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MATHEMATICS: STATISTICS (Half Credit)

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General comments

This Paper produced a wide range of marks. Most candidates had covered the Syllabus adequately with only a few Centres gaining consistently low marks. Premature approximation leading to a loss of marks was only witnessed in a few scripts, most candidates realising the necessity of working with four significant figures. One unforeseen problem was the candidates' failure to appreciate the difference between decimal places and significant figures. This was particularly noticeable in answers such as 0.0419 and 0.0451, where many gave answers as 0.042 etc. Candidates seemed to have sufficient time to answer all the questions, and only the weaker candidates answered questions out of order.

Comments on specific questions

Question 1

This question caused problems for many candidates. Many candidates confused this with a binomial situation and tried to find an 'n' and a 'p'. Others found f^2x for the variance, and as usual, some candidates found the standard deviation.

Answers: 0.850, 0.978.

Question 2

Approximately half the candidates appreciated the need to find a scaled frequency, or frequency density. It was pleasing to see most candidates had touching bars on the histogram, with the vertical axis labelled as frequency density, but only a small number labelled the horizontal axis as being area or m^2 and thus many candidates lost a mark.

Question 3

Apart from a few Centres where the normal distribution did not appear to have been taught with any rigour, this question was well done with most candidates finding an appropriate z-value. The range of z-values was wider than expected, with many ranging from 0.492 to 0.5 for $\Phi(0.69)$. Only values of 0.495 and 0.496 were accepted. Solving the simultaneous equations was well done and almost all candidates who had done some work on the normal distribution scored at least 4 marks out of 6.

Answers: 8.91, 23.6.

Question 4

This question was the worst attempted on the Paper. A tree diagram would perhaps have helped. Many candidates wrote $\frac{4}{5}$ instead of $\frac{19}{20}$, many thought it was a 'without replacement' type of question and many misunderstood the last part as meaning 'completes his collection with less than 3 pictures'.

Answers: **(i)** 0.774; **(ii)** 0.204; **(iii)** 0.0451.

Question 5

The tree diagram was well drawn by the majority of candidates. A few failed to realise that the male/female branch had to come first, and many multiplied their probabilities together before writing the second probabilities on the tree diagram, and then proceeded to multiply a third time. A minority of the candidates appreciated that this was a conditional probability question and thus many scored only 2 marks out of 6.

Answer: 0.746.

Question 6

This permutation and combination question was very well attempted by almost all candidates, many picking up 4 or more marks. Sometimes the answers were not integers, and occasionally they became probabilities. The answers were not always fully correct, but there were signs of sensible reasoning.

Answers: **(a)(i)** 18 564, **(ii)** 6188; **(b)(i)** 40 320, **(ii)** 2880.

Question 7

This very straightforward normal distribution first part gained nearly full marks for everyone who had studied the subject. However, quite a few lost the final mark for this part because of incorrect use of the four-figure Normal tables. The second part was a binomial situation based on the first part, the answer of which had already been calculated. Almost without exception, candidates calculated the probability all over again, suggesting they had not appreciated the significance of what they were doing in part **(i)**. The answers to part **(iii)** were almost all wrong. Candidates clearly did not appreciate the difference between 'mean' and 'median'. Neither did they realise that a normal distribution is symmetric with the mean and median coinciding.

Answers: **(i)** 0.3735 (0.374); **(ii)** 0.0419; **(iii)** box plot is skew, not symmetric so not normal.

Question 8

This question was the easiest question by far and was well done by a large majority. For some it provided half their marks. Rounding errors and premature approximation led to a few marks being lost, and not everyone realised that part **(iii)** entailed adding probabilities for two discrete numbers.

Answers: **(i)** $\frac{1}{18}$ or 0.0556; **(ii)** 2.78, 1.17; **(iii)** 0.611.