Prob laws with tree dia MS

0 min
0 marks

1. (a) $P(A \cap B) = 0$ (A1) (C1)

(b) $P(A \cap B) = P(A) \times P(B)$

$= \frac{4}{13} \times \frac{5}{13}$ (M1)

__Note:__ Award (M1) for product of two fractions, decimals or percentages.

$P(A \cap B) = \frac{20}{169}$ (= 0.118) (A1) (C2)

(c) $\frac{7}{13} = \frac{4}{13} + \frac{5}{13} - P(A \cap B)$ (M1)(M1)

__Notes:__ Award (M1) for $\frac{4}{13} + \frac{5}{13}$ seen, (M1) for subtraction of $\frac{7}{13}$ shown.

OR

Award (M1) for Venn diagram with 2 intersecting circles, (A1) for correct probabilities in diagram.

$P(A \cap B) = \frac{2}{13}$ (= 0.154) (A1) (C3)

[6]

2. (a) For solving for $P(A \cap B)$ from the formula in their tables (M1)

$P(A \cap B) = 0.2$ (A1) (C2)

(b) Because $0.4 \times 0.65 \neq 0.2$ need to see the numbers, not just a statement (R1)
Therefore no, not independent (A1) (C2)

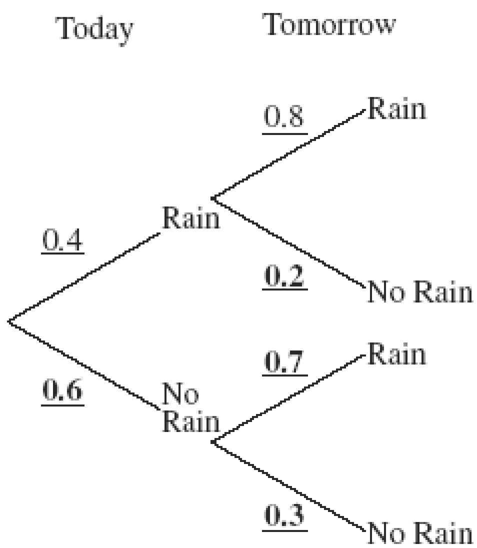
Note: *Cannot award (A1) if (R1) not awarded.*

(c) Because $P(A \cap B) \neq 0$ (R1)
Not mutually exclusive (A1) (C2)

Note: *Cannot award (A1) if (R1) not awarded.*

[6]

3. (a)



(A1)(A1)(A1) (C3)

Note: *Award (A1) for each correct pair.*

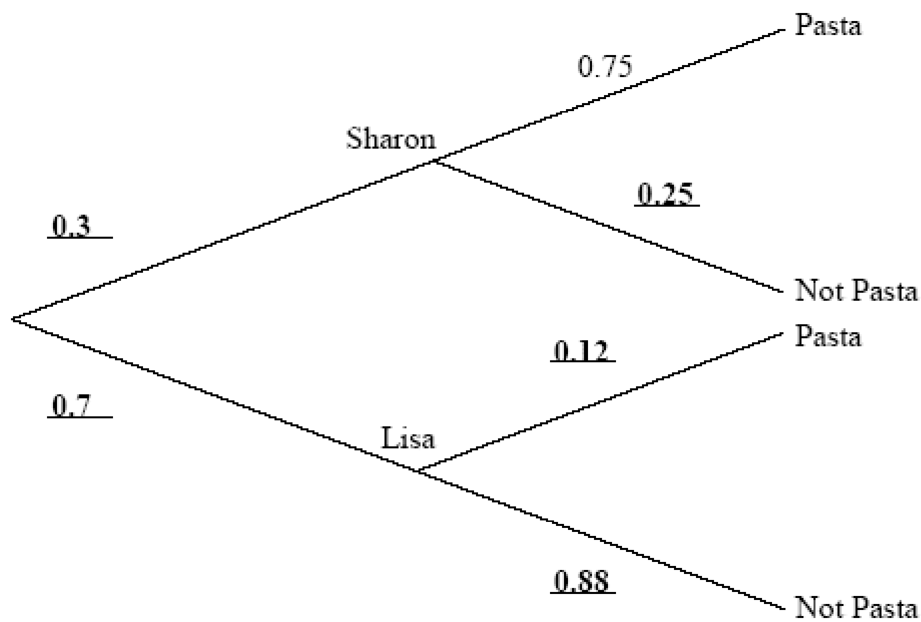
(b) $0.4 \times 0.8 + 0.6 \times 0.7$ (A1)(ft)(M1)

Notes: *Award (A1)(ft) for two consistent products from tree diagram, (M1) for addition of their products. Follow through from their tree diagram provided all probabilities are between 0 and 1.*

$= 0.74$ (A1)(ft) (C3)

[6]

4. (a)



(A3)

Note: *Award (A1) for each correct pair.*

(b) $0.7 \times 0.88 = 0.616\ \left(\frac{77}{125}, 61.6\%\right)$ (M1)(A1)(ft)(G2)

Note: *Award (M1) for multiplying the correct probabilities.*

(c) $0.3 \times 0.25 + 0.7 \times 0.88$ (M1)(M1)

Notes: *Award (M1) for a relevant two-factor product, could be $S \times NP$* ***OR*** *$L \times NP$.*
Award (M1) for summing 2 two-factor products.

$\text{P} = 0.691\left(\frac{691}{1000}, 69.1\%\right)$ (A1)(ft)(G2)

Notes: *(ft) from their answer to (b).*

(d) $\frac{0.616}{0.691}$ (M1)(A1)

Note: *Award (M1) for substituted conditional probability formula, (A1) for correct substitution.*

$\text{P} = 0.891\left(\frac{616}{691}, 89.1\%\right)$ (A1)(ft)(G2)

[11]

5. (a) 12 (A2) (C2)

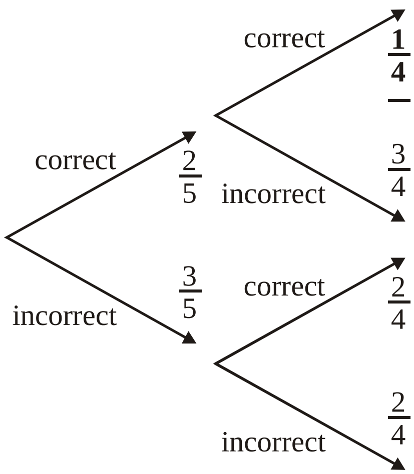
(b) $\frac{3}{12} = \frac{1}{4}$ or 25% (A2) (C2)

(c) $\frac{2}{12} = \frac{1}{6}$ or 16.7% (3 s.f.) (A2) (C2)

(d) $\frac{4}{12} = \frac{1}{3}$ or 33.3% (3 s.f.) (A2) (C2)

[8]

6. (a)



(A2) (C2)

(b) (i) $\frac{2}{5} \times \frac{3}{4} + \frac{3}{5} \times \frac{2}{4}$ (A1)(A1)

Note: *Award (A1) for each correct product.*

$= \frac{12}{20}$ (= 0.6) (A1) (C3)

(ii) $\dfrac{\frac{2}{5} \times \frac{1}{4}}{\frac{3}{10} + \frac{1}{10}} = \frac{1}{4}$ = (0.25) (A1)(A1)(A1) (C3)

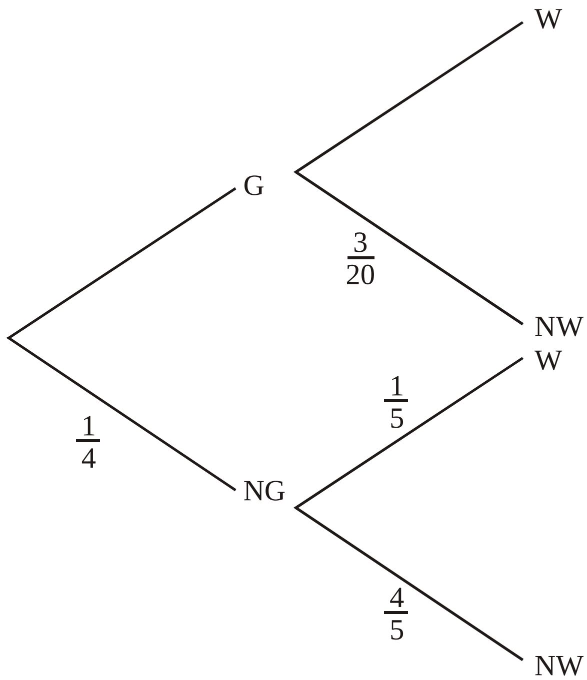
Note: *Award (A1) for* $\frac{2}{5} \times \frac{1}{4}$ *seen and (A1) for* $\frac{3}{10} + \frac{1}{10}$ *seen.*

[8]

7.

Note: *In the Spanish papers B is used instead of G and P is used instead of W.*

(a)



(A4) (C4)

(b) $P\ (G \cap W) = \frac{3}{4} \times \frac{17}{20}$ (A1)

$P(NG \cap W) = \frac{1}{4} \times \frac{1}{5}$ (A1)

$P(W) = \frac{3}{4} \times \frac{17}{20} + \frac{1}{4} \times \frac{1}{5}$ (M1)

$= \frac{11}{16}$ (0.6875, 68.75% or 0.688 to 3 s.f.) (A1) (C4)

[8]