

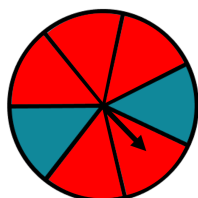
Combined Events Probability - Worksheet

Skill

Group A – Using the AND probability rule with independent events

Work out:

- 1) A circular spinner has seven equal sections. Five of the sections are red and two are blue. The spinner is spun twice.



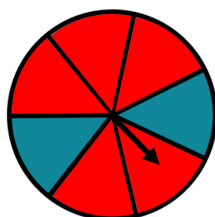
- 2) There are five cards with letters on them spelling the word **TOTAL**. The cards are placed face down on a table. A card is chosen, the letter it shows is recorded and then it is replaced. A second card is then chosen.



- 3) An online store claims that 85% of their orders are delivered within three days of purchase. Evin and Ailbhe make separate purchases from this online store and await the arrival of their orders.



- 4) A circular spinner has seven equal sections. Five of the sections are red and two are blue. The spinner is spun 3 times.



- a) What is the probability it lands on red both times?

- b) What is the probability that it lands on red first and then it lands on blue?

- c) What is the probability that it lands on blue twice?

- a) What is the probability that both cards show the letter **A**?

- b) What is the probability that the first card is a **T** and the second card is an **L**?

- c) What is the probability that the first card is a vowel, and the second card is a consonant.

- a) What is the probability that both parcels arrive within three days?

- b) What is the probability that both parcels do not arrive within three days?

- c) What is the probability that Evin's parcel arrives within three days, but Ailbhe's does not?

- a) What is the probability it lands on red three times in a row?

- b) What is the probability that it lands on blue first and then it lands on red twice?

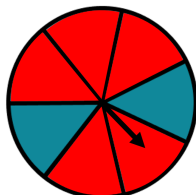
- c) What is the probability that it lands on blue, then red, then blue again?

Combined Events Probability - Worksheet

Group B – Using the AND and the OR probability rules with independent events

Work out:

- 1) A circular spinner has seven equal sections. Five of the sections are red and two are blue. The spinner is spun twice.



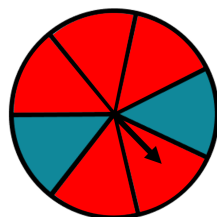
- 2) There are five cards with letters on them spelling the word **TOTAL**. The cards are placed face down on a table. A card is chosen, the letter it shows is recorded and then it is replaced. A second card is then chosen.



- 3) An online store claims that 85% of their orders are delivered within three days of purchase. Evin and Ailbhe make separate purchases from this online store and await the arrival of their orders.



- 4) A circular spinner has seven equal sections. Five of the sections are red and two are blue. The spinner is spun 3 times.



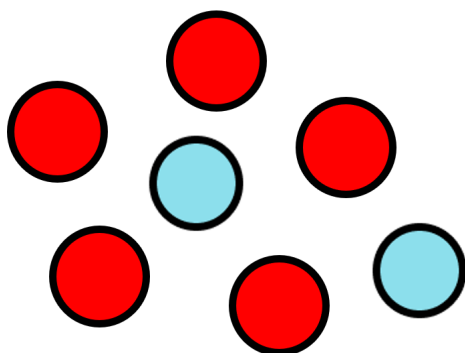
- a) What is the probability it lands on the same colour?
- b) What is the probability that it lands on different colours?
- a) What is the probability that both cards show the letter **L** or both cards show the letter **T**?
- b) What is the probability that one of the cards is an **A** and one of the cards is a **T**?
- c) What is the probability that one of the cards is a vowel, and one of the cards is a consonant?
- a) What is the probability that either both parcels arrive within three days or both parcels do not arrive within three days?
- b) What is the probability that one of the parcels arrives within three days and one of them does not?
- a) What is the probability it lands on the same colour each time?
- b) What is the probability that it lands on red twice and blue once?
- c) What is the probability that it lands on blue at least once?

Combined Events Probability - Worksheet

Group C – Dependent events

Work out:

1) There are seven counters in a bag. Five of the counters are red and two are blue. Two counters are chosen at random one at a time and not replaced.



a) What is the probability that both counters are blue?

b) What is the probability that the first counter is red, and the second counter is blue?

c) What is the probability that the first counter is blue, and the second counter is red?

d) What is the probability that the counters are the same colour?

e) What is the probability that the counters are different colours?

f) What is the probability that there is at least one red?

2) There are five cards with letters on them spelling the word **TOTAL**. The cards are placed face down on a table. Two cards are then chosen one at a time and not replaced.



a) What is the probability that both cards show the letter **T**?

b) What is the probability the first card is a **L** and the second card is an **T**?

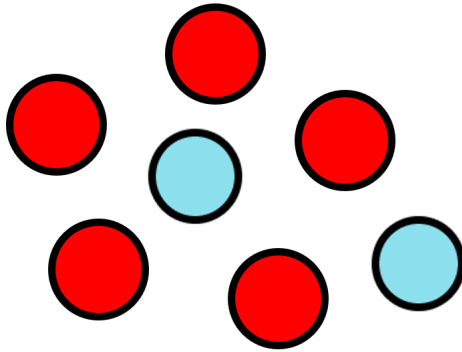
c) What is the probability that one of the cards is a vowel, and one of the cards is a consonant?

d) What is the probability that both cards are vowels or both cards are consonants?

e) After the two cards are chosen a third card is then selected as well. What is the probability that two **T** cards are chosen in the selection of 3 cards?

Combined Events Probability - Worksheet

3) There are seven counters in a bag. Five of the counters are red and two are blue. Three counters are chosen at random one at a time and not replaced.



- a)** What is the probability that all three counters are red?
- b)** What is the probability that the first and second counters are blue, and the last counter is red?
- c)** What is the probability that the first counter is red, the second counter is blue, and the last counter is red?
- d)** What is the probability that both blue counters get chosen?
- e)** What is the probability that at least one red counter is chosen?

Combined Events Probability - Worksheet

Applied

1) Maeve rolls a fair 6-sided dice numbered 1 to 6 and flips a coin.

(a) Complete the sample space diagram to show the outcomes.

	1	2	3	4	5	6
H	1H	2H	3H	4H		
T	1T					

(b) What is the probability of the combined outcome of Maeve rolling a seven on the dice and the coin landing on heads?

(c) Maeve says;
“There are 12 combined outcomes and each one has the same probability”.
Do you agree with Maeve? Give reasons for your answer.

(d) What is the probability that she rolls an odd number on the dice and the coin lands on tails?

(e) What is the probability that she rolls a 2 or a 3 on the dice and the coin lands on heads?

(f) Maeve says:
“Rolling a 2 and rolling a 3 are mutually exclusive outcomes”.
Maeve is correct. Explain what Maeve means by the term ‘mutually exclusive’.

2) A pet shop has a cage with 9 hamsters in it. 3 of the hamsters are white and 6 of them are brown.

Customers are allowed to request to hold a hamster before they choose if they would like to purchase it. The shop assistant selects hamsters at random and replaces them in the cage if they are not purchased.

(a) Arjun visits the pet shop and asks to hold a hamster. After holding the hamster Arjun chooses not to buy it. Immediately afterwards Cameron also visits the pet shop, holds a hamster, but does not purchase it.

- (i)** What is the probability that Arjun holds a white hamster and Cameron holds a brown hamster?
- (ii)** What is the probability that Arjun and Cameron hold hamsters that are the same colour?
- (iii)** Explain why the colour of the hamster Cameron held was independent of the colour of the hamster Arjun held.

Combined Events Probability - Worksheet

- (b) Emiko visits the pet shop and asks to hold a hamster. After holding the hamster Emiko chooses to buy it. Immediately afterwards Racheal also visits the pet shop and holds a hamster.
- What is the probability that Emiko and Racheal both hold a white hamster?
 - What is the probability that Emiko and Racheal hold hamsters which are different colours?
 - Explain why the colour of the hamster Racheal held is dependent on the colour of the hamster Emiko held.

- 3) Students David and Katlego must take a Chemistry test. The probability that David will pass the test is 0.4. The probability that Katlego will pass the test is 0.7.
- What is the probability that both students will pass the test?
 - What is the probability that David will pass the test and Katlego will fail?
 - What is the probability that the students get the same result?
 - If a student fails the Chemistry test, then they must re-sit the test a month later. The probability that David passes the resit, given that he fails the initial test, is 0.8.
 - What is the probability that David fails the initial test and passes the re-sit?
 - What is the probability that David fails both the initial test and the re-sit?

- 4) A fruit machine has three wheels.
 The first wheel has 2 cherries, 2 apples and 1 orange.
 The second wheel has 1 cherry, 2 apples and 2 oranges.
 The third wheel has 2 cherries, 1 apple and 2 oranges.
- When the button is pressed all three wheels spin.
 When the wheels stop spinning, if the fruit on each wheel matches, then a prize is won.

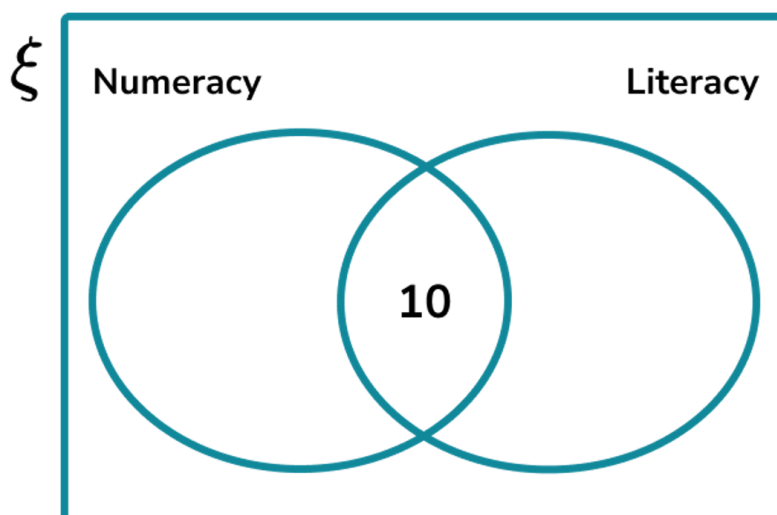


- What is the probability of getting three cherries?
- What is the probability of winning a prize?
- What is the probability of not winning a prize?

Combined Events Probability - Worksheet

- 5) 20 students sit both a numeracy test and a literacy test.
10 people passed both tests.
5 people failed both tests.
13 people passed the numeracy test.

(a) Complete the Venn diagram for the students.



- (b) Two students are chosen at random.
Calculate the probability that both students passed both tests.
- (c) Two students are chosen at random.
Calculate the probability that both students passed only one test.

Combined Events Probability - Exam Questions

- 1) A factory makes electric toy cars. A quality control officer checks that each car has no faults before it is put in a sales box. The officer estimates that the probability that a toy car has a fault is 0.1.

- (a) What is the probability that a toy car has no faults?

.....
(2)

- (b) Two toy cars are selected at random from the factory. What is the probability that they both have faults?

.....
(2)

- (c) Three toy cars are selected at random from the factory. What is the probability that exactly two of the toy cars have faults?

.....
(3)
(7 marks)

- 2) Jess and Ramaitha have a small box of chocolates each.
In Jess's box there are two nut chocolates and one caramel.
In Ramaitha's box there is one nut chocolate, one caramel and two mint chocolates.

Jess and Ramaitha both choose a chocolate from their own box.

- (a) Complete a sample space diagram to illustrate all the combined outcomes.

		Ramaitha			
		Nut	Caramel	Mint	Mint
Jess	Nut	NN	NC	NM	
	Nut				
	Caramel				

(2)

Combined Events Probability - Exam Questions

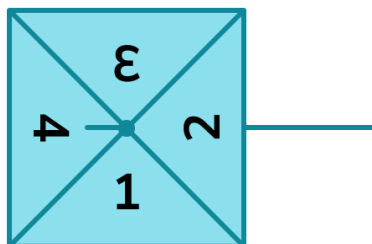
- (b) What is the probability that Jess and Ramaitha select the same type of chocolate

.....
(1)

- (c) Jess and Ramaitha then select a second chocolate from their respective boxes and eat both. What is the probability that Jess eats two nut chocolates and Ramaitha eats two mint chocolates?

.....
(3)
(6 marks)

- 3) A biased four-sided spinner has the numbers 1, 2, 3 and 4 on it.



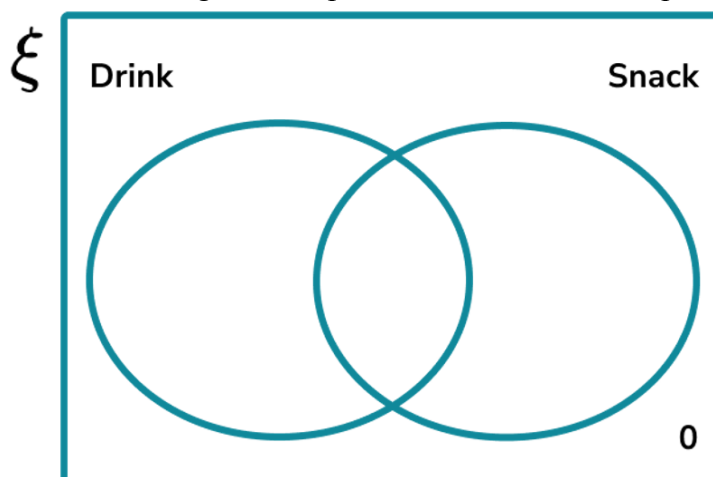
The table shows the probability that the spinner will land on each of the numbers 1, 2 and 3.

Number	1	2	3	4
Probability	0.2	0.4	0.1	

- (a) What is the probability that the spinner will land on 4?
-
(2)
- (b) The spinner is spun twice. What is the probability that it will land on 1 and then land on 2?
-
(2)
- (b) The spinner is spun twice and the two numbers it lands on are added together. What is the probability that the total will be 4?
-
(3)
(7 marks)

Combined Events Probability - Exam Questions

- 4) A flight attendant serves 45 passengers. They note that:
39 passengers chose a drink.
27 passengers chose a snack.
All passengers chose something.
Some passengers had both a drink and a snack.
- (a) Complete the Venn diagram to represent the choices of the passengers.

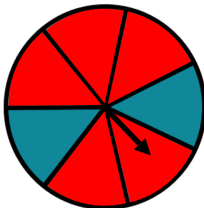



(2)

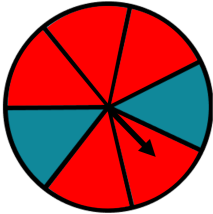
- (b) Two passengers are chosen at random. What is the probability that each of them chose both a drink and a snack?

.....
(3)
(5 marks)

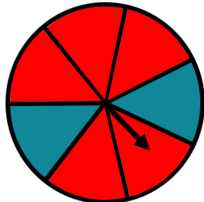

Combined Events Probability - Answers

	Question	Answer
	Skill Questions	
Group A	<p>Work out:</p> <p>1) A circular spinner has seven sections. Five of the sections are red and two are blue. The spinner is spun twice.</p>  <p>a) What is the probability it lands on red both times?</p> <p>b) What is the probability that it lands on red first and then it lands on blue?</p> <p>c) What is the probability that it lands on blue twice?</p> <p>2) There are five cards with letters on them spelling the word TOTAL. The cards are placed face down on a table. A card is chosen, the letter it shows is recorded and then it is replaced. A second card is then chosen.</p>  <p>a) What is the probability that both cards show the letter A?</p> <p>b) What is the probability that the first card is a T and the second card is an L?</p> <p>c) What is the probability that the first card is a vowel, and the second card is a consonant.</p>	<p>1)</p> <p>a) $\frac{5}{7} \times \frac{5}{7} = \frac{25}{49}$</p> <p>b) $\frac{5}{7} \times \frac{2}{7} = \frac{10}{49}$</p> <p>c) $\frac{2}{7} \times \frac{2}{7} = \frac{4}{49}$</p> <p>2)</p> <p>a) $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$</p> <p>b) $\frac{2}{5} \times \frac{1}{5} = \frac{2}{25}$</p> <p>c) $\frac{2}{5} \times \frac{3}{5} = \frac{6}{25}$</p>


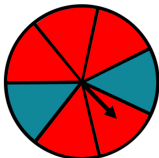
Combined Events Probability - Answers

Group A contd	<p>3) An online store claims that 85% of their orders are delivered within three days of purchase. Evin and Ailbhe make separate purchases from this online store and await the arrival of their orders.</p> <div data-bbox="549 439 863 640" style="border: 1px solid #00728f; border-radius: 15px; padding: 10px; text-align: center; margin: 10px auto; width: fit-content;"> <p style="font-size: 24px; color: #00728f; margin: 0;">85%</p> <p style="color: #00728f; margin: 0;">of orders are delivered within <u>three</u> days</p> </div> <p>a) What is the probability that both parcels arrive within three days?</p> <p>b) What is the probability that both parcels do not arrive within three days?</p> <p>c) What is the probability that Evin's parcel arrives within three days, but Ailbhe's does not?</p> <p>4) A circular spinner has seven sections. Five of the sections are red and two are blue. The spinner is spun 3 times.</p> <div data-bbox="603 1115 813 1326" style="text-align: center; margin: 10px auto;">  </div> <p>a) What is the probability it lands on red three times in a row?</p> <p>b) What is the probability that it lands on blue first and then it lands on red twice?</p> <p>c) What is the probability that it lands on blue, then red, then blue again?</p>	<p>3)</p> <p>a) $0.85 \times 0.85 = 0.7225$</p> <p>b) $1 - 0.85 = 0.15$ $0.15 \times 0.15 = 0.0225$</p> <p>c) $0.85 \times 0.15 = 0.1275$</p> <p>4)</p> <p>a) $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \frac{125}{343}$</p> <p>b) $\frac{2}{7} \times \frac{5}{7} \times \frac{5}{7} = \frac{50}{343}$</p> <p>c) $\frac{2}{7} \times \frac{5}{7} \times \frac{2}{7} = \frac{20}{343}$</p>
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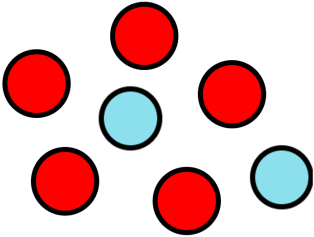

Combined Events Probability - Answers

Group B	<p>1) A circular spinner has seven sections. Five of the sections are red and two are blue. The spinner is spun twice.</p>  <p>a) What is the probability it lands on the same colour?</p> <p>b) What is the probability that it lands on different colours?</p> <p>2) There are five cards with letters on them spelling the word TOTAL. The cards are placed face down on a table. A card is chosen, the letter it shows is recorded and then it is replaced. A second card is then chosen.</p>  <p>a) What is the probability that both cards show the letter L or both cards show the letter T?</p> <p>b) What is the probability that one of the cards is an A and one of the cards is a T?</p> <p>c) What is the probability that one of the cards is a vowel, and one of the cards is a consonant?</p>	<p>a) $\frac{2}{7} \times \frac{2}{7} + \frac{5}{7} \times \frac{5}{7} = \frac{29}{49}$</p> <p>b) $\frac{2}{7} \times \frac{5}{7} + \frac{5}{7} \times \frac{2}{7} = \frac{20}{49}$</p> <p>a) $\frac{1}{5} \times \frac{1}{5} + \frac{2}{5} \times \frac{2}{5} = \frac{5}{25}$</p> <p>b) $\frac{1}{5} \times \frac{2}{5} + \frac{2}{5} \times \frac{1}{5} = \frac{4}{25}$</p> <p>c) $\frac{2}{5} \times \frac{3}{5} + \frac{3}{5} \times \frac{2}{5} = \frac{12}{25}$</p>
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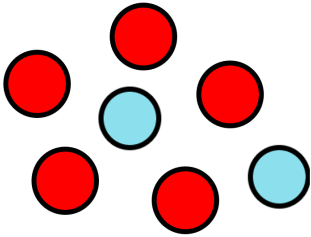
Combined Events Probability - Answers

<p>Group B</p>	<p>3) An online store claims that 85% of their orders are delivered within three days of purchase. Evin and Ailbhe make separate purchases from this online store and await the arrival of their orders.</p> <div data-bbox="579 477 778 607" data-label="Figure">  </div> <p>a) What is the probability that either both parcels arrive within three days or both parcels do not arrive within three days?</p> <p>b) What is the probability that one of the parcels arrives within three days and one of them does not?</p> <p>4) A circular spinner has seven sections. Five of the sections are red and two are blue. The spinner is spun twice. The spinner is spun 3 times.</p> <div data-bbox="601 1135 758 1292" data-label="Image">  </div> <p>a) What is the probability it lands on the same colour each time?</p> <p>b) What is the probability that it lands on red twice and blue once?</p> <p>c) What is the probability that it lands on blue at least once?</p>	<p>3)</p> <p>a) $0.85 \times 0.85 = 0.7225$ $0.15 \times 0.15 = 0.0225$ $0.7225 + 0.0225 = 0.745$</p> <p>b) $0.85 \times 0.15 = 0.1275$ $0.15 \times 0.85 = 0.1275$ $0.1275 + 0.1275 = 0.255$</p> <p>4)</p> <p>a) $\frac{2}{7} \times \frac{2}{7} \times \frac{2}{7} = \frac{8}{343}$ $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \frac{125}{343}$ $\frac{8}{343} + \frac{125}{343} = \frac{133}{343}$</p> <p>b) $\frac{5}{7} \times \frac{5}{7} \times \frac{2}{7} = \frac{50}{343}$ RRB, RBR, BRR $\frac{50}{343} \times 3 = \frac{150}{343}$</p> <p>c) $P(\text{blue at least once}) = 1 - P(\text{no blue})$ $P(\text{no blue}) = P(\text{RRR}) =$ $1 - \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \frac{218}{343}$</p>
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Combined Events Probability - Answers

Group C	<p>Work out:</p> <p>1) There are seven counters in a bag. Five of the counters are red and two are blue. Two counters are chosen at random one at a time and not replaced.</p>  <p>a) What is the probability that both counters are blue?</p> <p>b) What is the probability that the first counter is red, and the second counter is blue?</p> <p>c) What is the probability that the first counter is blue, and the second counter is red?</p> <p>d) What is the probability that the counters are the same colour?</p> <p>e) What is the probability that the counters are different colours?</p> <p>f) What is the probability that there is at least one red?</p>	<p>1)</p> <p>a) $\frac{2}{7} \times \frac{1}{6} = \frac{2}{42} = \frac{1}{21}$</p> <p>b) $\frac{5}{7} \times \frac{2}{6} = \frac{10}{42} = \frac{5}{21}$</p> <p>c) $\frac{2}{7} \times \frac{5}{6} = \frac{10}{42} = \frac{5}{21}$</p> <p>d) $\frac{5}{7} \times \frac{4}{6} + \frac{2}{7} \times \frac{1}{6} = \frac{11}{21}$</p> <p>e) $\frac{5}{7} \times \frac{2}{6} + \frac{2}{7} \times \frac{5}{6} = \frac{10}{21}$</p> <p>f) $P(\text{at least one red}) = 1 - P(\text{no red}) = 1 - \frac{2}{7} \times \frac{1}{6} = \frac{20}{21}$</p>
Group C	<p>2) There are five cards with letters on them spelling the word TOTAL. The cards are placed face down on a table. Two cards are then chosen one at a time and not replaced.</p>  <p>a) What is the probability that both cards show the letter T?</p>	<p>2)</p> <p>a) $\frac{2}{5} \times \frac{1}{4} = \frac{2}{20} = \frac{1}{10}$</p>

Combined Events Probability - Answers

Group C	<p>b) What is the probability the first card is a L and the second card is an T?</p> <p>c) What is the probability that one of the cards is a vowel, and one of the cards is a consonant?</p> <p>d) What is the probability that both cards are vowels or both cards are consonants?</p> <p>e) After the two cards are chosen a third card is then selected as well. What is the probability that two T cards are chosen in the selection of 3 cards?</p> <p>3) There are seven counters in a bag. Five of the counters are red and two are blue. Three counters are chosen at random one at a time and not replaced.</p>  <p>a) What is the probability that all three counters are red?</p> <p>b) What is the probability that the first and second counters are blue, and the last counter is red?</p> <p>c) What is the probability that the first counter is red, the second counter is blue, and the last counter is red?</p> <p>d) What is the probability that both blue counters get chosen?</p> <p>e) What is the probability that at least one red counter is chosen?</p>	<p>b) $\frac{1}{5} \times \frac{2}{4} = \frac{2}{20} = \frac{1}{10}$</p> <p>c) $\frac{2}{5} \times \frac{3}{4} + \frac{3}{5} \times \frac{2}{4} = \frac{6}{10}$</p> <p>d) $\frac{2}{5} \times \frac{1}{4} + \frac{3}{5} \times \frac{2}{4} = \frac{2}{5}$</p> <p>e) $\frac{2}{5} \times \frac{1}{4} \times \frac{3}{3} = \frac{6}{60} = \frac{1}{10}$ TT#, #TT, T#T $\frac{1}{10} \times 3 = \frac{3}{10}$</p> <p>a) $\frac{5}{7} \times \frac{4}{6} \times \frac{3}{5} = \frac{60}{210} = \frac{2}{7}$</p> <p>b) $\frac{2}{7} \times \frac{1}{6} \times \frac{5}{5} = \frac{10}{210} = \frac{1}{21}$</p> <p>c) $\frac{5}{7} \times \frac{2}{6} \times \frac{4}{5} = \frac{40}{210} = \frac{4}{21}$</p> <p>d) $\frac{2}{7} \times \frac{1}{6} \times \frac{5}{5} = \frac{10}{210} = \frac{1}{21}$ BBR, RBB, BRB $\frac{1}{21} \times 3 = \frac{3}{21} = \frac{1}{7}$</p> <p>e) P(at least one red) = $1 - P(\text{no red}) = 1 - 0 = 1$</p>
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Combined Events Probability - Answers

	Question	Answer																																										
	Applied Questions																																											
1)	<p>Maeve rolls a fair 6-sided dice and flips a coin.</p> <p>a) Complete the sample space diagram to show the outcomes.</p> <table><tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><th>H</th><td>1H</td><td>2H</td><td>3H</td><td>4H</td><td></td><td></td></tr><tr><th>T</th><td>1T</td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>b) What is the probability of the combined outcome of Maeve rolling a seven on the dice and the coin landing on heads?</p> <p>c) Maeve says; “There are 12 combined outcomes and each one has the same probability”. Do you agree with Maeve? Given reasons for your answer.</p> <p>d) What is the probability that she rolls an odd number on the dice and the coin lands on tails?</p> <p>e) What is the probability that she rolls a 2 or a 3 on the dice and the coin lands on heads?</p> <p>f) Maeve says: “Rolling a 2 and rolling a 3 are mutually exclusive outcomes”. Maeve is correct. Explain what Maeve means by the term ‘mutually exclusive’.</p>		1	2	3	4	5	6	H	1H	2H	3H	4H			T	1T						<p>a)</p> <table><tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><th>H</th><td>1H</td><td>2H</td><td>3H</td><td>4H</td><td>5H</td><td>6H</td></tr><tr><th>T</th><td>1T</td><td>2T</td><td>3T</td><td>4T</td><td>5T</td><td>6T</td></tr></table> <p>b) $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$</p> <p>c) Maeve is correct.</p> <p>There are 12 outcomes: 1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T,</p> <p>These can be seen in the sample space diagram. Each number on the dice has an equal chance of being rolled and there is an equal chance of flipping a heads or tails on a coin. Therefore, each combined outcome also has an equal chance, and this is $\frac{1}{12}$.</p> <p>d) $\frac{3}{6} \times \frac{1}{2} = \frac{3}{12} = \frac{1}{4}$</p> <p>e) $\frac{2}{6} \times \frac{1}{2} = \frac{2}{12} = \frac{1}{6}$</p> <p>f) Mutually exclusive outcomes can not occur at the same time. When you roll a dice once you cannot roll a 2 and a 3. Hence, rolling a 2 and rolling a 3 are mutually exclusive outcomes.</p>		1	2	3	4	5	6	H	1H	2H	3H	4H	5H	6H	T	1T	2T	3T	4T	5T	6T
	1	2	3	4	5	6																																						
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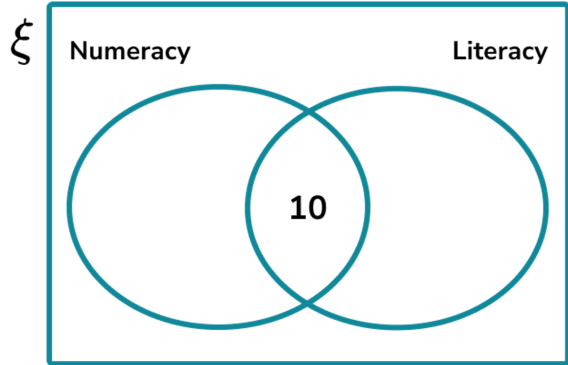
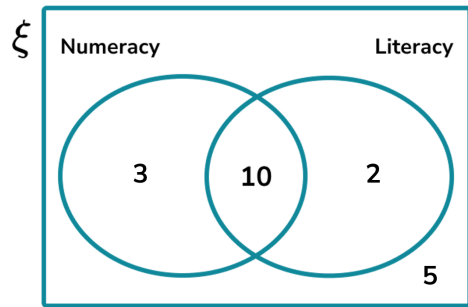
Combined Events Probability - Answers

<p>2)</p>	<p>A pet shop has a cage with 9 hamsters in it. 3 of the hamsters are white and 6 of them are brown.</p> <p>Customers are allowed to request to hold a hamster before they choose if they would like to purchase it. The shop assistant selects hamsters at random and replaces them in the cage if they are not purchased.</p> <p>a) Arjun visits the pet shop and asks to hold a hamster. After holding the hamster Arjun chooses not to buy it. Immediately afterwards Cameron also visits the pet shop, holds a hamster, but does not purchase it.</p> <p>(i) What is the probability that Arjun holds a white hamster and Cameron holds a brown hamster?</p> <p>(ii) What is the probability that Arjun and Cameron hold hamsters that are the same colour?</p> <p>(iii) Explain why the colour of the hamster Cameron held was independent of the colour of the hamster Arjun held.</p> <p>b) Emiko visits the pet shop and asks to hold a hamster. After holding the hamster Emiko chooses to buy it. Immediately after, Racheal also visits the pet shop and holds a hamster.</p> <p>(i) What is the probability that Emiko and Racheal both hold a white hamster?</p> <p>(ii) What is the probability that Emiko and Racheal hold hamsters which are different colours?</p> <p>(iii) Explain why the colour of the hamster Racheal held is dependent on the colour of the hamster Emiko held.</p>	<p>a)</p> <p>(i) $\frac{3}{9} \times \frac{6}{9} = \frac{18}{81} = \frac{2}{9}$</p> <p>(ii) $\frac{3}{9} \times \frac{3}{9} + \frac{6}{9} \times \frac{6}{9} = \frac{5}{9}$</p> <p>(iii) Arjun did not purchase the hamster and therefore it was returned to the cage leaving the same selection for Cameron. Events are independent if the occurrence of one event does not affect the occurrence of another.</p> <p>b)</p> <p>(i) $\frac{3}{9} \times \frac{2}{8} = \frac{6}{72} = \frac{1}{12}$</p> <p>(ii) $\frac{3}{9} \times \frac{6}{8} + \frac{6}{9} \times \frac{3}{8} = \frac{1}{2}$</p> <p>(iii) Emiko purchased a hamster and therefore there was one less hamster available for Racheal affecting the probability. Events are dependent if the occurrence of one event affects the occurrence of another.</p>
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Combined Events Probability - Answers

<p>3)</p>	<p>Students David and Katlego must take a Chemistry test. The probability that David will pass the test is 0.4. The probability that Katlego will pass the test is 0.7.</p> <p>a) What is the probability that both students will pass the test?</p> <p>b) What is the probability that David will pass the test and Katlego will fail?</p> <p>c) What is the probability that the students get the same result?</p> <p>d) If a student fails the Chemistry test, then they must re-sit the test a month later. The probability that David passes the resit, given that he fails the initial test, is 0.8.</p> <p>(i) What is the probability that David fails the initial test and passes the re-sit?</p> <p>(ii) What is the probability that David fail both the initial test and the re-sit?</p>	<p>a) $0.4 \times 0.7 = 0.28$</p> <p>b) $1 - 0.7 = 0.3$ $0.4 \times 0.3 = 0.12$</p> <p>c) $P(\text{both pass}) = 0.4 \times 0.7 = 0.28$ $1 - 0.4 = 0.6$</p> <p>$P(\text{both fail}) = 0.6 \times 0.3 = 0.18$</p> <p>$P(\text{same result})$ $= 0.28 + 0.18 = 0.46$</p> <p>d)</p> <p>(i) $0.6 \times 0.8 = 0.48$</p> <p>(ii) $1 - 0.8 = 0.2$ $P(\text{fails both}) = 0.6 \times 0.2 = 0.12$</p>
<p>4)</p>	<p>A fruit machine has three wheels. The first wheel has 2 cherries, 2 apples and 1 orange. The second wheel has 1 cherry, 2 apples and 2 oranges. The third wheel has 2 cherries, 1 apple and 2 oranges. When the button is pressed all three wheels spin. When the wheels stop spinning, if the fruit on each wheel matches, then a prize is won.</p> <p>a) What is the probability of getting three cherries?</p>	<p>a) $P(3 \text{ cherries})$ $= \frac{2}{5} \times \frac{1}{5} \times \frac{2}{5} = \frac{4}{125}$</p>

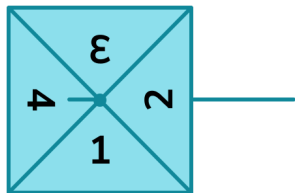
Combined Events Probability - Answers

	<p>b) What is the probability of winning a prize?</p> <p>c) What is the probability of not winning a prize?</p>	<p>b) $P(\text{win}) = P(3 \text{ cherries or } 3 \text{ apples or } 3 \text{ oranges}) =$ $\frac{4}{125} + \frac{4}{125} + \frac{4}{125} = \frac{12}{125}$</p> <p>c) $P(\text{not win prize}) = 1 - \frac{12}{125} = \frac{113}{125}$</p>
5)	<p>20 students sit both a numeracy test and a literacy test. 10 people passed both tests. 5 people failed both tests. 13 people passed the numeracy test.</p> <p>a) Complete the Venn diagram for the students.</p>  <p>b) Two students are chosen at random. Calculate the probability that both students passed both tests.</p> <p>c) Two students are chosen at random. Calculate the probability that both students passed only one test.</p>	<p>a) $13 - 10 = 3$ $20 - 3 - 10 - 5 = 2$</p>  <p>b) $\frac{10}{20} \times \frac{9}{19} = \frac{90}{380} = \frac{9}{38}$</p> <p>c) $\frac{5}{20} \times \frac{4}{19} = \frac{20}{380} = \frac{1}{19}$</p>

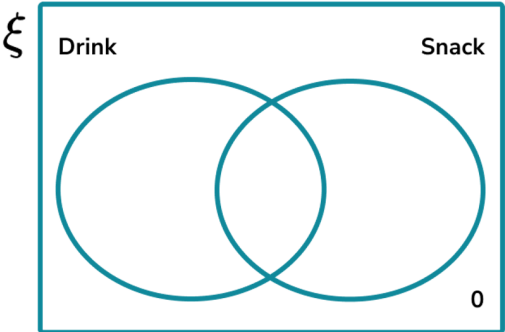
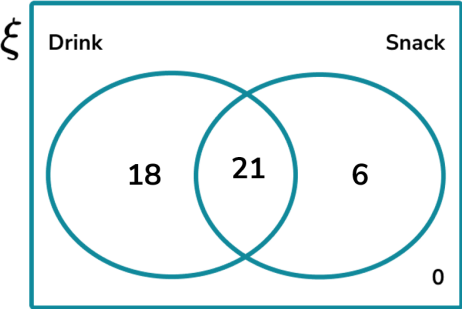
Combined Events Probability - Mark Scheme

	Question	Answer																																																					
	Exam Questions																																																						
1)	<p>A factory makes electric toy cars. A quality control officer checks that each car has no faults before it is put in a sales box.</p> <p>The officer estimates that the probability that a toy car has a fault is 0.1.</p>																																																						
(a)	What is the probability that a toy car has no faults?	(a) $1 - 0.1$ 0.9	(1) (1)																																																				
(b)	Two toy cars are selected at random from the factory. What is the probability that they both have faults?	(b) 0.1×0.1 0.01	(1) (1)																																																				
(c)	Three toy cars are selected at random from the factory. What is the probability that exactly two of the toy cars have faults?	(c) $P(\text{Fault, Fault, No fault})$ $= 0.1 \times 0.1 \times 0.9 = 0.009$ 3×0.009 0.027	(1) (1) (1)																																																				
2)	<p>Jess and Ramaitha have a small box of chocolates each.</p> <p>In Jess's box there are two nut chocolates and one caramel.</p> <p>In Ramaitha's box there is one nut chocolate, one caramel and two mint chocolates.</p> <p>Jess and Ramaitha both choose a chocolate from their own box.</p> <p>(a) Draw a sample space diagram to illustrate all the combined outcomes.</p> <table border="1"><tr><th colspan="2" rowspan="2"></th><th colspan="4">Ramaitha</th></tr><tr><th>Nut</th><th>Caramel</th><th>Mint</th><th>Mint</th></tr><tr><th rowspan="3">Jess</th><th>Nut</th><td>NN</td><td>NC</td><td>NM</td><td></td></tr><tr><th>Nut</th><td></td><td></td><td></td><td></td></tr><tr><th>Caramel</th><td></td><td></td><td></td><td></td></tr></table>			Ramaitha				Nut	Caramel	Mint	Mint	Jess	Nut	NN	NC	NM		Nut					Caramel					<p>(a)</p> <table border="1"><tr><th colspan="2" rowspan="2"></th><th colspan="4">Ramaitha</th></tr><tr><th>Nut</th><th>Caramel</th><th>Mint</th><th>Mint</th></tr><tr><th rowspan="3">Jess</th><th>Nut</th><td>NN</td><td>NC</td><td>NM</td><td>NM</td></tr><tr><th>Nut</th><td>NN</td><td>NC</td><td>NM</td><td>NM</td></tr><tr><th>Caramel</th><td>CN</td><td>CC</td><td>CM</td><td>CM</td></tr></table> <p>For 4 correct entries For a completely correct table with all correct outcomes.</p>			Ramaitha				Nut	Caramel	Mint	Mint	Jess	Nut	NN	NC	NM	NM	Nut	NN	NC	NM	NM	Caramel	CN	CC	CM	CM	(1) (1)
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	Nut	NN	NC	NM	NM																																																		
	Caramel	CN	CC	CM	CM																																																		
(b)	What is the probability that Jess and Ramaitha select the same type of chocolate?	(b) $\frac{3}{12}$ oe	(1)																																																				

Combined Events Probability - Mark Scheme

(c)	Jess and Ramaitha then select a second chocolate from their respective boxes and eat both. What is the probability that Jess eats two nut chocolates and Ramaitha eats two mint chocolates?	(c) $\frac{2}{3} \times \frac{1}{2} = \frac{2}{6}$ oe $\frac{2}{4} \times \frac{1}{3} = \frac{2}{12}$ oe $\frac{1}{3} \times \frac{1}{6} = \frac{1}{18}$ oe	(1) (1) (1)										
3)	<p>A biased four-sided spinner has the numbers 1, 2, 3 and 4 on it.</p>  <p>The table shows the probability that the spinner will land on each of the numbers 1, 2 and 3.</p> <table><tr><th>Number</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>Probability</td><td>0.2</td><td>0.4</td><td>0.1</td><td></td></tr></table>	Number	1	2	3	4	Probability	0.2	0.4	0.1			
Number	1	2	3	4									
Probability	0.2	0.4	0.1										
(a)	What is the probability that the spinner will land on 4?	(a) $1 - 0.2 - 0.4 - 0.1$ 0.3	(1) (1)										
(b)	The spinner is spun twice. What is the probability that it will land on 1 and then land on 2?	(b) 0.2×0.4 0.08	(1) (1)										
(c)	The spinner is spun twice and the two numbers it lands on are added together. What is the probability that the total will be 4?	(c) There are 3 permutations that produce the sum of 4 $1 + 3 = 4$ $3 + 1 = 4$ $2 + 2 = 4$ (1) $0.2 \times 0.1 = 0.02$ $0.1 \times 0.2 = 0.02$ $0.4 \times 0.4 = 0.16$ 0.02 and 0.16 $0.02 + 0.02 + 0.16 = 0.2$	(1) (1) (1)										

Combined Events Probability - Mark Scheme

<p>4)</p> <p>A flight attendant serves 45 passengers. They note that: 39 passengers chose a drink. 27 passengers chose a snack. All passengers chose something. Some passengers had both a drink and a snack.</p> <p>(a) Draw a Venn diagram to represent the drink choices of the passengers.</p>		<p>(a)</p>  <p>$39 + 27 - 45 = 21$</p> <p>Fully correct diagram</p>	<p>(1)</p> <p>(1)</p>
<p>(b) Two passengers are chosen at random. What is the probability that each of them chose both a drink and a snack?</p>		<p>(b) Second probability = $\frac{20}{44}$</p> <p>$\frac{21}{45} \times \frac{20}{44}$</p> <p>$\frac{420}{1980}$ oe</p>	<p>(1)</p> <p>(1)</p> <p>(1)</p>

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