

Exercise walk-through

4.5

Conditional Probability

AP Statistics

Conditional probability and independence

A **conditional probability** restricts
to the times B happens:

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

The **multiplication rule** :

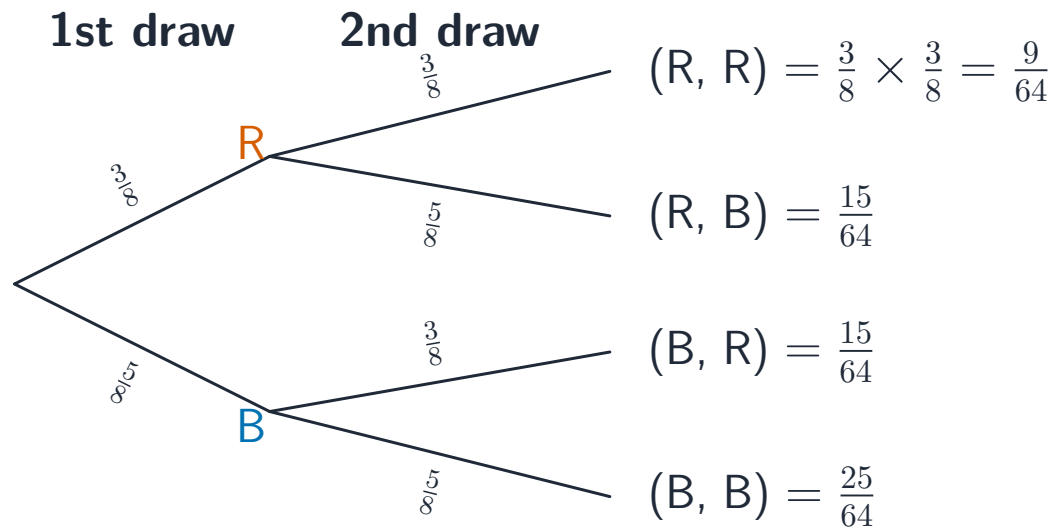
$P(A \cap B) = P(A) P(B \mid A)$. The chance of A **once you know** B happened. Two-way tables make these easy: restrict to B 's row or column, then find A 's share.

Independent : $P(A \mid B) = P(A)$, so $P(A \cap B) = P(A)P(B)$. Not the same as mutually exclusive!

	girl	boy
sport	24	36
none	16	24

$$P(\text{girl} \mid \text{sport}) = \frac{24}{60}$$

On a tree diagram



On a tree diagram, multiply the probabilities along the branches

Exercises 2.1-2.3

2.1 Write the formula for $P(A \mid B)$.

[1]

2.2 If $P(A \cap B) = 0.12$ and $P(B) = 0.4$, find $P(A \mid B)$.

[2]

2.3 State the multiplication rule.

[1]

Exercises 2.1-2.3

2.1 Write the formula for $P(A \mid B)$.

[1]

2.1

- $$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

2.2 If $P(A \cap B) = 0.12$ and $P(B) = 0.4$, find $P(A \mid B)$.

[2]

2.2

- $$P(A \mid B) = \frac{0.12}{0.4} = 0.3$$

2.3 State the multiplication rule.

[1]

2.3

- $$P(A \cap B) = P(A) \cdot P(B \mid A)$$

Exercise 3.1

3.1 $P(A \mid B)$ equals

[1]

☐

A $\frac{P(A \cap B)}{P(B)}$

B $P(A) + P(B)$

C $P(A) \cdot P(B)$

D $\frac{P(B)}{P(A)}$

Exercise 3.1

3.1 $P(A \mid B)$ equals

[1]

- ☐ **A** $\frac{P(A \cap B)}{P(B)}$
- B** $P(A) + P(B)$
- C** $P(A) \cdot P(B)$
- D** $\frac{P(B)}{P(A)}$

3.1 **A**

• $\frac{P(A \cap B)}{P(B)}.$

Exercise 3.2

3.2 The multiplication rule gives $P(A \cap B) =$

[1]

☐

A $P(A) + P(B \mid A)$

B $P(A) \cdot P(B \mid A)$

C $\frac{P(A)}{P(B)}$

D $P(A) - P(B)$

Exercise 3.2

3.2 The multiplication rule gives $P(A \cap B) =$ [1]

☐

A $P(A) + P(B \mid A)$

B $P(A) \cdot P(B \mid A)$

C $\frac{P(A)}{P(B)}$

D $P(A) - P(B)$

3.2 B

- $P(A) \cdot P(B \mid A)$.

Exercise 3.3 (a)

3.3 In a class, $P(\text{likes maths and science}) = 0.3$ and $P(\text{science}) = 0.6$.

(a) Find $P(\text{likes maths} \mid \text{science})$.

[2]

Exercise 3.3 (a)

3.3 In a class, $P(\text{likes maths and science}) = 0.3$ and $P(\text{science}) = 0.6$.

(a) Find $P(\text{likes maths} \mid \text{science})$.

[2]

(a)

- $\frac{0.3}{0.6} = 0.5$

Exercise 3.3 (b)

3.3 In a class, $P(\text{likes maths and science}) = 0.3$ and $P(\text{science}) = 0.6$.

(b) Write the general formula for $P(A \mid B)$.

[1]

Exercise 3.3 (b)

3.3 In a class, $P(\text{likes maths and science}) = 0.3$ and $P(\text{science}) = 0.6$.

(b) Write the general formula for $P(A \mid B)$.

[1]

(b)

- $$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$