www.tutor-homework.com (for tutoring, homework help, or help with online classes)

Question 1

The main aims of this question are to:

- explain how a statistical investigation can be broken down into four stages of posing the question, collecting the data, analysing the data and interpreting the results;

- classify investigations into the three broad investigation types of summarizing, comparing and looking for relationships;

- take an overview of the statistical techniques used in the analysing stage of an investigation;

- understand some of the issues involved in estimation and approximation.

In preparation for the 'estimation' section of an upcoming math test, 12 primary school children were asked to guess the length of a rectangular table in meters. Their teacher recorded their guess. Children were then told if their guess was an overestimate or underestimate, or was exactly right, and was the asked to guess again.

To see if this is an effective teaching strategy, the teacher wants to analyse the results to see if telling the children about their first guesses improved their next guesses.

For each child, the teacher recorded the errors (in meters) for both guesses. (A negative value represents an underestimate.) The results are given in Table 1.

Table 1   Errors in children's estimates

Child	1	2	3	4	5	6	7	8	9	10	11	12
Error 1 / m	0.2	-0.6	0.5	-1	0.2	-0.5	-1	-0.3	0.1	0	-0.4	-0.7
Error 2 / m	0.1	-0.5	0.3	-0.5	0	-0.3	-0.7	-0.2	-0.1	0	-0.1	-0.5

The teacher asks for your help in calculating and interpreting statistics for the two groups of data.

(i)   Calculate the 1-VAR STATS for both error data sets, and find the absolute values of the mean and standard deviation.

(ii)	(a)	How would you explain the fact that the means for both data sets are negative?

(b)	How would you explain the fact that the absolute values of the mean and standard deviation are smaller for Error 2 than for Error 1?

(iii)	You decide to continue further the teacher's investigation, as outlined at the beginning of the question.

(a)	State clearly in your own words the problem that you are investigating.

(b)	Classify the investigation as one of summarizing, comparing, or looking for relationships.

(c)	For each child, calculate the absolute error of each guess, display the results in a table similar to Table 1 above, and enter the values into your calculator.

(d)	Display the first and second sets of absolute errors using a graphical representation suitable for the purpose of this investigation. Give your reason(s) for the method of representation you chose.

(e)	What conclusions can you draw about the problem under investigation?

(f)	Review the investigation across the whole question, and identify three or four stages of a statistical investigation – posing, analysing, and interpreting. (The collection has already been done.) State, which parts of the question and your solution, address each stage.

Question 4

The main aims of this question are to:
-	build up formulae from given information;
-	evaluate an algebraic expression by substituting a value for a variable;
-	simplify algebraic expressions, multiply out brackets and multiply an expression by a number;
-	change the subject of a formula.

(i)   Express the following without brackets, simplifying as much as possible.

     a) $10 (200 - A)$

     b) $10 (200 - A) + 9 A$

     c) $10 (200 - A) + (9 A + 6)$

     d) $(200 - A) (9A + 6)$

(ii)   (a)   Write down a formula, which gives the persons age, A years, on his/her birthday this year, in terms of the year of the person's birth, B.

(b)   Rearrange the formula to give the year of the person's birth in terms of the person's age on his/her birthday this year, explaining the steps you make.

(iii)   Below is a trick, which you are asked to analyse:

Write down your age next birthday; subtract it from 200; multiply the result by 10; add nine times your age next birthday; add 6; and the result is the year in which you were born.

(a)   Write down the calculations to show whether the trick works for at least two different people's ages.

(b)   Using algebra, present an analysis of the trick, along the same lines as below, …

… and end up a formula that expresses the final result in terms of the initial input number (your age, A years, on your next birthday).

Simplify this formula as much as possible. You should find some of the answers to part (i) useful.

 (iv)   Does the trick always work? If so explain in one sentence; if not amend the description of the trick so that it does work.

(v)   (a)   Explain, as if to a non-mathematical friend, why this trick works.

(b)   Drawing on your answers to the previous parts of the question, explain the advantages of using symbols and algebra in the context of number tricks.