OCR
Oxford Cambridge and RSA

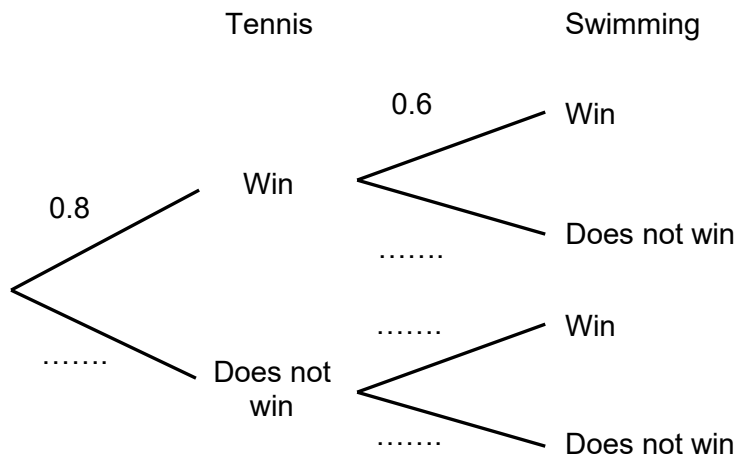# Foundation Check In - 11.02 Combined events and probability diagrams

1. A sample space diagram is shown below. Use it to work out the probability of an outcome of 7.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

2. A spinner has 5 equal sections, numbered 0, 1, 2, 3 and 4. The spinner is spun twice and a score calculated by adding the two values. Draw the sample space diagram for this and use it to find the probability that the score is less than 3.

3. A cinema sells four different sized bags of popcorn (small (S), medium (M), large (L) and extra large (X)) in three different flavours (toffee (T), plain (P) and sweet (S)). Write a list of all the possible combinations.

4. P is the set of integers 1, 3, 5, 7 and 9. Use set notation to describe the set P.

5. Mary has a tennis match and a swimming race this week. The probability that she will win the tennis match is 0.8 and the probability that she will win the swimming race is 0.6. Complete the tree diagram.

Tennis   Swimming

0.8   Win   0.6   Win

Win   …….   Does not win

…….   Does not win   …….   Win

…….   Does not win

6. Neil and Ruth see the following advert.

Steve's Ice Cream Hut

      Mint (M)   Vanilla (V)   Raspberry (R)

Choose any two scoops for only £3.00

Show that the probability of Neil and Ruth both choosing a scoop of mint ice cream and a scoop of vanilla ice cream is $\dfrac{1}{36}$.

7. In a class of 30 pupils, 22 are in the running club, 15 are in the basketball club and 2 are not in either. Draw a Venn diagram to show this and use it to calculate the probability that a pupil chosen at random from this class is in the basketball club only.

8. The probability that Anne is late is $\dfrac{3}{5}$ and the probability that Julie is late is $\dfrac{1}{10}$. Draw a tree diagram and use it to find the probability that both Anne and Julie are late.

9. In a bag there are 5 red marbles and 4 green marbles only. Freddie chooses a marble at random from the bag, notes its colour and replaces it. He then chooses another marble from the bag and notes its colour. Find the probability that Freddie chooses one green marble and one red marble.

10. A normal, fair, six-sided dice is rolled. The probability that the dice lands on an even number is p(A). The probability that the dice lands on a square number is p(B). Work out p(A *or* B).

Extension

Max has 10 vanilla cupcakes, 4 blueberry cupcakes and 6 chocolate cupcakes. He chooses two cupcakes at random. What is the probability that they are not the same flavour?

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Answers

1. Probability of an outcome of $7 = \dfrac{6}{36} = \dfrac{1}{6}$

2.

Spin 2

		0	1	2	3	4
	0	**0**	**1**	**2**	3	4
	1	**1**	**2**	3	4	5
Spin 1	2	**2**	3	4	5	6
	3	3	4	5	6	7
	4	4	5	6	7	8

Probability of getting a score less than $3 = \dfrac{6}{25}$

3.

ST	MT	LT	XT
SP	MP	LP	XP
SS		LS	XS

4. $P = \{x : x$ is a positive odd integer less than 10$\}$

5.

Tennis   Swimming

0.8 — Win
    0.6 — Win
    0.4 — Does not win

0.2 — Does not win
    0.6 — Win
    0.4 — Does not win
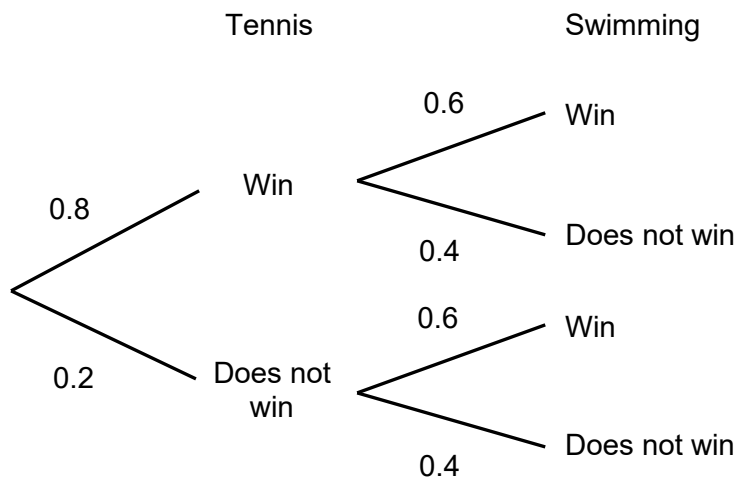
6. There are 6 different ways to have 2 scoops: MM, MV, MR, VV, VR and RR.

		Neil's 2 scoops					
		MM	MV	MR	VV	VR	RR
	MM						
	MV						
Ruth's 2 scoops	MR						
	VV						
	VR						
	RR						

There are 36 different combinations of the two scoops of ice cream that Neil and Ruth can choose, so the probability that they both choose mint and vanilla is $\frac{1}{36}$.

7.
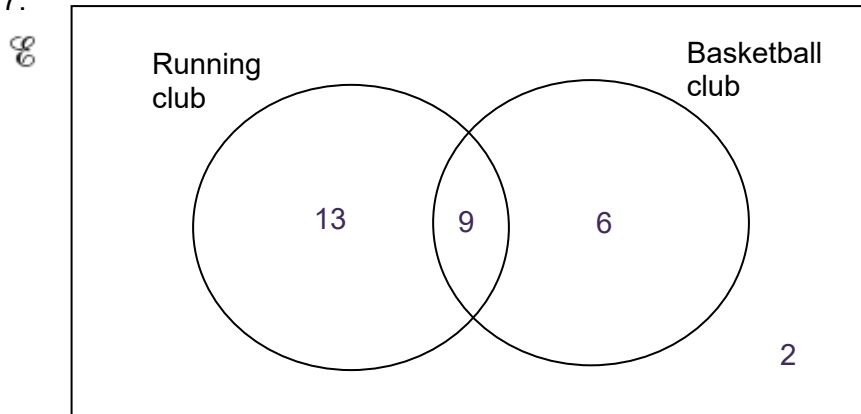
Probability that a girl is the member of the basketball club only $= \frac{6}{30} = \frac{1}{5}$

8.
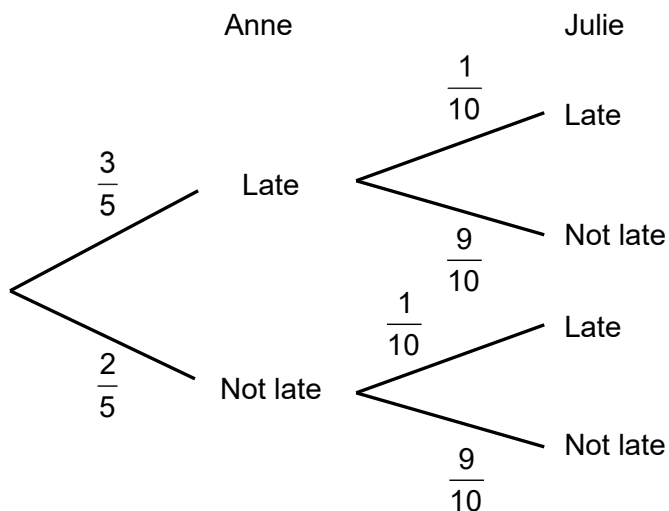
Probability that they are both late $= \frac{3}{50}$

9. Probability $= \left(\dfrac{5}{9} \times \dfrac{4}{9}\right) + \left(\dfrac{4}{9} \times \dfrac{5}{9}\right) = \dfrac{40}{81}$

May be seen on a tree diagram e.g.

$= \left(\dfrac{5}{9} \times \dfrac{4}{9}\right) = \dfrac{20}{81}$

$= \left(\dfrac{4}{9} \times \dfrac{5}{9}\right) = \dfrac{20}{81}$

$\dfrac{20}{81} + \dfrac{20}{81} = \dfrac{40}{81}$
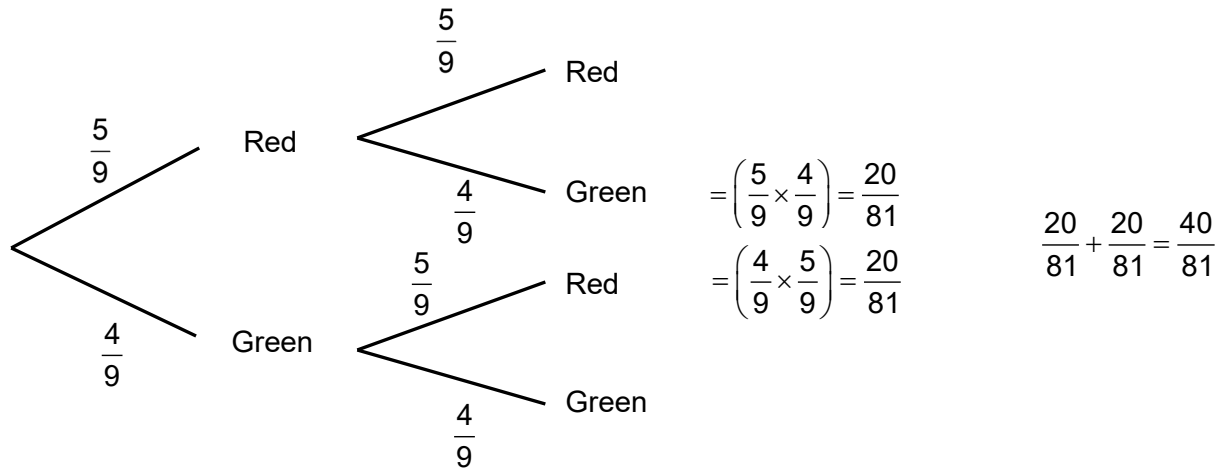
10.
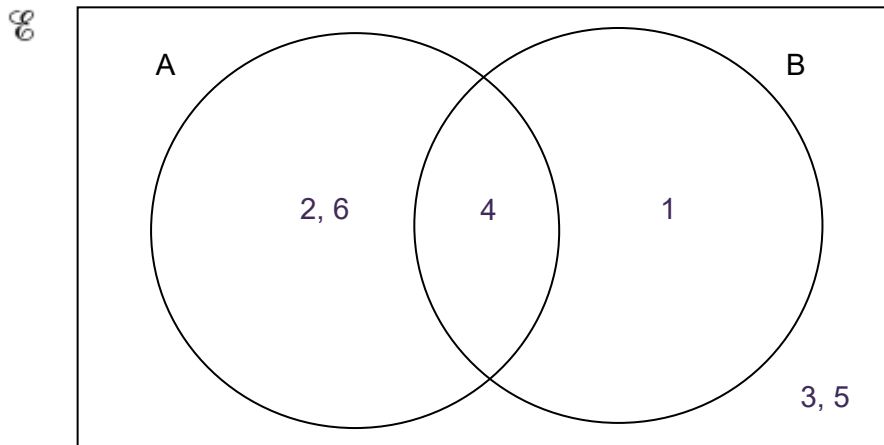
$p(A \; or \; B) = \dfrac{4}{6} = \dfrac{2}{3}$

Extension

$\dfrac{248}{380} \left(= \dfrac{62}{95}\right)$

Students could draw a tree diagram with 2 sets of branches, each with 3 limbs. Different methods of finding the answer can lead to a discussion about finding the probability that he chooses 2 cupcakes the same flavour and then subtracting this probability from 1.

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Calculate a probability from a sample space diagram			
AO1	2	Draw a sample space diagram and calculate a probability			
AO1	3	Use a systematic listing strategy			
AO1	4	Use set notation to describe a set of numbers			
AO1	5	Complete a tree diagram			
AO2	6	Calculate a probability			
AO2	7	Draw a Venn diagram to calculate a probability			
AO2	8	Draw a tree diagram to calculate a probability			
AO3	9	Calculate a probability			
AO3	10	Calculate a probability			