11. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

The furthest distance a particular electric car can travel at a constant speed, starting from a full charge, is modelled by the equation

$$y = \frac{1}{250}x^3 - \frac{3}{5}x^2 + 24x \qquad 0 \leqslant x \leqslant 70$$

where y is the furthest distance in miles and x is the constant speed in miles per hour.

Use the model to answer parts (a), (b), (c) and (d).

(a) Find the furthest distance the car can travel at a constant speed of 50 miles per hour, starting from a full charge.

(1)

(b) Use calculus to find the value of x for which y is a maximum, giving your answer to 3 significant figures.

(4)

(c) Using $\frac{d^2y}{dx^2}$ prove that y is maximised for the value of x found in part (b).

(2)

(d) Hence find the maximum distance the car can travel at a constant speed, starting from a full charge, giving your answer to the nearest mile.

(2)