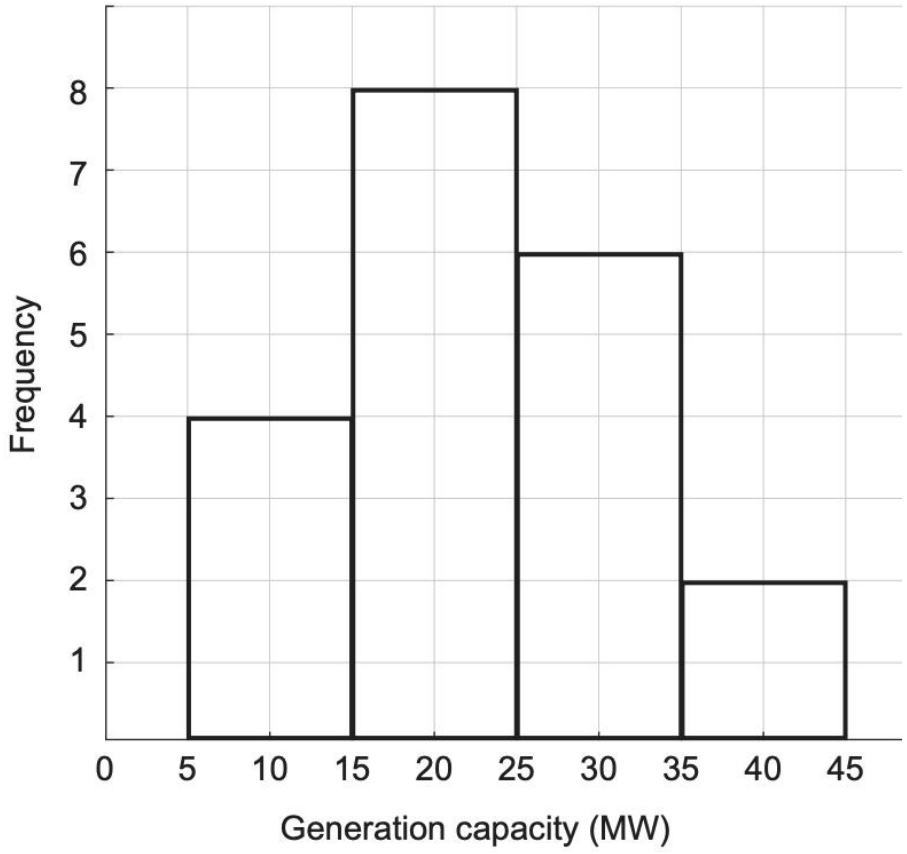
Question 3 **(10 marks)**

Solcolwa is a green energy company that owns 20 solar farms across Western Australia. The generation capacities, in megawatts (MW), of the solar farms are displayed in the histogram below.



Suppose that one of the Solcolwa solar farms is selected at random. Let the random variable W denote the generation capacity of the randomly-selected solar farm.

(a) Complete the following table of cumulative probabilities for W. (2 marks)

w	5	15	25	35	45
$P(W \leq w)$					

(b) Determine $P(W \geq 35)$. (1 mark)

(c) Assuming the solar farms are uniformly distributed within each interval:

(i) estimate $P(W \geq 20)$. (2 marks)

(ii) estimate the expected value $E(W)$. (2 marks)

To increase the generation capacity of its solar farms, Solcolwa decides to upgrade all its solar panels with the latest technology. A new random variable Y denotes the generation capacity of a randomly-selected upgraded solar farm. The random variables W and Y are related by

$$Y = aW$$

for some constant $a > 0$.

(d) Given that W and Y have variances $Var(W) = 81$ and $Var(Y) = 324$, determine the expected value $E(Y)$. (3 marks)