9 A school contains 500 students in years 7 to 11 and 250 students in years 12 and 13. A random sample of 20 students is selected to represent the school at a parents' evening. The number of students in the sample who are from years 12 and 13 is denoted by X.

(a) State a suitable binomial model for X. [1]

Use your model to answer the following.

(b) (i) Write down an expression for $P(X = x)$. [1]

(ii) State, in set notation, the values of x for which your expression is valid. [1]

(c) Find $P(5 \leqslant X \leqslant 9)$. [2]

(d) State one disadvantage of using a random sample in this context. [1]