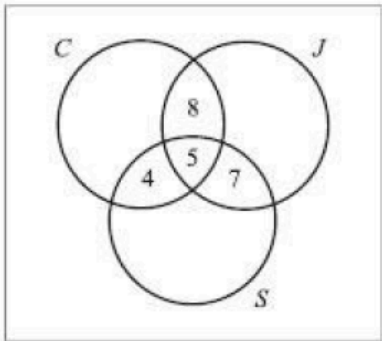### ASSIGNMENT: Venn Diagrams and Probability Trees

50.)   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)

(b)   studies only Japanese;
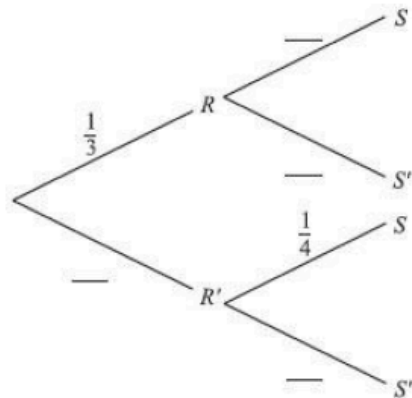
(2)

(c)   does not study any of these languages.

(3)

(Total 6 marks)

73.)   The following probabilities were found for two events R and S.

$$P(R) = \frac{1}{3} , P(S \mid R) = \frac{4}{5} , P(S \mid R') = \frac{1}{4}.$$

(a)   **Copy** and **complete** the tree diagram.

(3)

(b)   Find the following probabilities.

(i) $P(R \cap S)$.

(ii) $P(S)$.

(iii) $P(R \mid S)$.

(7)

(Total 10 marks)

Answer Key

50.)   (a) $\dfrac{19}{120}$ $(=0.158)$ A1   N1

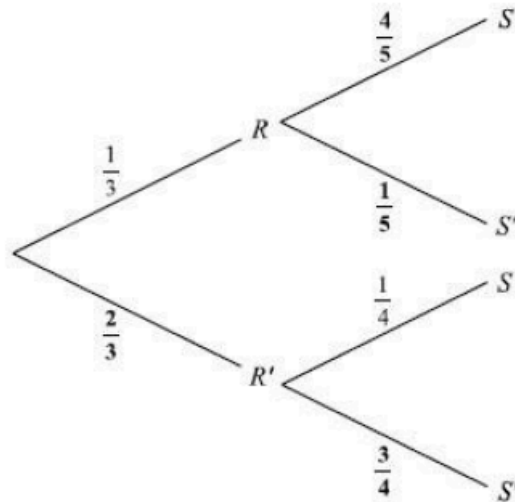(b) $35 - (8 + 5 + 7)(= 15)$ (M1)

Probability $= \dfrac{15}{120}$ $\left(= \dfrac{3}{24} = \dfrac{1}{8} = 0.125\right)$ A1   N2

(c)   Number studying $= 76$ (A1)

73.)   (a)

(A1)(A1)(A1)

(b)   (i) $P(R \cap S) = \dfrac{1}{3} \times \dfrac{4}{5}$ $\left(= \dfrac{4}{15} = 0.267\right)$ (A1) (N1)

(ii) $P(S) = \dfrac{1}{3} \times \dfrac{4}{5} + \dfrac{2}{3} \times \dfrac{1}{4}$ (A1)(A1)

$= \dfrac{13}{30}$ $(= 0.433)$ (A1) (N3)

(iii) $P(R \mid S) = \dfrac{\frac{4}{15}}{\frac{13}{30}}$ (A1)(A1)

$= \dfrac{8}{13}$ $(= 0.615)$ (A1) (N3)

[10]