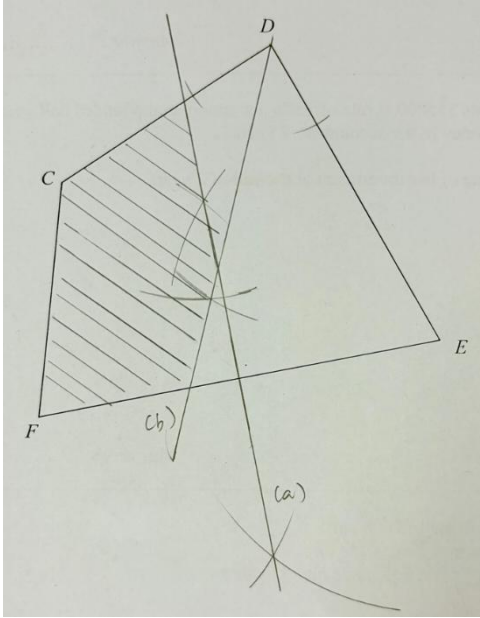


2026 4E5N Math Prelim Paper 1 Marking Scheme

1	950	B1	
2	$\$55000 \left(1 + \frac{1.8}{2 \times 100} \right)^4$ $= \$57006.89 \text{ (nearest cents)}$	M1 A1	
3	Possible answers: 7 cm by 9 cm by 16 cm 7 cm by 8 cm by 18 cm 7 cm by 12 cm by 12 cm	B2	B1 for 2 correct answers
4		B1 B1 B1	Line bisector Angle bisector Shaded region
5a	1 day needs 12 workers 3 days need $12 \div 3 = 4$ workers	B1	o.e.
5b	1 day needs 12 workers 5 days need $12 \div 5 = 2.4$ workers Number of structures = $36 \div 2.4 = 15$	M1 A1	o.e.
6	Let the mean COE price in 2022 be x . The mean COE price in 2023 = $1.254x$. The mean COE price in 2024 = $1.254x \times (1 - 0.0505)$ $\quad\quad\quad = 1.1907x$ The mean COE price in 2025 = $1.352x$ Price increase = $1.352x - 1.1907x = 0.1613x$ Percentage increase = $\frac{\text{their price increase}}{1.1907x} \times 100\%$	M1 M1 A1	Accept FT

	$= 13.5\% \text{ (3 s.fs.)}$ OR $\frac{1.352}{1.190673} \times 100\% = 113.549\%$ Percentage increase = $113.549\% - 100\% = 13.5\%$	M1 A1	
7a	The statement could be false because we do not know the total number of shirts sold in each store. If total shirts sold Outlet A are more than Outlet B, then Outlet A could have sold more blue shirts than Outlet B.	B1	o.e.
7b	Angle subtended by black shirts = $(135 \pm 1)^\circ$ percentage of the black shirts sold $= \frac{135}{360} \times 100\%$ $= 37.5\%$	M1 A1	37.2% (134°) 37.8% (136°)
8a	$\text{Height} = \sqrt{13^2 - 5^2}$ $= 12 \text{ cm}$	M1 A1	Use of P.T.
8b	$\frac{1}{3} \times 10^2 \times 12$ $= 400 \text{ cm}^2$	M1 A1	Accept FT (a)
9a	$\frac{p^4 q}{28x} \times \frac{21px}{5q^3}$ $= \frac{3p^5}{20q^2}$	M1 A1	Or B2
9b	$15ab - 3ac - 5b + c$ $= 3a(5b - c) - (5b - c)$ $= (3a - 1)(5b - c)$	M1 A1	
10	$\frac{p-3}{2} = 1$ $p = 5$ $y = -k(x+3)(x-5), k > 0$ At $q, x = 0$ $q = -k(0+3)(0-5), k > 0$ $= 15k$ $\therefore q$ is a multiple of 15 and $q > 0$.	B1 B1	Accept any answer with $k > 0$
11a	$a = -0.08 \text{ or } -\frac{2}{25}$	B1	

11b	$(5a - 1)(1 - 2c) = 3c$ $5a - 10ac - 1 + 2c = 3c$ $5a - 1 = c(1 + 10a)$ $c = \frac{5a - 1}{1 + 10a}$	M1 M1 A1	Remove denominator c as a common factor o.e.
12	Given $PT = ST$, $\angle SPT = x$ (base angle of isosceles Δ) $\angle QRS = 90^\circ - x$ (angle sum of a Δ) Given $QS = QR$, $\angle QRS = \angle QSR$ (base angle of isosceles Δ) $= 90^\circ - x$ $\angle RQS = 180^\circ - 2(90^\circ - x)$ (angle sum of a Δ) $= 2x$ (shown)	M1 M1 A1	
13a	$\overrightarrow{PQ} = \overrightarrow{OQ} - \overrightarrow{OP}$ $= \begin{pmatrix} 3 \\ -4 \end{pmatrix} - \begin{pmatrix} -1 \\ 5 \end{pmatrix} = \begin{pmatrix} 4 \\ -9 \end{pmatrix}$	B1	
13b	$\overrightarrow{PR} = k\overrightarrow{PQ}$ $\begin{pmatrix} 3 \\ h \end{pmatrix} - \begin{pmatrix} -1 \\ 5 \end{pmatrix} = k \begin{pmatrix} 4 \\ -9 \end{pmatrix}$ $4 = 4k$ $k = 1$ $h - 5 = -9k$ $h - 5 = -9$ $h = -4$	B1 B1	Accept FT Accept FT
14a	L.H.S $2x - 7 < 25$ $x < 16$ R.H.S $25 \leq 3x - 2$ $x \geq 9$ $\therefore 9 \leq x < 16$	M1 M1 A1	LHS RHS
14b	11 and 13	B1	Accept FT
15a	$\frac{\text{height of jar A}}{\text{height of jar C}} = \sqrt[3]{\frac{1}{64}} = \frac{1}{4}$ Diameter of base of jar A : Diameter of base of jar B 1 : 4	B1	

15b	$\left(\sqrt[3]{\frac{9}{64}}\right)^2 = \frac{\text{Surface area of jar } B}{900}$ Surface area of jar $B = 243 \text{ cm}^2$ (3 s.f.s)	M1 A1	
16	$(2n - 1)(2n + 3) = 4n^2 + 6n - 2n - 3$ $= 4n^2 + 4n - 3$ $= 4(n^2 + n) - 3$ Since $4(n^2 + n)$ is an even number, $4(n^2 + n) - 3$ is odd. OR $2n$ is even. So $(2n - 1)$ and $(2n + 3)$ are odd numbers. The product of odd numbers is also odd.	M1 A1	Express as $4k - 3$ or $2k + 1$ Justify the answer
17a	$\left(\frac{5}{12} \times \frac{7}{11}\right) \times 2$ $= \frac{35}{66}$	M1 A1	
17b	$\left(\frac{5}{12} \times \frac{7}{11} \times \frac{6}{10}\right) \times 3$ $= \frac{21}{44}$	M1 A1	
18a	$y = (x - 5)^2 + 4$	B1 B1	Value of a Value of b
18b	The minimum point is at $(5, 4)$ which is above the x-axis. OR At $y = 0$, $x = \pm\sqrt{-4} + 5$, which is undefined. Therefore the graph will not pass through the x-axis.	B1	
19a	$\left(\frac{m^{12}}{16n^4}\right)^{\frac{3}{4}}$ $= \frac{m^9}{8n^3}$	B1 B1	m^6 $8n^3$
19b	$343^x \times 3^{3x} = 21$ $7^{3x} \times 3^{3x} = 21$ $21^{3x} = 21 \quad \text{or} \quad 7^{3x} \times 3^{3x} = 7 \times 3$ $x = \frac{1}{3}$	M1 A1	
20ai	$360 = 2^3 \times 3^2 \times 5$	B1	

20aii	72, 90	B1B1	
20b	$2 \times 3^2 \times 7 = 126$	B1	
21	$\frac{2(x-5)+5x(2x-3)}{(2x-3)(x-5)} = \frac{1}{2}$ $\frac{2x-10+10x^2-15x}{2x^2-10x-3x+15} = \frac{1}{2}$ $2(10x^2-13x-10) = 2x^2-13x+15$ $18x^2-13x-35 = 0$ $x = \frac{13 \pm \sqrt{(-13)^2 - 4(18)(-35)}}{2(18)}$ $x = \frac{13 \pm \sqrt{2689}}{36}$ $x = 1.80, -1.08 \text{ (2 d.p.)}$	M1 M1 M1 M1 A1	Make denominator same Simplify Reduce Correct substitution of values
22a	$AD = AB$ (length of square) $DE = \frac{1}{2} DC$ $BF = \frac{1}{2} BC$ $\therefore DE = BF$ $\angle ADE = \angle ABF = 90^\circ$ $\therefore \triangle ADE \equiv \triangle ABF$ (SAS)	M1 M1 A1	o.e.
22b	$2DE = AD$ $\frac{DE}{AD} = \frac{1}{2}$ $\tan \angle EAD = \frac{DE}{AD}$ $\angle EAD = \tan^{-1}(0.5)$ $= 26.565\dots^\circ$ Since $\triangle ADE \equiv \triangle ABF$, $\angle EAD = \angle BAF$, $\angle EAF = 90^\circ - 2(26.565\dots^\circ)$ $= 36.9^\circ$ (1 d.p.)	M1 A1	
23ai	\$82	B1	
23aii	\$56, \$114	B1	
23bia	$(2000 \times 30 + 6000 \times 38 + 10000 \times 40 + 14000 \times 35 + 1800 \times 25 + 2500 \times 22 + 40000 \times 10) \div 200$ $= 12\,890$ (shown)	M1 B1	Mid-value for $\$30\,000 < x \leq \$50\,000$ (max) is \$40 000

23bib	\$9211	B1	
23bii	The group earning $\$x > \$30,000$ acts as "outliers." Because the mean is sensitive to these very high values, it gets pulled upward, making it higher than the median (the 100th/101st household's income).	B1	
23biii	$\frac{4}{25}$	B1	
24ai	$\angle AEB = 39^\circ$ ($\angle_s$ in the same segment) $\angle ABD = 180^\circ - 86^\circ - 39^\circ$ ($\angle_s$ in opposite segment) $= 55^\circ$	M1 A1	
24aii	$\angle CAB = 90^\circ - 39^\circ$ ($\angle_s$ in semicircle) $= 51^\circ$ Since $\angle ABD \neq \angle CAB$, triangle AFB is not isosceles.	M1 A1	
24b	Reflex $\angle KOL = 2\pi - 2.4$ $= 3.883185.....$ radians $440 = 0.5 \times r^2 \times 3.883185.....$ $r^2 = (440 \times 2) \div 3.883185.....$ $r = 15.1$ cm (3 s.f.s)	M1 M1 A1	
25a	$\frac{20}{4} = 5 \text{ m/s}^2$	B1	
25b	$\frac{3.6}{4} = \frac{x}{20}$ $x = 18$	M1 A1	
25c	$18t = 10(t - 4 + t)$ $t = 20$	M1 A1	Accept FT from (b)