Examiner reports

1. (a) Thevast majority of students showed a good knowledge of the Remainder Theorem and gained both marks with correct substitutions and working leading to the required result.

The question required the use of the Remainder Theorem, hence the few students who used polynomial division to get the remainder in terms of a, set it equal to -7 and then solve for a gained no credit.

(b) The vast majority of students also showed a good knowledge of the Factor Theorem and gained both marks with the correct substitution shown and correct working leading to a value of zero. As in the previous part, the small number of students who used polynomial division scored zero.

(c) Just over a third of the students formed a perfectly correct solution. However, another third failed to gain any marks at all as they did not attempt to use the information in the previous part to express the numerator as the product of x +3 and a quadratic factor, which was vital for carrying on with the solution. Instead, a significant number of students tried to multiply the numerator by $\left(x^{-\frac{3}{2}} + 3x^{-\frac{1}{2}}\right)$ or similar.

It was also relatively common to see students correctly cancel the factor $x + 3$ in both numerator and denominator only to multiply the numerator by $x^{\frac{1}{2}}$. This was insufficient for the second method mark to be awarded, and any further marks were dependent on this second method mark, so these students scored 2 marks in total.

A significant minority lost the final mark by making a mistake while integrating one of the terms in their integral.

2. In part (a) the majority of students showed a good knowledge of the Factor Theorem and used it to form proofs as outlined in the mark scheme. Students correctly manipulated the equation and nearly all showed the factorisation $p(b + 3m)$ which was a necessary justification if they were to gain full marks. A small number of students made the proof more difficult by using polynomial division. Two thirds of the students produced a thoroughly correct solution.
A quarter of the students, however, showed no knowledge of the Factor Theorem and made little if any attempt.

Part (b) gave another example where a common technique had been well-practised by the students. Very few of the students who attempted this question made an error when stating the condition on the discriminant for no real roots, and just over a half of students gained full marks.

Students failed to gain marks through incorrect algebraic manipulation or algebraic errors when finding the critical values. However it was pleasing to see students not being tempted into converting fractional values into inexact decimal equivalents and thus losing marks for accuracy.