

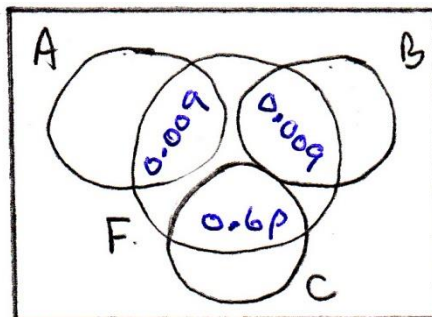
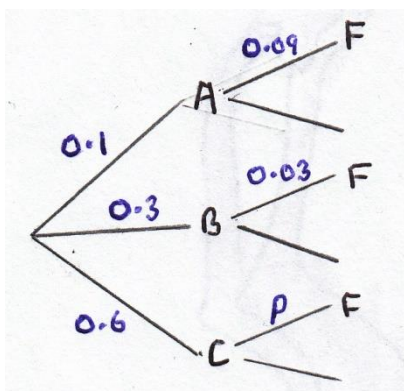
# Y1S5 XMQs and MS

(Total: 16 marks)

1. P31(AS)\_2018 Q2 . 4 marks - Y1S5 Probability
2. P31(AS)\_2019 Q2 . 5 marks - Y1S5 Probability
3. P31(AS)\_2021 Q1 . 2 marks - Y1S5 Probability
4. P31(AS)\_2021 Q5 . 5 marks - Y1S5 Probability



Qu	Scheme	Marks	AO
2 (a)	[Let $p = P(F   C)$ Tree diagram or some other method to find an equation for $p$ $0.1 \times 0.09 + 0.3 \times 0.03 + 0.6 \times p = 0.06$ $p = 0.07$ i.e. <u>7%</u>	M1 A1 A1 (3)	2.1 1.1b 1.1b
(b)	e.g. $P(B \text{ and } F) = 0.3 \times 0.03 = 0.009$ but $P(B) \times P(F) = 0.3 \times 0.06 = 0.018$ These are not equal so not independent	B1 (1)	2.4
		<b>(4 marks)</b>	
<b>Notes</b>			
(a)	<p>M1 for selecting a suitable method to find the missing probability e.g. sight of tree diagram with 0.1, 0.3, 0.6 and 0.09, 0.03, <math>p</math> suitably placed e.g. sight of VD with 0.009 for <math>A \cap F</math> and <math>B \cap F</math> and <math>0.6p</math> suitably placed <u>or</u> attempt an equation with at least one correct numerical and one “<math>p</math>” product (not necessarily correct) on LHS <u>or</u> for sight of <math>0.06 - (0.009 + 0.009)</math> (o.e. e.g. <math>6 - 1.8 = 4.2\%</math>) 1<sup>st</sup> A1 for a correct equation for <math>p</math> (May be implied by a correct answer) <u>or</u> for the expression <math>\frac{0.06 - (0.009 + 0.009)}{0.6}</math> (o.e.) 2<sup>nd</sup> A1 for 7% (accept 0.07) <b>Correct Ans:</b> Provided there is no incorrect working seen award 3/3 e.g. may just see tree diagram with 0.07 for <math>p</math> (probably from trial and improv’)</p>		
(b)	<p>B1 for a suitable explanation...may talk about 2<sup>nd</sup> branches on tree diagram and point out that <math>0.03 \neq 0.06</math> but need some supporting calculation/words Can condone incorrect use of set notation (it is not on AS spec) provided the rest of the calculations and words are correct.</p>		





Question	Scheme	Marks	AOs
2	$x = 0$	B1	2.2a
	$P(A) = 0.1 + z + y$ $P(C) = 0.39 + z[+x]$ $P(A \text{ and } C) = z$	M1	2.1
	$P(A \text{ and } C) = P(A) \times P(C) \rightarrow z = (0.1 + z + y) \times (0.39 + z[+x])$	M1	1.1b
	$[\sum p = 1]$ $0.06 + 0.3 + 0.39 + 0.1 + z + y[+x] = 1 \rightarrow [z + y[+x] = 0.15]$	M1	1.1b
	Solving (simultaneously) leading to $\underline{z = 0.13}$ $\underline{y = 0.02}$	A1	1.1b
<b>(5 marks)</b>			
<b>Notes</b>			
	<b>B1:</b> for $x = 0$ , may be seen on Venn diagram		
	<b>M1:</b> Identifying the probabilities required for independence and at least 2 correct These must be labelled If there are no labels, then this may be implied by $z = (0.1 + z + y)(0.39 + z[+x])$ , allow one numerical slip  Allow e.g. $P(A') = 0.39 + 0.30 + 0.06[+x]$ $P(C) = 0.39 + z[+x]$ $P(A' \text{ and } C) = 0.39$ [Not on spec. but you may see use of conditional probabilities]		
	<b>M1:</b> Use of independence equation with their labelled probabilities in terms $y, z$ [and $x$ ] All their probabilities must be substituted into a correct formula Sight of a correct equation e.g. $z = (0.1 + z + y)(0.39 + z[+x])$ scores M1M1		
	<b>M1:</b> Using $\sum p = 1$ Implied by $[x +] y + z = 0.15$ or their $x + y + z = 0.15$ where $x, y,$ and $z$ are all probabilities or e.g. $P(A) = 0.25$		
	<b>A1:</b> both $y = 0.02$ and $z = 0.13$		



Qu	Scheme	Marks	AO
1 (a)	$[p = 1 - (0.2 + 0.2 + 0.1 + 0.2)] = \underline{0.3}$	B1 (1)	1.1b
(b)	A and C are mutually exclusive. [ NOT P(A) and P(C) ]	B1 (1)	1.2
		(2 marks)	
<b>Notes</b>			
(a)	B1 for		
(b)	B1 for A and C [NB $A \cap C$ or $A \cap C = \emptyset$ is B0 ] If more than one case given they must <u>all</u> be correct e.g. $A \cap B$ and C		

5. Two bags, **A** and **B**, each contain balls which are either red or yellow or green.

Bag **A** contains 4 red, 3 yellow and  $n$  green balls.

Bag **B** contains 5 red, 3 yellow and 1 green ball.

A ball is selected at random from bag **A** and placed into bag **B**.

A ball is then selected at random from bag **B** and placed into bag **A**.

The probability that bag **A** now contains an equal number of red, yellow and green balls is  $p$ .

Given that  $p > 0$ , find the possible values of  $n$  and  $p$ .

(5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Qu	Scheme	Marks	AO
5	Must end up with 3 of each colour or 4 of each colour	M1	3.1b
	<b><u>n = 2</u></b> requires 1 <sup>st</sup> red and 2 <sup>nd</sup> green <u>or</u> red from <b>A</b> and green from <b>B</b>	M1	2.2a
	$P(1^{\text{st}} \text{ red and } 2^{\text{nd}} \text{ green}) = \frac{4}{9} \times \frac{1}{10} = \frac{4}{90}$ or $\frac{2}{45}$ $p = \frac{2}{45}$	A1	1.1b
	<b><u>n = 5</u></b> requires 1 <sup>st</sup> green and 2 <sup>nd</sup> yellow <u>or</u> green from <b>A</b> and yellow from <b>B</b>	M1	2.2a
	$P(1^{\text{st}} \text{ green and } 2^{\text{nd}} \text{ yellow}) = \frac{5}{12} \times \frac{3}{10} = \frac{15}{120}$ or $\frac{1}{8}$ $p = \frac{1}{8}$	A1	1.1b
	(5)	(5 marks)	
<b>Notes</b>			
NB	1 <sup>st</sup> M1 for an overall strategy realising there are 2 options. Award when evidence of both cases (3 of each colour or 4 of each colour) seen.		
	2 <sup>nd</sup> M1 for $n = 2$ <u>and</u> attempt at 1 <sup>st</sup> red and 2 <sup>nd</sup> green May be implied by e.g. $\frac{4}{9} \times \frac{1}{9}$		
	1 <sup>st</sup> A1 for $p = \frac{2}{45}$ or exact equivalent		
	3 <sup>rd</sup> M1 for $n = 5$ <u>and</u> attempt at 1 <sup>st</sup> green and 2 <sup>nd</sup> yellow May be implied by e.g. $\frac{5}{12} \times \frac{3}{9}$		
	2 <sup>nd</sup> A1 for $p = \frac{1}{8}$ or exact equivalent		
	If both correct values of $p$ are found and then added ( get $\frac{61}{360}$ ), deduct final A1 only (i.e. 4/5)		