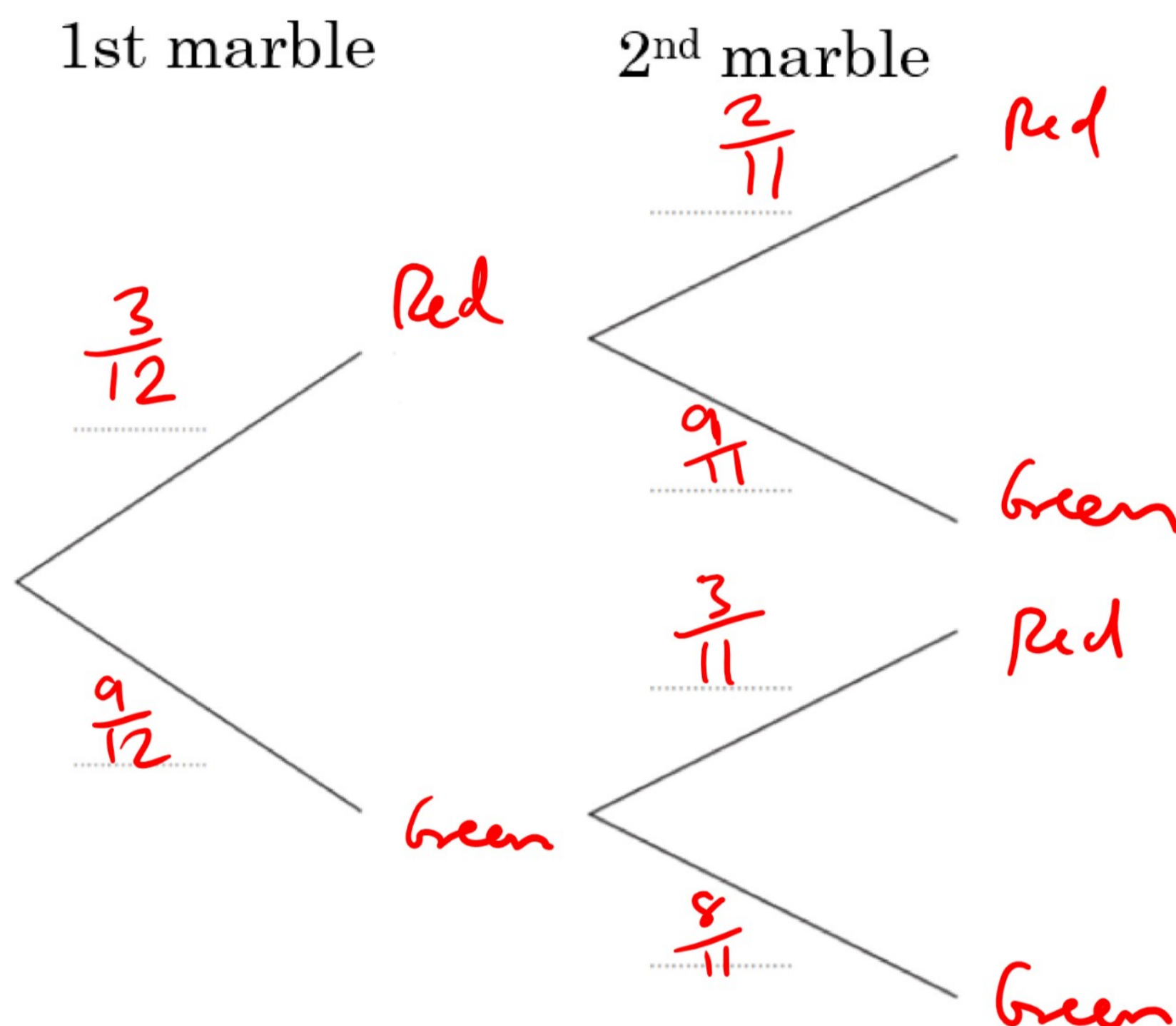




Conditional Probability Exam Practice

Q1. A bag contains 3 red marbles and 9 green marbles. Jim chooses one marble at random from the bag, and then chooses a second marble without replacement.

a) Complete the tree diagram below:



Answer: _____
(2 marks)

b) Find the probability that the two marbles are of different colours

$$= P(\text{Red and Green}) + P(\text{Green and Red})$$

$$= \frac{3}{12} \times \frac{9}{11} + \frac{9}{12} \times \frac{3}{11}$$

$$= \frac{27}{132} + \frac{27}{132}$$

$$= \frac{54}{132}$$

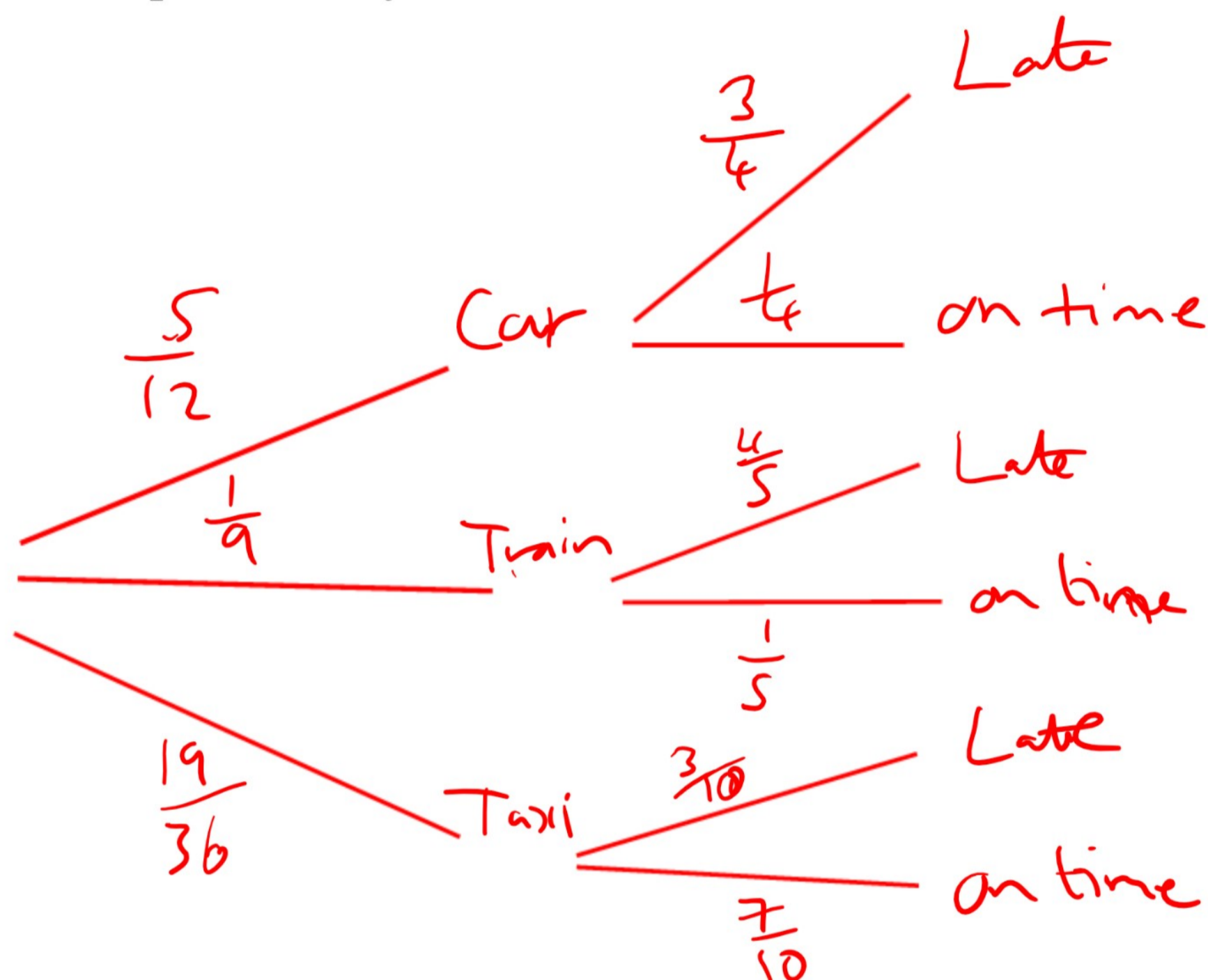
Answer: $\frac{9}{22}$
(2 marks)



Q2. Ron either takes the car, the train or the taxi to work. The probability that Ron takes the car or the train is $\frac{5}{12}$ and $\frac{1}{9}$ respectively.

If he goes by car, the probability he is late is $\frac{3}{4}$, if he goes by train, the probability he is on time is $\frac{1}{5}$, and if he takes a taxi the probability he is late is $\frac{3}{10}$.

Find the probability that Ron is late for work.



$$\begin{aligned} P(\text{Late}) &= P(\text{Late, takes Car}) + P(\text{Late, takes Train}) + P(\text{Late, Taxi}) \\ &= \frac{3}{4} \times \frac{5}{12} + \frac{4}{5} \times \frac{1}{9} + \frac{19}{36} \times \frac{3}{10} \\ &= \frac{15}{48} + \frac{4}{45} + \frac{57}{360} \\ &= \frac{403}{720} \end{aligned}$$

Answer: $\frac{403}{720}$

(4 marks)



Q3. The table compare the number of cars owned by owner of homes with different numbers of bedroom.

		No. of cars			Total
		1	2	3	
No. of bedrooms	1	28	43	29	100
	2	9	55	28	92
	3	8	39	18	65
	4	2	23	4	29
	5 or more	6	8	3	17
Total		53	168	82	303

a) Find the probability that a randomly selected home has 6 bedrooms and 3 cars.

$$\frac{3}{303}$$

Answer: $\frac{1}{101}$
(2 marks)

b) Given that a randomly selected home has 2 cars, find the probability that the home has at most 3 bedrooms.

"Given it has 2 cars" \Rightarrow restrict to the column for 2 cars only.

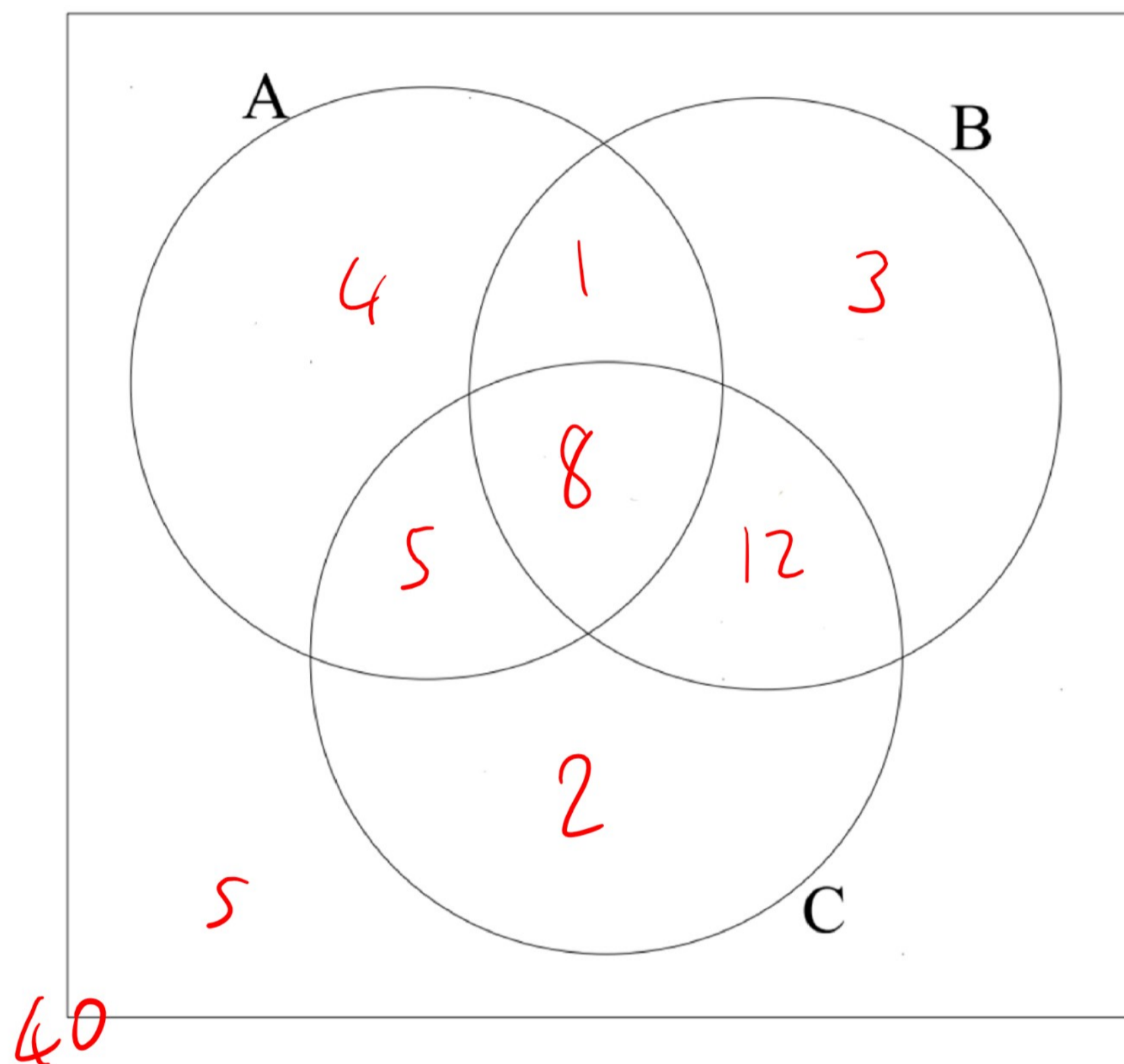
$$\frac{43}{168} + \frac{55}{168} + \frac{39}{168} = \frac{137}{168}$$

Answer: _____
(2 marks)

Q4. 40 students were asked what is their favourite flavour of ice-cream.



- 15 liked banana but not apple;
- 8 like all three flavours;
- 13 liked cherry and apple;
- 2 liked only cherry;
- 5 did not like any of the 3 flavours;
- 9 liked apple and banana and
- 20 liked cherry and banana.



Let :

$A = \text{apple}$

$B = \text{banana}$

$C = \text{cherry}$

Three students are chosen at random. Find the probability they all like cherry ice-cream. [You may use the Venn diagram to help you.]

$$\frac{27}{40} \times \frac{26}{39} \times \frac{25}{38}$$
$$= \frac{45}{152}$$

Answer: _____

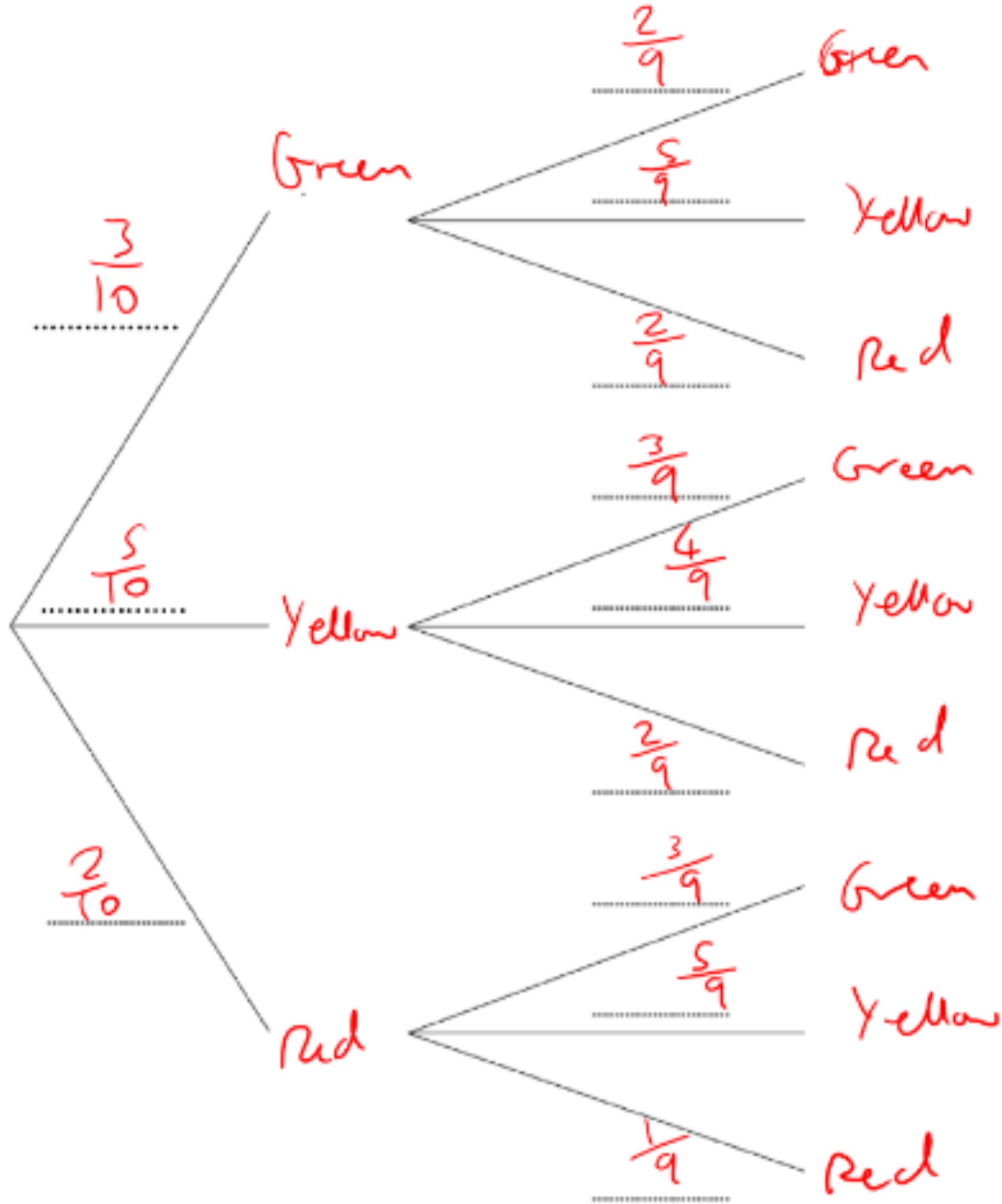
$$\frac{45}{152}$$

(4 marks)



Q5. A bag contains 3 green balls, 5 yellow balls and 2 red balls. Mary selects two balls from the bag without replacement.

a) Complete the tree diagram representing this situation:



Answer: _____

(3 marks)

b) Find the probability that Mary selects 1 yellow ball only

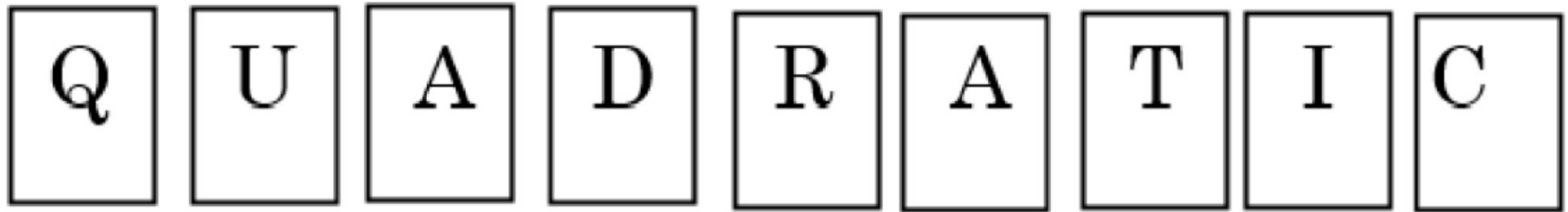
$$\begin{aligned} &= P(Y, G) + P(Y, R) + P(G, Y) + P(R, Y) \\ &= \frac{5}{10} \times \frac{3}{9} + \frac{5}{10} \times \frac{2}{9} + \frac{3}{10} \times \frac{5}{9} + \frac{2}{10} \times \frac{5}{9} \end{aligned}$$

Answer: $\frac{50}{90}$ ($\frac{5}{9}$)

(3 marks)



Q6. Rob selects 3 cards from the set below, without replacement.



(9 letters, 2 A's, 7 other letters)

Find the probability that 2 of the letters in his choice are the same.

$$= P(A, A, \text{not } A) + P(A, \text{not } A, A) + P(\text{not } A, A, A)$$

$$= \frac{2}{9} \times \frac{1}{8} \times \frac{7}{7} + \frac{2}{9} \times \frac{7}{8} \times \frac{1}{7} + \frac{7}{9} \times \frac{2}{8} \times \frac{1}{7}$$

$$= \frac{1}{36} + \frac{1}{36} + \frac{1}{36}$$

$$= \frac{1}{12}$$

Answer: $\frac{1}{12}$
(4 marks)



Q7. A sixth form contains 120 students in total, and each one plays either tennis or cricket.

	Tennis	Cricket	Total:
Lower 6 th Form	30	15	45
Upper 6 th Form	40	35	75
Total:	70	50	

Two students are selected at random. Find the probability that they both play the same sport.

$$= P(\text{Tennis and Tennis}) + P(\text{Cricket and Cricket})$$

$$= \frac{70}{120} \times \frac{69}{119} + \frac{50}{120} \times \frac{49}{119}$$

$$= \frac{7280}{14280}$$

Answer: $\frac{26}{51}$
(4 marks)



Q8. A jar contains n chocolates of which 7 are soft-centres. Sam selects two chocolates from the jar without looking. The probability that he picks out 2 soft-centres is $\frac{1}{10}$.

Find the number of chocolates in the jar which are not soft-centres.

$$P(2 \text{ soft-centres}) = \frac{7}{n} \times \frac{6}{n-1}$$

$$\Rightarrow \frac{7}{n} \times \frac{6}{n-1} = \frac{1}{10}$$

$$\Rightarrow \frac{42}{n(n-1)} = \frac{1}{10}$$

$$\Rightarrow 420 = n(n-1)$$

$$\Rightarrow n^2 - n = 420$$

$$\Rightarrow n^2 - n - 420 = 0$$

$$\Rightarrow (n+20)(n-21) = 0$$

$$\Rightarrow n = -20, 21$$

(reject, can't have negative no. of sweets)

$$\text{so } n = 21$$

$$\text{so } 21 - 7 = 14 \text{ are not soft-centres}$$

Answer: 14 sweets

(5 marks)