4x+3=0$ $(x+2)^2-1=0$ $(x+2)^2=1$ $x+2=1$ *or* $x+2=-1$ $x=-1$ *or* $x=-3$	 M1 A1
22a	9	B1
22b	3 + 10 – 7 – 4 = 2	B1
22c	$\frac{1(3)+2(10)+3(8)+4(x)+5(4)}{3+10+8+x+4}=3$ $\frac{67+4x}{25+x}=3$ $67+4x=75+3x$ $x=75-67$ $x=8$	M1 A1

23a	$\cos \angle QOR = \frac{5}{13}$ $\angle QOR = \cos^{-1} \frac{5}{13}$ $\angle QOR = 1.176005207$ $\angle QOR = 1.18$ rad	M1 A1
23b	$QR^2 = OR^2 - OQ^2$ $QR^2 = 13^2 - 5^2$ $QR = 12$ Arc length = $(5)(1.176005207)$ $= 5.880026035$ Perimeter $= 12 + 5.880026035 + (13 - 5)$ $= 25.88002604$ $= 25.9$ cm	M1 Pythagoras M1 Accept (5)(1.18) = 5.9 A1
23c	Area of triangle QOR $= \frac{1}{2}(12)(5)$ $= 30$ Sector area $= \frac{1}{2}(5)^2 (1.176005207)$ $= 14.70006509$ Area of shaded region $= 30 - 14.70006509$ $= 15.29993491$ $= 15.3$ cm^2	 M1 Sector Area A1