Level 3 Certificate
MATHEMATICAL STUDIES
1350/2B

Paper 2B Critical path and risk analysis

Mark scheme

June 2023

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236A1350/2B/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Glossary for Mark Schemes

Mathematical Studies examinations are marked in such a way as to award positive achievement wherever possible. Thus, for Mathematical Studies papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14…	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Mark	Comments
1 (a)	13 : 11	B1	

Q	Answer	Mark	Comments
1 (b)	**Alternative method 1**		
	22 + 20 + 22 or 64 or 39 + 41 + 33 or 113	M1	
	(22 + 20 + 22) ÷ 376 or 64 ÷ 376 or 0.17(0…) and (39 + 41 + 33) ÷ 613 or 113 ÷ 613 or 0.18(4…)	M1dep	condone 17.(0…)% condone 18.(4…)%
	0.17(0…) and 0.18(4…) and No	A1	condone 17.(0…)% and 18.(4…)%
	Alternative method 2		
	22 + 20 + 22 or 64 or 39 + 41 + 33 or 113	M1	
	376 ÷ (22 + 20 + 22) or 376 ÷ 64 or 5.8(75) and 613 ÷ (39 + 41 + 33) or 613 ÷ 113 or 5.4(2…)	M1dep	accept any correct rounding or truncation allow 6 and 5 from correct method
	5.8(75) and 5.4(2…) and No	A1	accept any correct rounding or truncation allow 6 and 5 from correct method

Q	Answer	Mark	Comments
1 (b) cont'd	**Alternative method 3**		
	22 + 20 + 22 or 64 or 39 + 41 + 33 or 113	M1	
	(39 + 41 + 33) ÷ (22 + 20 + 22) or 1.7(6…) or 1.77 or 1.8 and 613 ÷ 376 or 1.6(3…)	M1dep	oe inverse method 0.5(6…) or 0.57 and 0.6(1…)
	1.7(6…) or 1.77 or 1.8 and 1.6(3…) and No	A1	oe
	Additional Guidance		
	Do not accept missing brackets unless recovered		
	Any further incorrect method will lose the accuracy mark		
	Can also use comparative ratio		

Q	Answer	Mark	Comments
2 (a)	Any two valid improvements eg **General** Add axes Use a grid/graph paper **Graph 1** Do not repeat Age along the horizontal axis Move the values so they are not obscured by the lines Avoid the symbols overlapping, eg by extending the graph Join the points with straight lines Remove the lines **Graph 2** Increase the spacing between each category Remove the bars for All aged 5 – 15 or remove the word All Remove the bars for Aged 3 – 4 (from graph 2) so the All aged 5 – 15 includes all bars from the graph Make each grouping of ages cover the same number of years Use hatching/patterns to differentiate between the bars	E2	E1 for one valid improvement SC1 two or more errors identified instead of improvements
	Additional Guidance		
	Ignore any additional but non-contradictory suggestions		
	Allow two improvements in one answer space		
	Improvements must be about the graphs not the source of the graphs		
	Label the axis		E0
	Use colour to differentiate between the bars		E0
	Use a better system to differentiate between the bars		E0
	Make age ranges more realistic		E0

2 (a) cont'd	Improve the age ranges on graph 2	E0
	Go up to 18 years old	E0
	WhatsApp (or other platforms) should have been included in graph 2	E0
	Use more visibly different lines to better differentiate between the three sets of data	E0
	Use actual values rather than percentages	E0
	Grid lines	E0
	y-axis	E0
	Add grid lines	E1
	Add y-axis	E1
	Grid lines and y-axis	SC1

Q	Answer	Mark	Comments
2 (b)	(Messaging or social media is) 42(%)	B1	implied by '42% is 35' implied by correct answer
	35 ÷ their 42 or 0.83(…) or 35 ÷ their 42 × 100 or 83.(…) or 35 + 35 ÷ their 42 × 58 or 83.(…)	M1	oe their 42 must be 23 or 38
	83 or 84	A1ft	ft their 42 which must be 23 or 38 allow 80 with [83, 84] or [0.83, 0.84] seen
	Additional Guidance		
	Do not accept 83% or 84% for A1		
	Do not ignore subsequent working for M1		
	35 ÷ 42 × 99 and 82.5 or 82 or 83		B1 M0 A0
	23(%) and 35 ÷ 23 and 152 or 153		B0 M1 A1ft
	38(%) and 35 ÷ 38 and 92 or 93		B0 M1 A1ft

Q	Answer	Mark	Comments
2 (c)	4 hours and 54 minutes is not 4.54 hours or 2 hours and 54 minutes is not 2.54 hours or 0.787 has been rounded (down) from the exact value	E1	oe
	$4\frac{54}{60}$ or 4.9 or 294 (mins) or $2\frac{54}{60}$ or 2.9 or 174 (mins) or $\frac{54}{60}$ or 0.9	M1	oe
	[68.9, 69] (%)	A1	
	Additional Guidance		
	Mark the whole answer space for all three marks		
	He should have converted to minutes		E0
	The decimals are incorrect		E0
	The numbers are incorrect		E0
	He has not converted the time to a number correctly		E0
	He has not converted the time to a decimal correctly		E0
	He has not converted the time to a decimal number of hours correctly		E1
	There are not 100 minutes in an hour		E1
	4.54 hours is 4 hours and 32(.4) minutes		E1
	2.54 hours is 2 hours and 32(.4) minutes		E1
	4 hours and 54 minutes is 4.9 hours		E1
	2 hours and 54 minutes is 2.9 hours		E1
	54 minutes is 0.9 hours		E1
	0.54 hours in 32(.4) minutes		E1

Q	Answer	Mark	Comments
2 (d)	We do not know how many children there are for each age group (in the population) or Only percentages are given or The survey may not be representative (of the population) or The percentages are very close and were taken from a sample or Children may give incorrect information	E1	oe ignore extra non-contradictory reasons condone 'Parents may give incorrect information'

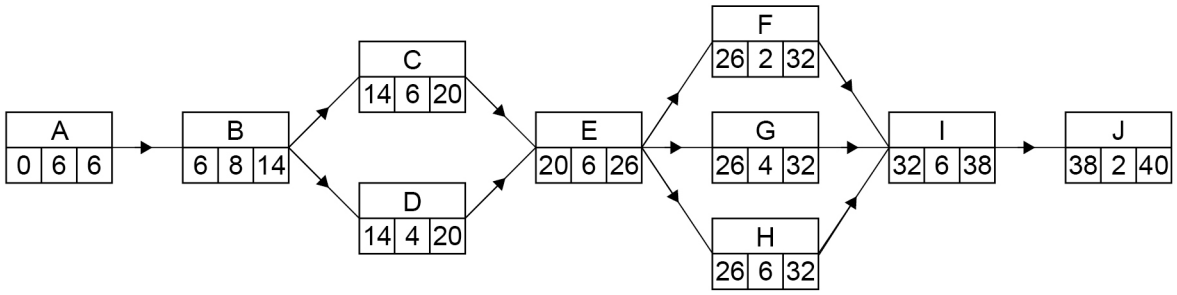
Additional Guidance	
We do not know how many children there are for each age group in the sample	E0
We do not know how many children were surveyed in each age group	E0
The percentages are very close	E0
The percentages were taken from a sample	E0

Q	Answer	Mark	Comments
2 (e)	Any two valid reasons eg Too much information or percentages or numbers, or information in sentence rather than table form Terms or abbreviations are not defined The article is inconsistent with mixed percentages and fractions Fractions written in words rather than using fraction notation The tense of the article is inconsistent Not clear which apps are messaging and which are social media Inconsistent age groups used Some comparisons include overlapping groups, eg 5- to 15-year-olds and 12- to 15-year-olds 12-year-olds or 16-year-olds are ignored in some sections Values in the article sometimes differ from those in the graphs	E2	E1 for each valid reason
	Additional Guidance		
	Allow two reasons in one answer space		
	Ignore incorrect but non-contradictory reasons		

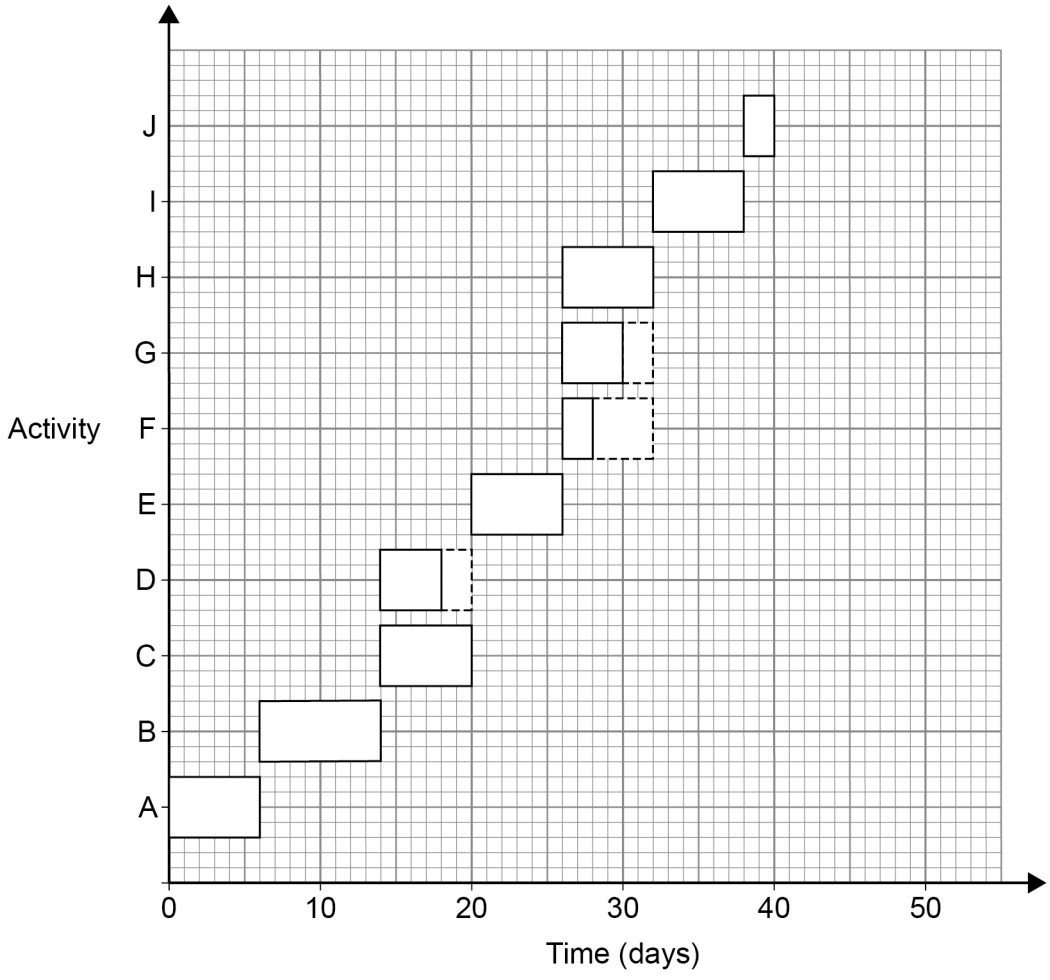
Q	Answer	Mark	Comments
2 (f)	$24 \div 1.41 \times 3.2 \times \frac{2}{3} \div 1.28$ or 28.3(6…) or $24 \div 1.41 \times 3.2 \times 66 \div 100 \div 1.28$ or 28.0(8…)	M4	oe **M3** $24 \div 1.41 \times 3.2 \times \frac{2}{3}$ or 36.3… or 36 (amount in $) or $24 \div 1.41 \times 3.2 \times 66 \div 100$ or 35.9… or 36 (amount in $) or $24 \div 1.41 \times 3.2 \div 1.28$ or 42.55… or 42.6 or 43 (amount in £ for all children in UK) **M2** $24 \div 1.41 \times 3.2$ or 54.468… or 54.47 or 54.5 or 54 (amount in $ for all children in UK) or $24 \div 1.41 \div 1.28$ or 13.297… or 13.29 or 13.3 or 13 (amount in £ per user) or $3.2 \times \frac{2}{3} \div 1410$ or 0.00151… or 0.0015 (proportion of Instagram users who are children in the UK) or $3.2 \times 66 \div 100 \div 1410$ or 0.00149… or 0.0015 (proportion of Instagram users who are children in the UK)

The mark scheme for Question 2(f) continues on the next page

Q	Answer	Mark	Comments
2 (f) cont'd			**M1** 24 ÷ 1.41 or 17(.0…) (income in $ per user) or 24 ÷ 1.28 or 18.75 (total income worldwide in £) or 1.41 ÷ 3.2 or 0.44(0…) (scaling factor for multiplication) or 3.2 ÷ 1.41 or 2.2695… or 2.27(0) or 2.3 (scaling factor for division) or $3.2 \times \frac{2}{3}$ or 2.1(3…) (children in UK using Instagram) or 3.2 × 66 ÷ 100 or 2.1(1…) (children in UK using Instagram)
	28	A1	accept 28 million or 28 000 000
	Additional Guidance		
	May work in billions or full dollar/pound values throughout		
	For method marks, condone use of correct digits and ignore place value eg 2.4 ÷ 1.41 × 3.2 × 66 ÷ 100 ÷ 1.28		M4
	M4 can only be awarded for a complete method that would lead to a correct answer. Do not ignore subsequent working. eg $24 \div 1.41 \times 3.2 \times \frac{2}{3} \div 1.28 \times 0.9$		M3

Q	Answer	Mark	Comments
3 (a)	Forward pass fully correct	B2	B1 one error or correct for activities C to E
	Backward pass fully correct	B2ft	B1 one error or correct for activities J to E ft their forward pass
	Additional Guidance		
	A cumulative error counts as one error		
	Incorrect but identical earliest start or latest finish times of C and D, or F, G and H count as one error		
			

Q	Answer	Mark	Comments
3 (b)	ABCEHIJ	B1ft	ft their critical path which must start at A and finish at J, or correct
	Additional Guidance		
	If multiple critical paths, accept any		

Q	Answer	Mark	Comments
3 (c)	At least 3 activities plotted correctly	M1	
	A critical path plotted correctly	A1ft	ft their activity network
	At least 2 floats of correct duration plotted	M1dep	dep on first M1
	All activities and floats plotted correctly	A1ft	ft their activity network
	Additional Guidance		
	ft their activity network throughout or correct		
	Accept tasks drawn elsewhere on the diagram if labelled unambiguously		
			

Q	Answer	Mark	Comments
4 (a)	$\frac{85}{990}$ or $\frac{17}{198}$ or 0.086 or 0.0859 or 8.6% or 8.59% or $0.0\dot{8}\dot{5}$ or $8.\dot{5}\dot{8}$%	B1	oe fraction, decimal or percentage
	Additional Guidance		
	Ignore incorrect simplification or conversion to a decimal or percentage from a correct fraction		
	Accept any correct rounding to at least two significant figures		

Q	Answer	Mark	Comments
4 (b)	$\frac{180}{390} \times \frac{330}{990}$	M1	oe
	$\frac{59400}{386100}$ or $\frac{2}{13}$ or 0.153(8…) or 0.154 or 0.15 or 15.3(8…)% or 15.4% or 15%	A1	oe fraction, decimal or percentage
	Additional Guidance		
	Ignore incorrect simplification or conversion to a decimal or percentage from a correct fraction		

Q	Answer	Mark	Comments
4 (c)	$\frac{4}{390} \times 22650$ or 232(.3…) or $\frac{85}{990} \times 13721$ or 1178(.0…)	M1	
	their 232(.3…) + their 1178(.0…)	M1dep	
	1410	A1	accept 1400 or 1411 with working seen

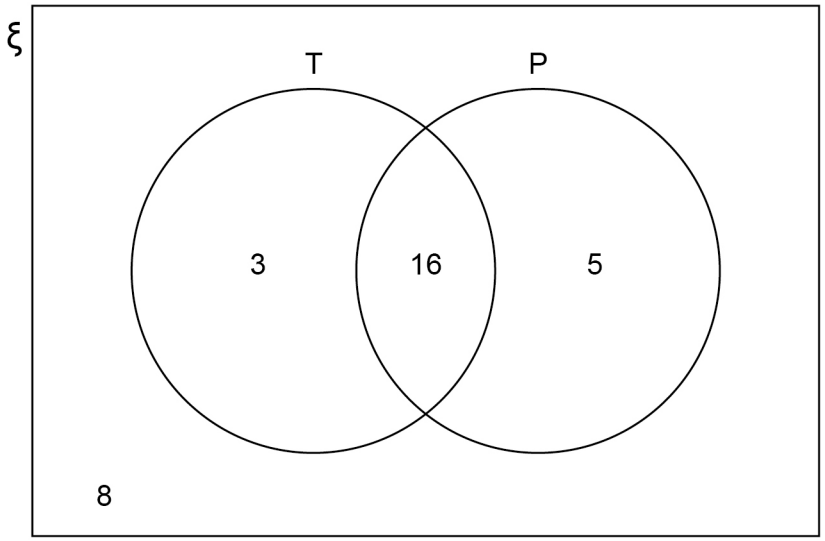
Q	Answer	Mark	Comments
4 (d)	The schools in the table may not be representative of Rochdale The rate in the population may be different than the rate in the sample The sample was relatively small compared to the size of the population The rate of cycling may have changed since the survey was carried out	E1	E1 for any reasonable statement
	Additional Guidance		
	‘Survey is biased’ scores E0 unless supported with a reason or reference to the population		
	‘Sample is small’ or ‘needs a bigger sample’ scores E0 unless reference is made to the size of the population (possibly implied)		

Q	Answer	Mark	Comments
5 (a) (i)	6	B1	
	Additional Guidance		
	May be written on activity network in correct place		

Q	Answer	Mark	Comments
5 (a) (ii)	Any two correct values	B1	must sum to 5 accept non-integer or zero values do not accept negative values
	Additional Guidance		
	May be written on activity network in correct place		

Q	Answer	Mark	Comments
5 (a) (iii)	Valid reason eg Activity G is not a critical activity Activity G is not on the critical path Activity G has a float The float on activity G is unknown We do not know the (earliest) start time of H We do not know the (latest) finish time of C or D	E1	
	Additional Guidance		
	Ignore incorrect but non-contradictory reasons		
	We do not know information about activity C and D (and H)		E0
	We do not know the durations of activities C and D (and H)		E0
	We do not know the (earliest) start time and durations of activities C and D		E0

Q	Answer	Mark	Comments
5 (b)	$20 + x + x + 1 = 27$ or $x + x + 1 = 7$ or $2x = 6$ or $y = 20 + x$ and $y = 27 - (x + 1)$ or $y = 20 + x$ and $y + x + 1 = 27$	M1	oe may be implied by $x = 3$ or $y = 23$
	$x = 3$	A1	
	$y = 23$	B1ft	ft 20 + their 3 where their 3 must be [0, 3]

Q	Answer	Mark	Comments
6 (a)	3 and 5 and 8 in correct place	B2	B1 for one or two correct values in correct place
	Additional Guidance		
			

Q	Answer	Mark	Comments
6 (b)	Denominator of 19 seen	M1	
	$\frac{16}{19}$ or 0.84(2…) or 84.(2…)%	A1	oe
	Additional Guidance		
	Ignore incorrect simplification or conversion to a decimal or percentage from a correct fraction		

Q	Answer	Mark	Comments
6 (c)	$\frac{18}{31}$	M1	oe
	$\frac{\text{their } 18}{\text{their } 31} \times \frac{\text{their } 18+1}{\text{their } 31+1}$	M1	oe
	$\frac{342}{992}$ or $\frac{171}{496}$ or 0.34(4…) or 34.(4…)%	A1	SC1 $\frac{420}{992}$ or $\frac{105}{248}$ or 0.42(3…) or 42.(3…)%
	Additional Guidance		
	SC1 is for using the practical test		

Q	Answer	Mark	Comments
7 (a)	**Alternative method 1 (probabilities applied to totals)**		
	50 × 4 or (£)200 or 15 × 4 or (£)60 or 65 × 4 or (£)260	M1	revenue from full-priced BBQs when it is hot and 50 are ordered revenue from full-priced BBQs when it is not hot and 50 or 100 are ordered revenue from full-priced BBQs when it is hot and 100 are ordered
	50 – 15 or (£)35 or 2 × 50 – 15 or (£)85 or 2 × 50 – 65 or (£)35	M1	revenue from reduced-priced BBQs when it is not hot and 50 are ordered revenue from reduced-priced BBQs when it is not hot and 100 are ordered revenue from reduced-priced BBQs when it is hot and 100 are ordered
	their 60 + their 35 or (£)95 or their 260 + their 35 or (£)295 or their 60 + their 85 or (£)145	M1	total revenue when it is not hot and 50 are ordered total revenue when it is hot and 100 are ordered total revenue when it is not hot and 100 are ordered
	their 200 × 0.7 or (£)140	M1	expected revenue when it is hot and 50 are ordered
	their 295 × 0.7 or (£)206.5(0)	M1	expected revenue when it is hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	their 95 × their 0.3 or (£)28.5(0)	M1	expected revenue when it is not hot and 50 are ordered
	their 145 × their 0.3 or (£)43.5(0)	M1	expected revenue when it is not hot and 100 are ordered
	their 140 + their 28.5 – 72 or (£)96.5(0) or their 206.5 + their 43.5 – 2 × 72 or (£)106	M1	expected profit if 50 are ordered expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

Q	Answer	Mark	Comments
7 (a) cont'd	**Alternative method 2 (probabilities applied separately)**		
	50 × 4 or (£)200 or 15 × 4 or (£)60 or 65 × 4 or (£)260	M1	revenue from full-priced BBQs when it is hot and 50 are ordered revenue from full-priced BBQs when it is not hot and 50 or 100 are ordered revenue from full-priced BBQs when it is hot and 100 are ordered
	50 – 15 or (£)35 or 2 × 50 – 15 or (£)85 or 2 × 50 – 65 or (£)35	M1	revenue from reduced-priced BBQs when it is not hot and 50 are ordered revenue from reduced-priced BBQs when it is not hot and 100 are ordered revenue from reduced-priced BBQs when it is hot and 100 are ordered
	their 200 × 0.7 or (£)140 or their 260 × 0.7 or (£)182	M1	expected revenue (from full-priced BBQs) when it is hot and 50 are ordered expected revenue from full-priced BBQs when it is hot and 100 are ordered
	their 35 × 0.7 or (£)24.5(0)	M1	expected revenue from reduced-priced BBQs when it is hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	their 60 × their 0.3 or (£)18	M1	expected revenue from full-priced BBQs when it is not hot and 50 or 100 are ordered
	their 35 × their 0.3 or (£)10.5(0) or their 85 × their 0.3 or (£)25.5(0)	M1	exp'd rev'ue from reduced-priced BBQs when it is not hot and 50 are ordered exp'd rev'ue from reduced-priced BBQs when it is not hot and 100 are ordered
	their 140 + their 18 + their 10.5 – 72 or (£)96.5(0)	M1	expected profit if 50 are ordered
	their 182 + their 24.5 + their 18 + their 25.5 – 2 × 72 or (£)106	M1	expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

Q	Answer	Mark	Comments
7 (a) cont'd	**Alternative method 3 (expected number of barbeques sold)**		
	0.7 × 50 or 35	M1	expected number of full-priced BBQs sold when it is hot and 50 are ordered
	0.7 × 65 or 45.5 or 0.7 × (100 – 65) or 0.7 × 35 or 24.5	M1	expected number of full-priced BBQs sold when it is hot and 100 are ordered expected number of reduced-priced BBQs sold when it is hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	0.3 × (50 – 15) or 0.3 × 35 or 10.5 or 0.3 × 15 or 4.5	M1	expected number of reduced-priced BBQs sold when it is not hot and 50 are ordered expected number of full-priced BBQs sold when it is not hot and 50 or 100 are ordered
	their 35 × 4 or (£)140 or their 4.5 × 4 or (£)18	M1	expected revenue (from full-priced BBQs) when it is hot and 50 are ordered expected revenue from full-priced BBQs when it is not hot and 50 or 100 are ordered
	0.3 × (100 – 15) or 25.5	M1	expected number of reduced-priced BBQs sold when it is not hot and 100 are ordered
	their 45.5 × 4 or (£)182	M1	expected revenue from full-priced BBQs when it is hot and 100 are ordered
	their 182 + their 24.5 or (£)206.5(0)	M1	expected revenue when it is hot if 100 are ordered
	their 140 + their 18 + their 10.5 – 72 or (£)96.5(0) or their 206.5 + their 18 + their 25.50 – 2 × 72 or (£)106	M1	expected profit if 50 are ordered expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

Q	Answer	Mark	Comments
7 (a) cont'd	**Alternative method 4 (expected number of barbeques sold)**		
	0.7 × 50 or 35	M1	expected number of full-priced BBQs sold when it is hot and 50 are ordered
	0.7 × 65 or 45.5	M1	expected number of full-priced BBQs sold when it is hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	0.3 × 15 or 4.5	M1	expected number of full-priced BBQs sold when it is not hot and 50 or 100 are ordered
	their 35 + their 4.5 or 39.5	M1	expected number of BBQs sold at full price if 50 are ordered
	their 45.5 + their 4.5 or 50	M1	expected number of BBQs sold at full price if 100 are ordered 50 must be from correct working
	their 39.5 × 4 + 50 – their 39.5 or (£)168.5(0)	M1	expected revenue if 50 are ordered
	their 50 × 4 + 2 × 50 – their 50 or (£)250	M1	expected revenue if 100 are ordered
	their 168.5 – 72 or (£)96.5(0) or their 250 – 2 × 72 or (£)106	M1	expected profit if 50 are ordered expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

Q	Answer	Mark	Comments
7 (a) cont'd	**Alternative method 5 (expected revenue per barbeque)**		
	0.7 × 4 or (£)2.8(0)	M1	expected revenue from a full-priced BBQ when it is hot
	65 × their 2.8 or (£)182 or (100 – 65) × 0.7 or (£)24.5(0)	M1	expected revenue from full-priced BBQs when it is hot and 100 are ordered expected revenue from reduced-priced BBQs when it is hot and 100 are ordered
	50 × their 2.8 or (£)140	M1	expected revenue when it is hot and 50 are ordered
	their 182 + their 24.5 or (£)206.5(0)	M1	expected revenue when it is hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	their 0.3 × 4 or (£)1.2(0)	M1	expected revenue from a full-priced BBQ when it is not hot
	15 × their 1.2 or (£)18	M1	expected revenue from full-priced BBQs when it is not hot and 50 or 100 are ordered
	(50 – 15) × their 0.3 or (£)10.5(0) or (25 × 50 – 15) × their 0.3 or (£)25.5(0)	M1	expected revenue from reduced-priced BBQs when it is not hot and 50 are ordered expected revenue from reduced-priced BBQs when it is not hot and 100 are ordered
	their 140 + their 18 + their 10.5 – 72 or (£)96.5(0) or their 206.5 + their 18 + their 25.5 – 2 × 72 or (£)106	M1	expected profit if 50 are ordered expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

Q	Answer	Mark	Comments
7 (a) cont'd	**Alternative method 6 (considering profit/loss per barbeque)**		
	4 – 72 ÷ 50 or (£)2.56 or 72 ÷ 50 – 1 or (£)0.44	M1	profit per full-priced BBQ loss per reduced-price BBQ
	50 × their 2.56 or (£)128 or 65 × their 2.56 or (£)166.4(0)	M1	profit from full-priced BBQs when it is hot and 50 are ordered profit from full-priced BBQs when it is hot and 100 are ordered
	(50 – 15) × their 0.44 or (£)15.4(0) or (100 – 65) × their 0.44 or (£)15.4(0)	M1	loss from reduced-priced BBQs when it is not hot and 50 are ordered loss from reduced-priced BBQs when it is hot and 100 are ordered
	their 166.4 – their 15.4 or (£)151	M1	profit when it is hot and 100 are ordered
	their 128 × 0.7 or (£)89.6(0) or their 151 × 0.7 or (£)105.7(0)	M1	expected profit when it is hot and 50 are ordered expected profit when it is hot and 100 are ordered
	15 × their 2.56 or (£)38.4(0) or (100 – 15) × their 0.44 or (£)37.4(0)	M1	profit from full-priced BBQs when it is not hot and 50 or 100 are ordered loss from reduced-priced BBQs when it is not hot and 100 are ordered
	1 – 0.7 or 0.3	M1	probability of not hot weather
	(their 38.4 – their 15.4) × their 0.3 or (£)6.9(0) or (their 38.4 – their 37.4) × their 0.3 or (£)0.3(0)	M1	expected profit when it is not hot and 50 are ordered expected profit when it is not hot and 100 are ordered
	their 89.6 + their 6.9 or (£)96.5(0) or their 105.7 + their 0.3 or (£)106	M1	expected profit if 50 are ordered expected profit if 100 are ordered
	(£)96.50 and (£)106 and Clara should order 100 barbeques	A1	condone (£)96.5 accept Clara should order 2 packs

	Additional Guidance
7 (a) cont'd	When calculating losses, marks can be awarded for either negative or positive values until an overall profit calculation is carried out
	Do not accept 0.3 seen in **7 (b)** for M1 if not seen in **7 (a)**

Q	Answer	Mark	Comments
7 (b)	Any valid reason eg **If recommends buying 100** She may worry that she will sell fewer barbeques than expected She thinks the likelihood of it being hot is lower than forecast The chance of it being hot may decrease She does not have space to store or sell 100 She does not want the hassle of selling lots of reduced barbeques **If recommends buying 50** She may think she will sell more barbeques than expected She thinks the likelihood of it being hot is higher than forecast The chance of it being hot may increase She thinks she can store any unsold barbeques and sell them at full price later She thinks she will run out of barbeques to sell	E1ft	ft their answer to **7(a)** if no recommendation then mark as if recommends buying 100

Additional Guidance	
Ignore any values unless contradictory	
She doesn't want to take the risk	E0
The chance of it being hot may change	E0
The chance of it being hot may decrease (if recommends buying 100)	E1
It may get colder (if recommends buying 100)	E0
It costs her more to buy 100 barbeques than 50 if the weather is not hot	E0
It is not guaranteed the weather will be hot	E0
It is not guaranteed the weather will be hot all weekend	E1
She would make more profit if she buys 50 barbeques than 100 if the weather is not hot	E1