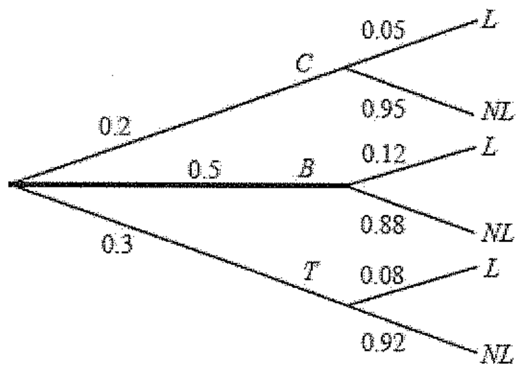
1. (a)



(A5) 5

Note: *Award* (A1) *for 0.5 at B,* (A1) *for 0.3 at T, then* (A1) *for each correct pair. Accept fractions or percentages.*

(b) 0.06 (A1)(ft) 1

Note: *Accept* 0.5×0.12 *or 6%*

(c) *for a relevant two-factor product, either* $C \times L$ *or* $T \times L$
for summing three two-factor products
$(0.2 \times 0.05 + 0.06 + 0.3 \times 0.08)$ (M1)(M1)
0.094 (A1)(ft)(G2) 3

(d) $\frac{0.3 \times 0.08}{0.094}$ (M1)(A1)(ft)

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

$= 0.255$ (A1)(ft)(G2) 3

[12]

2. (a) (i) P (a dog is grey and has the yellow bowl)

$= \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} (= 0.111)$ (M1)(A1)(G2)

Note: *The (M1) is for multiplying two values along any branch of the tree.*

(ii) P (dog does not get yellow bowl) $= \frac{2}{3} (= 0.667 (3 \text{sf}) \text{ or } 0.\dot{6})$ (A1) 3

(b) (i) The tree diagram should show the values $\frac{1}{2}, \frac{1}{2}$ for the brown branch (A1)

and $\frac{1}{4}, \frac{3}{4}$ in the correct positions for the grey branch. (A1)(ft)

Note: Follow through if the branches are interchanged.

(ii) P (the dog is grey or is playing with a stick, but not both)

$=\frac{1}{3}\times\frac{3}{4}+\frac{2}{3}\times\frac{1}{2}$ (M1)

$=\frac{7}{12}$ (=0.583) (A1)(ft)(G1)

***Notes:** The (M1) is for showing two correct products (whether added or not).*

Follow through from b(i).

Award (M1) for $\frac{1}{3}+\frac{1}{4}$ (must be a sum).

(iii) P (dog is grey given that it is playing with stick)

$\frac{p(G\cap S)}{P(S)}=\frac{\frac{1}{3}\times\frac{1}{4}}{\left(\frac{2}{3}\times\frac{1}{2}\right)+\left(\frac{1}{3}\times\frac{1}{4}\right)}$ or $\frac{1}{12}\Big/\frac{5}{12}$ (M1)(A1)(ft)

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

$=\frac{1}{5}(=0.2)$ (A1)(ft)(G2)

(iv) P (grey and fed from yellow bowl and not playing with stick)

$=\frac{1}{3}\times\frac{1}{3}\times\frac{3}{4}=\frac{1}{12}$ $\left(=\frac{3}{36}=0.0833 \text{ 3 sf}\right)$. (M1)

(A1)(ft)(G1) 9

***Note:** (M1) is for product of 3 reasonable probability values.*

[12]

3. (a) $\left(\frac{8}{15}\times\frac{7}{14}\right)$ (M1)

$=\frac{56}{210}=\frac{4}{15}$ (0.267) (A1) (C2)

***Note:** (M1) is for a product including at least one correct fraction.*

(b) $\left(\frac{4}{15}\times\frac{3}{14}\right)+\left(\frac{3}{15}\times\frac{2}{14}\right)$ (M1)(M1)

***Note:** (M1) is for adding two products, the other (M1) is if both products attempt to deal with non-replacement and the numbers are not ridiculous.*

$=\frac{18}{210}$ *or* $\frac{3}{35}$(0.0857) (A1) (C3)

***Note:** If one correct product is doubled this receives* (M1)(M0)(A0)

(c) The probability is 0. (Allow answer "impossible" or equivalent.) (A1) (C1)

[6]

4. (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]