AS Level / Year 1
Edexcel Maths / Paper 2

December 2017 Mocks

Question	Scheme		AO	Marks
1				
(a) Method 1	$10n = 55 + 5n$	Forms a 3 term equation involving 55 and at least one term in n, without t	AO1.1a	M1
	$n = 11$	Correct answer	AO1.1b	A1 **[2]**
(a) Method 2	$10 = \frac{55}{n} + 5$	Forms a 3 term equation involving 10 and at least one term in n, without t	AO1.1a	M1
	$n = 11$	Correct answer	AO1.1b	A1 **[2]**
(b)	$\frac{11}{1.15} = 9.56 \text{ mph} (9.5587...)$	Correct answer, units not required. Awrt 9.56	AO1.2	B1 **[1]**
(c)	Hurn had a lower average daily mean windspeed in 1987 than in 2015	Correct conclusion only ft their conversion in (b)	AO2.2	B1F **[1]**
(d)	Large data set only covers the months May to October / large data set does not cover the whole year / oe	Limitation	AO3.2c	B1 **[1]**
(e/i)	e.g. use a larger sample size, so that it is more representative	Improvement + explanation	AO3.5c	B1 **[1]**

(e/ii)	Any 1 from: • consider standard deviation/variation, so she can compare/take into account the spread of the data • consider another average/the median/the mode, so she can compare with respect to other averages / other explanation • consider/exclude outliers, to avoid the average being influenced by extreme values	A suitable improvement + explanation about why this can make it more reliable	AO3.5c	B1 **[1]**
				7

Question 1 Notes

(a) – both methods: M1 – the equation must be three-term, but this can be implied through correct workings, i.e. $5n = 55$ is M1

(e/i): Ignore 'take a census', not appropriate.

(e/ii): A suitable improvement and a suitable explanation.

General: Terms underlined in a solid line must be fully present to score the mark. Ideas underlined in a wavy line need to be conveyed, but can be phrased differently.

Question	Scheme		AO	Marks
2				
(a)	For every 1 mile from Chris'/the house, the price of petrol increases by 1.13 p	Suitable interpretation that contains all underlined elements	AO2.2	B1 **[1]**
(b)	Petrol price at *B* likely to be $p = 113 + 1.13(5.8) = 119.554$ p	Substitutes 5.8 into regression line	AO3.1b	M1
	which is less than the petrol price at *A*	Obtains awrt 119.6 and compares it to the price at *A*	AO2.4	A1 **[2]**
(c)	$p = 113 + 1.13(100) = 226$ p	Obtains petrol price as 226 p at 100 miles	AO1.1b	B1
	which is much higher than the current data values and so not reliable since 100 lies outside the range of the data	Correct reason for not using the current model	AO3.5b	B1 **[2]**
				5

Question	Scheme	AO	Marks
3			
(a)	$\mathrm{P}(4,4H)=\frac{1}{4}\times {}^{6}C_{4}\left(\frac{1}{5}\right)^{4}\left(\frac{4}{5}\right)^{2}$		
	Multiplies **their** expression for P(4H) by ¼	AO1.1a	M1
	Other factor is $k\left(\frac{1}{5}\right)^{4}\left(\frac{4}{5}\right)^{2}$, $k\geq 1$	AO1.1a	M1
	$=\frac{12}{3125}$		
	Correct answer oe	AO1.1b	A1 **[3]**
(b)	$\mathrm{P}(1,1H)=\frac{1}{4}\times {}^{3}C_{1}\left(\frac{1}{5}\right)^{1}\left(\frac{4}{5}\right)^{2}=\frac{12}{125}$ (0.096)		
	$\mathrm{P}(2,2H)=\frac{1}{4}\times {}^{4}C_{2}\left(\frac{1}{5}\right)^{2}\left(\frac{2}{5}\right)^{2}=\frac{24}{625}$ (0.0384)		
	$\mathrm{P}(3,3H)=\frac{1}{4}\times {}^{5}C_{3}\left(\frac{1}{5}\right)^{3}\left(\frac{2}{5}\right)^{2}=\frac{8}{625}$ (0.0128)		
	Correct expression for P(1,1H), P(2,2H) **or** P(3,3H)	AO1.1a	M1
	$\mathrm{Prob.}=\frac{472}{3125}$ (0.15104)		
	Sums their 3 or 4 appropriate outcomes for the game	AO1.1a	M1
	Correct probability	AO1.1b	A1 **[3]**
			6

Question	Scheme	AO	Marks
4			
(a)	Any **one** from: Valid suggestion • (3/some) individuals refused to respond • some people may have not taken their driving test	AO2.2	B1 **[1]**
(b)	One small square = $\frac{50}{250}$ oe (e.g. $\frac{250}{50}$) Attempts to count squares **and** uses 50 to obtain a measure of scale (oe)	AO1.1a	M1
	$\Rightarrow$ one small square = $\frac{1}{5}$ hours oe Correct calculation oe	AO1.1b	A1
	No. between 25–38 is $93\times\frac{1}{5}=18.6$ hours Counts squares for 25–38 and multiplies by **their** measure of scale	AO1.1a	dM1
	Correct number of hours, cao	AO1.1b	A1 **[4]**
(c)	$Q_2 = 30+\frac{9}{17}\times 10 = 35.3$ $(35.294...)$ Uses linear interpolation	AO1.1a	M1
	Correct median. Accept use of $n+1$ which gives $Q_2 = 35.6$	AO1.1b	A1 **[2]**
			7

Question 4 Notes

(b) 1st M1 – attempts to count squares to obtain a measure of scale. If using fd, must use 50 to obtain a measure of scale.

(c) M1 – must use linear interpolation. There are equivalent expressions for Q_2, such as $Q_2 = 40-\frac{8}{17}\times 10$ or $\frac{40-Q_2}{40-30}=\frac{33-25}{33-16}$ which should score the M mark when seen. **Accept** use of $n+1$, i.e. median at 25.5, which gives $Q_2 = 35.6$.

SC: Use of 29.5, 40.5 etc. is M0 A0.

Question	Scheme		AO	Marks
5				
(a)	the set of values/numbers of the test statistic for which the null hypothesis is rejected/the test is significant	Definition with all underlined elements oe	AO2.5a	B1 **[1]**
(b)	$X \sim B\left(50, \frac{1}{15}\right)$, $H_0 : p = \frac{1}{15}$, $H_1 : p < \frac{1}{15}$	Uses the correct binomial distribution and H_0 and H_1 explicitly stated	AO3.3	B1
	$P(X \leq 1) = 0.145 \quad (0.145175)$	Attempts to find probability $X \leq 1$ using **their** binomial distribution. Can be implied by correct probability OR finds correct CR: $X \leq 0$	AO1.1a	M1
	Reject H_1 or Insiginificant or 1 lies outside the critical region	Statement ft their probability	AO2.2	dM1
	There is insufficient evidence that the proportion of passengers that do not turn up to their flight is lower (than 1/15)	Contextual conclusion	AO3.2a	A1 **[4]**
				5
	Question 5 Notes			

(a) B1 – for a fully correct definition containing all the underlined elements (or equivalent formulations). For example, accept 'for which the alternative hypothesis is accepted'.

(b) B1 – for identifying a binomial distribution with correct parameters and explicitly stating the hypotheses correctly.

Question	Scheme		AO	Marks
6				
(a/i)	Either: • mass is concentrated at a single point (1 mark), so rotational effects are ignored (1 mark) • forces act through a single point (1 mark), so rotational effects are ignored (1 mark)	1 mark: assumption 1 mark: consequence	AO3.2b AO3.2b	B1 B1 **[2]**
(a/ii)	Any **one** from: • mass of the string is negligible/not significant • tension in the string is uniform	One or both assumptions	AO3.2b	B1 **[1]**
(b)	e.g. ignore air resistance	A correct suggestion	AO3.3	B1 **[1]**
				4

Question	Scheme	AO	Marks
7			
	Parts (i) and (ii) should be marked together		
(i)	$\{-\}\ 18 = 3a \Rightarrow a = \{-\}\ 6\ \text{m s}^{-2}$ — Equation of the form $\pm 18 = 3a$ (accept other symbols for a)	AO1.1a	M1
	$0 = 15 - '6't \Rightarrow t = ...$ $\quad \{t = 2.5\}$ — Attempts to use correct equation of motion with consistent signs	AO1.1a	dM1
	So total time for particle to come to rest is $8 + 2.5 = 10.5$ s — Adds 8 to their t	AO1.1a	dM1 A1
	Correct total time	AO1.1b	**[4]**
(ii)	In first 8 seconds, distance travelled is 120 m — 120 seen or implied	AO1.1b	B1
	e.g. $0^2 = 15^2 + 2(-'6')s \Rightarrow s = ...$ $\quad \left\{s = \frac{75}{4}\right\}$ — See notes	AO1.1a	M1
	Total distance $= \frac{555}{4}$ m — Cao	AO1.1b	A1 **[3]**
			7

Question 7 Notes

(i) 2nd M1 – the equation of motion must be correct and the signs should be consistent, i.e. $0 = \pm 15 \mp 6t$.

(ii) M1 – attempts to use a dimensionally correct equation of motion to find the distance taken for the particle to come to rest from the instant the surface becomes rough. If they use an equation with acceleration, accept any value for it; if they use an equation with time, they must use their '2.5' from (i).

Question	Scheme	AO	Marks
8			
(a)	$(y+3)=\pm(8+x)$ Seen or implied (accept equivalent forms)	AO2.1	M1
	$(y+3)=-(8+x)\Rightarrow x+y+11=0$ Cso. **Must use –ve sign.**	AO2.1	A1 **[2]**
(b)	$(x+8)^2+(y+3)^2=1568$ Forms the correct second equation	AO1.2	B1
	e.g. $(-y-3)^2+(y+3)^2=1568$ Substitutes for x or y using (i) and **their** second equation	AO1.1a	M1
	e.g. $y+3=\pm\sqrt{\frac{1568}{2}}$ Attempts to solve their quadratic equation for x or y	AO1.1a	dM1
	$y=25,\ y=-31\ ,\ \Rightarrow x=-36,\ x=20$ One pair of solutions, (x,y), to the simultaneous equations	AO1.1a AO1.1b	dM1 A1
	{But since $x<0$, we have} $x=-36,\ y=25$ Correct value of x and y selected	AO3.2a	A1 **[6]**
			8

Question 8 Notes

(a) M1 – sight of $(y+3)=\pm(8+x)$ oe, i.e $\tan(45)=-\frac{8+x}{y+3}$. A1 – cso, with negative sign used.

(b) 3rd M1 – uses (one of) their *x* or *y* values to find the corresponding the *y* or *x* value. Dependent on previous M mark.

1st A1 – one correct pair of solutions to the simultaneous equations (not the contextual problem itself).

2nd A1 – correct value of *x* and *y* selected.

Question	Scheme		AO	Marks
9				
(a)	$T - 0.3g - 0.75g = (0.3 + 0.75)(2.5)$	Resolves vertically, considering the lift	AO1.1a	M1
		Correct unsimplified resolution	AO1.1b	A1
	$T = 13$ N (12.915)	Correct tension to two or three significant figures	AO1.1b	A1 **[3]**
(b)	Consider the mass *A*	Considers *A* and resolves	AO1.1a	M1
	$R - 0.3g = 0.3(2.5)$	Correct unsimplified resolution	AO1.1b	A1
	$R = 3.7$ N (3.69) , {so force exerted on *B* by *A* has magnitude 3.7 N}	Correct magnitude force, final answer, to two or three significant figures. Ignore directions	AO1.1b	A1 **[3]**
(c)	$mg - 12.915 = 2.5m$	Attempts to use N2L to find equation of motion of the mass m	AO1.1a	M1
		Correct unsimplfiied equation ft their (a)	AO2.2	A1FT
	$\Rightarrow m = 1.8$ kg (1.7691...)	Correct mass	AO1.1b	A1 **[3]**
(d)	Magnitude of force is 26 N (25.83)	Correct magnitude of the resultant force ft their (a)	AO1.1b	B1FT
	Direction is (vertically) upwards	Correct direction of the resultant force	AO1.1b	B1 **[2]**
				11

	Question 9 Notes
In all cases, for an M mark for a resolution, the candidate's equation must be dimensionally correct and contain the correct number of terms. **(c)** M1 – for an equation of the form $mg - T = 2.5m$, where *T* is either general or is replaced by some positive value.	

Marks breakdown by AO

AO	Number of marks	%
AO1	39	65
AO2	9	15
AO3	12	20