

Section A (36 marks)

- 1 Make v the subject of the formula $E = \frac{1}{2}mv^2$. [3]
- 2 Factorise and hence simplify $\frac{3x^2 - 7x + 4}{x^2 - 1}$. [3]
- 3 (i) Write down the value of $\left(\frac{1}{4}\right)^0$. [1]
(ii) Find the value of $16^{-\frac{3}{2}}$. [3]
- 4 Find, algebraically, the coordinates of the point of intersection of the lines $y = 2x - 5$ and $6x + 2y = 7$. [4]
- 5 (i) Find the gradient of the line $4x + 5y = 24$. [2]
(ii) A line parallel to $4x + 5y = 24$ passes through the point $(0, 12)$. Find the coordinates of its point of intersection with the x -axis. [3]
- 6 When $x^3 + kx + 7$ is divided by $(x - 2)$, the remainder is 3. Find the value of k . [3]
- 7 (i) Find the value of 8C_3 . [2]
(ii) Find the coefficient of x^3 in the binomial expansion of $\left(1 - \frac{1}{2}x\right)^8$. [2]
- 8 (i) Write $\sqrt{48} + \sqrt{3}$ in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible. [2]
(ii) Simplify $\frac{1}{5 + \sqrt{2}} + \frac{1}{5 - \sqrt{2}}$. [3]
- 9 (i) Prove that 12 is a factor of $3n^2 + 6n$ for all even positive integers n . [3]
(ii) Determine whether 12 is a factor of $3n^2 + 6n$ for all positive integers n . [2]