**11.** The mean yearly concentration, $C$ parts per million (ppm), of carbon dioxide in the Earth's atmosphere was first measured in 1960.

The equation

$$C = ab^t \qquad \text{where } a \text{ and } b \text{ are constants}$$

models the mean yearly concentration of carbon dioxide $t$ years after 1960.

Given that the mean yearly concentration of carbon dioxide was

- 339 ppm in 1980
- 414 ppm in 2020

(a) (i) find the value of $b$ to 3 decimal places,

(ii) find the value of $a$ to the nearest integer.

**(4)**

(b) With reference to the model,

(i) interpret the value of $a$,

(ii) interpret the value of $b$.

**(2)**

Using the model,

(c) find the year when the mean yearly concentration of carbon dioxide is predicted to reach 450 ppm.

*(Solutions based entirely on calculator technology are not acceptable.)*

**(4)**