Edexcel GCSE

GCSE Statistics 1389

Summer 2008

Mark Scheme (Results)

advancing learning, changing lives

Edexcel GCSE
GCSE Statistics 1389

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information please call our Customer Services on + 44 1204 770 696, or visit our website at www.edexcel-international.org.

<u>Table Of Contents</u>

1389/1F – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A1			H ⎪ _____ T ⎪	2	B1 for H(ead) and T(ail) labelled B1 for spaces for separate results
A2	(a)(i)		discrete	3	B1 for discrete
	(ii)		qualitative		B1 for qualitative
	(iii)		continuous		B1 for continuous
					NB condone errors in spelling
	(b)	$240 \div 12$	20	2	M1 for dividing a total by 12 (total need not be correct) A1 for 20 (but only from $240 \div 12$)

1389/1F – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A3	(a)		35 – 39	1	B1
	(b)		50 – 54	1	B1
	(c)		**EITHER** there is a greater % of people below 20 (accept 19) in Northern Ireland than the UK **OR** it is higher/more in NI **OR** it is lower/less in UK	1	B1 the answers must suggest a comparison of % and not a comparison of numbers of people. The % sign will not necessarily be there (B0 for answer which suggests number of people) we expect an overall answer not a comparison of individual age groups
A4	(a)		2	1	B1 for 2 or 2.0
	(b)		negative (correlation)	1	B1 for negative or '(air) temperature decreases as height (above sea level) increases' oe
	(c)(i)		(1.5, 8) plotted	2	B1 for $(1.5 \pm 2\text{mm}, 8 \pm 2\text{mm})$
	(ii)		line of best fit through (1.5, 8)		B1 for line of best fit through '(1.5, 8)' for at least $1	x	2$; if extended the line should pass between (2.5, 0) and (3, 0)
	(d)		2.6 – 2.9	1	B1 for answer in the range 2.6 – 2.9 or ft from their line of best fit (award B0 for 0)

1389/1F – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A5	(a)		<table><tr><td>more than 25</td><td></td></tr><tr><td>between 20 and 25</td><td>×</td></tr><tr><td>between 15 and 20</td><td></td></tr><tr><td>less than 15</td><td></td></tr></table>	1	B1 for between 20°C and 25°C
	(b)		4, 5	1	B1 for 4, 5 or April, May
	(c)		comparisons	2	B2 for two different correct comparisons, e.g. (generally) hotter (in 1983) warmer **longer** (in 1983) bigger temperature **deeper** (in 1983) higher temperature **earlier** (in 1983) (B1 for one correct comparison) NB condone missing 1983 in the above examples but reverse cases require 1981 comparisons must be explicit special case if B0 scored: award B1 for a correct comparison of a corresponding cell in each year

1389/1F – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A6	(a)		604441	1	B1
	(b)		rising/ going up/ increasing/ getting bigger oe	1	B1 Look for a general comment. Sometimes this appears with figures as well, just figures are not enough Sometimes you will need to ignore subsequent sentences (B0 for positive or positive trend on its own)
	(c)		there are always more than 1000 male births for every 1000 female births	1	B1 It must make clear that the number is more for every year. Do not allow reference to a single year without making clear that every other year is also above
	(d)		falling/going down/decreasing oe because non-UK is going up	2	B1 B1 this mark only goes to a reason using the information on the table
A7	(a)	$1-0.4$	0.6	2	M1 for $1-0.4$ (which may be implied by a correct answer) A1 for 0.6 or 60% or $\dfrac{60}{100}$ oe
	(b)	$(1-0.4)\times(1-0.3)=$ 0.6×0.7	0.42	2	M1 for $(1-0.4)\times(1-0.3)$ or $'0.6'\times(1-0.3)$, i.e. ft their answer from part (a) A1 for 0.42 or 42% or $\dfrac{42}{100}$ oe

1389/1F – Section B				
Question	**Working**	**Answer**	**Mark**	**Notes**
B1 (a)		15	1	B1 for 15
(b)	22 – 17	5	1	B1 for 5
(c)		Completed bar chart	3	B1 for bar of height 30 B1 for 12 Bronze and 9 Silver (tolerance ± 2 mm) B1 for consistent shading Special case B2 for a correct upside down bar chart
(d)	$\dfrac{19}{72} \times 360$	95	2	M1 for $\dfrac{19}{72} \times 360$ or $19 \times \dfrac{360}{72}$ or 19×5 A1 for 95 NB 95 without working score M0 A0
(e)	$\dfrac{140}{360} \times 72$	28	2	M1 for $\dfrac{140}{360} \times 72$ or $140 \times \dfrac{72}{360}$ or $140 \div 5$ or $72 - 19 - 25$ A1 for 28
(f)	$72 - (28 + 19)$	25	1	B1 for 25 or for total medals in table = 72

1389/1F – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B2	(a)		<table><tr><td></td><td><20</td><td>21-30</td><td>>30</td></tr><tr><td>M</td><td>(7)</td><td>14</td><td>4</td></tr><tr><td>F</td><td>(5)</td><td>5</td><td>5</td></tr></table>	3	B3 cao (B2 for one row or two columns correct B1 for one cell correct in second or third columns) NB accept numbers for tallies and IIIII for 5
	(b)(i)		21 – 30, male	3	B1 ft for 21 – 30 and male or ft cell with the largest frequency from their table
	(ii)		$\frac{15}{40}$ (or 0.375)		B2 for $\frac{15}{40}$ oe seen or ft $\frac{'15'}{40}$, where '15' is the row total for females from their table (B1 for $\frac{n}{40}$) Special case: B1 for $\frac{15}{39}$ or $\frac{15}{41}$ or 0.38
	(c)		two comparisons	2	B2 for two correct comparisons condone use of values from their table. e.g. more males than females more in group 21-30 fewer over 30 more females than males over 30, etc (B1 for one correct comparison)

1389/1F – Section B					
Question		Working	Answer	Mark	Notes
B3	(a)		176, 108, 62, 620	1	B1
	(b)		11	1	B1
	(c)	620/62	10	2	M1 for $\dfrac{'620'}{'62'}$ or any correct method A1 for 10 cao If no working is shown and the answer is incorrect you will need to check this. Look at the table above first
	(d)		10	1	B1

	(e)		**EITHER:**
			 (the) mean:
			    • because it uses all the data or
			    • because it is more accurate or
			    • no skew/symmetrical or
			    • there are no extreme values
			 OR:
			 (the) median:
			    • because it is not affected by skew/extreme values or
			    • not symmetrical
			    • slight negative skew.
			 OR:
			 10
			    • because mean and median are both 10 oe
				1	B1

1389/1F – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B4	(a)		quicker/ easier/ cheaper	1	B1 for quicker/ easier/ cheaper oe
	(b)		list (of residents)	1	B1 for 'list' oe, e.g. electoral role, register, etc
	(c)		number the residents and select them using random numbers	2	B1 for a unique identification, e.g. names on pieces of paper, names numbered, etc B1 for a method for equally likely selection, e.g. names from a hat, random numbers, etc (B0 for e.g. use a calculator- this is insufficient)
	(d)(i)		What do you think about the plan to build a new swimming pool? □ good idea □ no opinion □ bad idea	4	B1 for a suitable relevant question about the swimming pool (B0 for a leading question) B1 for at least two appropriate response boxes
	(ii)		representation + justification		B1 for a suitable method of representation, e.g. pie chart, bar graph, composite bar chart, etc B1 (dep) for appropriate justification for representation, e.g. pie chart shows proportions, bar chart shows frequencies, easy to read, etc (B0 for easy to draw oe)
	(e)		reasons	2	B2 for two correct reasons (which may appear together in either 1 or 2), e.g. identifies problems, shows likely responses, checks questions work, tests questions are clear, gives idea of response rate, checks time to do, checks questions are inoffensive, etc (B1 for one correct reason)

1389/1F – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B5	(a)(i)	$(55+57+50)\div 3$ $(57+50+52)\div 3$	54.0 53.0	4	M1 for a correct method shown (may be implied by one correct answer) A1 for 54(.0) and 53(.0)
	(ii)		plot (2, 55.3), (3, 55.7), (1, 55.3), (2, 55.0), (3, 54.7), (1, 54.0) and (2, 53.0)		M1 for correctly plotting at least 3 moving averages A1 for correctly plotting 7 moving averages (only) (tolerance ± 2 mm) NB ignore plots of numbers of cars made
	(b)		decreasing trend	1	B1 for decreasing oe (B0 for negative)
	(c)(i)		2 (or May – Aug)	2	B1 for 2 or May – Aug oe (B0 for May – Aug (or 2) in 2005)
	(ii)		reason		B1 for a sensible reason, e.g. not many cars are bought in this period, summer holiday, new number plates
	(d)	$\dfrac{159}{166}\times 100$	95.7 – 96	2	B2 for 95.7 – 96 (B1 for $\dfrac{159}{166}$ seen or 0.957 – 0.96 or e.g. 96%)

1389/1F – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B6	(a)		draw a box plot LQ Median and UQ correct upper and lower values correct	3	B1 B1 B1
	(b)		Red Squirrel symmetrical (or normally distributed or no skew) and Grey Squirrel positive skew	2	B1 B1
	(c)		Grey Squirrel has a higher median plus Grey Squirrel has a greater IQR or range or spread (reverses acceptable using Red Squirrel)	2	B1 for comparing the medians B1 for comparing the spread/range/IQR/variability comparisons of ends or other quartiles not acceptable make sure only one range gets a mark
	(d)		any two from: Squirrels weighing more than 360 grams are likely to be grey. Squirrels weighing less than 300 grams are likely to be red. Squirrels between 300 and 360 grams may be either red or grey	2	B1 B1 we are looking for reference to the 300 and 360 grams special case B1 B0 for identifying a squirrel by its weight as red, grey, or we can't tell oe

1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A1			**Any two from: (only one from each bullet point)** • The 3 D effect (distorts the sizes) • Taking a slice out makes it difficult to see clear ratios. • Some colours stand out more. (o e) • Shown at an angle rather than a birds eye view. • hard to see which bits are bigger	2	B1 B1 Some of the comments that you might see that are acceptable for B1: - can't see size of segment (Bullet 1) - a comment relating to it being a perspective view such as 'not a birds eye view' or 'it is at an angle'.(Bullet 4) Note: The question does not ask them to say why it is misleading **Do not allow:** - no key - no figures/percentages - colours are very similar (this does not make it misleading)

1389/1H – Section A					
Question		Working	Answer	Mark	Notes
A2	(a)		604441	1	B1
	(b)		Rising/ going up/increasing oe	1	B1 Just figures are not enough. Look for a general comment. Sometimes this appears with figures as well. Sometimes you will need to ignore subsequent sentences.
	(c)		There are always more than 1000 male births for every 1000 female births.	1	B1 Some reference to the Male births per 1000 column – it may just use the 1000 - plus an indication that every figure in that column is greater than 1000. It must make clear that the number is more for every year. **Do not allow:** Reference to a single year without making clear that every other year is also above.
	(d)		Going down Because Non-UK is going up.	2	B1 B1 This mark only goes to a reason using the information on the table.

1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A3	(a)		35 to 39	1	B1
	(b)		50 to 54	1	B1
	(c)		**EITHER:** There is a greater % of people below 20(accept 19) in Northern Ireland than the UK. **OR:** It is higher in NI **OR**: It is lower in UK	1	B1 We expect an overall answer not a comparison of individual age groups. The answers must suggest a comparison of % and not a comparison of numbers of people. The % sign will not necessarily be there. **Do not allow:** More in NI or more people in NI OR: Less in UK or less people in UK These both suggest numbers of people

1389/1H – Section A					
Question		Working	Answer	Mark	Notes
A4	(a)		176, 108, 62, 620	1	B1
	(b)		11	1	B1
	(c)	620/62or their f(x)	10	2	M1 620/6 is a common incorrect method and gets M0 unless the table above has 6 instead of 62 A1 ft. If no working is shown and the answer is incorrect you will need to check this. Look at the table above first.
	(d)		10	1	B1
	(e)		**EITHER:** 1 The mean: • because it uses all the data or • because it is more accurate or • no skew/symmetrical or • there are no extreme values **OR:** The median: • because it is not affected by skew/extreme values or • not symmetrical • slight negative skew. **OR:** 10 because the mean and median are both 10	1	B1

1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A5	(a)		**Any Two of:** • It will identify any problems with the survey. • It will see the sort of response there is. • It will find any errors. • It will get an idea of the response rate • It will give feedback so that you can alter things • It will ensure questions are clear	2	B1 B1 Look for equivalent wording. Beware: Two answers are often the same
	(b)		**Any one from:** • Not all workers may work on Monday morning. • It could be biased • All workers do not have an equal chance of being chosen. • Only one day is used	1	B1 Look for equivalent wording **Do not allow**: • References to being stuck in traffic or arriving late. • She is picking certain people. • It is a census because she is asking all

1389/1H – Section A				
Question	Working	Answer	Mark	Notes
(c)		**EITHER**: Number all the workers. plus Use a random number table, generator, calculator or a computer to select the numbers you require. **OR:** Put the name of each worker on a piece of paper. Plus Put the names in a hat and draw one out.	2	B1 B1 One mark for numbering or listing in some way. The other mark for selection. To just say pick randomly is not enough. We need to know how they would do the random selection. Alternative: Number and put the numbers in a hat
(d)(i)		continuous	2	B1
(ii)		Qualitative		B1
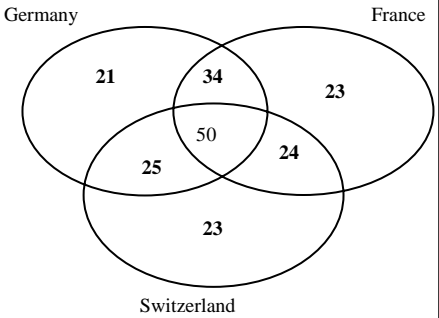
1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A6	(a)		June	1	B1
	(b)	70% of £720	£504	2	M1 A1 If you see the following numbers anywhere then give M1. They have correctly calculated for the wrong month 698.4, 792, 691.2 Some candidates might try to find 30% and take it from £729. This is an acceptable method.

Question		Working	Answer	Mark	Notes
A7	(a)		802.75	1	B1 Accept 802.8 or 803. Look carefully in the answer space. Candidates do not always put the answer on the line
	(b)	$\sqrt{(5196408/8 - 802.75^2)}$ or $\sqrt{(5196408/8 - 803^2)}$ or $\sqrt{(5196408/8 - 802.8^2)}$	**EITHER:** 71.7 awrt **OR**: 68.9 awrt **OR:** 71.2 awrt	2	M1ft Look for them using their (a)^2 to get the M1 (For 802.75^2 = awrt 644407 and 803^2 = 644809 802.8^2 = 644487) A1 There is no follow through for this it is these three correct answers only Look carefully at the working if the answer is wrong
	(c)		Puts it down (or equivalent correct wording) **PLUS**: $720 < 802.75$ **OR:** 1st quarter for 2006 is below the old mean **OR:** A below old mean value is being added on.	2	B1ft (for their answer to a) B1 ft (for their answer to a) and Depends on previous B mark being gained.

1389/1H – Section A					
Question		**Working**	**Answer**	**Mark**	**Notes**
A8	(a)	(260 – 251)/4.5 = 2 (sd's)	2.5%	2	M1 A1 If they use 95% within 2 standard deviations and write 5% then give M1 If they use 96% within 2 standard deviations and write 2 % then give M1 If they show that they are considering 2 standard deviations from the mean give the M1
	(b)		**Yes** they do conform Less than 2.5% below 250g (o.e.) (A reference to 250gm is expected)	2	B1 for Yes B1dep The second B mark depends on the first B mark being gained

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B1	(a)		Draw a box plot LQ Median and UQ correct Upper and lower values correct	3	B1 B1 B1
	(b)		Red Squirrel symmetrical (or normally distributed or no skew) **and** grey squirrel positive skew	2	B1 B1
	(c)		The grey Squirrel has a higher median PLUS The grey squirrel has a greater IQR or range or spread (Reverses acceptable using red squirrel)	2	B1 B1 We are looking for a comparison of means and of spread/range/IQR. Comparisons of ends or other quartiles are not acceptable. Make sure only one range gets a mark
	(d)		Any two from: Squirrels weighing more than 360 grams are likely to be grey. Squirrels weighing less than 300 grams are likely to be red. Squirrels between 300 and 360 grams may be either red or grey	2	 B1 B1 We are looking for reference to the 300 and 360 grams

1389/1H – Section B

Question		Working	Answer	Mark	Notes
B2	(a)	Germany / France / Switzerland Venn diagram: 21, 34, 23, 50, 25, 24, 23	Look for 25 ,24, 34 and 21, 23, 23 all in the correct places	3	B1 B1 B1 (B1 for 2 figures in the correct places B1 B1 for 5 figures in the correct places. B1 B1 B1 for all correct)
	(b) (i)		50/200 or 1/4 or 0.25 or 25%	4	B1
	(ii)	(200 – 131)/200	= 69/200 or 0.345		B1ft (must be over 200)
	(iii)	50 + 24 = 74 (other methods possible) Also allow follow through from diagram	74/131		M1 for 74 A1 ft (Allow awrt 0.565 for M1 A1)

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B3	(a)		A or $y = ax^2$	1	B1
	(b)		The greater the length the greater the wingspan. **OR** Body length approx half wing span. **OR** Relationship less obvious for big birds. oaea	1	B1
	(c)	$Y = ax + b$ $a = (y_1 - y_2)/(x_1 - x_2)$ (say = (80 -28)/(150 – 50 or (80 – 30)/(150 – 50) or other suitable)	$b = $ 4 awrt $a = $ between 0.48 and 0.52 (these values get the M mark) $y = 0.48$ to 0.52 $x + 4$ awrt	3	B1 M1 For an obvious effort at gradient A1
	(d)	$(0.52 \times 100) + 2(3,4)$ OR Line on graph	Answer in range 52 to56 awrt	2	M1 For either substituting into their equation or a clear line up and across from 100 on the graph A1

Question		Working	Answer	Mark	Notes
B4	(a)		**Any two from:** • Expensive, • Time Consuming, • Difficult to do • Lots of data (to handle) (equivalent words acceptable)	2	B1 B1
	(b)		Not an ideal sample **Plus Any two from:** • The sample is very small. • The sample is likely to be biased. • No rural people are involved. • Not everyone has a land-line telephone. • Not everyone has a chance of being asked.	2	B1 B1
	(c)		<u>**A**</u> (The first question) is best. Plus The first question is closed and/or the second question is open. (oe)	2	B1 B1 Accept as reason: A has only two possible answers (It is possible to get B0 B1 if A is not stated)

1389/1H – Section B				
Question	**Working**	**Answer**	**Mark**	**Notes**
B5 (a)		0.95	1	B1
(b)		Binomial	1	B1
(c)(i)	M1 for seeing $4p^3q$ OR 4 x 0.95^3 x 0.05 OR 4 x 0.05^3 x 0.95	= 0.171 a.w.r.t	5	M1 Remember if you see $4p^3q$ give the M1 A1
(ii)	Either $1 – (p^4 + 4p^3q)$ or $(6p^2q^2 + 4pq^3 + q^4)$ $1 – (0.815 + 0.171)$	0.815 or 0.0135375 or 0.000475 or 0.000000625 = 0.014 a.w.r.t		M1 For an attempt at one of the two methods M1 For one of these figures A1 For 0.014 gained by a correct method. (Watch out for a final answer of 0.014 obtained incorrectly from $6p^2q^2 =$ 0.014 when rounded. This could get M0 M1 A0 if they have the exact number 0.0135375 in their working)

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B6	(a)(i)	(55 – 52)/ 15	= 1/5 or 0.2 oe	3	M1 Method correct for i or ii A1
	(ii)	(48 – 45)/12	¼ or 0.25 oe		A1 (Both i and ii correct gets 3 marks)
	(b)		Tyson did best in **Maths.** **Plus:** He has the **higher standardised score** in that subject. or The standardised score for statistics is not so much **above** the mean	2	B1 B1 **Do not allow:** The standardised score is further from the mean.
	(c)		**Any two of:** • Maths was a more difficult exam./Statistics easier • Students did less well in maths/better in Stats • Stats results more variable than maths o.e	2	B1 B1

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B7	(a)		1, 2, 3, 4, 6, 5, 7, 10, 8, 9. 0, 0, 0, 0, 1, 1, 0, 2, 1, 1. 0, 0, 0, 0, 1, 1, 0, 4, 1, 1 (SC Reverse ranking all correct (B1))	2	B1 B1 ft for d^2
	(b)	$1 - (6 \times 8) / (10 \times 99)$ $= 1 - 48/990$	 $= 0.95$ (awrt)	2	M1 (Watch out for ft of their d^2 they will get the M1) A1
	(c)		There is (strong) positive correlation between distance from the bank and the depth. The further from the river bank the deeper the water (oe)	2	B1ft from their answer to (b) Ignore strong weak etc. B1 ft from first B1 If they have **not** stated positive/negative correlation B1ft from their part (b) If they **have** stated positive/negative correlation the second B1 dependent on them getting the first B1 followed through from their correlation statement. This allows the candidate that gets a negative value in (b) to get marks.

1389/1H – Section B					
Question		**Working**	**Answer**	**Mark**	**Notes**
B8	(a)		Evidence of frequency density.	3	M1 Evidence acceptable is EITHER: Seeing figures 2.9 or/and 1.2 OR: One correct bar. Remember that if they do not get this M mark they get no marks for this part
			Sensible Vertical Scale or Key		A1 The scale must go up in multiples of 1, 2, 3, 4….
			Both bars correct - First bar(10 wide 2.9 high), Second bar (15 wide 1.2 high)		A1 Allow tolerance of +/- half little square in height.
	(b)		**EITHER:** It would help to give some idea of the proportions of each shoe size required. **OR:** So he knows how many of each size to make	1	B1 (Do not accept individual shoe size comments)

1389/1H – Section B				
Question	**Working**	**Answer**	**Mark**	**Notes**
(c)	Require either100th or 100.5thperson. (M1) Therefore in range 260 to 265 group for M1	= 261.52 or 261.59	3	M1 (Accept 10 or 10.5) M1 If answer in range 260 to 265 then second M1 given) A1
(d)		Normal	1	B1

1389/1H – Section B				
Question		**Working**	**Answer**	**Mark**	**Notes**
B9	(a)	Add four figures/4		3	M1
			94 and 97		A1 A1
	(b)		Plotted correctly	1	B1
	(c)		Ruled straight line extends (horizontally) at least through 7 points and at least touches points 1 and 5	1	B1
	(d)		-42 (hundreds) or -4200	1	B1
	(e)	10200 to 10000 – 4200 Or their d		2	M1 (If the answer is not in the range and no working is shown then M0A0 If working is shown then you will have to check for ft .)
			= any value between 6000 and 5800		A1 ft