+

Mark Scheme (RESULTS)

Pearson Edexcel GCSE (9 – 1)
In Statistics (1ST0)
Higher Paper 2H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2021
Publications Code 1ST0_2H_MS

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).

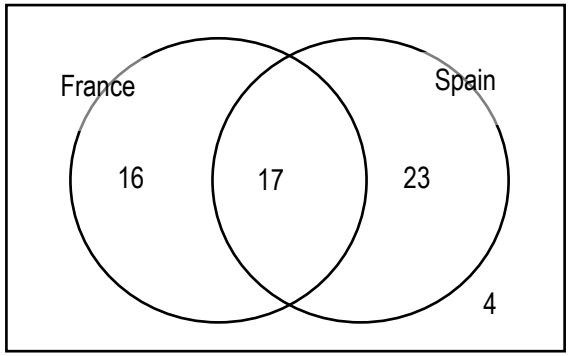
8 Probability

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 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)	 M1 two intersecting circles drawn A1 17 in centre and 23 in Spain M1 33 – 17 or 16 M1 60 – (‘16’ + 17 + 23) or 4 in the correct region A1 fully correct with labels	Accept e.g. F,S or any other unambiguous indication for labels. Do not accept three intersecting circles. Their ft ‘16’ must be „ 20	(5)
(b)	B1 e.g. • The statement is valid for her sample since 33/60 is more than $\frac{1}{2}$ • The statement is valid as 0.55 is greater than 0.5 • The statement is valid as 33 is more than half of 60 B2 e.g. Not valid/we cannot be sure since we don’t know if the sample was representative. (B1 e.g. ‘Not valid/We cannot be sure’ with an attempt at a reason OR sample may not be representative/sample is too small/do not know the population size of the town with no conclusion/incorrect conclusion)	B1 for first statement valid with supporting reason Allow: Valid, since 33 is more than half. B2 for second statement may be valid with supporting reason (B1 for not valid/unable to determine the validity of the second statement with an attempt at a reason OR for a correct comment on issues with the sample with no conclusion/incorrect conclusion)	(3)

Question number	Answer	Additional guidance	Mark
2	M1 for males: IQR: 6 – 5.2 (= 0.8) or Range: 6.2 – 4.6 (= 1.6) for females: IQR: 5.4 – 4.2 (= 1.2) or Range: 5.9 – 3.9 (= 2) A1 0.8 and 1.2 OR 1.6 and 2 B1 e.g. • Median height for male adult giraffes, 5.6, is greater • Median height for male giraffes is 5.6 and median height for female adult giraffes is smaller • 5.6 for male giraffes is greater than 4.9 for female giraffes B1ft IQR/range for male adult giraffes is smaller or IQR/range for female adult giraffes is bigger dep B1ft Claim one is correct (for Giraffes at the zoo) **AND** claim two is incorrect	M1 for attempt at finding either IQR or range. Accept for a subtraction with one of the two values correct e.g. $6.2 - k$ A1 for both correct IQRs or ranges B1 for a correct statistical statement comparing the medians together with the correct median for males. Do not accept comparison with 4.8/mean. If they have compared both 5.6 and 4.9 allow the use of the word average. B1ft for a correct statistical statement comparing the range or IQR. ft their stated range or stated IQR for male giraffes dep B1ft for accepting claim one and rejecting claim two. Dependent on B1 B1 scored correct statistical comparison having been made to support the conclusion.	(5)

Question number	Answer	Additional guidance	Mark
3(a)	B1 e.g. 'The number of goals scored is discrete'	B1 for correct reference to the type of data (allow ungrouped) Accept whole numbers or integers. Do not accept quantitative.	(1)
(b)	B1 4		(1)
(c)(i)	B1 0		(1)
(c)(ii)	M1 28 – 23 OR 1 + 3 + 1 A1 5	M1 for identifying 23	(2)
(d)	B1 8		(1)
(e)	B1 e.g. 'The range/maximum number of goals scored is <u>10</u>, (so the IQR must be less than 10')	B1 for correct reasoning Do not accept reference to the maximum/range being 11 or 12.	(1)

Question number	Answer	Additional guidance	Mark
4(a)	B1 all of the hammers produced today		(1)
(b)(i)	B2 Quota sampling may not be appropriate since • hammers likely to all have the same characteristics • there is no information given to put the hammers into different groups • it is not random/it is biased • you have a sampling frame (list of id numbers) (B1 for not appropriate with an attempt at a reason OR a correct reason with no conclusion or an incorrect conclusion).	B2 not appropriate with correct supporting reason (B1 not appropriate with any reason) Accept: e.g. 'No it isn't' in place of inappropriate.	(2)
(b)(ii)	B2 Systematic sampling is (more) appropriate since • it is easy to take every n^{th} item from a production line • it is less/not biased (compared to quota sampling) OR B2 Systematic sampling is not appropriate as there may be a fault in the machine that occurs at regular intervals. (B1 for appropriate with an attempt at a reason OR a correct reason with no conclusion or an incorrect conclusion).	B2 appropriate with correct supporting reason (B1 appropriate with any reason) Accept: e.g. 'yes it is' in place of appropriate. Do not accept: 'Appropriate, it is easy…' for B2 This will score B1 only.	(2)

Question number	Answer	Additional guidance	Mark
5	B1 Spinner X does not appear to be biased B1 e.g. • Experimental frequencies match closely to expected frequencies/12 • Experimental frequencies are approximately equal/range of frequencies is low. • The experimental probability is approximately $\frac{1}{5}$ (approximately equal to the theoretical probability) B1 Spinner Y likely to be biased B1 e.g. • Since we would expect 30 spins to land on 2 • Since we would expect 10 spins to land on 5 • Should have a probability of a $\frac{1}{2}$ for two, but the experimental probability is close to $\frac{1}{3}$ • There is only one section labelled 5, there are more sections for 2 and 3, but it landed on 5 the most. • There should be a higher frequency of 2 than 3 or 5.	B1 for Spinner X is not likely to be biased B1 for correct comment based on expected frequencies/number of trials B1 for Spinner Y likely to be biased B1 for correct comment based on expected frequencies/number of trials Do not accept comments relating to spinner Y that suggests it is unbiased.	(4)

Question number	Answer	Additional guidance	Mark
6(a)	B1 32		(1)
(b)	B1 Point plotted at (26, 12) B1 Straight lines joined from (22, 25) to plotted point and from plotted point to (30, 6)	B1 B1 **two** correct line segments. Do not accept additional line segments drawn between $t = 18$ and $t = 34$ Do not ignore the polygon closed by a line from (18, 7) to (34, 2) but ignore any lines drawn below $t = 18$ and above $t = 34$	(2)
(c)	B1 $\frac{45}{52}$ o.e.	B1 allow awrt 0.87 or awrt 87%	(1)
(d)	B1 Positive skew B1 mean > median	B1 for positive skew or correct description of positive skew. e.g. more data to the left (of the distribution) B0 for positive distribution B1 for correct comparison of mean and median	(2)
(e)	B1 11 minutes	B1	(1)
(f)	B1 $24 < t$,, 28	B1	(1)

Question number	Answer	Additional guidance	Mark
7(a)	M1 $\frac{537\,877\times1000}{52\,140\,181}$ A1 10.315….	M1 correct calculation which may be seen in stages Do not allow a misread of 100 for 1000. A1 answer in the range 10.3 to 10.4	(2)
(b)	B2 e.g. 'Can be true as the population has likely increased' (B1 for can be true with an incomplete reason e.g. Can be true because the population has changed OR For the correct reason with no or incorrect conclusion)	B2 Can be true with correct supporting reason (B1 Can be true with incomplete reasoning)	(2)

Question number	Answer	Additional guidance	Mark
8(a)	B1 Each person in the experiment is paired with another person of similar characteristics. B1 so that you can control for other variables/factors	B1 for the idea of pairing with similar person Accept description of pairing people according to specific characteristics, e.g age, weight, height, memory B1 for controlling for other variables (other than the one being tested)	(2)
(b)	M1 $3\times43+4\times25+5\times19+8\times24=[129+100+95+192=516]$ M1 (dep) $\frac{3\times43+4\times25+5\times19+8\times24}{3+4+5+8}$ A1 25.8 oe	M1 attempt at product of scores and weightings (at least 3 correct) M1 (dep on 1st M1) $\frac{\sum w\times s}{\sum w}$ A1 25.8	(3)

Question number	Answer	Additional guidance	Mark
9(a)	B1 Area for 'Very' for Newspapers is less than area for 'Very' in Radio B1dep since 60 < 65	B1 for correct comparison of areas Accept converse statement. B1dep for correct supporting reason	(2)
(b)	M1 $152\times\left(\frac{4.7}{3}\right)^2 (=373)$ M1 $\frac{65}{373}\times 360$ A1 62.7	M1 attempt at find total frequency for Radio pie chart M1 attempt to find angle for Radio pie chart Allow: $\frac{65}{k}\times 360, \quad k>65$ where k is an integer A1 62.7 – 63.0	(3)

Question number	Answer	Additional guidance	Mark
10	B1 Standard deviation = 0.1 B1 Mean = 16.65 B1ft Point plotted at (4, 16.65) B1 Take another sample (immediately) B1ft Stop/reset/adjust the machine	B1 correct standard deviation B1 correct mean B1ft point plotted at (4, '16.65') B1 correct reasoning B1ft correct reasoning ft their '16.65' plotted on the graph.	(5)

Question number	Answer		Additional guidance	Mark
11(a)	B1 121.7			(1)
(b)	M2 $5.3\times(1.4-(-1.6))$ A1 15.9	M1 $121.7+5.3\times1.4$ M1 $121.7+5.3\times(-1.6)$ A1 15.9	For method 1 allow M1 for $1.4-(-1.6)$ or 3 provided there is no evidence of incorrect working.	(3)
(c)(i)	B2 Appropriate since the <u>sample</u> mean will be approximately the same as the <u>population</u> mean (B1 for inappropriate/no conclusion since the sample mean will be approximately the same as the population mean)		B2 for appropriate and correct supporting reason Accept equivalent wording for sample and/or population. (B1 for correct reason with no or incorrect conclusion)	(2)
(c)(ii)	B2 Not appropriate since the spread of the sample mean is smaller than individual values of the population (B1 for appropriate/no conclusion, because the spread of the sample mean is smaller than individual values of the population OR B1 for not appropriate because the spread of the sample mean is different to/not the same as the spread of the individual values of the population)		B2 for not appropriate and correct supporting reason (B1 for correct conclusion with incomplete reason, OR for correct reason with no or incorrect conclusion)	(2)

Question number	Answer	Additional guidance	Mark
12(a)	M1 $p : 3p = \frac{\frac{1}{2}}{4} : 3 \times \frac{\frac{1}{2}}{4}$ or $p + 3p = \frac{1}{2}$ A1 $p = \frac{1}{8}$ or $3p = \frac{3}{8}$ M1 B(5, $\frac{1}{8}$) $P(X = 1) = 5\left(\frac{1}{8}\right)\left(\frac{7}{8}\right)^4$ M1 B(5, $\frac{3}{8}$) $P(X = 2) = 10\left(\frac{3}{8}\right)^2\left(\frac{5}{8}\right)^3$ A1 0.366… or 0.343…. A1 both 0.366… and 0.343 and Salome is correct	M1 for use of ratio or sum of probabilities = 1 A1 allow p = 0.125 or 12.5% M1 for use of P(X = 1) with B(5,p) M1 for use of P(X = 2) with B(5, 3p) A1 for either correct probability A1 for both correct probabilities and correct conclusion	(6)
(b)	B1 B1 for any two from: • since there are a fixed number of trials • since the probability (of selecting red) is constant • since there are only two outcomes (selecting red and not selecting red) • since the trials are independent B1dep ….so is appropriate. B1 for… • if the selected counter is replaced at the top of the bag/the bag is not well-mixed between trials so not appropriate. To a maximum of 3 marks.	B1 for each correct assessment (maximum 3) based on the binomial distribution Ignore additional non-contradictory comments. Maximum B1B1 if no conclusion is given with 3 correct reasons. Allow appropriate with 1 or 2 correct reasons and inappropriate with the correct reasons.	(3)
(c)	B1 Binomial would not be suitable as there is not a fixed number of trials	B1 Not suitable and correct supporting reason	(1)

Question number	Answer	Additional guidance	Mark
13(a)	B1 e.g. ‘ • To see if the data has been collected from a trusted source/reliable (source). • So that readers can check her results. • So that readers can check if it is up to date.	B1 for any correct reason Comments stating ‘up to date’/’reliable’ are insufficient without reference to the ability to see if/check/verify.	(1)
(b)	B1 ‘As income (per person) increases, life expectancy increases’	B1 correct interpretation in context Do not allow positive correlation on its own	(1)
(c)	B2 SRCC > 0.72 (PMCC) since the life is increasing as income is increasing but not linearly. (B1 SRCC > (0.72 / PMCC) with an attempt at a reason)	B2 correct comparison and correct supporting reason (B1 correct comparison with attempt at reason)	(2)
(d)	B2 PMCC for fertility rate and life expectancy is stronger than PMCC for income (per person) and life expectancy since –0.80 is closer to –1 than 0.72 is to 1 Or PMCC for fertility rate and life expectancy is stronger than PMCC for income (per person) and life expectancy since 0.80 > 0.72 (B1 PMCC for fertility rate and life expectancy is stronger than PMCC for income (per person) and life expectancy with an attempt at a reason)	B2 for correct comparison with correct supporting reason (B1 for correct comparison with attempt at reason)	(2)

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

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: ±5º
Measurements of length: ±5 mm

PAPER: 1ST0_2H			
Question		**Modification**	**Mark scheme notes**
1		Wording added ‘There is blank space on pages * and * in the Data Booklet’.	Standard mark scheme.
2		Wording added ‘Look at the diagram for Question 2 in the Data Booklet. It is a box plot.’ Wording removed ‘below’ and replaced by ‘in the Data Booklet’. Diagram enlarged. Black grid lines. Small squares removed. Axis label moved to left of horizontal axis. Box plot outline made thicker. Table enlarged, turned vertical and left aligned.	M1 for males: IQR: 6 – *their* 5.2 (= 0.8) or Range: 6.2 – *their* 4.6 (= 1.6) for females: IQR: 5.4 – 4.2 (= 1.2) or Range: 5.9 – 3.9 (= 2) A1 *their* 0.8 and 1.2 OR *their* 1.6 and 2 B1 Median height / *their* 5.6 for male adult giraffes is greater or median height / 4.9 for female adult giraffes is smaller B1 B1ft as standard scheme Additional guidance column: M1 for attempt at finding either IQR or range For *their* 5.2 accept $5.15 \leq \text{LQ} \leq 5.2$ For *their* 4.6 accept $4.55 \leq \text{min} \leq 4.7$ A1 for both correct IQRs or ranges For *their* 0.8 accept $0.8 \leq \text{IQR} \leq 0.85$ For *their* 1.6 accept $1.5 \leq \text{range} \leq 1.65$ B1 for a correct statistical comparing the medians For *their* 5.6 accept $5.55 \leq \text{median} \leq 5.7$ B1 B1ft as standard scheme

PAPER: 1ST0_2H			
Question		**Modification**	**Mark scheme notes**
3		Wording added ‘Look at the diagram for Question 3 in the Data Booklet. It is a’. Wording removed ‘The’. Wording ‘shows’ removed and replaced with ‘showing’. Diagram enlarged. Black grid lines. Graph line made thicker. Open headed arrows. Axes labels moved to top of vertical axis and to left of horizontal axis. Right axis labelled.	Standard mark scheme.
4		Wording added ‘This question is multiple choice. Write the letter of your chosen answer in the box provided’. Wording removed ‘This question must be answered with a cross…’. Option boxes removed, options A-D listed vertically and left aligned. Answer box added.	Answer ‘D’
5		Wording added ‘Look at the diagram for Question 5 in the Data Booklet. It shows two spinners that Roslyn makes and two tables.’ Wording removed ‘Roslyn makes two spinners’. Diagrams enlarged. Spinners straightened, spikes removed and centre dot added. Wording ‘below’ removed and replaced with ‘in the Data Booklet’. Tables enlarged.	Standard mark scheme.
6	a	Value ‘52’ changed to 60. Table enlarged and left aligned. Values in table changed: 7 changed to 5 12 changed to 15 6 changed to 10 2 changed to 5	B1 30
	b		B1 Point plotted at (26, 15) B1 Straight lines joined from (22, 25) to plotted point and from plotted point to (30, 10) Additional guidance as standard mark scheme

PAPER: 1ST0_2H			
Question		**Modification**	**Mark scheme notes**
	c	Wording added ‘Look at the diagram for Question 6 in the Data Booklet. It is an incomplete frequency polygon.’ Wording removed ‘below’. Diagram enlarged. Black grid lines. Small squares removed. Open headed arrows. Axes labels moved to top of vertical axis and to left of horizontal axis. Crosses replaced with solid dots. Graph lines and dots moved to match the modified values in the table. Graph lines made thicker. 6b Wording added ‘in the Data Booklet’.	B1 $\frac{55}{60}$ oe
	d	No additional modifications.	Standard mark scheme.
	e	Value 19 changed to 21 to be consistent with the modified values in the table.	B1 9 minutes
	f	No additional modifications.	Standard mark scheme.
7		Wording added ‘Look at the table for Question 7 in the Data Booklet’. Table enlarged. Frame removed, information left aligned and quotation marks added.	Standard mark scheme.
8		Wording added ‘Look at the table for Question 8(b) in the Data Booklet’. Wording ‘below’ removed and replaced with ‘in the Data Booklet’. Table enlarged.	Standard mark scheme.
9		Wording added ‘Look at the table for Question 9 in the Data Booklet’. Wording added ‘in the Data Booklet’. Table enlarged.	Standard mark scheme.

PAPER: 1ST0_2H			
Question		**Modification**	**Mark scheme notes**
10		Wording added ‘Look at the diagram for Question 10 in the Data Booklet. It shows an incomplete quality assurance report.’ Wording ‘below’ removed and replaced with ‘in the Data Booklet’. Diagram enlarged. Axes labels moved to top of vertical axis and to left of horizontal axis. Open headed arrows. Black grid lines. Graph lines made thicker. Small squares removed. Intermediate grid lines added. Crosses replaced with solid dots. Table enlarged. Wording added ‘by filling in the table and completing the graph in the Data Booklet’.	Standard mark scheme.
11		No modifications.	Standard mark scheme.
12		Wording added ‘Look at the table for Question 12 in the Data Booklet.’ Table enlarged and turned vertically.	Standard mark scheme.
13		Wording added ‘Look at the diagram for Question 13(c) and 13(d) in the Data Booklet.’ Wording added ‘as shown in the Data Booklet’. Diagram enlarged. Crosses replaced with solid dots. Open headed arrows. Axes labels moved to top of vertical axis and to left of horizontal axis. Right axis labelled.	Standard mark scheme.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom