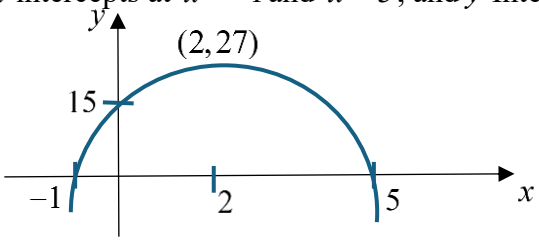
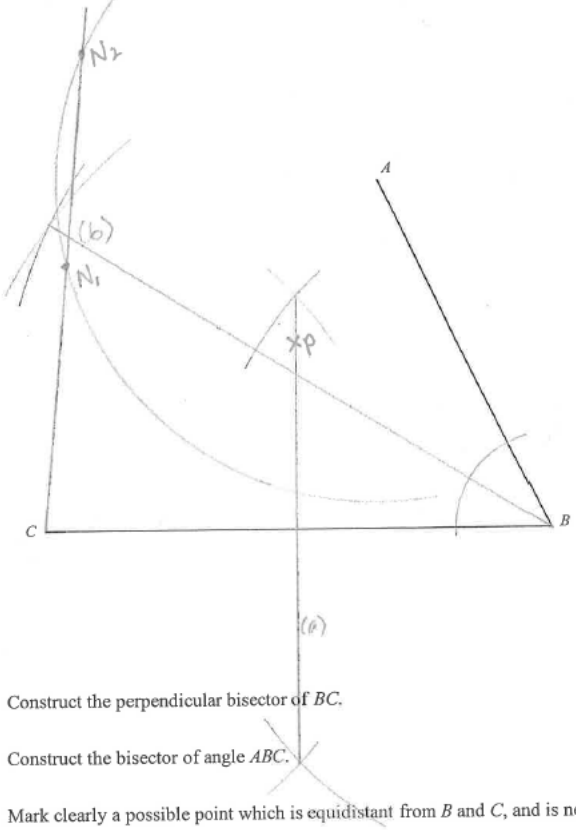
1(a)	$\frac{33.17\times 55.2^{\frac{1}{3}}}{-(-1)+\sqrt[3]{647.9}}$ $=13.08359745$ $=10$	B1
1(b)	$\frac{3m}{s}=\frac{0.003km}{\frac{1}{3600}h}$ $=10.8km/h$	B1
2(a)	$10^{2m-n}=(10^m)^2\div 10^n$ $=2^2\div 11$ $=\frac{4}{11}$	B1
2(b)	$\frac{7mn^{-1}}{m^2}\div\frac{(mn^2)^3}{7}$ $=\frac{7m}{m^2n}\div\frac{m^3n^6}{7}$ $=\frac{7m}{m^2n}\times\frac{7}{m^3n^6}$ $=\frac{49}{m^4n^7}$	M1 for either simplying or change of sign A1
3	$T=k\sqrt{L}$ $1.25T=k\sqrt{L_{New}}$ $1.25k\sqrt{L}=k\sqrt{L_{New}}$ $1.25\sqrt{L}=\sqrt{L_{New}}$ $(1.25)^2L=L_{New}$ $\%change$ $=\frac{L_{New}-L}{L}\times 100\%$ $\frac{(1.25)^2L-L}{L}\times 100\%$ $=0.5625\times 100\%$ $=56.25\%$	M1 $\times 100\%$ A1

4(a)	37 min	B1
4(b)	$25\%\text{ of }28 = \dfrac{25}{100}\times 28$ $= 7$ From the stem and leaf diagram, 7 workers took less than 19 minutes to assemble a toy. $p = 19$ min.	A1
5	$P = \$12000,\ R = \dfrac{7}{2} = 3.5\%\ ,\ n = 4$ $A = P\left(1+\dfrac{R}{100}\right)^n$ $A = 12000\left(1+\dfrac{3.5}{100}\right)^4$ $= 13770.27601$ $= \$13770.28$ Compound interest $= 13770.27601 - \$12000$ $= \$1770.27601$ $= \$1770.28(2d.p)$	M2,1,0 A1
6	$z = \dfrac{\sqrt{x^2+y}}{2}$ $2z = \sqrt{x^2+y}$ $4z^2 = x^2+y$ $x^2 = 4z^2 - y$ $x = \pm\sqrt{4z^2-y}$	M1 A1 (minus 1 m if no $\pm$)
7(a)(i)	$x^2 - 6x - 16$ $= (x-3)^2 - 16 - (-3)^2$ $= (x-3)^2 - 16 - 9$ $= (x-3)^2 - 25$	B2
7(a)(ii)	$(3,-25)$	B1

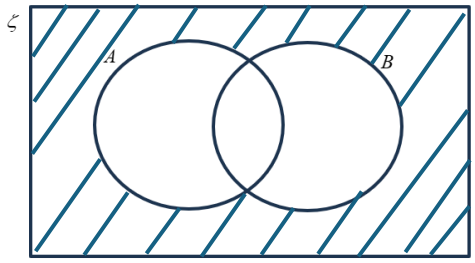
7(a)(iii)	$x = 3$	B1
7(b)	B1 – Shape + turning point (2,27) B1 – x-intercepts at $x = -1$ and $x = 5$, and y-Intercept at (0,15) 	
8	8 Three points A, B and C are shown below.  (a) Construct the perpendicular bisector of BC. (b) Construct the bisector of angle ABC. (c) Mark clearly a possible point which is equidistant from B and C, and is nearer to AB tha to BC. Label this point P. (d) The point N is such that angle $BCN = 85°$ and $AN = 7$ cm. Find the two possible positions of N and label them N_1 and N_2.	
9(a)	$sum = n(3n-2)$ 1st term $= 1[3(1)-2] = 1$	

	Sum of 2 terms $= 2\left[3(2)-2\right] = 8$ 2nd term $= 8-1 = 7$ Sum of 3 terms $= 3\left[3(3)-2\right] = 21$ 3rd term $= 21-8 = 13$ First 3 terms: 1, 7, 13	B2,1,0
9(b)	$6n-5$	B1
10(a)	$(5-2)\times 180° = 90° + 90° + 3y$ $540° = 180° + 3y$ $3y = 360°$ $y = 120°$ $x = 360° - 120° = 240°$ $\frac{y}{x} = \frac{120°}{240°} = \frac{1}{2}$	M1 A1
10(b)	$(12-2)\times 180° = 1800°$ $\frac{1800°}{12} = 150°$ $360° - 150° - 90° = 120°$ $180° - 120° = 60°$ $\frac{360°}{60°} = 6 sides$	 M1 A1
11	1. The title is biased • It does not allow reader to make his/her own judgement OR 2. Horizontal axis does not start from zero • This exaggerates the differences between the data	B1 – Misleading Feature AND – Effect of the misleading feature on interpretation of data

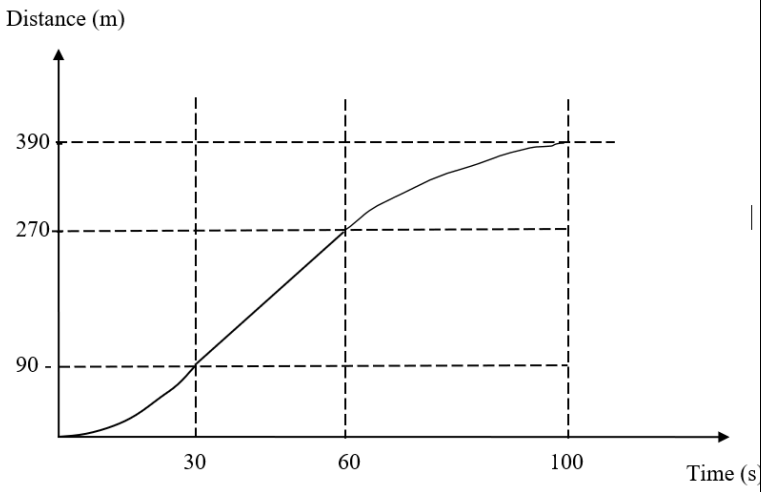
12(a)	$\overrightarrow{CD} = \overrightarrow{OD} - \overrightarrow{OC}$ $= \begin{pmatrix} 3 \\ -1 \end{pmatrix} - \begin{pmatrix} -2 \\ 5 \end{pmatrix}$ $= \begin{pmatrix} 5 \\ -6 \end{pmatrix}$	 B1
12(b)	$\overrightarrow{CE} = n\overrightarrow{CD}$ $= n\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ $\left\|\overrightarrow{CE}\right\| = n\left\|\overrightarrow{CD}\right\|$ $= n \times \sqrt{5^2 + (-6)^2}$ $= n \times \sqrt{61} = 2\sqrt{61}(given)$ Since x-coordinate of C is greater than the x-coordinate of E, $\left\|\overrightarrow{CE}\right\| = n \times \sqrt{61} = -2 \times \sqrt{61}$ $n = -2$ $\overrightarrow{CE} = \begin{pmatrix} -10 \\ 12 \end{pmatrix}$	 M1 $n \times \sqrt{61} = 2\sqrt{61}(seen)$ A1
13(a)	$(-6,\ 5)$, and $(-3,\ -2)$ *Gradient* $= \frac{5-(-2)}{-6-(-3)}$ $= \frac{7}{-3}$ $y = \frac{7}{-3}x + c$ Sub $(-6,\ 5)$ $5 = \frac{7}{-3}(-6) + c$ $c = -9$ $y = \frac{7}{-3}x - 9$	 M1 A1

13(b)	$y = \frac{7}{-3}x + c$ Sub (9, 5) $5 = \frac{7}{-3}(9) + c$ $c = 26$ $y = \frac{7}{-3}x + 26$	M1 A1
13(c)	$9-(-6) = 15$ $5-(-2) = 7$ $Area = \frac{1}{2} \times 15 \times 7 = 52.5$	M1 A1
13(d)	(9, 5) (−3, −2) $BC = \sqrt{(9-(-3))^2 + (5-(-2))^2}$ $BC = \sqrt{144+49} = \sqrt{193}$ $Area = \frac{1}{2} \times d \times \sqrt{193} = 52.5$ $d = \frac{52.5}{\frac{1}{2} \times \sqrt{193}}$ $= 7.558065$ $= 7.56(3sf)$	M1 A1
13(e)	$y = \frac{7}{-3}x - 9$ Sub $y = 0$ $\frac{7}{3}x = -9$ $x = \frac{-27}{7}$ $P(\frac{-27}{7}, 0)$	M1 A1
14(a)	$AC = \sqrt{12^2 + 5^2} = 13$ $\cos \angle ACD$ $= -\cos \angle ACB$ $= -\frac{5}{13}$	M1 A1

14(b)	Using angles in a semicircle, AC is diameter. Radius = $= \frac{13}{2} = 6.5$	 B1
15(a)	500	A1
15(b)	$\frac{500(4)^2 - 500}{500} \times 100\%$ $= 1500\%$	M1 A1
15(c)	t=3.5	A1
16(a)	$\frac{x^2 + xy}{x^2 + 2xy + y^2}$ $= \frac{x(x+y)}{(x+y)^2}$ $= \frac{x}{(x+y)}$	 M1 A1
16 (b)	$10yz - 5y^2 - 2xz + xy$ $= 5y(2z - y) - x(2z - y)$ $= (5y - x)(2z - y)$	 M1 A1
17(a)	$\frac{3}{5}, \frac{4}{9}$	 B1,0
17(b) (i)	$\frac{3}{5} \times \frac{4}{9} + \frac{2}{5} \times \frac{2}{3}$ $= \frac{8}{15}$	M1 A1
17(b) (ii)	$1 - \frac{3}{5} \times \frac{5}{9}$ $= \frac{2}{3}$	M1 A1
18(a)	Deposit $= \frac{20}{100} \times \$1200 = \$240$ Remaining amount $= \$1200 - \$240 = \$960$ Monthly payment $= \frac{1.5}{100} \times \$960 \times 12$ $= \$172.80$ Total amount paid $= \$172.80 + \$1200$ $= \$1372.80$	 M1 A1

18(b)(i)	3	B1
18b)(ii)		B1
19(a)	1 cm : 10 km 1 cm² : 100 km² Area (map) = $\frac{225}{100}$ = 2.25 cm²	M1 A1
19b)	36 cm² : 225 km² 6 cm : 15 km 1 cm : 2.5 km 1 cm : 250000 cm Map scale is 1:250000	M1 A1
20(a)(i)	$4624 = 2^4 \times 17^2$	B1
20(a)(ii)	$4624 \times \frac{p}{q} = 2^4 \times 17^2 \times \frac{p}{q}$ $p = 17, q = 2$	B1
20(b)	$a = 27, b = 29, c = 32$	B2
21(a)	$\angle AED = \angle BEC$ (vert. opp. ∠s) $\angle EAD = \angle EBC = 24°$ (∠s in the same segment) $\angle EDA = \angle ECB = 67°$ (∠s in the same segment) ΔAED is similar to ΔBEC (AA similarity test)	M1 (1 pair of correct corresponding angles with reasons) A1
21(b)	$\frac{2}{4} = \frac{3.5}{EB}$ $EB = 7$ Alternative solution	M1 A1 M1

	$\frac{4}{\sin 24°} = \frac{EB}{\sin 67°}$ $EB = \frac{4\sin 67°}{\sin 24°} = 9.05cm(3s.f)$	A1
21(c)	$\angle AOD = 180° - 67° - 67° = 46°$ $\angle BOC = 180° - 24° - 24° = 132°$ $\frac{\frac{46}{360} \times 2\pi r}{\frac{132}{360} \times 2\pi r}$ $= \frac{46}{132}$ $= \frac{23}{66}$	M1 A1
22(a)	$\frac{\text{Base area of Vase } B}{\text{Base area of Vase } A} = \left(\frac{\text{Base radius of Vase } B}{\text{Base radius of Vase } A}\right)^2$ $\frac{\text{Base area of Vase } B}{50} = \left(\frac{3}{1}\right)^2$ Base area of Vase $B = \frac{9}{1} \times 50 = 450\ cm^2$	M1 A1
22(b)(i)	$\frac{\text{Curved surface area of Vase } C}{\text{Curved surface area of Vase } A}$ $= \frac{\text{Base area of Vase } C}{\text{Base area of Vase } A}$ $= \frac{800}{50} = \frac{16}{1}$ The required ratio is 16: 1	 A1
22(b)(ii)	$\frac{\text{Base area of Vase } C}{\text{Base area of Vase } A} = \frac{16}{1}$ $\frac{\text{height of Vase } C}{\text{height of Vase } A} = \frac{\sqrt{16}}{\sqrt{1}} = \frac{4}{1}$ $\frac{\text{Volume of Vase } C}{\text{Volume of Vase } A} = \left(\frac{4}{1}\right)^3$ $\frac{\text{Volume of Vase } C}{400} = \frac{64}{1}$ Volume of Vase $C = \frac{64}{1} \times 400 = 25600\ cm^3$	 M1 A1

23 (a)	$gradient(acceleration) = \frac{speed}{time}$ $= \frac{6-0}{60-100} = -0.15$ $\frac{v-0}{70-100} = -0.15$ $\frac{v}{-30} = -0.15$ $v = 4.5\ m/s$	M1 A1
23 (b)	 B1 – correct values for distance and time (must be proportionate) B1 – correct shape	