1. Finding the correct value of a in the first part of the question proved to be relatively straightforward for most candidates. Few errors were seen although some candidates provided very little in the way of working out and did not always make it explicit that they were using the fact that the sum of the probabilities equals one. Similarly, most candidates were able to obtain the correct value of E(X), though not many deduced this fact by recognising the symmetry of the distribution.

The majority opted to use the formula to calculate E(X), which resulted in processing errors in some cases. Common errors seen in calculating Var (X) included forgetting to subtract $[\text{E}(X)]^2$ from $\text{E}(X^2)$ or calculating $\text{E}(X^2) - \text{E}(X)$, although on the whole the correct formula was successfully applied.

Most candidates were able to correctly apply $\text{Var}(aX + b) = a^2 \text{Var}(X)$ to deduce $\text{Var}(Y) = 4 \text{Var}(X)$, although $\text{Var}(Y) = 6 - 2\text{Var}(X)$ was a typical error. Quite a number of candidates attempted to calculate $\text{E}(Y^2) - [\text{E}(Y)]^2$ with varying degrees of success. Occasionally, candidates divided their results in part (b), part (c) and part (d) by 5.

The final part of the question proved to be the most challenging of all and was often either completely omitted or poorly attempted with little or no success. Only a minority of candidates knew they would need to equate $6 - 2X$ to X in order to obtain the corresponding values of X and of those who did, only a small number scored full marks, as candidates were generally unable to identify the correct values of X.

2. Despite the compact nature of the probability function many candidates gave clear and fully correct solutions to this question. Part (a) was a "Show that" and candidates needed to make sure that they clearly used $\sum \text{p}(x) = 1$ to form a suitable equation in k. Part (b) was often answered poorly as a number could not interpret $\text{P}(X \geq 2)$ correctly and gave the answer of $\frac{5}{14}$ (from $\text{P}(X \geq 2)$). Most could answer part (c) and many part (d) too but the usual errors arose here. Some forgot to subtract $(\text{E}(X))^2$ and there were a number of incorrect formulae for Var($1 - X$) seen such as: – Var(X) 1 – Var(X), $[\text{Var}(X)]^2$, and $(-1)^2\ \text{E}(X)$.

3. This entire question was usually very well done if part (b) was correct. Some candidates did not identify that the sum of probabilities should equal one and had problems trying to find the values of a and b resorting to guessing. Even if candidates could form two correct equations, some lacked the ability to solve these relatively simple equations. A number of candidates who had no success with part (b) gave up at this point but others managed to get part (d) and part (f) correct using the values given in the question. In part (e) many knew that they had to take 1.6^2 from their figure, and not having got the figures for a and b correct in part (b) they adjusted their number to come to 4.2, so that $4.2 - 1.6^2$ came to 1.64. On occasion it was difficult to distinguish between Σ and E in the candidate's handwriting.

4. Part (a) was answered well although a small minority of candidates insisted on dividing by n (where n was usually 4). Part (b), on the other hand, caused great confusion. Some interpreted F(1.5) as E(1.5X), others interpolated between $P(X = 1)$ and $P(X = 2)$ and a few thought that F(1.5) was zero since X has a discrete distribution. Although the majority of candidates gained full marks in part (c) the use of notation was often poor. Statements such as $\text{Var}(X) = 2 = 2 - 1 = 1$ were rife and some wrote Var(X) or $\sum X^2$ when they meant $E(X^2)$. Many candidates can now deal with the algebra of Var(X) but there were the usual errors such as 5Var(X) or 25Var(X) or –3Var(X) and the common -3^2 Var(X) which was condoned if the correct answer followed.

Part (e) was not answered well and some candidates did not attempt it. Those who did appreciate what was required often missed one or more of the possible cases or incorrectly repeated a case such as (2, 2). There were many fully correct responses though often aided by a simple table to identify the 6 cases required.

5. This proved to be a good question allowing the better students to show their understanding of the topic. It was generally done well with the majority of students aware of what they were trying to achieve. Of those who did less well, many failed to realise the significance of the 0.55 and others only came up with one equation in part (a) and thought that q was therefore equal to 0. A very large number of candidates incorrectly squared –1 in part (b) affecting their calculation of variance. Part (c) was generally well answered.

6. This question was an excellent example of why students should revise the syllabus and not just from past papers. Only a minority of candidates tackled this question effectively; some candidates seemed to have no idea at all as to how to tackle the question. Those who gave correct solutions often made many incorrect attempts in their working. The vast majority showed an understanding of discrete random variables but most missed or did not understand the word "cumulative" and consequently spent a lot of time manipulating quadratic expressions trying to make them into a probability distribution. The majority view was that F(1) + F(2) + F(3) = 1 which led to a lot of incorrect calculations.

7. A sizeable minority of candidates did not attempt this question, but, when attempted, this question was well done with many candidates picking up most or all the marks. Rather surprisingly in part (a) the equation missing was $p + q = 0.45$ and a few candidates divided one side of their second equation by 5. In part (b) nearly all of those who had two correct equations for part (a) were able to solve them simultaneously. In part (c) a substantial number of candidates were unable to make a successful attempt at this part of the question with many omitting it entirely. There were a large number of accurate solutions to part (d) with most of those making an error failing to use the given values. A number of candidates reworked $E(X^2)$ for part (e) even though it was given. There were some mistakes in part (f) but most candidates used16 correctly, but some multiplied E(X) instead of Var(X).

8. This often scored full marks. For the variance in part (a) there were a few occasions where the working shown made it clear that the candidate would have forgotten to subtract $(E(X))^2$ if the value of the variance had not been given in the question. As is usually the case, some candidates are not aware of the need for full working when a "show that" question is asked. In part (c) some were using 4^2 rather than 3^2.

9. This proved to be a well balanced question giving strong candidates a chance to score well, but sufficient opportunities for weaker candidates to gain some marks. Some candidates appeared to guess the answers to *p* and *q* and then were able to carry these through into part (c). A significant number of candidates forgot that the total of the probabilities should be 1 and tried to 'solve' one equation while some candidates missed out the question completely. Some worked out the expectation although it was given at the start of the question.

10. Generally this question was tackled well and there was much evidence of effortless solutions.

(a) Most candidates realised that the probabilities must sum to 1 and managed to use the split definition of the probability function well. Occasionally candidates failed to use both parts of the function and focused on just kx to get a value of a sixth, or more often through incorrect calculation and ignoring the (k+1) gained a value of k = 1/15.

(b) Usually well answered, but some candidates failed to recognise the demand for an exact value and proceeded to write down an approximate equivalent decimal.

(c) This part of the question was well answered. Although a minority of candidates failed to give their answer to 1 decimal place.

11. A well answered question with many candidates scoring full marks. Some weaker candidates had difficulty in interpreting the probability function and producing a convincing argument in part (a) proved demanding for some.

12. This was a standard type of question for this paper and many of the candidates were able to answer it correctly. Some candidates wrote down one equation in part (a) and then found *a* and *b* by trial and improvement losing two marks for doing so. Some candidates did not show sufficient working in part (d) and the usual error of finding 2Var(X) instead of 4Var(X) occurred regularly in part (d).

13. A well answered question in general. However, some candidates still did not know how to deal with F(2.6) and the other common errors were to carry the wrong expected value into the final part of the question or to ignore altogether the need to square the expected value when finding the variance.

14. The first two marks were scored by many of the candidates, but in too many cases very few of the remaining marks were gained. Many candidates could not establish the values of X as 0, 10, 20 and 30 and they were unable to calculate corresponding probabilities. The methods for finding the mean and the standard deviation were usually known and they were often correctly applied to the distribution produced by the candidates. Too many candidates forgot to take the square root to find the standard deviation. Having struggled with part (b) candidates then could not interpret the demand in part (d).

15. Showing than $n = 9$ for the given discrete uniform distribution produced a variety of solutions but the mark scheme was sufficiently flexible to accommodate most of them. There were, however, too many incomplete solutions that resulted in marks being lost. Most candidates knew how to handle the rest of the question and many of them gained all the available marks in parts (b) and (c).

16. This question proved to be a good source of marks for many candidates and it was pleasing to see many candidates gaining full marks. Other candidates did not produce convincing proofs for the value of k – they had to state that $\mathrm{P}(X = x) = 1$. In part (b) there were some arithmetic slips and part (c) produced the usual crop or errors associated with $\mathrm{Var}(X)$.

17. To gain the mark in part (a) 'discrete uniform' was needed not just one of the words. It was pleasing to see that many candidates either knew the formulae for the mean and the variance in part (b) or could work them out from first principles. Part (d) proved to be a discriminator since many candidates could not give all 6 combinations that added to 16. It was, however, surprising how many did score full marks for parts (c), (d) and (e) having gained no marks for the first two parts of the question.

18. Many candidates could handle parts (a), (b) and (c) sufficiently well to gain most of the marks. The use of two independent observations from ONE random variable caused problems for many candidates. They did not realise that 5 could be made up from 2 and 3 or 3 and 2 and that since $\mathrm{P}(X = 2) = 0$ then $\mathrm{P}(X \;\; + X\;) = 0$. If they did not appreciate the hint given in part (d) then they were unable to continue with the question and many candidates abandoned the question at this stage. Parts (d) and (e) were very good discriminators.

19. No Report available for this question.