OCR
Oxford Cambridge and RSA

GCE

Mathematics

Unit **4732**: Probability and Statistics 1

Advanced Subsidiary GCE

Mark Scheme for June 2016

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations and abbreviations

Annotation in scoris	Meaning
and	
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working
M0 M1 ,	Method mark awarded 0, 1
A0 A1 ,	Accuracy mark awarded 0, 1
B0 B1 ,	Independent mark awarded 0, 1
SC	Special case
^	Omission sign
MR	Misread
Highlighting	
Other abbreviations in mark scheme	**Meaning**
E1	Mark for explaining
U1	Mark for correct units
G1	Mark for a correct feature on a graph
M1 dep*	Method mark dependent on a previous mark, indicated by *
cao	Correct answer only
oe	Or equivalent
rot	Rounded or truncated
soi	Seen or implied
www	Without wrong working

1 **Subject-specific Marking Instructions for GCE Mathematics (OCR) Statistics strand**

a Annotations should be used whenever appropriate during your marking.

The A, M and B annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks. It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.

For subsequent marking you must make it clear how you have arrived at the mark you have awarded.

b An element of professional judgement is required in the marking of any written paper. Remember that the mark scheme is designed to assist in marking incorrect solutions. Correct *solutions* leading to correct answers are awarded full marks but work must not be judged on the answer alone, and answers that are given in the question, especially, must be validly obtained; key steps in the working must always be looked at and anything unfamiliar must be investigated thoroughly.

Correct but unfamiliar or unexpected methods are often signalled by a correct result following an *apparently* incorrect method. Such work must be carefully assessed. When a candidate adopts a method which does not correspond to the mark scheme, award marks according to the spirit of the basic scheme; if you are in any doubt whatsoever (especially if several marks or candidates are involved) you should contact your Team Leader.

c The following types of marks are available.

M
A suitable method has been selected and *applied* in a manner which shows that the method is essentially understood. Method marks are not usually lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, eg by substituting the relevant quantities into the formula. In some cases the nature of the errors allowed for the award of an M mark may be specified.

A
Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated Method mark is earned (or implied). Therefore M0 A1 cannot ever be awarded.

B
Mark for a correct result or statement independent of Method marks.

E
A given result is to be established or a result has to be explained. This usually requires more working or explanation than the establishment of an unknown result.

Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored. Sometimes this is reinforced in the mark scheme by the abbreviation isw. However, this would not apply to a case where a candidate passes through the correct answer as part of a wrong argument.

d When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. (The notation 'dep *' is used to indicate that a particular mark is dependent on an earlier, asterisked, mark in the scheme.) Of course, in practice it may happen that when a candidate has once gone wrong in a part of a question, the work from there on is worthless so that no more marks can sensibly be given. On the other hand, when two or more steps are successfully run together by the candidate, the earlier marks are implied and full credit must be given.

e The abbreviation ft implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise A and B marks are given for correct work only — differences in notation are of course permitted. A (accuracy) marks are not given for answers obtained from incorrect working. When A or B marks are awarded for work at an intermediate stage of a solution, there may be various alternatives that are equally acceptable. In such cases, exactly what is acceptable will be detailed in the mark scheme rationale. If this is not the case please consult your Team Leader.

Sometimes the answer to one part of a question is used in a later part of the same question. In this case, A marks will often be 'follow through'. In such cases you must ensure that you refer back to the answer of the previous part question even if this is not shown within the image zone. You may find it easier to mark follow through questions candidate-by-candidate rather than question-by-question.

f Wrong or missing units in an answer should not lead to the loss of a mark unless the scheme specifically indicates otherwise.

Candidates are expected to give numerical answers to an appropriate degree of accuracy. 3 significant figures may often be the norm for this, but this always needs to be considered in the context of the problem in hand. For example, in quoting probabilities from Normal tables, we generally expect *some* evidence of interpolation and so quotation to 4 decimal places will often be appropriate. But even this does not always apply – quotations of the standard critical points for significance tests such as 1.96, 1.645, 2.576 (maybe even 2.58 – but not 2.57) will commonly suffice, especially if the calculated value of a test statistic is nowhere near any of these values. Sensible discretion *must* be exercised in such cases.

Discretion must also be exercised in the case of small variations in the degree of accuracy to which an answer is given. For example, if 3 significant figures are expected (either because of an explicit instruction or because the general context of a problem demands it) but only 2 are given, loss of an accuracy ("A") mark is likely to be appropriate; but if 4 significant figures are given, this should not normally be penalised. Likewise, answers which are slightly deviant from what is expected in a very minor manner (for example a Normal probability given, after an attempt at interpolation, as 0.6418 whereas 0.6417 was expected) should not be penalised. However, answers which are *grossly* over- or under-specified should normally result in the loss of a mark. This includes cases such as, for example, insistence that the value of a test statistic is (say) 2.128888446667 merely because that is the value that happened to come off the candidate's calculator. Note that this applies to answers that are given as final stages of calculations; intermediate working should usually be carried out, and quoted, to a greater degree of accuracy to avoid the danger of premature approximation.

The situation regarding any particular cases where the accuracy of the answer may be a marking issue should be detailed in the mark scheme rationale. If in doubt, contact your Team Leader.

g Rules for replaced work

If a candidate attempts a question more than once, and indicates which attempt he/she wishes to be marked, then examiners should do as the candidate requests.

If there are two or more attempts at a question which have not been crossed out, examiners should mark what appears to be the last (complete) attempt and ignore the others.

NB Follow these maths-specific instructions rather than those in the assessor handbook.

h Genuine misreading (of numbers or symbols, occasionally even of text) occurs. If this results in the object and/or difficulty of the question being considerably changed, it is likely that all the marks for that question, or section of the question, will be lost. However, misreads are often such that the object and/or difficulty remain substantially unaltered; these cases are considered below.

The simple rule is that *all* method ("M") marks [and of course all independent ("B") marks] remain accessible but at least some accuracy ("A") marks do not. It is difficult to legislate in an overall sense beyond this global statement because misreads, even when the object and/or difficulty remains unchanged, can vary greatly in their effects. For example, a misread of 1.02 as 10.2 (perhaps as a quoted value of a sample mean) may well be catastrophic; whereas a misread of 1.6748 as 1.6746 may have so slight an effect as to be almost unnoticeable in the candidate's work.

A misread should normally attract *some* penalty, though this would often be only 1 mark and should rarely if ever be more than 2. Commonly in sections of questions where there is a numerical answer either at the end of the section or to be obtained and commented on (eg the value of a test statistic), this answer will have an "A" mark that may actually be designated as "cao" [correct answer only]. This should be interpreted *strictly* – if the misread has led to failure to obtain this value, then this "A" mark must be withheld even if all method marks have been earned. It will also often be the case that such a mark is implicitly "cao" even if not explicitly designated as such.

On the other hand, we commonly allow "fresh starts" within a question or part of question. For example, a follow-through of the candidate's value of a test statistic is generally allowed (and often explicitly stated as such within the marking scheme), so that the candidate may exhibit knowledge of how to compare it with a critical value and draw conclusions. Such " fresh starts" are not affected by any earlier misreads.

A misread may be of a symbol rather than a number – for example, an algebraic symbol in a mathematical expression. Such misreads are more likely to bring about a considerable change in the object and/or difficulty of the question; but, if they do not, they should be treated as far as possible in the same way as numerical misreads, *mutatis mutandis*. This also applied to misreads of text, which are fairly rare but can cause major problems in fair marking.

The situation regarding any particular cases that arise while you are marking for which you feel you need detailed guidance should be discussed with your Team Leader.

Note that a miscopy of the candidate's own working is not a misread but an accuracy error.

Note: "(3 sfs)" means "answer which rounds to ... to 3 sfs". If correct ans seen to ≥ 3sfs, ISW for later rounding
Penalise over-rounding only once in paper.

Question			Answer	Mk	Guidance	
1	i		Σxp = 2.7 oe	M1 A1	≥ 3 correct terms	÷ 4 or ÷ 10 etc M0A0
			Σx^2p (= 8.1) - "2.7"^{2} = 0.81 oe	M1 M1 A1 **[5]**	≥ 3 correct terms dep +ve result	(x - '2.7') ≥ 3 correct terms M1 $\Sigma(x$ - '2.7')^2p ≥ 3 correct terms M1 ÷ 4 or ÷ 10 etc M0M0 A0
	ii		$0.3^2 \times 0.7 \times 3 + 0.3^3$ or 0.189 + 0.027 oe $= \frac{27}{125}$ or 0.216	M2 A1 **[3]**	or $0.3^2 \times 0.7 + 0.3^3$ M1 or $0.3^2 \times 0.7 \times 3$ or 0.189 oe M1 0.3^2 or 0.09: M0 unless clearly part of correct method $0.3^2\times0.1\times3+0.3^2\times0.4\times3+0.3^2\times0.2\times3 + 0.3^3$ M2 "×3" omitted 3 times or ≥ 2 terms correct M1	1 - ($^3C_1 \times 0.3 \times 0.7^2 + 0.7^3$) M2 or 1 - ($0.3 \times 0.7^2 + 0.7^3$) M1 SC: M1 for $0.3^2\times0.6\times3+0.3^3$ or 1 - ($^3C_1 \times 0.3 \times 0.6^2 + 0.6^3$) $\times^3C_1$or $\times^3C_2$ instead of ×3 is OK throughout
Total				**8**		
2	i	a	$S_{xx} = 3215 - \frac{179^2}{12}$ (= 544.9167 or $\frac{6539}{12}$) $S_{yy} = 3565 - \frac{191^2}{12}$ (= 524.9167 or $\frac{6299}{12}$) $S_{xy} = 3343 - \frac{179\times191}{12}$ (= 493.9167 or $\frac{5927}{12}$) $r = \frac{"493.9167"}{\sqrt{"544.9167"\times"524.9167"}}$ = 0.924 (3 sf) or 0.9235.....	M1 M1 A1 **[3]**	Correct sub in a correct S formula Correct sub in 3 correct S formulae and a correct r formula Must see ≥ 3 sf	Correct ans, (≥3 sf) no wking, M1M1A1 Ignore any comparison with 0.92
	i	b	Correlation does not imply causation or It depends on the time of year or Both depend on a third variable or There could be other factors	B1 **[1]**	Any answer which implies or is equiv to any of these	Allow without context. Ignore incorrect comments

Question			Answer	Mk	Guidance		
	ii	a	'Increased' <u>and</u> Positive gradient or positive coeff of *n* or 'Output goes up by 0.6 each month' Both needed	 B1 **[1]**	'Increased' <u>and</u> values of *z* shown as follows: at least 6 values or 1st and last values or 1st, or 2nd or 3rd or 4th **<u>and</u>** 9th or10th or 11th or 12th ie 17.6 or 18.2 or 18.8 or 19.4 **<u>and</u>** 22.4 or 23 or 23.6 or 24.2	'Increased' <u>and</u> 'Value of 0.6*n* increases as *n* increases'	<u>NOT:</u> 'Increased' and 'Value of *z* incr *as n* incr' '*z* incr as no. of mths incr
	ii	b	$\bar{n}$ = 6.5 or $\frac{78}{12}$ oe seen $\bar{z}$ = 0.6×'6.5' + 17 alone, eg not ÷12 or 17 = $\bar{z}$ - 0.6×'6.5' oe $\bar{z}$ = 20.9	B1 M1 A1 **[3]**	 or (0.6×1+17+0.6×2+17+ . . .0.6×12+17)÷12 oe or '250.8'÷12 M1 ft their '6.5' only if comes from ....÷12 cao	Long method, all correct terms seen and ÷12 M1 NB ans 20.9 may not score the B1	
	ii	c	Total output = "20.9" × 12 251 (3 sf)	M1 A1f **[2]**	or 0.6×1+17+0.6×2+17+ . . .0.6×12+17 oe or eg $\frac{88}{5}+\frac{91}{5}+\ldots+\frac{121}{5}$ oe ft their (ii)(b)	Long method, all correct terms seen Not ISW, eg 25100 scores A0, even if 251 seen	
Total				**10**			
3	NB in (i) and (ii) 1768 + 150^2 × 52 = 1171768 is incorrect and scores no marks in either part, except possible ft in (ii) .						
3	i		$\frac{-182}{52}$ or –3.5 seen or implied Mean = 150 – "3.5" = 146.5 or 147 $\frac{1768}{52}-("-3.5")^2$ alone, eg not if + 150 = 21.75 or 21.8	B1 M1 A1 M1 A1 **[5]**	 or $\frac{-182+150\times52}{52}$ or $\frac{7800-182}{52}$ B1M1 Allow within √ sign Not ISW, eg $\sqrt{21.75}$ (or 4.66) M1A0 ans 4.66, no working, M1A0 NB $\frac{1768}{52}-"146.5"^2$ or 1768 -('-3.5^2') M0A0	Σm = 150x52 - 182 or 7618 B1 "7618" ÷ 52 M1 =146.5 A1 (Σ(m-150)²=1768 Σm²-300Σm+150²x52=1768 Σm²=1768+300x"7618"-150²x52 = 1117168) $\frac{1768+300\times'7618'-150^2\times52}{52}-'146.5'^2$ or $\frac{'1117168'}{52}-'146.5'^2$ fully correct method M1 = 21.75 A1	

Question			Answer	Mk	Guidance	
	ii		$\frac{\Sigma m^2}{52}$ –"146.5"^{2} = "21.75" or Σm^2 = ('21.75' + '146.5^2') × 52 ft their mean & +ve var from (i) for M2 Σm^2 = 1117168 ISW	M2 A1 **[3]**	Allow M1 for $\frac{\Sigma m^2}{52}$ –"3.5"^{2} = "21.75" or Σm^2 = ('21.75' + '3.5^2') × 52 Exact; no ft from (i) eg 147 or 21.8	Σ(m-150)²=1768 Σm²-300Σm+150²x52=1768 ≥ 2 terms correct M1 Σm²=1768+300x"7618"-150²x52 correct method M1 =1117168 A1 Correct ans, no wking M1M1A1 If incorrect ans given with no wking, possibly M1M1 for (ii) may be obtained by correct method seen in (i), However M1M0 or M0M0 is more likely.
3(iii)	The correct method is in the 1st column. However, most candidates will give the allowed method in the middle column and score both marks. NB 3rd column					
	iii		(52 + 1) ÷ 4 = 13.25 or (26+1) ÷ 2 = 13.5 (⇒ 13th apple has mass < 140) ⇒ (no. below 140 =) 13	M1 A1 **[2]**	Allow 52÷ 4 or 26 ÷2 (= 13) M1 ⇒ (no. below 140 =) 13 A1	Allow 52÷ 4 or 26 ÷2 (= 13) M1 (⇒ 13th apple has mass 140) ⇒ (no. below 140 =) 12 A0
	iv		IQR = 15 seen or implied 155+1.5×15 = 177.5 (or > 176) or 140–1.5×15 = 117.5 (or < 130) No outliers	B1 B1 B1 **[3]**	or 22.5 seen or implied 176-155 = 21 (or < 22.5) or 140-130=10 (or < 22.5) Ignore method	$\frac{176-155}{15}$ =1.4 (or <1.5) or $\frac{140-130}{15} = \frac{2}{3}$ (or <1.5) Equivalent correct methods may be seen For 2nd B1 allow 14 ≤ IQR ≤ 16
Total				**13**		
4	i		–1	B1 **[1]**		
	ii		5 pts (or line or curve or zigzag) such that: grad always +ve (not vertical) not in st line.	 B1 B1 dep **[2]**	Allow ≥ 4 pts dep 1st B1 Must be clearly intended not to be st line	eg st line, +ve grad, B1B0 If crosses and curve or line, mark crosses SC Some segments vertical (not all) B0B1

Question			Answer	Mk	Guidance	
	iii		x 1 2 3 4 5 or 1 2 3 4 5 y 1 2 3 5 4 2 1 3 4 5 Allow both sets reversed $\Sigma d^2 = 2$ $r_s = 1 - \frac{6\times"2"}{5(5^2-1)}$ $= 0.9$	M1 A1 M1 M1 A1 **[5]**	Attempt ranks Correct ranks dep 1st M1 Correct method for Σd^2; ft their ranks NB $\Sigma d^2 = 2^2 = 4$: M0 Sub their Σd^2 into correct formula, dep M1M1, eg not using $\Sigma d^2 = 2^2=4$	$\Sigma x=\Sigma y=15$ $\Sigma x^2=\Sigma y^2=55$ $\Sigma xy=54$ $S_{xx}=S_{yy}=55-(15^2\div5)=10$ $S_{xy}=54-(15^2\div5)=9$ correct method for one S M1 $r_s = \frac{9}{\sqrt{10\times10}}$ fully correct method M1 $=0.9$ A1 ans 0.9, no wking: full marks ans -0.9 with wking may get M1M1M1 ans -0.9, no wking: no marks
Total				**8**		
5	i	a	0.414(2)	B1 **[1]**		
	i	b	0.4142 – 0.2677 = 0.1465 or 0.147 (3 sf) allow 0.146	M1 A1 **[2]**	$^{25}C_{14} \times 0.4^{11} \times 0.6^{14}$	or their (i) - 0.2677, dep +ve result: M1
	i	c	$25 \times 0.6 \times 0.4$ or 15 - 9 (ie from $np(1-p)$) $= 6$	M1 A1 **[2]**	Allow $\sqrt{(25 \times 0.6 \times 0.4)}$ or 2.45 for M1	
	ii		$^{24}C_y \times 0.7^{24-y} \times 0.3^y$ oe $(^{24}C_8 \times 0.7^{16} \times 0.3^8 =)$ 0.160 (3 sf)	B1 B1 **[2]**	Allow other letters for y Allow 0.16	**NB Must see this for 1st B1** **0.16(0) scores only the second B1** **No M-mark for the correct express'n**
	iii		$(0.8^2)^2 + (2\times0.8\times0.2)^2 + (0.2^2)^2$ oe $= \frac{321}{625}$ or 0.5136 or 0.514	M2 A1 **[3]**	or $0.64^2+0.32^2+0.04^2$ or $\frac{256}{625}+\frac{64}{625}+\frac{1}{625}$ oe	M1 for any correct term or value of term
Total				**10**		

Question			Answer	Mk	Guidance	
6	a		$^{12}C_5$ or $^{12}C_4$ or $^{12}C_3$ oe seen $^{12}C_5 \times {}^7C_4$ ($\times {}^3C_3$) alone, ie correct method = 27720	M1 M1 A1 **[3]**	 or $^{12}C_4 \times {}^8C_5$ or $^{12}C_3 \times {}^9C_4$ or etc alone ie any of the six correct products of 2 or 3 C's alone	or $\frac{^{12}P_5}{5!}$ or etc M1 or $\frac{^{12}P_5}{5!} \times \frac{^7P_4}{4!} \times \frac{^3P_3}{3!}$ or other correct M1 or $\frac{12!}{5!4!3!}$ M2
	b	i	$\frac{7!}{3!2!2!}$ or $\frac{^7P_7}{3!2!2!}$ or $\frac{5040}{6\times2\times2}$ oe = 210	M1 A1 **[2]**		
	b	ii	$\frac{1}{210}$ oe or 0.00476 (3 sf)	B1f **[1]**	ft their (b)(i)	Ignore method
	b	iii	$\frac{3\times2\times1\times2}{7\times6\times5\times4}$ or $\frac{12}{840}$ alone M2 or $3\times2\times1\times2$ or $^3C_2\times{}^2C_2\times2\times2$ or 12 oe seen in num or $7\times6\times5\times4$ or 840 oe seen in denom M1 = $\frac{1}{70}$ oe or 0.0143 (3 sf)	M2 A1 **[3]**	$\frac{^3P_2\times{}^2P_2}{^7P_4}$ alone M2 or $^3P_2\times{}^2P_2$ in num or $^7P_4$ in denom M1 $\frac{3}{7}\times\frac{2}{6}\times\frac{1}{5}\times\frac{2}{4}$ oe <u>alone</u> M2 all denoms or all nums correct: M1 But $\frac{3}{7}\times\frac{2}{6}\times\frac{1}{5}\times\frac{2}{4}$ ÷ or × something: M1	$\frac{^3C_2\times{}^2C_2}{^7C_4} \times \frac{1}{(\frac{4!}{2!2!})}$ or $\frac{3}{35}\times\frac{1}{6}$ alone oe M2 or $\frac{^3C_2\times{}^2C_2\times{}^2C_0}{^7C_4}$ or $\frac{3}{35}$ or $\frac{1}{(\frac{4!}{2!2!})}$ or $\frac{4}{^4P_4}$ seen M1 (not $\frac{1}{6}$ alone) NB $^7C_4$ or 35 seen does NOT score, even if in denom
Total				**9**		
7	i		Const prob of scoring oe Each shot indep oe	B1 B1 **[2]**	In context Not 'Prob of goal is <u>consistent</u>' In context Ignore incorrect comments	Prob score on one shot not affected by other shots Each shot indep of previous shot Allow Goals are independent Allow Prob of goals are independent <u>Not</u> Number of goals indep

Question			Answer	Mk	Guidance	
	ii	a	$0.8^2 \times 0.2$ = 0.128 or $\frac{16}{125}$ oe	M1 A1 **[2]**		
	ii	b	$1 - 0.8^9$ = 0.866 (3 sf) (0.865782 . . .)	M1 A1 **[2]**		Long method: all 9 terms correct: M1
	ii	c	$0.8^9 - 0.8^{19}$ or $1 - 0.8^{19} - (1 - 0.8^9)$ or 1 - '0.866' - 0.8^{19} or 1 - 0.8^{19} - '0.866' = 0.120 (3 sf)	M2 A1 **[3]**	Allow M1 for $0.8^{8,\ 9 \text{ or } 10} - 0.8^{18,19 \text{ or } 20}$ or $1 - 0.8^{18,19 \text{ or } 20} - (1 - 0.8^{8,9 \text{ or } 10})$ Allow 0.12	Long method: all 10 terms correct: M2 1 term extra, omitted or incorrect: M1
7(iii)(a) & (iii)(b): SC If 0.2 and 0.3 interchanged, or If 0.3 replaced by $\frac{1}{3}$, consistently throughout (iii)(a) and (iii)(b), all three M-marks can be awarded if consistent working seen OR 'correct' answer with no working. Answers: 0.2 ↔ 0.3: (iii)(a) 0.09 (iii)(b) 0.0364 Use of $\frac{1}{3}$: (iii)(a) 0.04 (iii)(b) $\frac{8}{75}$ or 0.107						
	iii	a	$0.2 \times 0.3 \times 0.2 + 0.2 \times 0.7 \times 0.2$ alone = 0.04 or $\frac{1}{25}$ oe	M1 A1 **[2]**	or 0.2×0.2	
	iii	b	$0.2 \times 0.3 \times 0.8 \times 0.3 + 0.8 \times 0.3 \times 0.2 \times 0.3$ $+ 0.8 \times 0.3 \times 0.8 \times 0.3$ alone oe or $0.3 \times 0.8 \times 0.3 + 0.8 \times 0.3 \times 0.2 \times 0.3$ oe = 0.0864 or $\frac{54}{625}$ oe	 M2 A1 **[3]**	or $(0.2 \times 0.8 \times 2 + 0.8^2) \times 0.3^2$ oe M2 or $\frac{9}{625} + \frac{9}{625} + \frac{36}{625}$ oe M2 or any two correct prods of 4 probs oe :M1 If on tree, must be identified $0.3 \times 0.8 \times 0.3$ M0 unless part of a correct method	$(1 - 0.2^2) \times 0.3^2$ or $(1 - 0.04) \times 0.3^2$ oe M2 or $1 - 0.2^2$ or 1 - 0.04 M1
Total				**14**		

Total 72 marks

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553