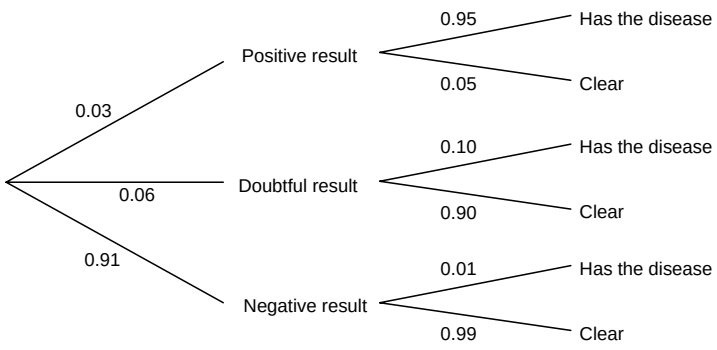
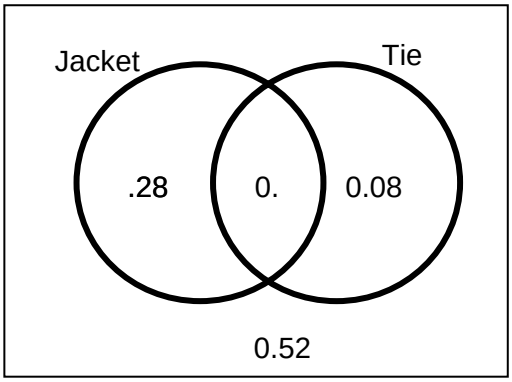
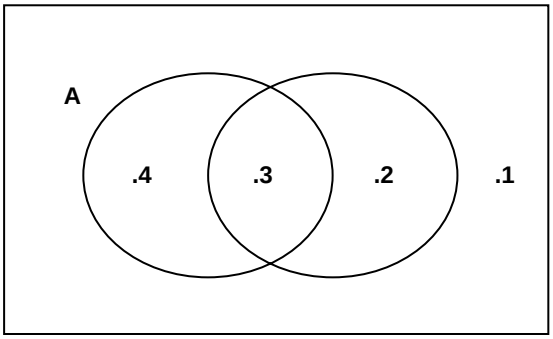
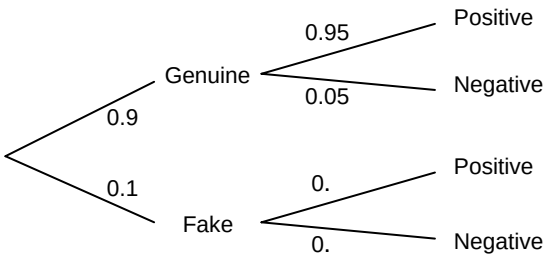
1 **(i)**		G1 probabilities of result G1 probabilities of disease G1 probabilities of clear G1 labels	**4**
(ii)	P(negative and clear) = 0.91×0.99 = 0.9009	M1 for their 0.91×0.99 A1 CAO	**2**
(iii)	P(has disease) = $0.03 \times 0.95 + 0.06 \times 0.10 + 0.91 \times 0.01$ = 0.0285 + 0.006 + 0.0091 = 0.0436	M1 three products M1*dep* sum of three products A1 FT their tree	**3**
(iv)	P(negative | has disease) $= \frac{\text{P(negative } \textit{and} \text{ has disease)}}{\text{P(has disease)}} = \frac{0.0091}{0.0436} = 0.2087$	M1 for their 0.01×0.91 or 0.0091 on its own or as numerator M1 *indep* for their 0.0436 as denominator A1 FT their tree	**3**
(v)	Thus the test result is not very reliable. A relatively large proportion of people who have the disease will test negative.	E1 FT for idea of 'not reliable' or 'could be improved', etc E1 FT	**2**
(vi)	P(negative or doubtful and declared clear) $=0.91+0.06\times0.10\times0.02+0.06\times0.90\times1$ $=0.91+0.00012+0.054=0.96412$	M1 for their 0.91 + M1 for either triplet M1 for second triplet A1 CAO	**4**
		TOTAL	**18**

2 **(i)**	P(jacket and tie) = 0.4 × 0.3 = 0.12	M1 for multiplying A1 CAO	**2**
(ii)		G1 for two intersecting circles labelled G1 for 0.12 and either 0.28 or 0.08 G1 for remaining probabilities <u>Note</u> FT their 0.12 provided < 0.2	**3**
(iii)	*(A)* P(jacket or tie) =P(J) + P(T) – P(J∩T) = 0.4 + 0.2 – 0.12 = 0.48 *OR* = 0.28 + 0.12 + 0.08 = 0.48 (*B*) P(no jacket or no tie) = 0.52 + 0.28 + 0.08 = 0.8 *OR* 0.6 + 0.8 – 0.52 = 0.88 *OR* 1 – 0.12 = 0.88	B1 FT B2 FT <u>Note</u> FT their 0.12 provided < 0.2	**3**
		TOTAL	**8**

3 (i)	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B \mid A) = \frac{7}{10} \times \frac{3}{7}$ $\rightarrow \mathrm{P}(A \cap B) = 0.3$ **o.**	M1 Product of these fractions A1	**2**
(ii)		B1FT either 0.4 or 0.2 in correct place B1FT all correct and labelled	**2**
(iii)	P(*B*|*A*) ≠ P(*B*), 3/7 ≠ 0.5 Unequal so not independent	E1 Correct comparison E1*dep* for 'not independent'	**2**
(iv)	3/7 < 0.5 so Isobel is less likely to score when her parents attend	E1 for comparison E1*dep*	**2**
		TOTAL	**8**

4 **(i)**		G1 for left hand set of branches fully correct including labels and probabilities G1 for right hand set of branches fully correct	**2**
(ii)	P (test is positive) = (0.9)(0.95) + (0.1)(0.2) = 0.875	M1 Two correct pairs added A1 CAO	**2**
(iii)	P (test is correct) = (0.9)(0.95) + (0.1)(0.8) = 0.935	M1 Two correct pairs added A1 CAO	**2**
(iv)	P (Genuine|Positive) = 0.855/0.875 = 0.977	M1 Numerator M1 Denominator A1 CAO	**3**
(v)	P (Fake|Negative) = 0.08/0.125 = 0.64	M1 Numerator M1 Denominator A1 CAO	**3**
(vi)	EITHER: A positive test means that the painting is almost certain to be genuine so no need for a further test. However, more than a third of those paintings with a negative result are genuine so a further test is needed. NOTE: Allow sensible alternative answers	E1FT E1FT	**2**
(vii)	P (all 3 genuine) = $(0.9 \times 0.05 \times 0.96)^3$ $= (0.045 \times 0.96)^3$ $= (0.0432)^3$ $= 0.0000806$	M1 for 0.9×0.05 (=0.045) M1 for complete correct triple product M1*indep* for cubing A1 CAO	**4**
		TOTAL	**18**