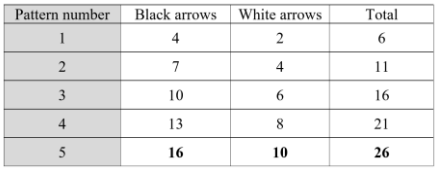
2023 4N Prelim P1 MS

1	$\frac{3}{11}$ $\sqrt[3]{0.02}$ 0.25 $0.\dot{2}$	B2 Deduct 1 mark for each error
2a	2 : 5	B1
2b	$\frac{1200}{150}\times 100\%$ = 800%	M1 A1
3	$-2x < -8$ $x > 4$ Smallest prime = 5	M1 A1
4	$P = \frac{k}{x^2}$ $20 = \frac{k}{(2.5)^2}$ $k = 125$ $P = \frac{125}{5^2}$ = 5	M1 A1
5a	Acute x = $\sin^{-1}(0.7) = 44.4$ Obtuse x = 180-44.4=135.6°	B1
5b	y = 180-123 = 57°	B1
6a	$m = 4(-5)^2 - 5$ = 95	B1
6b	$m = 4a^2 - 5$ $m + 5 = 4a^2$ $\frac{m+5}{4} = a^2$ $\pm\sqrt{\frac{m+5}{4}} = a$ $a = \pm\sqrt{\frac{m+5}{4}}$	M1 (isolate a^2) A1

7a	x = 180 – 140 = 40 They are interior angles between 2 parallel lines	B1 (mention interior and parallel)

7b	Angle a= = 62 (base angles of isos tri)
	Y = 180 – 62 (interior angles, // lines)
	= 118
		M1
		
		A1
		Deduct 1 mark if missing/ no reason

8	The trend may not be decreasing There are missing data for the months of March to June and August.	B2
9	$\frac{PQ}{7.5}=\frac{2x}{1.5x}$ $\frac{PQ}{7.5}=\frac{4}{3}$ PQ = 10 cm	M1 (or find scale factor = 4/3) A1
10	$x = 2(x + 3)$ $x = 2x + 6$ $– 6 = x$ $x = – 6$	 M1 (expand) A1
11	$1592.19=1500(1+\frac{r}{100})^5$ $1.06146=(1+\frac{r}{100})^5$ $1.06146^{\frac{1}{5}}=1+\frac{r}{100}$ $1.06146^{\frac{1}{5}}-1=\frac{r}{100}$ R = 1.20% (3sf)	M1 M1 (remove power 5) or attempt to solve A1
12ai	$405=3^4\times5$	B1
12aii	HCF = $3^2\times5$ =45	B1
12b	$Q^3=(2^3\times5^{6n})^2$ $Q^3=2^6\times5^{12n}$ $Q=2^2\times5^{4n}$	M1 A1
13	Remainder = 11/20 Food and shopping = 60% of (11/20) * 100% = 33%	M1 (find remainder) M1 (or find 40%) A1

14a	See BUY rate as bank is buying CAD 1 CAD = 1.0028 SGD 250 CAD = 250 x 1.0028 = 250.70 SGD	 M1, A1
14b	See SELL rate as bank is selling JYP 100 JPY = 0.9447 SGD 500 SGD = 500/0.9447 X 100 = 52926.855 = 52927 JYP	 M1 A1
15a		B1
15bi	2n	B1
15bii	5n+1	B1
15c	$5n+1=615$ $5n=614$ $n=122.8$ He is not correct as n is not a whole number when total has 615 arrows.	M1 A1
16a	$\frac{k-(-1)}{3-k}=3$ $\frac{k+1}{3-k}=3$ $k+1=9-3k$ $4k=8$ $k=2$ P is (2, -1)	M1 M1 or (attempt) to solve A1
16b	$y=mx+c$ $-3=3(5)+c$ $-3=15+c$ $-18=c$ $y=3x-18$	 M1 A1

Pattern number	Black arrows	White arrows	Total
1	4	2	6
2	7	4	11
3	10	6	16
4	13	8	21
5	**16**	**10**	**26**

17a	<table><tr><td>16</td><td>20</td><td>24</td></tr><tr><td>20</td><td>25</td><td>30</td></tr><tr><td>24</td><td>30</td><td>36</td></tr></table>	B2 Deduct 1 for each error
17bi	P (prime) = 6/36 = 1/6	B1
17bii	P(at most 20) = 1-6/36 = 5/6	B1
17biii	P(irrational) = 0	B1
18a	$x^2-6x-16$ $=x^2-6x+\left(\frac{-6}{2}\right)^2-16-\left(\frac{-6}{2}\right)^2$ $=(x-3)^2-25$ a = -3 and b = -25	M1 A1 OR B2
18bi	x = 3	B1
18bii	When y = 0, $(x-3)^2-25=0$ $(x-3)^2=25$ $x-3=\pm\sqrt{25}$ $x=\pm\sqrt{25}+3$ X = 8 or -2	M1 (solve) A1
19a	No he is not correct as the line AB has a positive gradient so it should be upward sloping.	M1 (positive m) A1 (upward slope)
19b	$x=\frac{-4+2}{2}=-1$ $y=-(-1+4)(-1-2)=9$ Max pt (-1, 9)	M1 (find x coord) or any other method A1
20a	$L=\sqrt{5^2+18^2}=\sqrt{349}$ Curved area = $\pi rL=\pi(5)(\sqrt{349})$ =293.4489707 = 293 cm^2	M1 M1 A1
20b	$293.4489707=\frac{\theta}{360}\times\pi(\sqrt{349})^2$ $\theta=96.4$ (1dp)	M1 A1

	Or $\frac{1}{2}(\sqrt{349})^2\theta = 293.4489707$ $\theta = 1.68\text{rad} = \frac{1.68}{\pi}\times 180°$ $= 96.4°$	
21	See construction	[4]