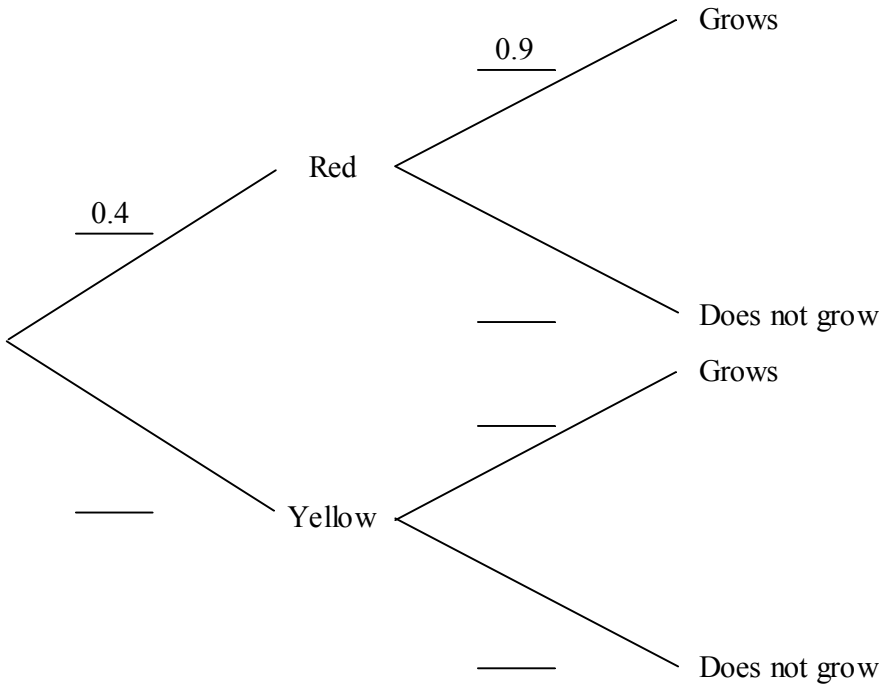
Probability 2

1) *[Maximum mark: 10]*

A packet of seeds contains 40 % red seeds and 60 % yellow seeds. The probability that a red seed grows is 0.9, and that a yellow seed grows is 0.8. A seed is chosen at random from the packet.

(a) On your **answer sheet,** copy and complete the probability tree diagram below.



[3 marks]

(b) (i) Calculate the probability that the chosen seed is red and grows.

(ii) Calculate the probability that the chosen seed grows.

(iii) Given that the seed grows, calculate the probability that it is red. *[7 marks]*

2) Two unbiased 6-sided dice are rolled, a red one and a black one. Let E and F be the events

E : the same number appears on both dice;

F : the sum of the numbers is 10.

Find

(a) $\mathrm{P}(E)$;

(b) $\mathrm{P}(F)$;

(c) $\mathrm{P}(E \cup F)$.

3) A class contains 13 girls and 11 boys. The teacher randomly selects four students. Determine the probability that all four students selected are girls.

4) Let A and B be independent events such that $\mathrm{P}(A) = 0.3$ and $\mathrm{P}(B) = 0.8$.

(a) Find $\mathrm{P}(A \cap B)$.

(b) Find $\mathrm{P}(A \cup B)$.

(c) Are A and B mutually exclusive? Justify your answer.

5) In a class, 40 students take chemistry only, 30 take physics only, 20 take both chemistry and physics, and 60 take neither.

(a) Find the probability that a student takes physics given that the student takes chemistry.

(b) Find the probability that a student takes physics given that the student does **not** take chemistry.

(c) State whether the events "taking chemistry" and "taking physics" are mutually exclusive, independent, or neither. Justify your answer.

6) Events E and F are independent, with $\mathrm{P}(E) = \frac{2}{3}$ and $\mathrm{P}(E \cap F) = \frac{1}{3}$. Calculate

(a) $\mathrm{P}(F)$;

(b) $\mathrm{P}(E \cup F)$.

7) Consider the events A and B, where $\mathrm{P}(A) = \frac{2}{5}$, $\mathrm{P}(B') = \frac{1}{4}$ and $\mathrm{P}(A \cup B) = \frac{7}{8}$.

(a) Write down $\mathrm{P}(B)$.

(b) Find $\mathrm{P}(A \cap B)$.

(c) Find $\mathrm{P}(A \mid B)$.

8) The eye colour of 97 students is recorded in the chart below.

	Brown	Blue	Green
Male	21	16	9
Female	19	19	13

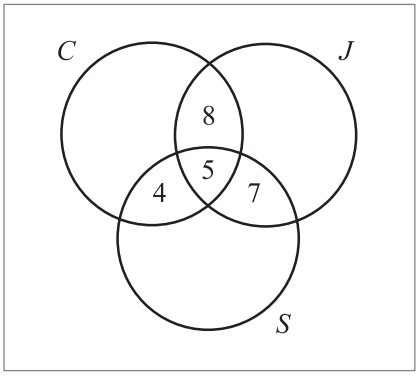
One student is selected at random.

(a) Write down the probability that the student is a male.

(b) Write down the probability that the student has green eyes, given that the student is a female.

(c) Find the probability that the student has green eyes or is male.

9) The Venn diagram below shows information about 120 students in a school. Of these, 40 study Chinese (C), 35 study Japanese (J), and 30 study Spanish (S).



A student is chosen at random from the group. Find the probability that the student

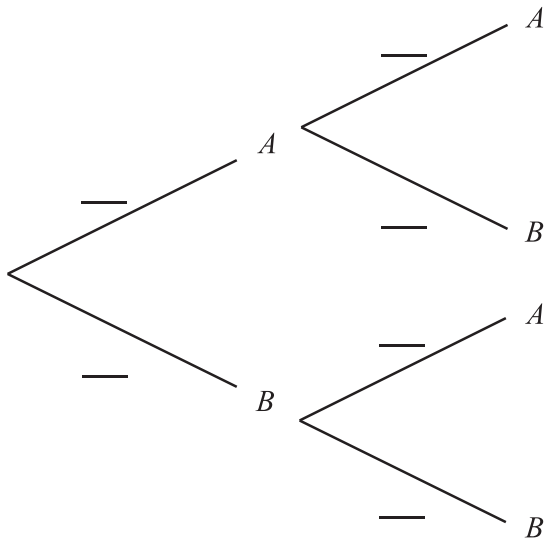
(a) studies exactly two of these languages; *[1 mark]*

(b) studies only Japanese; *[2 marks]*

(c) does not study any of these languages. *[3 marks]*

10) A bag contains four apples (A) and six bananas (B). A fruit is taken from the bag and eaten. Then a second fruit is taken and eaten.

(a) Complete the tree diagram below by writing probabilities in the spaces provided. *[3 marks]*



(b) Find the probability that one of each type of fruit was eaten. *[3 marks]*