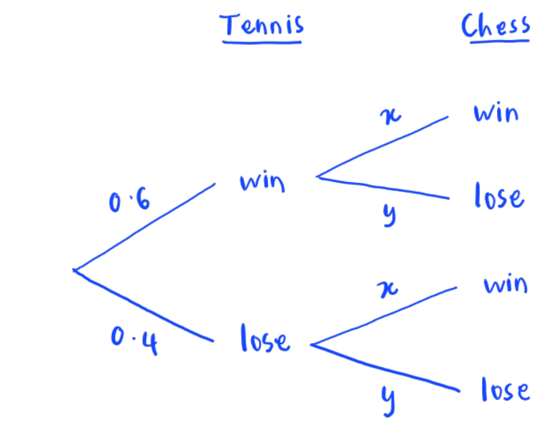
1 Steffi is going to play one game of tennis and one game of chess.

The probability that she will win the game of tennis is 0.6
The probability that she will win **both** games is 0.42

Work out the probability that she will **not** win either game.



$0.6 \times x = 0.42$

$x = 0.7$ (1)

$y = 1 - 0.7$

$= 0.3$ (1)

$P(\text{lose}, \text{lose}) = 0.4 \times 0.3$ (1)

$= 0.12$ (1)

0.12

(Total for Question 1 is 4 marks)

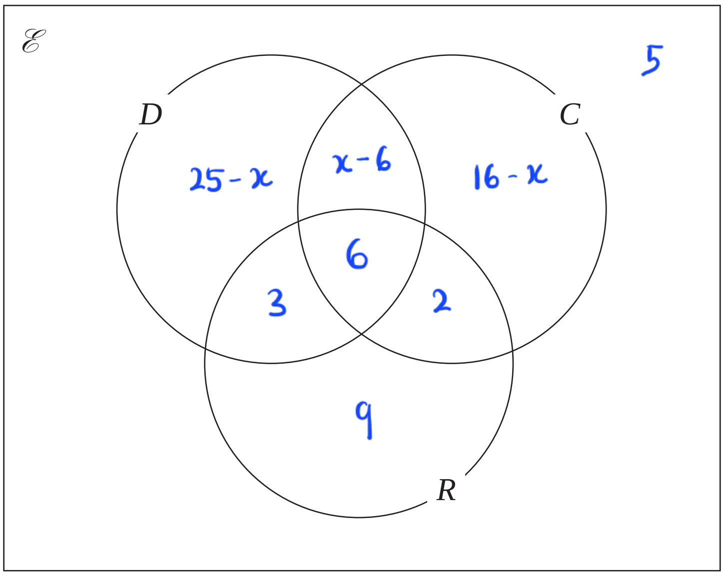
2 Some students in a school were asked the following question.

"Do you have a dog (D), a cat (C) or a rabbit (R)?"

Of these students

28 have a dog
18 have a cat
20 have a rabbit
8 have both a cat and a rabbit
9 have both a dog and a rabbit
x have both a dog and a cat
6 have a dog, a cat and a rabbit
5 have not got a dog or a cat or a rabbit

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.
Give the numbers in terms of x where necessary.



3

(3)

Given that a total of 50 students answered the question,

(b) work out the value of x.

$(25-x)+(x-6)+(16-x)+3+6+9+2+5 = 50$ 1

$60 - x = 50$

$x = 60 - 50$

$= 10$ 1

$x =$ 10

(2)

not C not D

(c) Find $n(C' \cap D')$

$9 + 5 = 14$ 1

14

....
(1)

(Total for Question 2 is 6 marks)

3 The table shows information about the weights, in kilograms, of 40 babies.

Weight (w kg)	**Frequency**
$2 < w \leqslant 3$	12
$3 < w \leqslant 4$	16
$4 < w \leqslant 5$	9
$5 < w \leqslant 6$	2
$6 < w \leqslant 7$	1

One of the 40 babies is going to be chosen at random.

(c) Find the probability that this baby has a weight of more than 5 kg.

Baby weight more than 5 kg $= \frac{2}{40} + \frac{1}{40}$ (1)

$= \frac{3}{40}$ (1)

$\frac{3}{40}$

(2)

(Total for Question 3 is 2 marks)

4 There are 16 sweets in a bowl.

4 of the sweets are blackcurrant. (B)
5 of the sweets are lemon. (L)
7 of the sweets are orange. (O)

Anna, Ravi and Sam each take at random one sweet from the bowl.

Work out the probability that the 5 lemon sweets are still in the bowl.

Scenario 1 : BBB

$\frac{4}{16} \times \frac{3}{15} \times \frac{2}{14} = \frac{1}{140}$ (1)

Scenario 2 : OOO

$\frac{7}{16} \times \frac{6}{15} \times \frac{5}{14} = \frac{1}{16}$

Scenario 3 : BBO

$\frac{4}{16} \times \frac{3}{15} \times \frac{7}{14} = \frac{1}{40}$ (1)

Scenario 4 : OOB

$\frac{7}{16} \times \frac{6}{15} \times \frac{4}{14} = \frac{1}{20}$

Scenario 5 : BOB

$\frac{4}{16} \times \frac{7}{15} \times \frac{3}{14} = \frac{1}{40}$

Scenario 6 : BOO

$\frac{4}{16} \times \frac{7}{15} \times \frac{6}{14} = \frac{1}{20}$

Scenario 7 : OBO

$\frac{7}{16} \times \frac{4}{15} \times \frac{6}{14} = \frac{1}{20}$

Scenario 8 : OBB

$\frac{7}{16} \times \frac{4}{15} \times \frac{3}{14} = \frac{1}{40}$

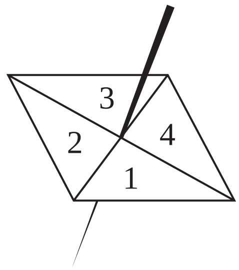
Total : $\frac{1}{140} + \frac{1}{16} + \frac{1}{40} + \frac{1}{20} + \frac{1}{40} + \frac{1}{20} + \frac{1}{20} + \frac{1}{40}$ (1)

$= \frac{33}{112}$ (1)

$\frac{33}{112}$

(Total for Question 4 is 4 marks)

5 Here is a biased 4-sided spinner.



The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26	0.28	0.18	0.28

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Ravina is going to spin the spinner a number of times.

Ravina works out that an estimate for the number of times the spinner will land on 3 is 45

Work out an estimate for the number of times the spinner will land on 4

$P(2 \text{ or } 4) = \frac{(1-0.26-0.18)}{2}$

$= \frac{0.56}{2} = 0.28$ (1)

Land on 4 $= \frac{45}{0.18} \times (0.28)$

$= 150\,(0.28)$ (1) (1)

$= 70$ (1)

70

(Total for Question 5 is 4 marks)

6 Abraham is going to play a computer game.
Abraham can win the game, draw the game or lose the game.

For any game that Abraham plays

the probability that he wins the game is 0.3
the probability that he draws the game is 0.5
the probability that he loses the game is 0.2

When Abraham wins a game, he scores +10 points.
When Abraham draws a game, he scores 0 points.
When Abraham loses a game, he scores −5 points.

Abraham plays 3 games and the points he scores in each of the 3 games are added together to get his total score.

Work out the probability that when he has played 3 games his total score is 0 points.

Draws all 3 : $0.5^3 = 0.125$ (1)

W 1, L 2 : $0.3 \times 0.2^2 = 0.012$ (1)

WLL
LWL
LLW

$\therefore\ 0.125 + 0.012 \times 3$ (1)

$= 0.125 + 0.036$

$= 0.161$ (1)

0.161

(Total for Question 6 is 4 marks)

7 Osvaldo has a biased coin.
He spins the coin three times.

The probability that the coin lands on a head three times is $\frac{27}{64}$

Work out the probability that the coin will land on a tail three times.

$$P(\text{head}) = \sqrt[3]{\frac{27}{64}}$$

$$= \frac{3}{4} \quad 1$$

$$P(\text{tail}) = 1 - \frac{3}{4} = \frac{1}{4}$$

$$P(\text{tail 3 times}) = \left(\frac{1}{4}\right)^3 \quad 1$$

$$= \frac{1}{64} \quad 1$$

$\frac{1}{64}$ ....

(Total for Question 7 is 3 marks)

8 There are 12 counters in a bag.

3 of the counters are red
9 of the counters are green

Ameya, Jack and Ella each take at random one counter from the bag.

Work out the probability that at least one red counter is still in the bag.

$P(GGG) = \frac{9}{12} \times \frac{8}{11} \times \frac{7}{10} = \frac{84}{220}$

$P(GGR) = \frac{9}{12} \times \frac{8}{11} \times \frac{3}{10} = \frac{36}{220}$ (1)

$P(GRR) = \frac{9}{12} \times \frac{3}{11} \times \frac{2}{10} = \frac{9}{220}$

$P(\text{at least one red}) = \frac{84}{220} + 3 \times \frac{36}{220} + 3 \times \frac{9}{220}$ (1)

$= \frac{219}{220}$ (1)

$\frac{219}{220}$

(Total for Question 8 is 3 marks)