

1	(a)	$2x = 9x - 3$ $x = \frac{3}{7}$	M1 A1	or common denominator
	(b)	Working $x = -2, y = \frac{3}{4}$	M1 A2	
	(c)(i)	$\frac{5}{33}$	B1	
2	(a)	$p^2 - 2 = \frac{r}{q}$ $p = \sqrt{\frac{r}{q} + 2}$	M1 A1	
	(c)(ii)	Accept $\sqrt{2}$ or 1.26	B1	
	(a)	AD is a straight line and $\angle CED = 90^\circ, \therefore \angle AEB = 90^\circ$ [R] $AB = CD = 17$ (given, H) $BE = DE = 8$ (given, S) $\therefore \triangle ABE \equiv \triangle CDE$ (RHS Congruency Test) If students use Pythagoras' Theorem to find remaining side, or trigo to find included angle, accept SSS, SAS, AAS or ASA accordingly, ensuring that the appropriate Congruency test is applied.	B1 B1 B1	B1 for any 2 correct Correct test
3	(b)(i)	$-\frac{8}{17}$	B1	
	(b)(ii)	$\frac{\sqrt{17^2 - 8^2}}{17}$ $= \frac{15}{17}$	M1 A1	for pythagoras
	(a)	$(450 - 4x)(150 - 2x)$ $= 67500 - 1500x + 8x^2$	B2	1 for each bracket. Only B1 if both brackets given but in the wrong operation, e.g. subtraction or division instead of multiplication

4	(b)	$67500 - 1500x + 8x^2 = 48000$ $2x^2 - 375x + 4875 = 0$ $x = \frac{375 \pm \sqrt{(-375)^2 - 4(2)(4875)}}{2(2)}$ $= 14.1$ or 173.4 (rej)	M1 M1 A1	Set up eqn Substitute correctly based on their eqn
	(a)	$\frac{\sin ACE}{20} = \frac{\sin 15}{10}$ $ACE = 31.2^\circ$ (rej) or 148.8°	M1 A1	
	(b)	16.2°	B1	Allow FT from 4a
	(c)	$\frac{1}{2}(20)(10)\sin 16.18$ $= 27.9$ (3sf)	M1 A1	Substitution. Allow FT from 4b
	(d)	$\frac{1}{2}(20)h = 27.86$ $h = 2.79$ (3sf)	M1 A1	Allow FT from 4c
5	(e)	$\angle BAD = \cos^{-1}\left(\frac{20^2 + 10^2 - 25^2}{2(20)(10)}\right)$ $= 108.2$ (shown)	B1 B1	Correct formula, Correct substitution
	(a)	15 and -1	B2	B1 each
	(b)	Correct plot Smooth line (see annex)	B2 B1	-1 for each wrongly plotted point
6	(c)	Gradient = -3.75 [accept -4.5 to -2.5]	M1 A1	Set up with correct points
	(d)(i)	-2.1 [Accept -2.3 to -2.05, cannot accept -2]	B1	
	(d)(ii)	-1 or -5	B2	Max of 1 only if no lines drawn.
6	(a)	$\theta = \tan^{-1}\left(\frac{75}{200}\right)$ $= 20.6^\circ$	M1 A1	Or $\tan \theta = 75/200$. 1 point only for 69.4°

	(b)	$h = 200 \tan 10^\circ$ $H = 75 + h$ $= 110m(3sf)$	MI MI A1	Formula Addition
7	(a)(i)	100	B1	
	(a)(ii)	3200	B1	
	(a)	The population doubles every 60 days	B1	
	(c)	60	B1	
	(d)(i)	Correct substitution, working and conclusion should show $P \ll 200$	B1	
	(d)(ii)	Change $10/100$ to <u>$90/100$ or 0.9</u> or $\left(1 - \frac{10}{100}\right)^x$	B1	
	(e)	14 months (must round up to 14)	B1	

