

MARK SCHEME for the May/June 2013 series

**1347 MATHEMATICS (STATISTICS WITH PURE
MATHEMATICS)**

1347/01

Paper 1 (Pure Mathematics), maximum raw mark 65

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, Pre-U, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

Page 2	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2013	1347	01

1	(i)	$1 - 14x + 84x^2$	M1 A1 [2]	1 and correct method for another term All correct, ignore extra terms
	(ii)	Substitute $x = 1/35$ Get 117/175	M1 A1 [2]	Subs reasonable x into their answer Or extract fractional equivalent
2	(i)		M1 A1 [2]	Decreasing curve, not below x -axis Correct including apparently asymptotic to axis to right, allow $x > 0$ only
	(ii)	$\ln y = \ln 2 + 0.7x$ $x = \frac{1}{\ln 0.7} (\ln y - \ln 2)$	M1 A1 [2]	Law of logs used correctly once Final answer, aef, allow $\log_{0.7} (y/2)$
3	(i)	338 350	B1 [1]	
	(ii)	1 353 400	B1✓ [1]	(i) $\times 4$, f.t. from (i)
	(iii)	338 450	B1✓ [1]	(i) $+ 100$, f.t. from (i)
4	(i)	$A = 27$	B1	27 seen anywhere
		$k = \frac{1}{2} \ln 1.5$ or 0.203	M1 A1 [3]	Rearrange and take $\ln$ Answer, aeef or a.r.t. 0.203
	(ii)	$12 \times \left(\frac{2}{3}\right)^2$	M1	Or substitute into formula
		$= 5\frac{1}{3}$	A1 [2]	Answer, aef, allow 5.33 or better
5	(i)		M1	Use $b^2 - 4ac$, 0
		$k^2 - 12k$, 0	A1	This inequality, ae <i>simplified</i> f
		$k(k - 12)$, 0	M1	Method for solution (<i>not</i> “, 0, , 12”)
		0, k , 12	A2 [5]	One error, A1 only

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6	(i)	$\sqrt{4^2 + 2^2}$ $= 2\sqrt{5}$	M1 A1	Use Pythagoras Allow $\sqrt{20}$ or exact equivalent
	(ii)	$AC = 2\sqrt{5} - 3$ $\frac{1}{2}AD \times (2\sqrt{5} - 3) = 22$ $AD = \frac{44}{2\sqrt{5} - 3} = \frac{44(2\sqrt{5} + 3)}{11}$ $= 12 + 8\sqrt{5}$	B1√ M1 M1 A1√ A1 [5]	<i>Their</i> (i) – 3 seen [if circle equation used, need to reject $C(-6 \div \sqrt{5}, 3 - 6 \div \sqrt{5})$] Use Δ and make AD subject of formula Multiply by conjugate of $q\sqrt{r} - p$ Correct on <i>their</i> (i) if form $q\sqrt{r} - p$ used CAO, aef provided of form $a + b\sqrt{c}$ with a, b, c integer
7		$\int_1^4 x^{1/2} + \frac{2}{x} dx = \left[\frac{2x^{3/2}}{3} + 2 \ln x \right]_1^4$ [=7.439] Area of trapezium = 8.25 Difference 0.811 (3 SF)	M1 B1 B1 M1 A1 A1 [6]	Attempt to integrate curve, limits 1, 4 One term correct Fully correct indefinite integral Method for trapezium, e.g. integration [y-coords 3 and 2.5] 8.25 seen or implied 0.811 or better, final answer +ve $\left[= \frac{43}{12} - 2 \ln 4 \right]$
8	(i)	Velocity 20 (+ve x)	B1	One fact about velocity
		Initial position	B1	[2] One fact about position
	(ii)	$(20t - 250)^2 + (15t - 500)^2$ $625t^2 - 25\,000t + 312\,500$ AG	M1 A1	Use Pythagoras; correctly simplify to AG , at least one intermediate line
	(iii)	$625[t^2 - 40t + 500]$ $= 625[(t - 20)^2 + 100]$ Minimum distance $\sqrt{625 \times 100}$ $= 250$	M1 A1 M1 A1√	Take out factor and halve t term Fully correct, allow 625 omitted Use <i>their</i> b $\sqrt{625 \times \text{their } b}$
		Time $t = 20$	A1√	[5] <i>their</i> a

Page 4	Mark Scheme	Syllabus	Paper
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9	(i)	$y' = 2x - 3$ $= 3$ $x = 3 - 3y$	M1 A1 M1 A1	Differentiate correctly Obtain $m = 3$ Use $\frac{-1}{m}$ and method for finding q Answer, as simplified f
	(ii)	$y = (3 - 3y)^2 - 3(3 - 3y)$ or $x^2 - 3x = 1 - \frac{x}{3}$ $10y = 9y^2$ or $3x^2 - 8x - 3 = 0$ $\left(-\frac{1}{3}, \frac{10}{9}\right)$	M1 A1 A1	Subs <i>their</i> x or y into quadratic This equation, as simplified form Get $\frac{10}{9}$ or $-\frac{1}{3}$ (with or without others)
	(iii)	(a) $(5, 0), \left(\frac{5}{3}, \frac{10}{9}\right)$ (b) $(3, 0), \left(-\frac{1}{3}, -\frac{10}{9}\right)$ (c) $(6, 0), \left(-\frac{2}{3}, \frac{20}{9}\right)$	M1 A1√ M1 A1√ M1 A1√ [6]	Both coordinates, no others Coords translated ± 2 , x or y : M1 Coords reflected, either axis: M1 $\times 2$ or $\div 2$, any combination: M1 All √ on <i>their</i> (ii)
	10 (i)	$\frac{d^2P}{dv^2} = 6v^2 + 3 - \frac{18}{v^2}$	M1 A1	Differentiate Fully correct
	(ii)	$= 0$ at $6v^4 + 3v^2 - 18 = 0$ $3(2v^2 - 3)(v^2 + 2) = 0$ $v^2 = \frac{3}{2}$ $v = 1.22$ (474...) $P = 22.0$ (454)	M1 M1 A1 A1 A1	Polynomial and equate to 0 Method for solving quadratic in v^2 $\frac{3}{2}$ seen or implied $v = 1.22$ or better and nothing else $P = 22.0$ or better
	(iii)	$\frac{d^2P}{dv^2} = 12v + \frac{36}{v^3} \therefore 0 \therefore$ minimum	B1	Correctly show minimum, needn't justify ". 0", can use numerical gradients or other complete argument