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March 2013

GCSE Mathematics 5MB1H
Higher (Calculator)
Paper 1

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March 2013

Publications Code UG035030

Introduction

There were many well-prepared candidates. Standard techniques such as stem and leaf diagrams, box plots and questions involving cumulative frequency seemed to be particularly well done.

There were concerns over some basics, however. For example, the calculation of 75% of £283 in Q5 and the plotting of values on the box and whisker diagram in Q8 were not as good as they should have been. Many candidates showed little understanding of rounding and were not able to score marks on Q7.

Reports on individual questions

Question 1

Most candidates were able to get the correct answer of £60 from 105 ÷ 7 and then multiplying by 4. A few were successful by building up from, for example, 40 + 30 = 70. Some candidates had no grasp of ratio and worked out 105 ÷ 4 or 105 ÷ 3 or even (105 ÷ 7) ÷ 4. A few candidates assigned the final sums of money £60 and £45 to the wrong person.

Question 2

The idea of using exact numbers to get an estimate in this case was well known to the majority of candidates. A few ignored the % sign and got 74 400 as their answer. Others thought that 'estimate' meant work to one significant figure and so worked out 90% of 700, for example.

Question 3

Many candidates were able to give lucid answers to part (a). A common explanation was to note that there was no opportunity for the response 'never'. Others had been well coached to give the answer 'no time frame'. Many also pointed out that the response boxes were too vague or equivalently should have had some numerical values attached.

Part (b) was generally well done with many candidates specifying a time period, either in the question or in the labelling of the response boxes. The theme was about frequency of use, rather than duration of use, but some candidates did not pick this up and were clearly asking a question about length of time.

Responses to part (c) were a little less clear. Good answers explained why the manager's sample was unsatisfactory. For example, taking a sample at the sports centre biased it towards people already interested in sport; taking it on a Tuesday morning would bias it against those in full-time work. Many candidates stated correctly that the sample was too small, but those who said that the sample did not have a wide enough range of views or could all be males (or cyclists) were not awarded a mark. Responses that just said the manager's sample was biased did not score unless there was further explanation.

Question 4

It was pleasing to see so many candidates had been taught to set the information out in a two-way table and these candidates generally scored full marks. Less successful were ad hoc approaches, although if the calculations were clear enough, method marks, where earned, could be obtained for incorrect answers.

Question 5

This proved to be a mark earner for many candidates. The main loss of marks came about because of the confusion between 'of' and 'off', resulting in many cases of reductions of 75% rather than 25%. Another area of confusion came from dealing with the total adult fare, for example, £566 for the two adults on the outward journey, and finding 75% of that. Also common was 75% of the total adult return cost (£1136). A few candidates struggled with the mechanics of working out 25% (or 75%) of the ticket cost.

This was a quality of written communication question (QWC), so candidates were expected to state a conclusion and support it with a clearly indicated total cost, including the £ sign, or the difference between the total cost and the £1600 that was available. Some did not and so lost a mark.

Question 6

This was a well-answered question. Most candidates were able to give a correct response with very few failing to score any marks at all. There were a few cases where candidates either failed to write a key or provided only a partial entry.

Question 7

Part (a) was generally well answered with most candidates opting for 64.5. They were less successful with part (b) where answers of 64.4, 65.4, 65.49 and 65.9 were commonly seen.

Question 8

Many candidates knew what a box plot (box and whisker diagram) should look like and indeed knew how the plot related to the five given values. However, very many candidates lost marks through inaccurate drawing. The three upper values caused few problems as they were multiples of 5 and so were plotted above the corresponding values on the time axes. But very many candidates plotted the 18 at 19, not taking note of the scale. Similar poor plotting happened with the lowest value of 14, which was often plotted at 12.

Question 9

For a question such as this, candidates have to decide which (simple) statistics they can and are able to calculate in order for a comparison to be made. Some were unaware of this and worked out the mean.

Many other candidates worked out the median and the values of the lower quartile and upper quartile as these were given for the distribution of heights of the unfertilised plants. This gained one mark (for the median).

To get further marks, candidates had to work out a measure of spread and then comment on the relationship between the medians and between the interquartile ranges (IQRs) or the ranges. This could be as simple as 'The median of the heights of the fertilised plants is greater than the heights of the unfertilised plants'.

For full marks, it was expected that there would be some simple interpretation, for example, 'Since the median of the fertilised plants is bigger than the median of the unfertilised plants, on average the fertilised plants grew taller'. This sort of response was not frequently seen.

It was very important in this question that the results of calculations were identified, for example, the median had to be stated as 47 (cm). It was not sufficient simply to circle 47 in the list of heights.

Question 10

Candidates generally earned either no marks or four marks for part (a). The response gaining no marks was generally $\Sigma f \div 5 = 18$.

For the remaining parts (b, c and d), many candidates responded well to the teaching they had received on cumulative frequencies and were able to obtain most of the remaining six marks.

For part (c), some candidates plotted their cumulative frequencies at the mid-points of the intervals, but were still able to get most of the remaining marks if they used correct methods. Conversely, there were some candidates who plotted points correctly but then drew a 'line of best fit' through them.

For part (d)(i), a few candidates thought that the median corresponded to the 50th, rather than 45th value. Many candidates lost marks on part (d)(ii) by failing to subtract from 90 the value they had read off their cumulative frequency diagram.

Question 11

The most successful approach seen on this question was from those who used a multiplier of 0.8. Those who did generally showed evidence of $0.8^n \times 1200$ with $n = 4$. The more long-winded approach of taking off 20% of that year's cost for each year was also seen, although the success rate was lower. This was due mainly to poor arithmetic, although some miscounted the years and gave an answer of 5. Many candidates thought that the depreciation was linear.

Question 12

Many candidates were able to score full marks on this question. The common approaches were the direct ($\frac{140}{420}$) × 135 and the pair of divisions 420 ÷ 135 followed by 140 ÷ the answer. However, this second method often lead to loss of marks due to premature approximation.

Some candidates did not understand the table and added all four numbers (ie including the total) to get 840 instead of the correct 420. They did not score any marks.

Question 13

Many candidates were able to score full marks. They generally drew an additional column for the table in the question and recorded the frequency densities there. Only occasionally did this approach lead to fewer than full marks. There were a few candidates who used an area approach, although not as successfully.

Question 14

This question was not well answered. The majority of candidates had little idea of the general shapes of the curves detailed in the specification. Curve **A**, $y = x^2 + 4$, was the most successful match. Some candidates did not seem to recognise the equation of the exponential curve and wrote $y = 2x$ instead of $y = 2^x$. Commonly, there were attempts to plot graphs of the given equations, but this approach was not generally successful.

Question 15

There were many correct answers – with or without a full or partial probability tree – although some candidates were not able to complete their attempt at such a diagram. A very common answer to part (a) was 0.6 obtained from 0.2 + 0.4.

Generally candidates who got part (a) correct also got part (b) correct. Oddly enough, this did not seem to happen the other way around. In part (b), in many cases candidates displayed the correct calculation of 0.4 × 0.2 + 0.6 × 0.8 = 0.56, but got a completely wrong answer to part (a). For part (b), a few candidates worked out the 0.4 × 0.2 and the 0.6 × 0.8 but then multiplied the answers to the two calculations.

Summary

Based on the performance of candidates, teaching colleagues should be aware of the following points:

- In questions that assess QWC, candidates will not obtain full marks unless they write correct units.
- In questions that require a comparison of two distributions, candidates need to calculate at least one statistic that describes location and one statistic that describes spread.
- In questions that assess knowledge of graphs, candidates should have seen examples involving quadratic, cubic, reciprocal and exponential curves, preferably in best fit cases situations drawn from statistical scenarios.

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