

Venn diagrams

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Worked example

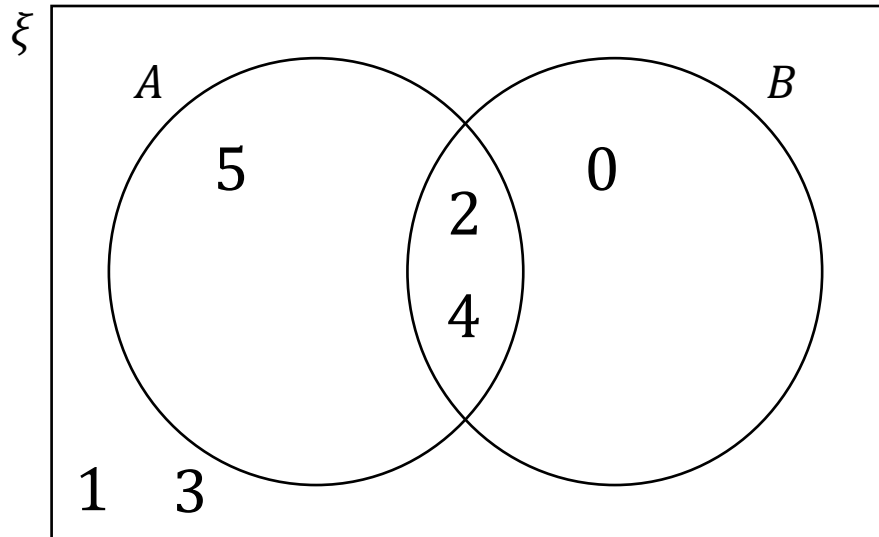
A number is picked from the Venn diagram. Calculate the probability of picking:

A prime number

An even number

A number greater than 5

A number less than or equal to 5



Your turn

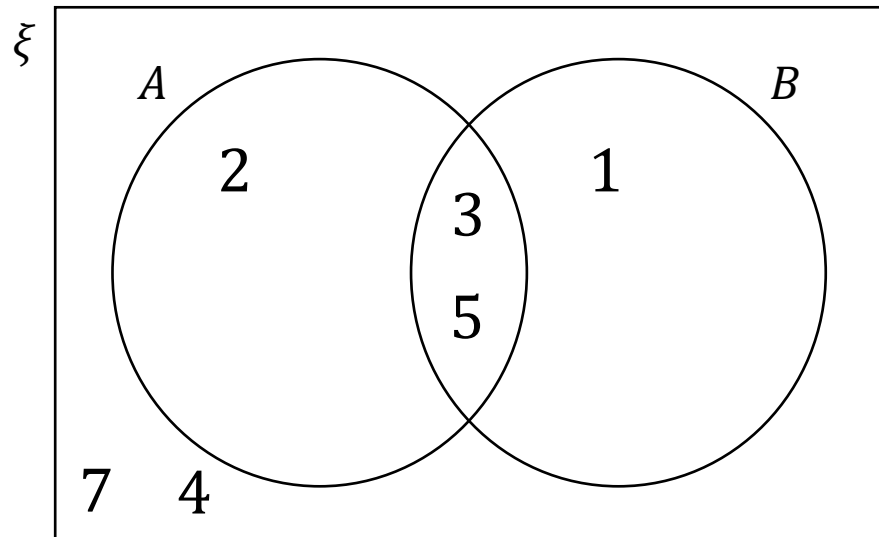
A number is picked from the Venn diagram. Calculate the probability of picking:

A prime number $\frac{2}{3}$

An even number $\frac{1}{3}$

A number greater than 5 $\frac{1}{6}$

A number less than or equal to 5 $\frac{5}{6}$



Worked example

In a group of 28 scientists:

- 20 have degrees in Physics.
- 18 have degrees in Chemistry.
- Some have degrees in both
- 4 scientists have degrees which are neither Physics nor Chemistry.

A scientist is chosen at random.
Find the probability that the scientist has a degree in:

Physics

Chemistry

Both Physics and Chemistry

Neither Physics nor Chemistry

Your turn

In a group of 30 mathematicians:

- 15 have studied Calculus.
- 22 have studied Topology.
- Some have studied both.
- 3 mathematicians have not yet studied either Calculus or topology

A mathematician is chosen at random. Find the probability that the mathematician has studied:

Calculus $\frac{1}{2}$

Topology $\frac{11}{15}$

Both Calculus and Topology $\frac{1}{3}$

Neither Calculus nor topology $\frac{1}{10}$

Worked example

There are 150 pupils. The examinations available are: English, Maths and Science.

- 15 pupils are sitting English and Maths but not science
- 20 pupils are sitting Science and Maths but not English
- 18 pupils are sitting Science and English but not Maths
- 8 pupils are sitting all three exams.
- 55 are sitting English in total
- 72 are sitting Maths in total
- 65 are sitting Science in total

A pupil is chosen at random. What is the probability that they are sitting no exams?

Your turn

There are 130 pupils. The examinations available are: English, Maths and Science.

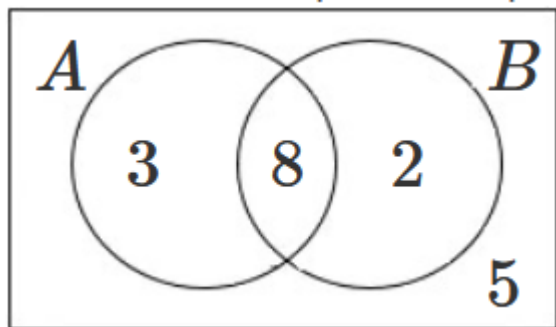
- 10 pupils are sitting English and Maths but not science
- 20 pupils are sitting Science and Maths but not English
- 9 pupils are sitting Science and English but not Maths
- 13 pupils are sitting all three exams.
- 49 are sitting English in total
- 83 are sitting Maths in total
- 62 are sitting Science in total

A pupil is chosen at random. What is the probability that they are sitting no exams?

$$\frac{1}{130}$$

Worked example

Calculate:



$$P(A)$$

$$P(B)$$

$$P(A')$$

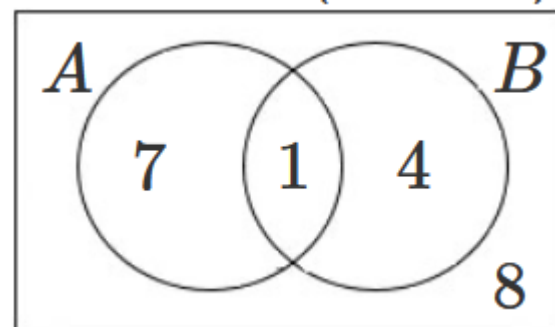
$$P(B')$$

$$P(A \cap B)$$

$$P(A \cup B)$$

Your turn

Calculate:



$$P(A) \quad \frac{2}{5}$$

$$P(B) \quad \frac{1}{4}$$

$$P(A') \quad \frac{3}{5}$$

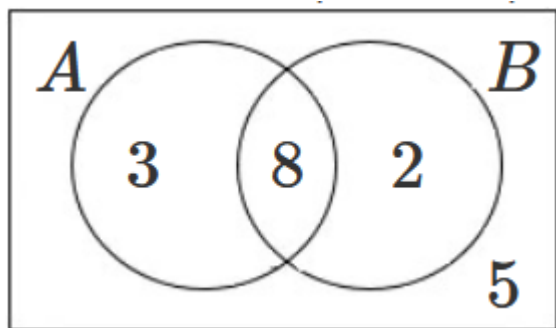
$$P(B') \quad \frac{3}{4}$$

$$P(A \cap B) \quad \frac{1}{20}$$

$$P(A \cup B) \quad \frac{3}{5}$$

Worked example

Calculate:



$$P(A' \cap B)$$

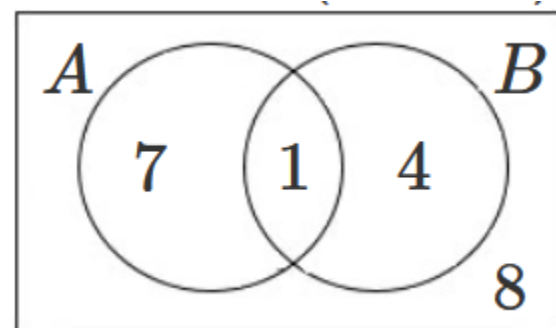
$$P(A \cap B')$$

$$P(A' \cap B')$$

$$P((A \cap B)')$$

Your turn

Calculate:



$$P(A' \cap B)$$

$$\frac{1}{5}$$

$$P(A \cap B')$$

$$\frac{7}{20}$$

$$P(A' \cap B')$$

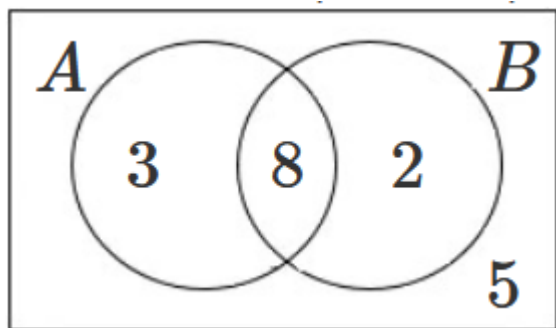
$$\frac{2}{5}$$

$$P((A \cap B)')$$

$$\frac{19}{20}$$

Worked example

Calculate:



$$P(A' \cup B)$$

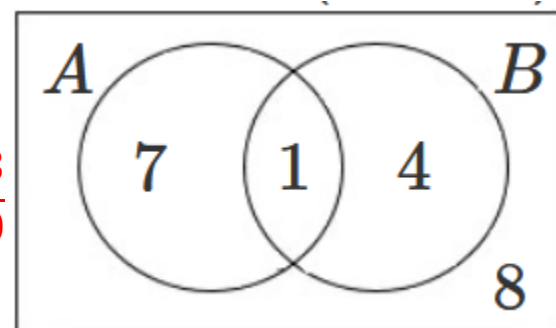
$$P(A \cup B')$$

$$P(A' \cup B')$$

$$P((A \cup B)')$$

Your turn

Calculate:



$$P(A' \cup B) \quad \frac{13}{20}$$

$$P(A \cup B') \quad \frac{4}{5}$$

$$P(A' \cup B') \quad \frac{19}{20}$$

$$P((A \cup B)') \quad \frac{2}{5}$$