Suggested Marking Scheme 4NA Prelim P1 2023

<table>
<tr><td>1</td><td></td><td>$\frac{3}{5}(x+2)=-(x-1)$
$3x+6=-5x+5$
$8x=-1$
$x=-\frac{1}{8}$</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td>12units $\rightarrow$ 1200cm
3units $\rightarrow$ 300cm</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>3</td><td></td><td>$1-y<-10$
$-y<-11$
$y>11$

Smallest prime = 13</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>4</td><td></td><td>
<table>
<tr><th>Red box</th><th>Blue box</th></tr>
<tr><td>1</td><td>A</td></tr>
<tr><td>1</td><td>B</td></tr>
<tr><td>1</td><td>C</td></tr>
<tr><td>1</td><td>D</td></tr>
<tr><td>2</td><td>A</td></tr>
<tr><td>2</td><td>B</td></tr>
<tr><td>2</td><td>C</td></tr>
<tr><td>2</td><td>D</td></tr>
<tr><td>3</td><td>A</td></tr>
<tr><td>3</td><td>B</td></tr>
<tr><td>3</td><td>C</td></tr>
<tr><td>3</td><td>D</td></tr>
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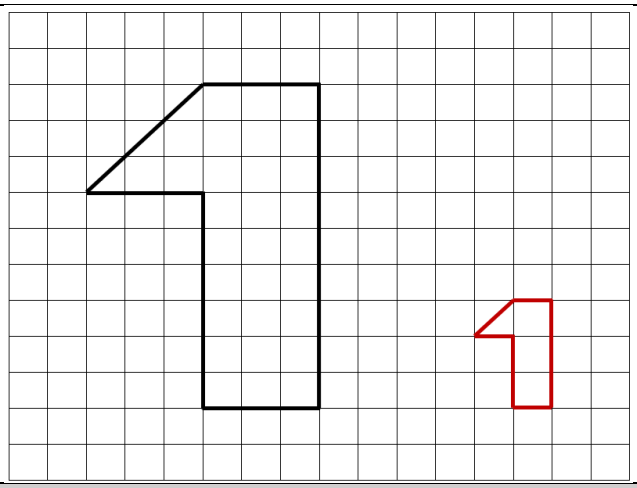
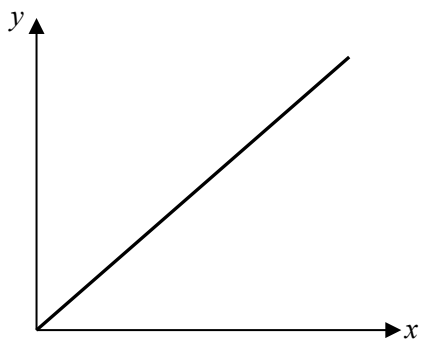
</table>

5		
6		5 seconds $\rightarrow$ 15 characters 60 seconds $\rightarrow$ 180 characters
7		$y=(x+1)(x-5)$ $y=x^2-4x-5$ $b=-4,\ c=-5$
8	(a)	$h=\frac{k}{r^2}$ $8=\frac{k}{(10)^2}$ $k=800$ $h=\frac{800}{r^2}$ $h=\frac{800}{(4)^2}$ $h=50$
	(b)	
9	(a)	$a=4$
	(b)	$5^3=125$

10	(a)	x^2+4x-9 $=(x+2)^2-9-4$ $h=2,\ k=-13$
	(b)	-13
11	(a)	$x^{-2}\times x^{\frac{1}{3}}=x^n$ $x^{-\frac{5}{3}}=x^n$ $n=-\frac{5}{3}$
	(b)	$\sqrt{\frac{y^8}{y^2}}$ $=\sqrt{y^6}$ $=y^3$
12		$\angle AED=48°$ (base angle of isosc. Δ) $\angle DEF=48°$ (congruent) $x°=48°+48°$ (alt. $\angle$s) $x=96$
13	(a)	6n-23
	(b)	$6n-23>50$ $6n>73$ $n>12.2$ $k=13$
14		$\tan\angle DCA=\frac{2.6}{3}$ $\angle DCA=\tan^{-1}\left(\frac{2.6}{3}\right)$ $\angle CAB=\angle DCA$ (alt. $\angle$s) Obtuse $\angle EAB=180°-\tan^{-1}\left(\frac{2.6}{3}\right)$ $=139.1°$

15

$AF = \sqrt{15^2 - 9^2}$

$= 12$

$\frac{DE}{5} = \frac{22.5}{15}$

$DE = 7.5$

$\frac{AG}{12} = \frac{22.5}{15}$

$AG = 18$

Area of triangle ADE

$= \frac{1}{2}(7.5)(18)$

$= 67.5 \text{ cm}^2$

16 (a)

$(2x-3)^2 = 4x^2 - 12x + 9$

(b)

$1 - \frac{2x}{2x-3}$

$= \frac{2x-3-2x}{2x-3}$

$= \frac{-3}{2x-3}$

$= \frac{-3(2x-3)}{(2x-3)^2}$

$= \frac{-6x+9}{(2x-3)^2}$

$a = -6,\ b = 9$

17

$2x + 5y = x + 4y + 7$

$x + y = 7$

$x + 1 = 3y$

$3y - 1 + y = 7$

$y = 2$

$x = 5$

Length = 20

Breadth = 6

$BD = \sqrt{20^2 + 6^2} = 20.9$

18 (a)

Time (*h* hours)	**Mid-value *x***	**Frequency *f***	***fx***

$0 < h \leq 2$	1	0	0
$2 < h \leq 4$	3	1	3
$4 < h \leq 6$	5	4	20
$6 < h \leq 8$	7	8	56
$8 < h \leq 10$	9	9	81
$10 < h \leq 12$	11	2	22
$12 < h \leq 14$	13	1	13
Total		25	195

Estimated mean $= \frac{195}{25}$

$= 7.8$

(b) The time is given in a range and we are not able to determine the exact amount of time spent studying for each student.

19 i

$L = \frac{110^\circ}{360^\circ} \times 2\pi(80)$

$L = 153.5889...$

$L = 154cm$

ii

Area of big sector = $L = \frac{110^\circ}{360^\circ} \times \pi(80)^2$

Area of small sector = $L = \frac{110^\circ}{360^\circ} \times \pi(45)^2$

Area of display = $\frac{110^\circ}{360^\circ} \times \pi(80)^2 - \frac{110^\circ}{360^\circ} \times \pi(45)^2$

$= 4199.698513$

$= 4200 \text{ cm}^2$

20		$m_{AB} = m_{AC}$ $\frac{2m-(-5)}{-m-4} = \frac{5-(-5)}{-16-4}$ $\frac{2m+5}{-m-4} = -\frac{1}{2}$ $2(2m+5) = -1(-m-4)$ $4m+10 = m+4$ $3m = -6$ $m = -2$
21	(a)	$\pi(10)(15) - \pi(3)(4.5)$ $= 429 \text{ cm}^2$
	(b)	$\frac{1}{3}\pi r^2 h = \frac{4}{3}\pi r^3$ $h = 4r$
22	(a)	Construct triangle: $\angle CAB = 98°$ $BC = 9.8$ cm (with construction arc)
	(b)	Construct angle bisector for $\angle CAB$
	(c)	Construct arc 2 cm from A Shade correct region
23	(a)	Total Cost $= 2(\$34.20) + 2(\$20.70)$ $= \$109.80$
	(b)	Total cost (before Wildpass discount) $= 2(\$43.20) + (\$20.00)$ $= \$106.40$ Total cost he pays $= \frac{80}{100} \times \$106.40$ $= \$85.12$
	(c)	Percentage increase $= \frac{43.20 - 34.20}{34.20} \times 100$ $= 26.3\%$