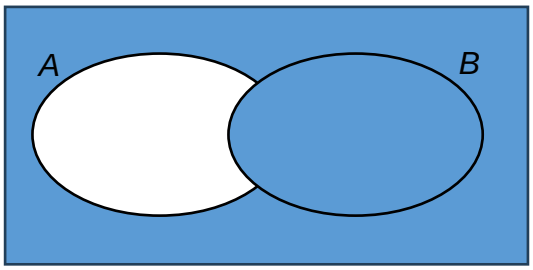
4E5N Prelim Exam 2024 Maths P1- Marking Scheme

1	$9-\frac{1}{2}x=25$ $-\frac{1}{2}x=16$ $x=-32$
2	Total sum of money $=\frac{\$900}{3}\times 10$ $=\$3000$
3	$\frac{3}{2a-1}-\frac{2}{1-2a}$ $=\frac{3}{2a-1}+\frac{2}{2a-1}$ $=\frac{5}{2a-1}$
4	3, 3, 4, 5, 10
5a	
5b	$A\cap B'$
6a	a = 3, b = 7
6b	Since the minimum point of y is at (-2, -25), y will not have a value smaller than -25.
7a	$(3x-y)(y+x)$ $=3xy+3x^2-y^2-xy$ $=3x^2+2xy-y^2$
7b	$3-12a^2$ $=3(1-4a^2)$ $=3(1-2a)(1+2a)$
8a	3.5

8b	$4 \div \left(\frac{x}{2}\right)^{-2}$ $= 4 \div \left(\frac{2}{x}\right)^{2}$ $= 4 \times \left(\frac{x^2}{4}\right)$ $= x^2$
9a	$x^2 - 10x + 27$ $= x^2 - 10x + 5^2 - 5^2 + 27$ $= (x-5)^2 + 2$ p = -5, q = 2
9b	(5, 2)
10	$\angle ACB = \frac{70^\circ}{2}$ (angle at centre = twice the angle at circumference) $= 35^\circ$ $\angle ABC = 180^\circ - 70^\circ$ (angles in opposite segments) $= 110^\circ$ $\therefore \angle BAC = 180^\circ - 110^\circ - 35^\circ$ (angles sum of triangle) $= 35^\circ$ Since angle ACB = angle BAC, triangle ABC is an isosceles triangle.
11a	$18x = 360^\circ$ $x = 20^\circ$
11b	$3x + 6x = 9x$ $= 180^\circ$ $\therefore$ the angles are interior angles. $6x + 5x = 11x$ $\neq 180^\circ$ The quadrilateral is a trapezium and not a parallelogram as it has 2 parallel sides and 2 non-parallel sides.
12a	$\frac{V_L}{300} = \left(\frac{2}{1}\right)^3$ $V_L = 2400m^3$

12b	$\frac{1}{3}x^2y = 300$ $x^2y = 900$ Volume of pyramid $= \frac{1}{3}(3x)^2 \times \frac{2}{3}y$ $= 2x^2y$ $= 2 \times 900\text{m}^3$ $= 1800\text{m}^3$
13a	78
13b	The interquartile range = 87 – 73 = 14
14a	$AB = \sqrt{15^2 - 12^2}$ $= \sqrt{81}$ $= 9$ $\therefore \cos \angle ABD = \frac{9}{15}$ $= \frac{3}{5}$
14b	$\frac{BC}{DA} = \frac{BE}{DB}$ $\frac{BC}{12} = \frac{20}{15}$ BC = 16 cm
15a	Total population = (33.57 + 5.64) million = 39.21 million $= 39.21 \times 10^6$ $= 3.921 \times 10^7$
15b	Population of Singapore in 2013 $= \frac{5.64}{105} \times 100$ million $= 5.37$ million (or 5370000 or 5.37×10^6)
16a	$\frac{15 - x}{15}$
16b	P(green marbles) = P(yellow marbles)

	$= \frac{1}{2}$ $\frac{x+5}{20} = \frac{1}{2}$ $x = 5$
17a(i)	$2^2 \times 3 \times 5^3$
17a(ii)	$1500 = 2^2 \times 3 \times 5^3$ $p = 2^m \times 3^2 \times n$ $HCF = 2 \times 3$ $\therefore m = 1$ and $n = 7$
17b	$LCM = 2^3 \times 3$ $= 24$
18a	10 km
18b	5 cm: 2.5 km 1 cm: 0.5 km 1 cm: 50000 cm 1 : 50000
18c	$1cm^2 : 0.25km^2$ $30cm^2 : 7.5km^2$
19a	Gradient $= \frac{12-3}{15-0}$ $= \frac{3}{5}$ $\therefore$ equation of PQ: $y = \frac{3}{5}x + 3$
19b	Gradient of R $= (15, -12)$ Perimeter of OPQR $= 3 + \sqrt{(15-0)^2 + (12-3)^2} + (12 \times 2) + \sqrt{15^2 + 12^2}$ $= 63.70223$ $\simeq 63.7$
20	The y-axis of the line chart <u>does not start from zero</u> and the reader may be <u>misled to think that the sales performance has increased greatly</u> from Jan to Jun.
21a	72 days
21b	12 men will take 54 days. 18 men will take $\frac{54 \times 12}{18} = 36$ days. No. of days saved = (54 – 36) days = 18 days
22	Area of shaded region in triangle ABC

	$= \left[\frac{1}{2}(5)^2 \sin 60^\circ - \frac{1}{2}\pi(2)^2 \right] cm^2$ $= \left(\frac{25\sqrt{3}}{4} - 2\pi \right) cm^2$ $\tan 1.2 = \frac{EF}{OE}$ $EF = 2\tan 1.2$ $DF = 4\tan 1.2$ Area of shaded region in triangle ODF $= \left[\left(\frac{1}{2} \times 2 \times 4 \tan 1.2 \right) - \frac{1}{2}(2)^2 2.4 \right] cm^2$ $= (4\tan 1.2 - 4.8) cm^2$ $\therefore$ area of shaded region of the logo $= \left(\frac{25\sqrt{3}}{4} - 2\pi + 4\tan 1.2 - 4.8 \right) cm^2$ $= 10.030739 \ cm^2$ $\simeq 10.0 \ cm^2$
23a	Let the speed of the car after 9s be v m/s. $\frac{v}{20} = \frac{9}{15}$ $v = 12$
23b(i)	$\left(\frac{1}{2} \times 15 \times 20 \right) + \frac{1}{2}(20 + u) \times 25 = 900$ $\frac{1}{2}(20 + u) \times 25 = 750$ $u = 40$
23b(ii)	$2 \ m/s^2$
24a	$\begin{pmatrix} 2 & 3 & 3 \\ 1 & 0 & 4 \end{pmatrix}$
24b	$\text{M} = \begin{pmatrix} 2 & 3 & 3 \\ 1 & 0 & 4 \end{pmatrix} \begin{pmatrix} 3.50 & 0.40 \\ 2.70 & -0.20 \\ 5.00 & -0.50 \end{pmatrix}$

	$= \begin{pmatrix} 30.10 & -1.30 \\ 23.50 & -1.60 \end{pmatrix}$
24c	Azza should buy from Café B as she would save \$1.30.
25	$\tan 35^\circ = \frac{FC}{75}$ $FC = 75\tan 35^\circ$ $AC = \sqrt{40^2 + 75^2}$ $= \sqrt{7225}$ $\tan \angle FAC = \frac{FC}{AC}$ $= \frac{75\tan 35^\circ}{\sqrt{7225}}$ $\therefore \angle FAC = \tan^{-1}\left(\frac{75\tan 35^\circ}{\sqrt{7225}}\right)$ $= 31.70902^\circ$ $\simeq 31.7^\circ$
26a	Let the radius of the water surface be r cm. $\frac{r}{5} = \frac{4}{8}$ $r = \frac{5}{2}$ $\therefore$ volume of water = $\frac{1}{3}\pi\left(\frac{5}{2}\right)^2 \times 4$ $= \frac{25}{3}\pi$ (Shown)
26b	Surface area $= \pi rl$ $= \pi\left(\frac{5}{2}\right)\sqrt{4^2 + \left(\frac{5}{2}\right)^2}$ $= 37.04716\ cm^2$ $\simeq 37.0\ cm^2$
26c	Let the height of the water above the hemisphere be h cm.

	$\pi\left(\frac{3}{2}\right)^2 h + \frac{2}{3}\pi\left(\frac{3}{2}\right)^3 = \frac{25}{3}\pi$ $\frac{9}{4}h = \frac{73}{12}$ $h = 2\frac{19}{27}$ cm $\therefore$ height of water in the test-tube $= \left(2\frac{19}{27} + \frac{3}{2}\right)$ cm $= 4\frac{11}{54}$ cm (or 4.20 cm)