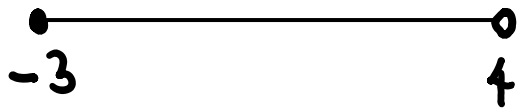
Marking Scheme
4NA PRELIM 2023 EM Paper 1
4045/01

Qn	Working	Note
1	$\frac{\pi}{3}$, $\frac{\sqrt{3}}{2}$, 73% , 0.63 , $\frac{3}{7}$ [B2]	Cover one and all correct (1 mark) All correct 2 marks
2a	2444466.947 = 2444000	
2b	2.444×10^{6} [B1]	Accept their (a) changed to standard form
3	3 [B1]	
4	$\frac{p}{x^2-25}+\frac{q(x-5)}{x+5}=\frac{p+qx-5q}{x^2-25}$ [M1] $7x=qx$ $q=7$ [A1] $p-5q=-33$ $p=-33+35$ $p=2$ [A1]	
5a	$x^2+10x-5$ $=x^2+10x+5^2-5^2-5$ $=(x+5)^2-30$ $a=5, b=-30$ [B1, B1]	If answers wrong, accept M1 for this step
5b	$(x+5)^2=30$ $x+5=\pm\sqrt{30}$ $x=\sqrt{30}-5$ or $x=-\sqrt{30}-5$ $x=0.48, -10.48$ [B1, B1]	If answers wrong, accept M1 for this step
6a	 [B1]	
6b	$-3y+1<15$ $y>\frac{14}{-3}$ [M1] $y>-4\frac{2}{3}$ $Ans: -4$ [A1]	

7	$x:y=9:4=27:12$ $x:y:z=27:12:7$ [A1] [M1]	
8a	$168=2^3\times3\times7$ $540=2^3\times3^3\times5$ $LCM=2^3\times3^3\times5\times7=7560$ [M1, A1] or B2	
8b	$2\times5^2=50$ [B1]	
9	$y=\frac{k}{x^3}$ $3=\frac{k}{2^3}$ $k=24$ $y=\frac{24}{x^3}$ [M1] $y=\frac{24}{4^3}=\frac{3}{8}$ [A1]	
10a	$-24,-29$ [B1]	
10b	$-5n+6$ [B1]	
10c	$-110=-5n+6$ $5n=116$ $n=\frac{116}{5}=23.2$ [M1] Since $n=23.2$ which is not an integer, -110 is not a term in this sequence. [A1]	
11a	89 [B1]	
11b	63 [B1]	
11c	52 [B1]	
11d	$\frac{7}{20}\times100\%=35\%$ Yes, student A is correct as only 7 out of 20 failed , which is 35%. [B1]	
12	Answer behind	
13a	$u=\sqrt{4^2-2(-10)}$ $u=\sqrt{36}$ $u=6$ [B1]	

13b	$u^2 = v^2 - 2t$ [M1] $2t = v^2 - u^2$ $t = \frac{v^2 - u^2}{2}$ [A1]	
14a	40 [B1]	
14b	0930 to 1030 The gradient is gentler. [B1]	
14c	$\frac{100}{1.5} = 66.7$ km/h [M1, A1]	
15a	The table only shows the percentage of participants. [B1]	
15b	$\frac{35}{100} \times 360 = 126°$ [M1, A1]	
16a	\$1 = 106.5 JPY [B1]	
16b	\$1 AUD ------ \$0.90 \$1080AUD – 0.9 x 1080 = \$972 [M1] € 0.68 ------- \$1 € 1 ---------- $\frac{1}{0.68}$ €620 ---------- $\frac{1}{0.68} \times 620 = \$911.76$ [M1] Yes, he should ask his Spanish friend to buy as it is cheaper by \$\$60.24 to buy the wallet in Spain than in Australian. [A1]	Must state that is it \$60.24 cheaper.
17	$x = \sin^{-1} 0.723$ $x = 46.3°, 180° - 46.3°$ [M1] $x = 46.3°, 133.7°$ [A1 or B1,B1]	
18a	$\frac{3xy^3}{10} \div \left(\frac{-2y}{5x}\right)^2$ $= \frac{3xy^3}{10} \times \frac{25x^2}{4y^2}$ [M1] $= \frac{15x^3y}{8}$ [A1]	
18b	$-2(3x+7)(3x+7)$ $= -2(9x^2 + 42x + 49)$ [M1] $= -18x^2 - 84x - 98$ [A1]	
18c	$(2x+3)(x-4)$ [B1]	

19	Curved surface area $= \pi \times 6 \times 19$ [M1] $= 114\pi$ Base $= \pi r^2$ $= \pi (6)^2$ [M1] $= 36\pi$ Total = $114\pi + 36\pi = 471.238898 = 471$ [A1]	Aceept 3 sf or more (471.238898)
20	Answer at the back	
21ai	$\frac{(8-2)\times 180}{8} = 135°$ [M1, A1]	
21aii	$\frac{360}{8} = 45°$ [M1, A1]	
21aiii	$\angle HAG = \frac{180-135}{2} = 22.5°$ [M1] $\angle BAG = 135 - 22.5 = 112.5°$ [A1]	
21b	Parallelogram [B1]	
22	Area of sector AOB $= \frac{120}{360} \times \pi \times 14^2$ [M1] $= 205.25072$ $\tan 60° = \frac{14}{OC}$ $OC = \frac{14}{\tan 60°}$ [M1] Area of ΔAOC $= \frac{1}{2} \times OC \times 14$ $= \frac{1}{2} \times \frac{14}{\tan 60} \times 14$ [M1] $= 56.58032638$ Area of shaded region $= 205.25072\ldots - 56.58...$ $= 148.67$ $= 149$ [A1]	

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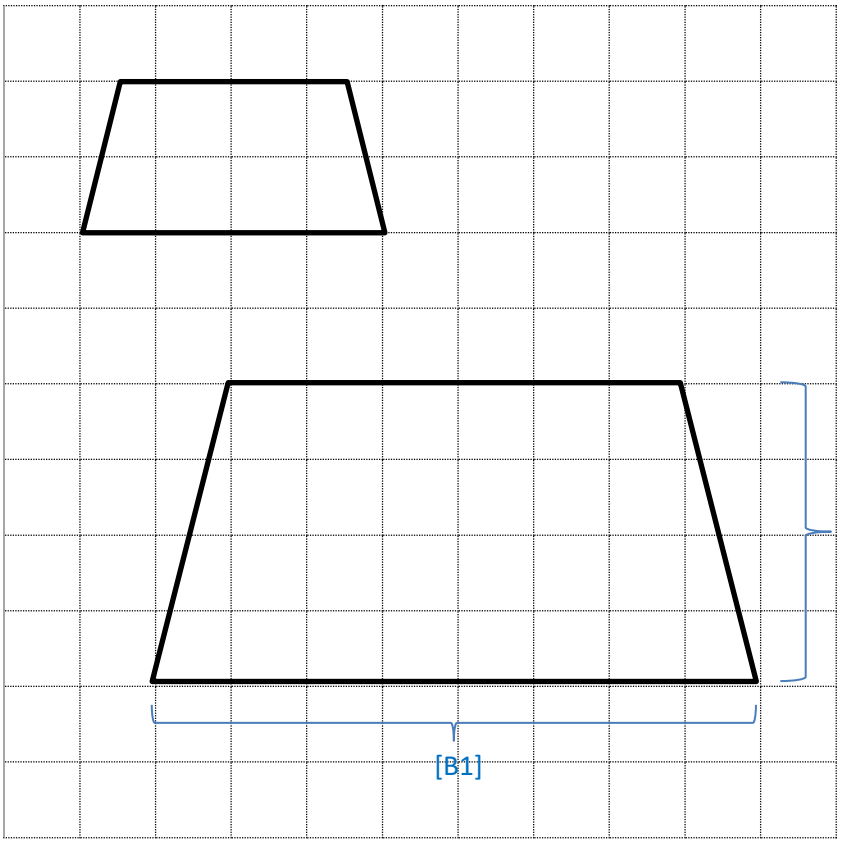

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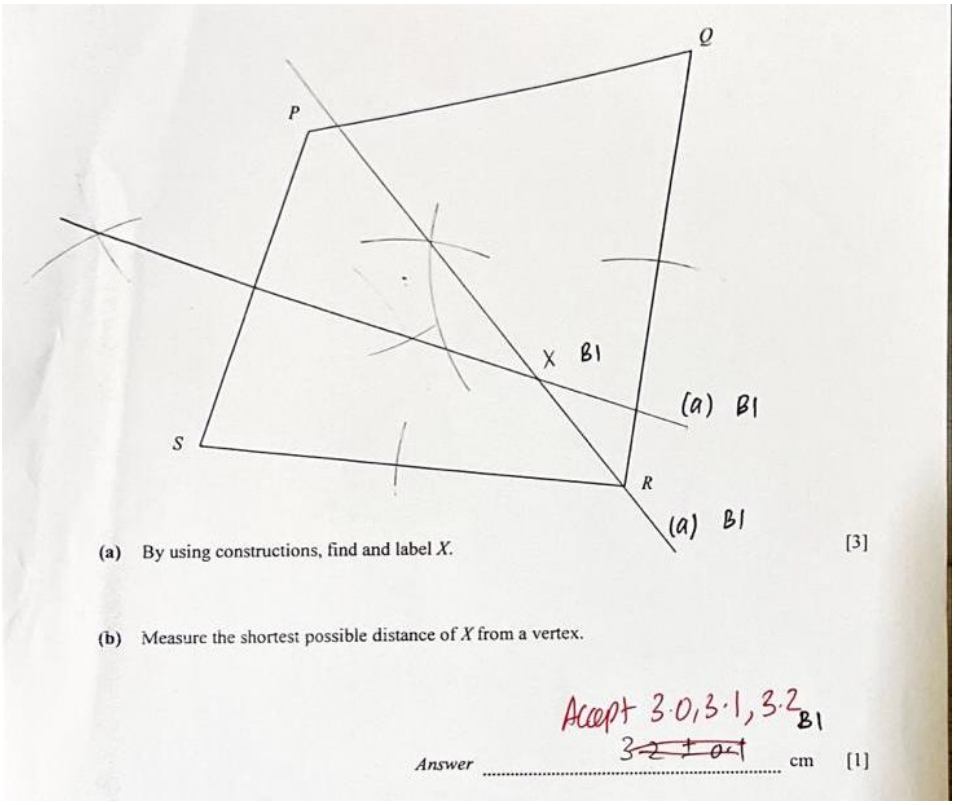

(a) By using constructions, find and label X. [3]

(b) Measure the shortest possible distance of X from a vertex.

Accept 3·0, 3·1, 3·2 B1

Answer ~~3 2 1 0~~ cm [1]