

PRACTICE 8.3 – Independent and Dependent Events

* Full, worked solutions can be found in the folder linked on the Course Website ☺

Exercise 8G

TOK

Do you think that mathematics is a useful way to measure risks?

To what extent do emotion and faith play a part in taking risks?

- 1 Erland's wardrobe contains five shirts—one blue, one brown, one white, one black and one purple. He reaches into the wardrobe and chooses a shirt without looking. He replaces this shirt and chooses again. What is the probability Erland chooses the purple shirt both times?
- 2 A large school conducts a survey of the food provided by the school cafeteria. It is found that $\frac{4}{5}$ of the students like pasta. Three students are chosen at random. What is the probability that all three students like pasta?
- 3 Millie is playing in a cricket match and a game of hockey at the weekend. The probability that her team will win the cricket match is 0.75 and the probability of her team winning the hockey match is 0.85. What is the probability that Millie's team loses both matches?
- 4 Three events A , B and C are such that A and B are mutually exclusive and $P(A) = 0.2$, $P(C) = 0.3$, $P(A \cup B) = 0.4$ and $P(B \cup C) = 0.34$.
 - a Calculate $P(B)$ and $P(B \cap C)$.
 - b Determine whether B and C are independent.
- 5 Muamar tosses a coin and rolls a six-sided dice. Find the probability that Muamar gets a head on the coin, and does not get a 6 on the dice.
- 6 A missile has a $\frac{8}{9}$ chance of hitting its target. If four missiles are launched what is the probability that the target is not hit?
- 7 Given that $P(E') = P(F) = 0.6$ and $P(E \cap F) = 0.24$:
 - a Write down $P(E)$.
 - b Explain how you know E and F :
 - i are independent
 - ii are not mutually exclusive.
 - c Find $P(E \cup F')$.
- 8 A six-sided dice is numbered 1, 2, 2, 5, 6, 6. It is thrown three times. What is the probability that the scores add up to 6?
- 9 A and B are independent events such that $P(A) = 0.9$ and $P(B) = 0.3$. Find:
 - a $P(A \cap B)$
 - b $P(A \cap B')$
 - c $P(A \cup B')$

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Exercise 8H



- 1 There are 27 students in a class. Of the students, 15 take film and 20 take theatre, and four do neither subject.
- How many students take both subjects?
 - One person is chosen at random. Find the probability that the person:
 - takes theatre but not film
 - takes at least one of the two subjects
 - takes theatre given that they take film.

- 2 A number is chosen at random from this list of eight numbers:

1 2 6 7 11 14 24 29

Find:

- $P(\text{it is even} \mid \text{it is not a multiple of 4})$
- $P(\text{it is less than 15} \mid \text{it is greater than 5})$

- $P(\text{It is less than 5} \mid \text{it is less than 15})$
- $P(\text{it lies between 1 and 10} \mid \text{it lies between 5 and 25})$

- 3 V and W are mutually exclusive events where $P(V) = 0.26$ and $P(W) = 0.37$.

Find:

- $P(V \cap W)$
- $P(V \mid W)$
- $P(V \cup W)$

- 4 The table below shows the number of left-handed and right-handed table tennis players in a sample of 50 males and females at a club.

	Left-handed	Right-handed	Total
Male	5	32	37
Female	2	11	13
Total	7	43	50

A table tennis player was selected at random from the group. Find the probability that the player was:

- male and left-handed
- right-handed
- right-handed, given that the player selected was female.

- 5 J and K are independent events. Given that $P(J \mid K) = 0.3$ and $P(K) = 0.5$, find $P(J)$.

- 6 Your neighbour has two children. You learn that he has a son, Samuel. What is the probability that Samuel's sibling is a brother?

HINT

This is not as obvious as it might initially seem!