

Probability : Tree Diagrams - Edexcel Past Exam Questions **MARK SCHEME**

Question 1 : Jan 05 Q1

Question Number	Scheme	Marks
(a)		<p>Tree 0.85, 0.15 0.03, 0.97, 0.06, 0.94</p> <p>M1 A1 A1</p> <p>(3)</p>
(b)	<p>$P(\text{Not faulty}) = (0.85 \times 0.97) + (0.15 \times 0.94)$ $= 0.9655$</p> <p>their values, all correct awrt 0.966</p>	<p>M1, A1 A1</p> <p>(3)</p> <p>(Total 6 marks)</p>

Question 2 : Jan 06 Q4

(a)		<p>Tree</p> <p>$\frac{9}{12}, \frac{3}{12}$</p> <p>Complete & labels</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>(3)</p>
(b)	<p>$P(\text{Second ball is red}) = \frac{9}{12} \times \frac{3}{11} + \frac{3}{12} \times \frac{2}{11} = \frac{1}{4}$</p>	<p>M1A1</p>	<p>(2)</p>

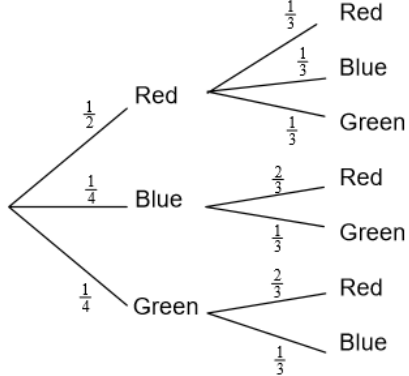
Question 3 : Jan 07 Q2

Question number	Scheme	Marks
(a)	<p> $P(A \cap D) = 0.35 \times 0.03 = \underline{0.0105}$ or $\frac{21}{2000}$ $P(D) = (i) + 0.25 \times 0.06 + (0.4 \times 0.05)$ $= \underline{0.0455}$ or $\frac{91}{2000}$ </p>	<p>Correct tree shape M1 <i>A, B and C and 0.35 and 0.25</i> A1 <i>D (x3) and 0.03, 0.06, 0.05</i> A1 (3) <i>(May be implied by seeing $P(A \cap D)$ etc at the ends)</i></p> <p>$P(C) = 0.4$ (anywhere) B1</p> <p>M1</p> <p>A1 (5)</p>
(a)	<p>M1 for tree diagram, 3 branches and then two from each. At least one probability attempted.</p>	
(b)	<p>1st M1 for 0.35×0.03. Allow for equivalent from <u>their</u> tree diagram.</p> <p>B1 for $P(C) = 0.4$, can be in correct place on tree diagram or implied by 0.4×0.05 in $P(D)$.</p> <p>2nd M1 for all 3 cases attempted and <u>some</u> correct probabilities seen, including +. Can fit their tree.</p> <p>Condone poor use of notation if correct calculations seen. E.g. $P(C D)$ for $P(C \cap D)$.</p>	

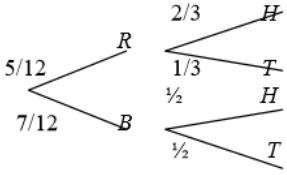
Question 4 : June 09 Q2

Question Number	Scheme	Marks
(a)	<p style="text-align: center;"> $\frac{1}{2}$ → C → $\frac{1}{5}$ → L $\frac{4}{5}$ → NL $\frac{1}{6}$ → B → $\frac{2}{5}$ → L $\frac{3}{5}$ → NL $\frac{1}{3}$ → F → $\frac{1}{10}$ → L $\frac{9}{10}$ → NL </p>	<p>Correct tree All labels Probabilities on correct branches</p> <p>B1 B1 B1</p> <p>(3)</p>
(b)(i)	$\frac{1}{3} \times \frac{1}{10} = \frac{1}{30}$ or equivalent	<p>M1 A1 (2)</p>
(ii)	$\text{CNL} + \text{BNL} + \text{FNL} = \frac{1}{2} \times \frac{4}{5} + \frac{1}{6} \times \frac{3}{5} + \frac{1}{3} \times \frac{9}{10}$ $= \frac{4}{5} \text{ or equivalent}$	<p>M1 A1 (2)</p>
Notes	<p>Exact decimal equivalents required throughout if fractions not used e.g. 2(b)(i) 0.03 Correct path through their tree given in their probabilities award Ms 2(a) All branches required for first B1. Labels can be words rather than symbols for second B1. Probabilities from question enough for third B1 i.e. bracketed probabilities not required. Probabilities and labels swapped i.e. labels on branches and probabilities at end can be awarded the marks if correct. 2(b)(i) Correct answer only award both marks. 2(b)(ii) At least one correct path identified and attempt at adding all three multiplied pairs award M1</p>	

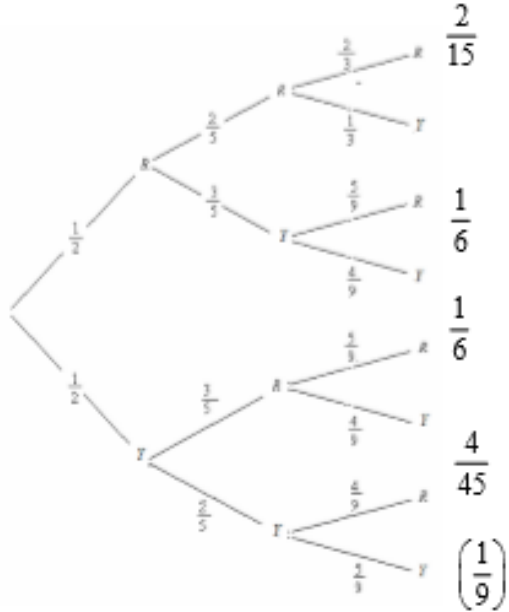
Question 5 : Jan 10 Q1

Question Number	Scheme	Marks
(a)		<p>M1 A1 A1 (3)</p>
(b)	<p>P(Blue bead and a green bead) = $\left(\frac{1}{4} \times \frac{1}{3}\right) + \left(\frac{1}{4} \times \frac{1}{3}\right) = \frac{1}{6}$ (or any exact equivalent)</p>	<p>M1 A1 (2)</p>
Total [5]		
(a)	<p>M1 for shape and labels: 3 branches followed by 3,2,2 with some <i>R</i>, <i>B</i> and <i>G</i> seen Allow 3 branches followed by 3, 3, 3 if 0 probabilities are seen implying that 3, 2, 2 intended Allow blank branches if the other probabilities imply probability on blanks is zero Ignore further sets of branches 1st A1 for correct probabilities and correct labels on 1st set of branches. 2nd A1 for correct probabilities and correct labels on 2nd set of branches. (accept 0.33, 0.67 etc or better here)</p>	
(b)	<p>M1 for identifying the 2 cases <i>BG</i> and <i>GB</i> and adding 2 products of probabilities. These cases may be identified by their probabilities e.g. $\left(\frac{1}{4} \times \frac{1}{3}\right) + \left(\frac{1}{4} \times \frac{1}{3}\right)$ NB $\frac{1}{6}$ (or exact equivalent) with no working scores 2/2</p>	
Special Case	<p><u>With Replacement</u> (This oversimplifies so do not apply Mis-Read: max mark 2/5) (a) B1 for 3 branches followed by 3, 3, 3 with correct labels and probabilities of $\frac{1}{2}, \frac{1}{4}, \frac{1}{4}$ on each. (b) M1 for identifying 2, possibly correct cases and adding 2 products of probabilities but A0 for wrong answer $\left[\left(\frac{1}{4} \times \frac{1}{4}\right) + \left(\frac{1}{4} \times \frac{1}{4}\right)\right]$ will be sufficient for M1A0 here but $\frac{1}{4} \times \frac{1}{2} + \dots$ would score M0</p>	

Question 6 : June 10 Q2

Question Number	Scheme	Marks
<p>(a)</p>  <p>(b)</p> $P(H) = \frac{5}{12} \times \frac{2}{3} + \frac{7}{12} \times \frac{1}{2} = \frac{41}{72} \text{ or awrt } 0.569$ <p>(c)</p> $\left(\frac{5}{12}\right)^2 + \left(\frac{7}{12}\right)^2 = \frac{25}{144} + \frac{49}{144} = \frac{74}{144} \text{ or } \frac{37}{72} \text{ or awrt } 0.514$	<p>P(R) and P(B) 2nd set of probabilities</p>	<p>B1 B1 (2) M1 A1 (2) M1 A1ft A1 (3) Total 10</p>
<p>(a)</p> <p>(b)</p> <p>(c)</p>	<p>1st B1 for the probabilities on the first 2 branches. Accept 0.416̇ and 0.583̇ 2nd B1 for probabilities on the second set of branches. Accept 0.6̇, 0.3̇, 0.5 and $\frac{1.5}{3}$ Allow exact decimal equivalents using clear recurring notation if required.</p> <p>M1 for an expression for P(H) that follows through their sum of two products of probabilities from their tree diagram</p> <p>M1 for $\left(\frac{5}{12}\right)^2$ or $\left(\frac{7}{12}\right)^2$ can follow through their equivalent values from tree diagram 1st A1 for both values correct or follow through from their original tree and + 2nd A1 for a correct answer Special Case $\frac{5}{12} \times \frac{4}{11}$ or $\frac{7}{12} \times \frac{6}{11}$ seen award M1A0A0</p>	

Question 7 : Jan 11 Q7

Question Number	Scheme	Marks
(a)		both $\frac{2}{3}, \frac{1}{3}$ B1 $\frac{4}{9}$ B1 both $\frac{3}{5}, \frac{2}{5}$ B1 all three of $\frac{4}{9}, \frac{4}{9}, \frac{5}{9}$ B1 (4)
(b)	$P(A) = P(RR) + P(YY) = \frac{1}{2} \times \frac{2}{5} + \frac{1}{2} \times \frac{2}{5} = \frac{2}{5}$	B1 for $\frac{1}{2} \times \frac{2}{5}$ (oe) seen at least once B1 M1 A1 (3)
(c)	$P(B) = P(RRR) + P(RYR) + P(YRR) + P(YYR)$ $\left(\frac{1}{2} \times \frac{2}{5} \times \frac{2}{3}\right) + \left(\frac{1}{2} \times \frac{3}{5} \times \frac{5}{9}\right) + \left(\frac{1}{2} \times \frac{3}{5} \times \frac{5}{9}\right) + \left(\frac{1}{2} \times \frac{2}{5} \times \frac{4}{9}\right) = \frac{5}{9} (*)$	M1 for at least 1 case of 3 balls identified. (Implied by 2 nd M1) M1, A1cso (3)
(d)	$P(A \cap B) = P(RRR) + P(YYR)$ $= \left(\frac{1}{2} \times \frac{2}{5} \times \frac{2}{3}\right) + \left(\frac{1}{2} \times \frac{2}{5} \times \frac{4}{9}\right) = \frac{2}{9} (*)$	M1 for identifying both cases and + probs. may be implied by correct expressions A1cso (2)
(e)	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= \frac{2}{5} + \frac{5}{9} - \frac{2}{9} = \frac{11}{15}$	Must have some attempt to use M1 A1cao (2)