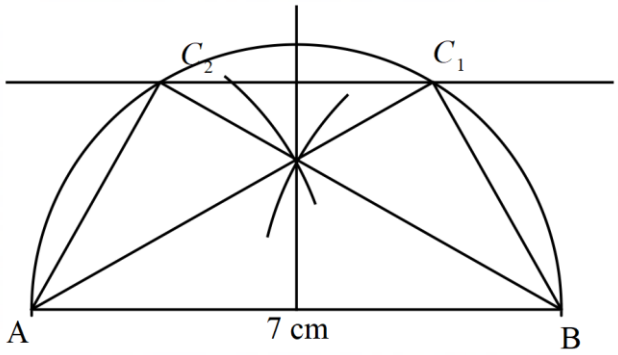
Maranda High School Form 4 Pre-Mock Examination
Marking guide Mathematics Paper 2 ©2024

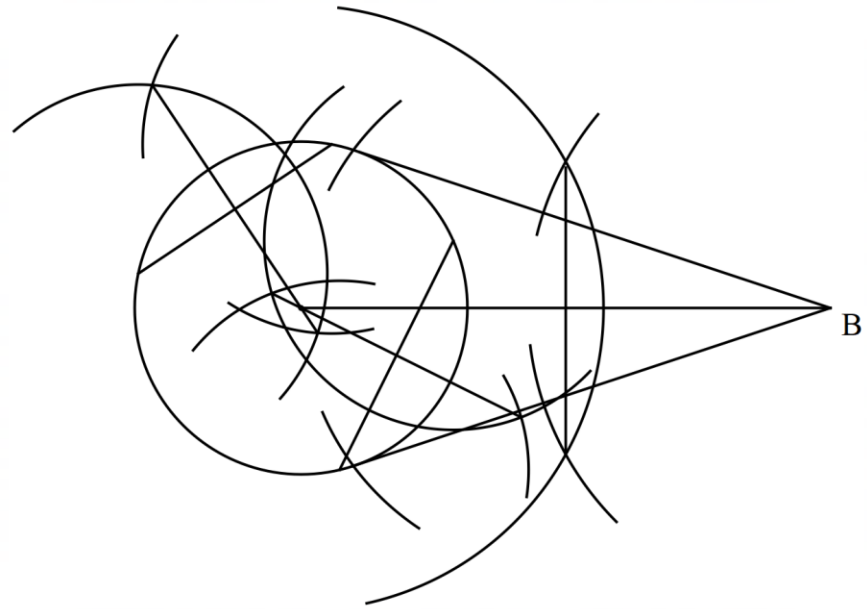
1.	$\frac{100}{130}\times 5200$ $=$ Ksh. 4000 $\frac{3600A+4800B}{A+B}=4000$ $3600A+4800B=4000A+4000B$ $\frac{800B}{400B}=\frac{400A}{400B}$ **2 : 1** = A : B	B1 M1 A1 03	Working out buying price. Correct equation. **(NB: accept correct use of pearson's square method)** Accurate ratio
2.	$\tan 22.5° = \frac{1}{\tan 67.5}$ $=\frac{1}{1+\sqrt{2}}\times\frac{(1-\sqrt{2})}{(1-\sqrt{2})}$ $=\frac{1-\sqrt{2}}{-1}$ $=\sqrt{2}-1$ a = **-1** b = **1** c = **2**	 M1 A1 B1 03	 Multiplication by conjugate surds Correct expression Values of a, b and c accurately listed
3	$\log_3 8t+2\log_3 t=-6$ $\log_3 8t+\log_3 t^2=\log_3 3^{-6}$ $\log_3 8t^3=\log_3\left(\frac{1}{729}\right)$ $8t^3=\left(\frac{1}{729}\right)$ $t^3=\left(\frac{1}{729}\times\frac{1}{8}\right)$ $t=\sqrt[3]{\left(\frac{1}{729}\times\frac{1}{8}\right)}$ $t=\frac{1}{18}$	M1 M1 M1 A1 04	Expressing -6 into log to base 3 Correct application of rules of log Finding cube root The value of t correct.

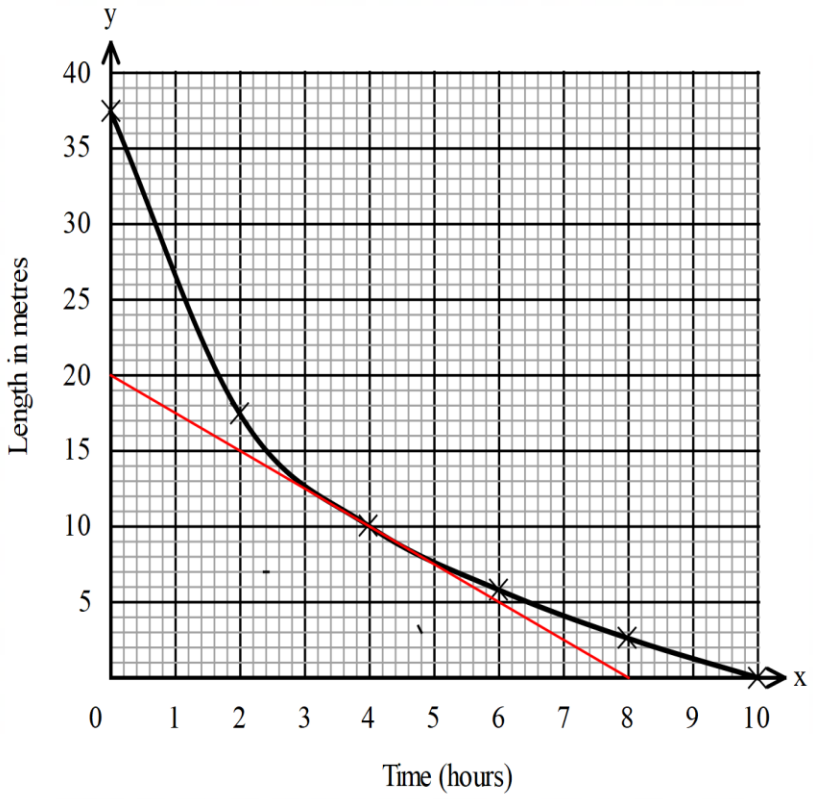
4.	$(2y)^6 - 6(2y)^5\left(\frac{3}{y^2}\right) + 15(2y)^4\left(\frac{3}{y^2}\right)^2 + \ldots\ldots\ldots$ $64y^6 - 576y^3 + 2160 + \ldots\ldots$ $y = 10$ $64(10)^6 - 576(10)^3 + 2160 + \ldots\ldots$ $= 63426160$	B1 M1 A1 03	Correct expression up to constant term. Substitution of value of y Accurate value
5.	A= $\frac{1}{2}bh$ $10.5 = \frac{1}{2} \times 7h$ h= $\frac{10.5}{3.5} = 3$ cm  	B1 B1 B1 03	Line AB drawn correctly Perpendicular bisector to get centre. Locus C correctly drawn
6.	$B^2 = \frac{9d^2}{k^2}\left(\frac{X - Q^2}{5c}\right)$ $\frac{B^2k^2}{9d^2} = \frac{X - Q^2}{5c}$ $X - Q^2 = \frac{B^2k^2 5c}{9d^2}$ $Q = \pm\sqrt{X - \frac{5B^2k^2c}{9d^2}}$ $Q = \pm\sqrt{\frac{9d^2x - 5B^2k^2c}{9d^2}}$	M1 M1 A1 03	

7.	$\frac{1}{4}x^4+x^2-3x+c\Big\|_2^5$ $\left[\frac{1}{4}(5)^4+5^2-3(5)+c\right]-\left[\frac{1}{4}(2)^4+2^2-3(2)+c\right]$ $=166\frac{1}{4}+c-(2+c)$ $=164\frac{1}{4}\ or 164.25$	M1 M1 A1 03	Performing integration Substitution of limits Accurate integral
8.	$\mathbf{q}=3\begin{pmatrix}2\\1\\-2\end{pmatrix}-\begin{pmatrix}5\\4\\-1\end{pmatrix}+2\begin{pmatrix}5\\3\\2\end{pmatrix}$ $=\begin{pmatrix}6\\3\\-6\end{pmatrix}-\begin{pmatrix}5\\4\\-1\end{pmatrix}+\begin{pmatrix}10\\6\\4\end{pmatrix}$ $=\begin{pmatrix}11\\5\\-1\end{pmatrix}$ $\|\mathbf{q}\|=\sqrt{(11)^2+(5)^2+(-1)^2}$ $=12.12$	M1 M1 A1 03	Attempt to get vector q Attempt to get magnitude Accurate magnitude should be to 2 d.p
9.	$\bar{x}=\frac{3+7+9+13+17+11}{6}=10$ $s=\sqrt{\frac{\Sigma d^2}{n}}=\sqrt{\frac{118}{6}}$ $=4.435$	M1 M1 A1 03	Attempt of getting mean Substitution in formulae for standard deviation.

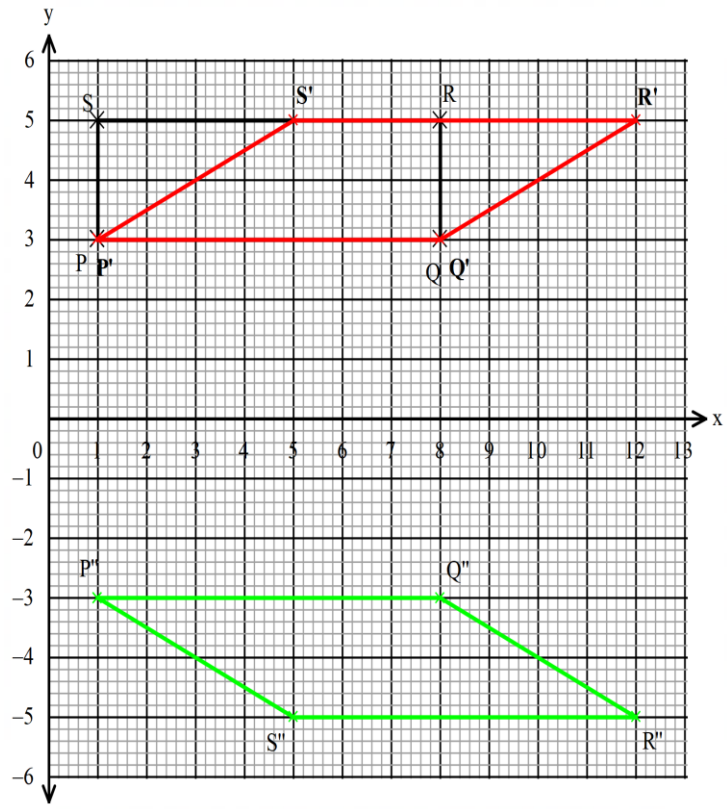
x	3	7	9	13	17	11	
$d=x-\bar{x}$	-7	-3	-1	3	7	1	
d^2	49	9	1	9	49	1	**118**

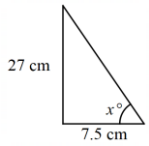
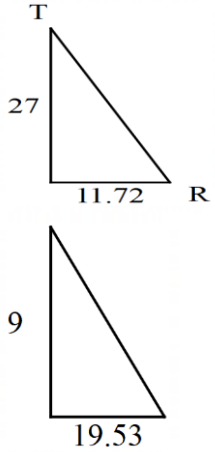
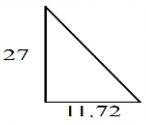
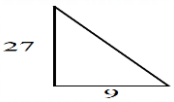
10.	Period = $\frac{360}{\frac{1}{2}}=720^0$ Phase angle = 70^0	B1 B1 02	Period stated correctly Phase angle correctly stated.
11.	D = 27×120 = 3240 nm $3240=60\theta\cos10$ $\theta=\frac{3240}{60\cos10}=54.83$ $(10°N, 99.83°E)$	B1 M1 A1 03	Distance (nm) Attempt to get θ Position correct

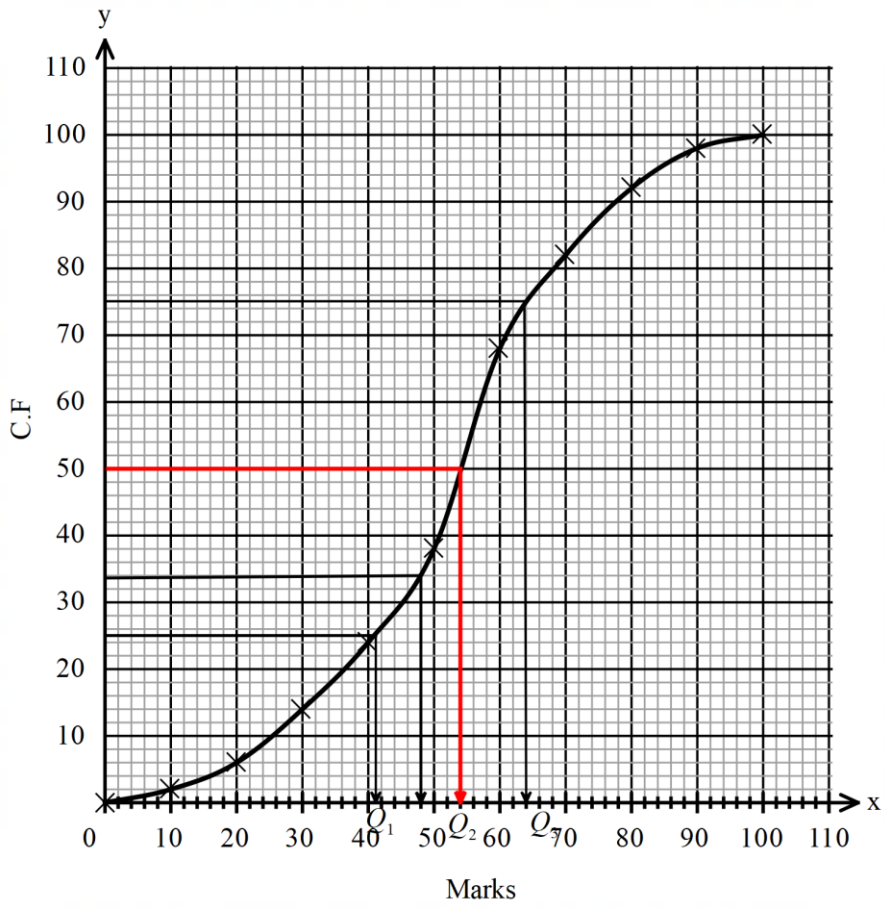
12.			B1 B1 B1 B1 04	Two non-parallel chords drawn Chords bisectors Bisector of B to the centre. Required tangent
13.	**C(-1,2)** **Radius = 2 units** $(x+1)^2+(y-2)^2=4$ $x^2+2x+1+y^2-4y+4=4$ $x^2+y^2+2x-4y+1=0$		B1 M1 A1 03	Radius and cetre correctly read Use of equation of a circle correctly. Correct answer in the required form.
14.	$Q\alpha\frac{R^2}{\sqrt[3]{P}}$ $Q=k\frac{R^2}{\sqrt[3]{P}}$ $12=k\frac{(6^2)}{\sqrt[3]{27}}$ $k=1$ $Q=\frac{R^2}{\sqrt[3]{P}}$	$Q=\frac{9^2}{\sqrt[3]{64}}$ $=20.25$ **Or** $20\frac{1}{4}$	B1 M1 A1 03	Correct equation connecting the variables Substitution of values of p and r Accurate value of Q

15.	$6k+9m \geq 316$ $k+2m \leq 34$ $k \geq 20$ $m > 14$	B1 B1 B1 03	1st inequality 2nd inequality must be simplified The last two inequalities tied
16.	 **b)** $\frac{20-0}{8-0}$ follow through $=-2.5 \pm 0.1$	P1 C1 B1 B1 04	All values plotted. Check the space plots to score. If not P0 Smooth curve Drawing of tangent Correct gradient

17.	$= 500000\left(1+\frac{8}{100}\right)^2$ a) $= 583200$ $\frac{75}{100}\times 583200$ $= 437400$	M1 M1 A1 03	Substitution in the formulae for compound interest. Attempt to multiply by 75% Accuracy
	b) i) A= $437400\left(1-\frac{4}{100}\right)^2$ $= ksh.403107.84$	M1 A1 02	Substitution in the formulae of depreciation Accuracy
	$403107.84\left(1+\frac{8}{100}\right)^{12}$ ii) A = $=1015094.117$ $= ksh.1015094$	M1 A1 B1 03	Substitution in the formulae for appreciation Accuracy Answer to the nearest shillings.
	c) $\frac{1015094-437400}{437400}\times 100\%$ $=132.1\%$	M1 A1 10	Attempt to compute percentage change. Accuracy

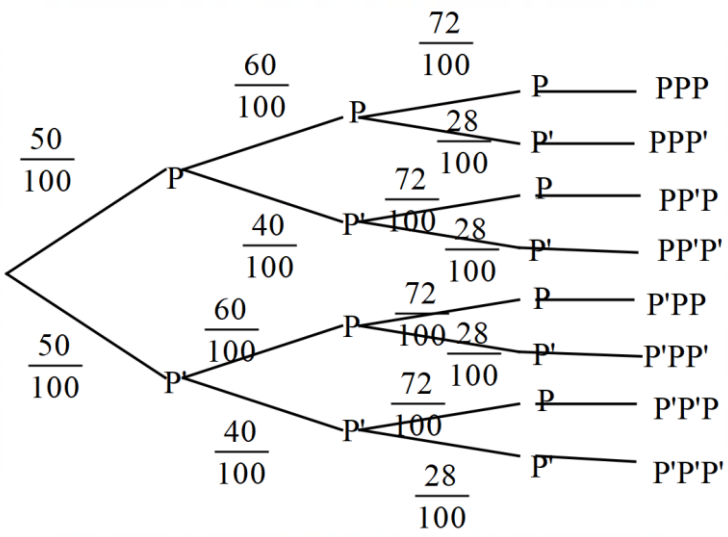
18.	 b)P' (1,3), Q' (8,3) S' (5,5) Shear factor = 2	B1 B1 B1 B1 B1	Object plotted 1st image plotted 2nd image plotted Shear factor Computation of S' P',Q' and S' stated in coordinate form
	$\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} 1 & 8 & 8 & 1 \\ 3 & 3 & 5 & 5 \end{pmatrix}=\begin{pmatrix} 1 & 8 & 12 & 5 \\ 3 & 3 & 5 & 5 \end{pmatrix}$ $8a+5b=12$ d) $a+5b=5$ $7a=7$ $a=1$ $b=0.8$ e) P'' (1,-3), Q'' (8,-3), R'' (12,-5), S'' (5,-5)	M1 M1 A1 B1	Correct use of **MOI** Substitution Required matrix Coordinates of second image correctly stated.
		10	

19.	a) $\frac{9+h}{h}=\frac{15}{10}$ $90+10h=15h$ $\frac{90}{5}=\frac{5h}{5}$ $h=18$ $H=18+9$ $=27cm$		M1 A1 02	Attempt to use similarity The height of pyramid.
	b) 	$\tan x=\frac{27}{7.5}$ $=74.48°$	M1 A1 02	Substitution in the ratio Required answer
	c) 	TR = $\sqrt{27^2+11.72^2}$ = 29.43 $\frac{29.43}{l}=\frac{3}{2}$ $l=\frac{29.43\times 2}{3}=19.62$ Slant length of frustum= 29.43-19.62 = 9.81 $\sqrt{9.81^2-9^2}$ = 3.903 $\tan\theta=\frac{9}{19.53}$ = 24.74°	M1 M1 A1 03	Attempt to find slant height of the frustum. Substitution in the formulae Accuracy
	d) 	$\tan\theta=\frac{27}{11.72}$ = 66.54°	B1 01	Accuracy.
	e) 	$\tan\theta=\frac{27}{9}$ = 71.57°	M1 A1 02	Substitution Accuracy.
			10	

20.	 b)(i) 54 ± 1 (ii) $\frac{64-42}{2}$ $= 11 \pm 0.5$ (iii) 100 – 66 = 34th 49 ± 1	B1 S1 P1 C1 B1 B1 M1 A1 B1 B1 10	Table of cf completed. Scale Plotting all points Smooth curve Correct reading from the curve. Reading of quartiles from the graph. Attempt to compute semi-interquartile Accuracy. Reading from the graph Correct value as per the reading.

21.	a, ar, ar^2		
a)	$a^3r^3 = 5832$	M1	Attempt of getting product
	$r = \frac{18}{a}$	A1	R expressed in terms of a
	$a + 18 + \frac{324}{a} = 78$	M1	Sum equated correctly.
	$a^2 + 18a + 324 = 78a$		
	$a^2 - 60a + 324 = 0$	M1	Correct substitution. (accept other techniques of solving quadratic equations if applied correctly.
	$a = \frac{60 \pm \sqrt{(-60)^2 - 4(324)}}{2}$		
b)	$= \frac{60 \pm 48}{2}$		
	$= 54 or 6$		
	$r = \frac{18}{54} or \frac{18}{6}$	A1	Correct values of a
	$r = \frac{1}{3} or 3$	B1	Values of r
	$54, 18, 6, 2, ...$	B1	The two possible sequences
	$6, 18, 54, 162, ...$		
	$s_n = \frac{6(3^n - 1)}{3 - 1}$		
	$6558 = 3(3^n - 1)$	M1	Substitution
c)	$(3^n - 1) = 2186$		
	$3^n = 2187$	M1	Introduction of log.
	$n = \frac{\log 2187}{\log 3}$		
	$= 7$	A1	Accurate terms
		10	

22.	$PT.PU = PS.PQ$ a) i) $31\times17 = 11(11+y)$ $y = \frac{31\times17}{11} - 11$ y = $36\frac{10}{11}$ or 36.91 cm	M1 A1	Substitution in the formulae of external intersection of chords. Accuracy
		02	
	ii) OR = $\sqrt{20.3^2 - \left(18\frac{5}{11}\right)^2}$ or $\sqrt{20.3^2 - 18.455^2}$ $= 8.457cm$ $= 8.456cm$	M1 A1	Use of pythagoreas theorem Accuracy.
		02	
	$\sin\theta = \frac{18\frac{5}{11}}{20.3}$ b)i) $= 65.38002267$ $= 65.4°$	M1 A1 B1	Substitution Accuracy. Answer to 1 d.p
		03	
	ii) $65.4\times2 = 130.8$ L = $\frac{130.8}{360}\times2\times\frac{22}{7}\times20.3$ $= 46.4cm$	B1 M1 A1	Getting the angle at the center Substitution in length of an arc Accuracy
		03	
		10	

23.	 a) b) i) P(PPP) = $\frac{50}{100}\times\frac{60}{100}\times\frac{72}{100}$ = 0.216 / 21.6%/ $\frac{27}{125}$ ii) 1 - P(P'P'P')+P(PPP) $1-\left(\left(\frac{50}{100}\times\frac{40}{100}\times\frac{28}{100}\right)+0.216\right)$ $1-(0.056+0.216)$ = 0.728/ 72.8% or $\frac{91}{125}$ iii) P(PPP') or P(P'P') or P(P'PP') or P(P'P'P') $\left(\frac{50}{100}\times\frac{60}{100}\times\frac{28}{100}\right)+\left(\frac{50}{100}\times\frac{40}{100}\times\frac{28}{100}\right)+$ $\left(\frac{50}{100}\times\frac{60}{100}+\frac{28}{100}\right)+\left(\frac{50}{100}\times\frac{40}{100}\times\frac{28}{100}\right)$ = $\frac{18}{25}$ or 72% or 0.72	B1 B1 M1 A1 M1 M1 A1 M1 M1 A1 10	1st branch 2nd branch Substitution Accuracy Attempt to get probability of failing in the 3 trials Subtraction from 1 Accuracy Substitution in 1st two Substitution in the last two Accuracy.

24.	a) $\frac{dv}{dt} = 5-4t$	M1	Performing differentiation
	$=5-4(2)$	M1	Substitution
	= -3 m/s^2	A1	Accuracy
	$\int_3^4 (3+5t-2t^2)dt$		
	$3t+\frac{5}{2}t^2-\frac{2}{3}t^3+c\Big\|_3^4$	M1	Integration done correctly.
	b) $\left\{\left[3(4)+\frac{5}{2}(4)^2-\frac{2}{3}(4)^3+c\right]-\left[3(3)+\frac{5}{2}(3)^2-\frac{2}{3}(3)^3+c\right]\right\}$	M1	Substitution
	$=\left[\left(9\frac{1}{3}+c\right)-\left(13\frac{1}{2}+c\right)\right]$		
	$=4\frac{1}{6}m$	A1	Accuracy. (reject decimal)
	c) $\int_0^3 (3+5t-2t^2)dt$		
	= $3t+\frac{5}{2}t^2-\frac{2}{3}t^3+c\Big\|_0^3+4\frac{1}{6}$	M1	Addition
	$=13\frac{1}{2}+4\frac{1}{6}=17\frac{2}{3}m$	A1	Accuracy
	$v=3+5t-2t^2$		
	$2t^2-5t-3=0$		
	$2t^2-6t+t-3=0$		
	d) $2t(t-3)+1(t-3)=0$	M1	Attempt to solve quadratic equation.
	$(2t+1)(t-3)=0$		
	$t=-\frac{1}{2}, t=3$	A1	Accuracy.
	$\therefore t=3s$		
		10	