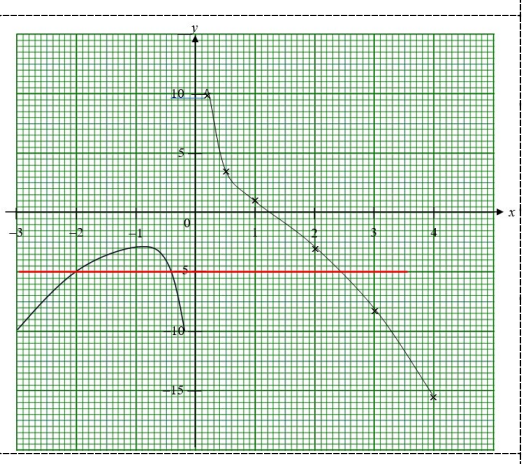
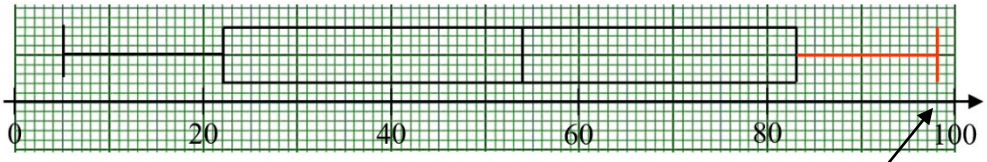
2024 4NA Prelim Paper 2 Answer Key

1	(a)	-1.5	(b)	2.42 (3 s.f.)
2		3.29×10^9		
3	(a)	$x = 6, y = 3$	(b)	$p = 2 \times 3 \times 7 = 42$
4		$x = 7,\ y = 4$		
5		The price in UK is cheaper.		
6	(a)	(i) 76 cm (ii) 61 cm	(b)	(i) 64.6 cm (ii) 12.7 cm
7		Rose should choose Plan A		
8		$QR^2 + PR^2 = 16^2 + 28^2 = 1\,040$ $PQ^2 = 34^2 = 1156$ Since $16^2 + 28^2 \neq 34^2$, $\angle PRQ$ is not a right angle. Hence, PQ is not a diameter.		
9	(a)	$\frac{46}{639}$ or 0.0720 (b) $\frac{145}{852}$ or 0.170	(c)	$\frac{1961}{2556}$ or 0.767
10	(a)	23.4° (1 d.p.) (b) 35.0 km^2	(c)	3.18 km
11	(a)	5 cm (b) 31.4 cm	(c)	2. 42 radians
12	(a)	\$568 (b) \$340.80	(c)	\$72.58
13	(a)	(i) 1.77 million (ii) 5.64 million (iii) 12.7%		
	(c)	219.5°		
14	(a)	-15.5	(b)	
	(c)	When $x = 0$, $\frac{2}{x}$ is undefined, so y is undefined.		
	(d)	$x = -2, -0.4$ or 2.45. (± 0.1)		
	(e)	Correct tangent drawn Gradient = 3.57 ± 0.2		
15	(a)	$\frac{4}{3}$ m/s^2 (b) 45	(c)	14.5 m/s (d) 86.4 km/h

16	(a)	(i) 20 (ii) 73	(iii)	66
	(b) (i)	 Max mark = 5+93 = 98 B1		
	(ii)	Interquartile range = 82 – 21 = 61	(c)	4H because 4H's interquartile range is smaller than 4I.

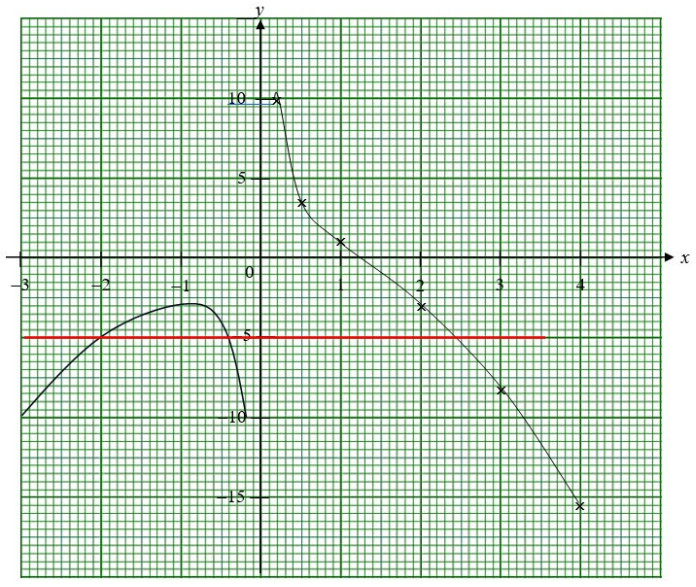
2024 4NA Prelim Paper 2 Marking Scheme

1	(a)	-1.5	B1	
	(b)	2.42 (3 s.f.)	B1	
2		3 292 498 114 $= 3.29 \times 10^9$	B1	
3	(a)	$8640 = 2^6 \times 3^3 \times 5$ $x = 6$, $y = 3$	 B1 B1	
	(b)	$p = 2 \times 3 \times 7 = 42$	B1	
4		$5x - 3y = 23$ ————(1) $2x + y = 18$ ————(2) (2) × 3: $6x + 3y = 54$ ————(3) (1) + (3): $11x = 77$ $x = 7$ Sub $x = 7$ into (2): $2 \times 7 + y = 18$ $y = 4$	 M1 M1 A1	
5		Price of Perfume in UK: £62.00 = S$ (62 ÷ 0.58) = S$ 106.90 (2 dp) Price of perfume in Singapore: S$102 × 1.09 = S$ 111.18 The price in UK is cheaper.	 M1 M1 A1	Accept S$102 × 1.09 = S$ 111.18 111.18 × £0.58 =£64.48 >£62
6	(a)(i)	Mode = 76 cm	B1	
	(ii)	Median = 61 cm	B1	
	(b)(i)	Mean = (43+51+57+60+61+73+76+76+84) ÷ 9 = 64.6 cm (3 s.f.)	M1 A1	
	(ii)	Standard deviation = 12.7 cm (3 s.f.)	B1	
7		Plan A's total interest after 5 years = $5000 × 3% × 5	M1	

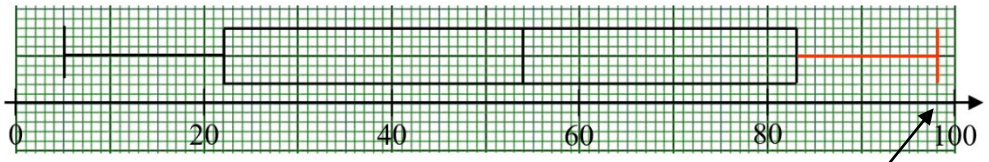
		= \$750 Plan B's interest after 5 years = \$5000 $(1+2.8\%)^5$ – \$5000 = \$740.31 (2 d.p.) Or Plan A's total amount = \$5000 × 3% × 5 + \$5000 = \$5750 = Plan B's total amount after 5 years = \$5000 $(1+2.8\%)^5$ = \$5740.31 < \$5750 Rose should choose Plan A <u>for higher interest (or higher total amount)</u> after 5 years	M1 M1 (M1) (M1) (M1) A1	For total amt of plan B For interest For simple interest For total amount Must provide reason
8		The sum of the square of the two shorted sides $=QR^2 + PR^2$ $= 16^2 + 28^2 = 1\,040$ The square of the longest side $PQ^2 = 34^2 = 1156$ Since $16^2 + 28^2 \neq 34^2$, $\angle PRQ$ is not a right angle. Angle in semicircle is not a right angle, so PQ is not a diameter.	M1 M1 A1	-1 mark If $16^2 + 28^2 = 34^2$, is seen from the beginning Must state angle in semicircle is not 90°
9	(a)	<table><tr><th></th><th>Boys</th><th>Girls</th><th>Total</th></tr><tr><td>4B</td><td>23</td><td>14</td><td>37</td></tr><tr><td>4C</td><td>19</td><td>16</td><td>35</td></tr><tr><td>Total</td><td>42</td><td>30</td><td>72</td></tr></table> $\frac{23}{72}\times\frac{16}{71}=\frac{46}{639}$ or 0.0720 (3 s.f.)	B1	
	(b)	$\frac{30}{72}\times\frac{29}{71}=\frac{145}{852}$ or 0.170 (3 s.f.)	B1	
	(c)	$1-\frac{35}{72}\times\frac{34}{71}$	M1	

		$= \frac{1961}{2556}$ 0r 0.767(3 s.f.)	A1	
10	(a)	$\cos \angle ABC = \frac{8^2 + 22^2 - 15^2}{2 \times 8 \times 22}$ $= \frac{323}{352}$ $\angle BAC = 23.420°$ $= 23.4°$ (1 d.p.)	M2 A1	M1 for correct numerator M1 for correct denominator
	(b)	Area of $\Delta ABC = \frac{1}{2} \times 8 \times 22 \times \sin 23.420°$ $= 34.977$ $= 35.0$ km^2 (3 s.f.)	M1 A1	
	(c)	Let h be the shortest (perpendicular) distance from A to BC. Area of $\Delta ABC = 34.977$ $\frac{1}{2} \times 22 \times h = 34.977$ $h = \frac{34.977}{11}$ $= 3.18$ km (3 s.f.)	M1 A1	
11	(a)	$r^2 + 12^2 = 13^2$ $r = \sqrt{13^2 - 12^2}$ $= 5$ cm	M1 A1	
	(b)	Circumference $= 2\pi \times 5$ $= 31.416$ cm $= 31.4$ cm (3 s.f.)	 B1	
	(c)	$r \times \angle BAC = 31.416$ cm $\angle BAC = 31.416 \div 13$ $= 2.42$ radians (3 s.f.)	M1 A1	
12	(a)	\$2840× 20% = \$568	B1	
	(b)	\$2840 – \$568 = \$2272 Interest = \$2272 × 5% × $\frac{36}{12}$ = \$340.80	M1 A1	

	(c)	Monthly instalment = (\$2272+ \$340.80) ÷ 36 = \$72.5777… = \$72.58	M1 A1	

13	(a)(i)	1.77 million	B1	
	(a)(ii)	$\frac{5.92}{105}\times 100$ million = 5.64 million (3 s.f.)	M1 A1	
	(a)(iii)	The growth in non-residents from 2022 to 2023 = 1.77 – 1.57 = 0.2 million The percentage growth, z $= \frac{0.2}{1.57}\times 100\%$ = 12.7% (3 s.f.) No, it should be 12.7%	M1 A1 A1	
	(b)	$\frac{3.61}{5.92}\times 360°$ = 219.5 ° (1 d.p.)	M1 A1	if $\frac{3.61}{5.92}$ is seen
14	(a)	–4.25	B1	
	(b)		G1 G1	Correct points plotted Smooth curve drawn

	(c)	When $x = 0$, $\frac{2}{x}$ is undefined, will result in "divisionby zero error" so y is undefined.	B1	
	(d)	$x = -2$, -0.4 or 2.45. (±0.1)	B2	for all correct answers B1 for only 1 or 2 correct answers.
	(e)	Correct tangent drawn Gradient = 3.57 ± 0.2	B1 B1	
15	(a)	Acceleration = $\frac{16}{12} = \frac{4}{3}$ m/s^2	B1	
	(b)	$\frac{1}{2}(k-37)(24) = 96$ $k - 37 = \frac{96}{12}$ $k = 37 + 8 = 45$	M1 A1	
	(c)	Total distance $= \frac{1}{2} \times 12 \times 16 + 10 \times 16 + \frac{1}{2} \times (16 + 24) \times 15 + 96$ = 652 m Average speed = $\frac{652}{45}$ = 14.5 m/s (3 s.f.)	M1 M1 A1	
	(d)	<u>Method 1:</u> 24 m/s = $\frac{24}{1000}$ km ÷ $\frac{1}{3600}$ h = 0.024 × 3600 km/h = 86.4 km/h <u>Method 2:</u> 1sec → 24 m = $\frac{24}{1000}$ km = 0.024 km 1hour = 3600s→0.024 km × 3600 = 86.4 km	M1 A1 (M1) (A1)	
16	(a)(i)	Interquartile range = 64 – 44 = 20	M1 A1	
	(ii)	90% × 30 = 27 90th percentile = 73	 B1	
	(iii)	20% × 30 = 6	M1	

		Min mark for distinction = 66	A1	
	(b)(i)	 Max mark = 5+93 = 98 B1		
	(ii)	Interquartile range = 83 – 22 = 61	B1	
	(c)	Class 4H because 4H's interquartile range is smaller than 4I.	B1	