



Pearson
Edexcel

Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCSE
In Statistics (1ST0)
Paper 2F

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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

- 1** All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

- 2** All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.

Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

- 3** **Crossed out work**

This should be marked **unless** the candidate has replaced it with an alternative response.

- 4** **Choice of method**

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line then mark both methods **as far as they are identical** and award these marks.

- 5** **Incorrect method**

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

6 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Range of answers

Unless otherwise stated, when an answer is given as a range (eg 3.5 – 4.2) then this is inclusive of the end points (eg 3.5, 4.2) and all numbers within the range.

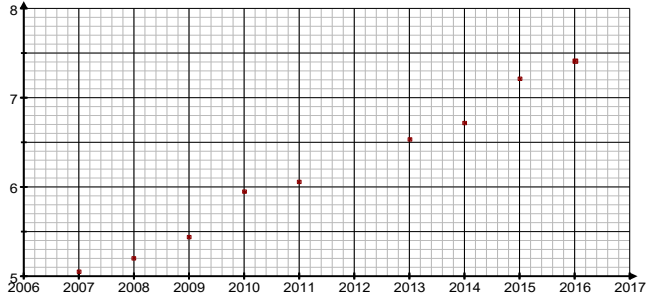
Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
A	accuracy mark (awarded after a correct method; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Question number	Answer	Additional guidance	Mark
1 (a)	B1 Pictogram	B1 for pictogram but accept pictograph. Ignore poor spelling if meaning clear.	(1)
(b)	M1 Evidence of correct use of key e.g. $2\frac{1}{2} \times 2$ or 4×2 A1 5 and 8	M1 implied by one correct answer A1 for both values correct in table	(2)
(c)(i)	B1 Pop	B1 for correct identification of mode.	(1)
(c)(ii)	B1 e.g. data is qualitative / categorical / not numbers	B1 for comment recognising that median/mean are not possible for non-numeric data. Do not allow e.g. 'easy to find/understand', 'gives the most popular', 'data not continuous', o.e. which are all B0	(1)
(d)	B2 Good choice + correct reason, e.g. <ul style="list-style-type: none"> • Easy to use/read/understand • Shows clearly which is most/least favourite • Clearly shows popularity of each type (of music) 	B2 for sensible reason with correct conclusion that pictogram is appropriate OR B1 for an incomplete answer, e.g. <ul style="list-style-type: none"> - sensible comment with no/incorrect conclusion, or - correct conclusion with attempted reason NB Correct conclusion with no reason scores B0	(2)
(e)	B1 $\frac{7}{40}$ (= 0.175)	B1 for correct equivalent fraction, decimal or percentage. (Allow 0.18)	(1)

Question number	Answer	Additional guidance	Mark
2 (a)	B1 B1 for any two reasons from: <ul style="list-style-type: none"> • Leading question / suggestive • Open question / no options / no scale / too many ways to answer / 'generous' is open to interpretation • May not wish to answer (honestly) / may feel pressured (into answering positively) 	B1 for each of two from 3 options given, maximum 2 marks (allow equivalent wording) <ul style="list-style-type: none"> • bias • responses will not be limited (and hence difficult to analyse) • may be seen as a sensitive question Allow each bullet once only.	(2)
(b)(i)	B1 $\frac{1}{8}$ (0.125)	B1 for correct equivalent fraction decimal or percentage (Allow 0.13)	(1)
(b)(ii)	B1 $\frac{1}{12}$ (0.08 or better)	B1 for correct equivalent fraction decimal or percentage	(1)
(b)(iii)	B1ft Nabir has a greater probability of being selected	B1ft for Nabir with a correct comparison (accept $\frac{1}{8} > \frac{1}{12}$ or $8 < 12$) Accept: Nabir as he is in a smaller team. Allow ft for Jenny if the reason based on their probabilities.	(1)

Question number	Answer	Additional guidance	Mark
3 (a)	B1 8.88 (%)	B1 for identifying correct value from table	(1)
(b)	B1 (Sales are) lower / decreased (in 2017 by 3320) o.e. or there is a difference of 3320	B1 for a correct comparison. (Not just listing figures.) Accept: (Sales are) higher in 2016. (Ignore sales figures if given.) (Figures required)	(1)
(c)	B1 Volkswagen	B1 for Volkswagen or VW. Condone misspelling if choice is clear.	(1)
(d)	B1 10		(1)

Question number	Answer	Additional guidance	Mark
4 (a)	B2 All 3 points correctly plotted 	B2 for last three points from table within tolerance: 6.7 – 6.8, 7.2 – 7.3, 7.4 – 7.5 OR B1 for at least one point correct in tolerance	(2)
(b)(i)	B1 Straight trend line drawn	B1 for an appropriate trend line (from 2007 to at least 2013) NB Joining point to point scores B0	(1)
(b)(ii)	B1 Upward / rising / increasing (trend)	B1 for correct equivalent description of trend, e.g. - accept 'positive' (but positive <i>correlation</i> alone is B0) - accept 'tickets are becoming more expensive' -	(1)
	B1 (Average price) increases (by 27 pence) per year	B1 for correct description. Must have 'increase per year' o.e. (Ignore figures)	(1)
	B2 (Axis) does not start from zero / starts at 5(.00), or changes are exaggerated, ...so Zoe is correct	B2 for correct decision with correct equivalent reasoning (recognising not from 0) OR B1 for recognising not from 0 without correct decision. SC: if B0 scored allow B1 for a complete argument of why the graph may be appropriate. e.g. 'not misleading as it helps to show the year to year changes clearly' (But '...easy to read' or '...shows the trend clearly' is B0)	(2)
(e)	B1 B1 B1 for any three points from: <ul style="list-style-type: none"> • use for 2012 is sensible • ... as 2012 is within the range of observations / within data • use for 2020 is not sensible • ... as trend may change / beyond range (of data) 	1 st /3 rd bullet for correctly identifying appropriateness of each estimate. (We must know which year they are referring to.) (Do not accept 'possible'/'would work' for 'sensible'. Do not accept 'impossible'/'would not work' for 'not sensible') 2 nd /4 th bullet for correct reasoning (e.g. may refer to interpolation/extrapolation, but do not accept e.g. 'on the graph' or 'off the grid' as equivalent to interpolation/extrapolation)	(3)

Question number	Answer	Additional guidance	Mark
5 (a)	M1 $\frac{75+111}{300}$ or $0.25+0.37$ or $1-\frac{96+18}{300}$ or $1-(0.32+0.06)$ A1 $\frac{186}{300}$ o.e. $\left(=\frac{31}{50}, 0.62 \right)$	M1 for attempting probability with a correct numerator (Condone '186 out of 300' for M1 only.) A1 for correct equivalent fraction decimal or percentage	(2)
(b)	B1 e.g. <ul style="list-style-type: none"> • Repeat the survey / collect more data • Use a longer period • use more than one shop 	B1 for recognising that a larger sample is likely to give a better estimate But do not accept e.g. 'use more money/notes' alone scores B0	(1)
(c)	B1 (UK has a) lower proportion (of £5 notes than prediction/ supermarket) B1 e.g. <ul style="list-style-type: none"> • people tend to use lower value notes when shopping • the sample is not representative of bank notes in use in the UK. • Data not from same year 	1 st B1 for a correct statistical comparison . Condone 'decreased' for lower. (Do not accept listing without comparison, and do not accept 'differ by 15%.) Accept converse statements about the prediction if made clear. 2 nd B1 for a sensible reason supporting a higher proportion of low value notes used in the supermarket. Condone suggesting problems with the data collection/recording e.g. a small sample / only one Saturday, or an error in recording data (but do not condone errors in calculation)	(2)

Question number	Answer	Additional guidance	Mark
6 (a)	B1 e.g. only 14 values are less than 160, or 15th (value) is in this class, or $14 < 30/2$	B1 for recognising that the middle value has not been reached until after 160. Allow use of n or $n+1$ for '15th' allow 15.5th, or 15 th & 16 th allow $14 < 31 \div 2$	(1)
(b)	M1 $\frac{1}{11} \times 40 (+160)$ A1 = 164 awrt	M1 for attempt at appropriate fraction \times class width. Allow use of n or $n+1$ e.g. $\frac{1.5}{11} \times 40 (+160 = 165)$ A1 for awrt 164 (not from inconsistent working) Condone awrt 165	(2)
(c)	B1ft (Median) was lower / has increased (by 54 minutes) or $110 < '164'$ or difference is '54' B1ft e.g. Matches/finals/games now take longer / were quicker (on average)	Allow correct answers, or correct ft from answer in (b) 1 st B1ft for correct statistical comparison (words or figures) 2 nd B1ft for correct contextual interpretation (must mention matches, o.e.), but note that ' they take longer' alone is B0 (Condone 'slower'/'faster' for 'take more time' / 'take less time' For both marks follow through their answer to part (b)	(2)
(d)	B1 e.g. (mean) will be affected by the few longer matches	B1 for recognising that skew/outliers will affect mean (but not median), or that the data has skew/outliers	(1)

Question number	Answer	Additional guidance	Mark
7 (a)	B1 Gender	B1 for uniquely identifying Gender. (Accept ringed/underlined etc)	(1)
(b)	B2 Two different valid reasons, e.g. <ul style="list-style-type: none"> there is a mix of units/format (in Age / Amount column) need to remove units / have purely numeric format (in Age / Amount column) to allow calculations/graphs/analysis to be done (850) may be an outlier 850 has no units 	B2 for any two correct equivalent reasons OR B1 for one correct equivalent reason First three bullets each only count once unless referring to more than one variable/column. e.g. 'there is a mix of units' is B1, but 'there is a mix of units in age and amount columns' is B2 Do not accept vague reasons. e.g. to correct the data / remove errors / make easier to read, data is misleading/unclear, or to sort/organise data, all score B0	(2)
(c)	B1 (Using a spreadsheet...) makes it easier/quicker (to sort, do calculations/graphs, make changes, etc) (...so it is appropriate)	B1 for a sensible reason why using a spreadsheet to process the data is appropriate e.g. 'easy to sort data' refers to processing, so is B1 but 'so you can get the info you need' is too vague so B0 Condone 'displays data clearly', or 'can store lots of data' for B1 but e.g. 'it is clear' alone is B0	(1)
(d)	B1 $\frac{252}{24}$ (= 10.5) or $10.5 \times 24 = 252$ or $252 \div 10.5 = 24$	B1 for a correct equivalent calculation NB Answer 10.50 is given.	(1)
(e)	B1 Pie chart	B1 for selecting correct option only. (Accept ringed/underlined etc)	(1)

Question number	Answer	Additional guidance	Mark
8 (a)	B1 Any one from <ul style="list-style-type: none"> • Can still see the original data values (in a stem & leaf) o.e. • Can use to find (accurate) values for, e.g.: median/mode/mean/average/quartile(s)/range/IQR • Can identify outliers 	B1 for advantage of using a stem and leaf diagram Do not accept e.g. ‘does not group data’ to mean ‘see original data’ Condone ‘it is more detailed/accurate’ But do not accept, e.g. clearer / quicker or easier to plot/read/understand/interpret (all B0)	(1)
(b)	B1 B1 B1 B1 for four correct statements from <ul style="list-style-type: none"> • First hypothesis is supported / males are taller • Males have a higher median (or mean) OR males are 2 cm (or 5 cm) taller on average, (Accept “163 > 161” or “165 > 160”) • Second hypothesis is not supported / female heights have greater spread • Males have lower IQR (or lower range). (Accept $16 < 18$ or $45 < 50$) • Median is more appropriate than mean (as males’ data is positively skewed) B1B1 any two comments from <ul style="list-style-type: none"> • conclusion(s) are not reliable (condone ‘data’ are not reliable) • not a representative sample / only early arrivals • small sample only (e.g. only/just used 20/40) • quota sampling (or convenience sample) • not random • sample is only for college age / he didn’t record age • sample is for one area only / only his college 	B1 for each of four statements from the options given, maximum 4 marks <ul style="list-style-type: none"> • statement supporting first hypothesis (condone ‘is correct’) • correct supporting evidence (can ignore figs for ‘median’) (Comparison of e.g. tallest male/female alone is B0) • statement refuting second hypothesis (condone ‘incorrect’) • correct use of measure of dispersion. • recognition of appropriate average due to skew Note: for the first 4 marks it needs to be clear which hypothesis or gender their comment refers to. B1 for each of two statements from the options given, maximum 2 marks. Allow each bullet once only. Do not accept contradictory comments for any bullet point.	(6)

Question number	Answer	Additional guidance	Mark
9 (a)	B1 $\frac{27}{200}$ (= 0.135)	B1 for exact equivalent fraction, decimal or percentage	(1)
(b)	B1 $\frac{x \text{ (or 18)}}{30} = 0.6$ or $0.6 \times 30 (=18)$ or $\frac{18}{0.6} = 30$	B1 for correct use of absolute risk in a calculation. (NB Answer 18 is given)	(1)
(c)(i)	M1A1 $\frac{15}{50} \div 0.6 (= 0.5)$ or $0.3 \div 0.6 (= 0.5)$	M1 for a probability $\div 0.6$ (or $\div \frac{18}{50}$) A1 for fully correct calculation (may be seen in stages) NB Answer 0.5 is given and need not be stated, or may be embedded. Accept e.g. $0.5 \times 0.6 = 0.3$ for M1A1	(2)
(c)(ii)	B1 e.g. Lateness is half as likely by car (than by bus) or Lateness is twice as likely by bus (than by car)	B1 for a correct contextual interpretation of relative risk	(1)

Question number	Answer	Additional guidance	Mark
10 (a)	B1B1 Any two from: <ul style="list-style-type: none"> • Repeated random numbers • Random numbers out of range/may not correspond to students' numbers • Selected students may not (want to) participate • Some students may have left the university 	B1 for each bullet point up to a maximum of 2 Accept each bullet point only once Students may have joined the university is B0. There may not be 100 students at the university is B0. Random numbers may not be whole numbers is B0. Database may not be up to date on its own is B0. Do not accept (random) numbers may be more than 100 for the second bullet point. Ignore extraneous non-contradictory comments.	(2)
(b)	B1B1 Any two advantages from: <ul style="list-style-type: none"> • Easy/convenient/quick/efficient/cheap • Represents population (proportions) • Allows for comparison (between undergraduates and postgraduates) • No sample frame required 	B1 for each bullet point up to a maximum of 2 Accept each bullet point only once For 2 nd bullet point allow e.g. 'fair number of each (group)' 'Unbiased' on its own is B0. Ignore extraneous non-contradictory comments.	(2)
(c)	B1 Any one from: <ul style="list-style-type: none"> • Not every student has an equal(o.e.) chance of being selected • Only those in the main building can be selected/not every student has a chance of being selected • Robert is choosing the students 	B1 for a reason which states or implies 'equal likelihood' of being selected or that Robert is doing the choosing Do not allow 'even' chance or 'its biased' for the first bullet point, but condone 'fair chance'.	(1)

Question number	Answer	Additional guidance	Mark
11 (a)	B1 9 (thousand)	B1 Accept 9000	(1)
(b)	B1 e.g. <ul style="list-style-type: none"> • age group is narrower/doesn't start at 10 • there are fewer drivers (under 20) o.e. 	B1 for equivalent wording suggesting that the class is 'smaller'. (e.g. drivers start from age 17) Condone sensible contextual comments, e.g. 'they have not been driving long', 'they are learning', 'they are more careful', etc.	(1)
(c)	M1 25(000) + 21(000) + 19(000) A1 65 (thousand) B1 They have decreased / there were more claims (in 2014 by male drivers aged 20–49)/ there were fewer claims in 2015 o.e.	M1 for addition of 3 correct figures from population pyramid (o.e.) A1 for 65 or 65 000 (may be implied by 1700 or 1.7) B1 for a correct conclusion (This mark is independent of M1A1)	(3)
(d)	B1 B1 for two correct statements: <ul style="list-style-type: none"> • Bars get shorter as age increases, o.e. • Bars are shorter for females, o.e. 	NOTE: Condone use of e.g. 'accidents' for 'claims'. 1 st B1 for a correct statement comparing age . Accept e.g. '20 – 29 make most claims'. (Condone 'older drivers make fewer claims' o.e. but 'there are fewer older drivers' o.e. is B0) 2 nd B1 for a correct statement comparing gender . (Condone 'male drivers make more claims' o.e. and reference to single age-groups, but 'there are more male drivers' o.e. is B0) If both age and gender are included in a single comment, award this comment for the feature that is different . NB: If B0 scored, then a single incomplete comment e.g. 'young males make more claims' can score B1B0 (as we don't know if they are comparing age or gender).	(2)

Question number	Answer	Additional guidance	Mark
11 (e)	B1 Not appropriate since, e.g. <ul style="list-style-type: none"> • the population pyramid only shows drivers who made claims • not all drivers are included 	B1 for Not appropriate/No with valid reason	(1)
(f)	B1 Cannot be used to support the statement as, e.g. <ul style="list-style-type: none"> • we only have data for one year/2015 • there is no data for 2019 • (distribution of claims) may be different to 2015 • future claims may differ from past claims, etc 	B1 for Not supported/No with valid reason Condone, e.g. 'No, as it is extrapolation' for B1. Condone, e.g. 'No, it is (only) a prediction' for B1. Do not allow 'No, the trend may not continue' on its own.	(1)

Question number	Answer	Additional guidance	Mark				
12 (a)	<table border="1" data-bbox="526 225 920 296"> <thead> <tr> <th data-bbox="526 225 723 260">Time</th> <th data-bbox="723 225 920 260">Frequency</th> </tr> </thead> <tbody> <tr> <td data-bbox="526 260 723 296">$53 < t \leq 54$</td> <td data-bbox="723 260 920 296">6</td> </tr> </tbody> </table>	Time	Frequency	$53 < t \leq 54$	6	B1 for both 53 and 54 in correct order	(1)
Time	Frequency						
$53 < t \leq 54$	6						
(b)	<p>M1 $4 + 16 + 20$ or $49 - (6 + 3)$</p> <p>A1 40</p>	<p>M1 for the addition 3 figures with at least two correct from 4, 16 and 20</p> <p>or for the subtraction of the sum of 2 figures from 49 with at least one correct from 6 and 3</p> <p>A1 for 40</p>	(2)				
(c)	<p>M1 $4 \times 50.5 + 16 \times 51.5 + 20 \times 52.5 + 6 \times 53.5 + 3 \times 54.5 (= 2560.5)$</p> <p>M1 $2560.5 \div 49$</p> <p>A1 52.255...</p>	<p>M1 for Σft with at least 3 correct products or $2500 < \Sigma ft < 2600$</p> <p>M1 for 'Σft' $\div 49$ (must be dividing a sum of products by 49)</p> <p>A1 for 52.2 to 52.3</p> <p>Allow 52 from correct working seen to score 3 out of 3</p>	(3)				

Question number	Answer	Additional guidance	Mark
13 (a)	B2 SRCC is sensible because... (one reason from) <ul style="list-style-type: none"> • e.g. we expect correlation (if price depends on quality) • e.g. it will show if there is correlation / is a relationship • e.g. the (three) highest quality mince pies do seem to be the (three) most expensive 	B2 for correct conclusion with a sensible reason why. OR B1 for an incomplete answer. e.g. correct reasoning with incorrect or no conclusion, or 'yes' with an attempt at a reason e.g. 'yes, as it is bivariate/ranked data', is B1 only	(2)
(b)	B1 e.g. higher quality mince pies are more expensive, or price does depend on quality, or there is agreement between (quality and price) ranks B1 there is ... <ul style="list-style-type: none"> • positive correlation, or • (0.77) is close to 1, or • accept strong correlation 	1 st B1 for a correct interpretation of (positive) correlation. Allow equivalent wording. (condone e.g. 'taste' for 'quality') Note e.g. 'as one increases the other increases' is B0 2 nd B1 for formally recognising (positive) correlation.	(2)

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1ST0 2F

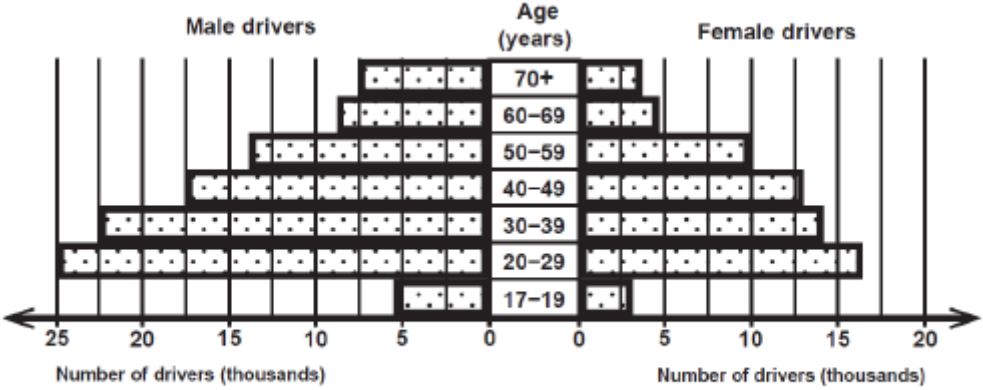
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

Question Number	Modification	Mark scheme notes
1	Diagram enlarged.	
2	Table turned vertical.	
3	Total car makes reduced from 14 to 10 (Audi, Hyundai, Renault and Mini have been removed). Horizontal lines added to table.	
3* (d)	Total car makes reduced to 10.	B1 6
4*	Table turned vertical. Numbers changed as follows: 2014: 6.75 2015: 7.25 2016: 7.50	
4* (a)	Table turned vertical. Diagram enlarged. Right axis labelled.	B2 for last three points plotted correctly at heights 6.75 , 7.25 and 7.50 OR B1 for at least one correct
5	Tables turned vertical.	
7 (a)	Wording 'of four' added.	
7 (e)	Wording 'of four' added.	

Question number	Modification	Mark scheme notes
11*	<p>Bars moved as shown:</p>  <p>(Source: adapted from Department for Transport)</p>	<p>(a) B1 10 (thousand)</p> <p>(c) M1 $25 + 22.5 + 17.5$ (or equivalent in thousands) A1B1 as scheme</p>
12*	<p>Diagram enlarged. Final point moved down to 2. Value 49 changed to 48.</p>	<p>(c) M1 final product is $\dots + 2 \times 54.5 (= 2506)$ M1 $2506 \div 48$ A1 52.2</p>

