MATHEMATICS · GRADES 10-12

Mutually exclusive events

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you work out the chance of one thing or another when both cannot happen at once, like rolling a one or a six on a single die. You use it whenever two outcomes cannot both happen, like drawing one card that cannot be both a heart and a spade. A game designer uses it to set fair odds, and a forecaster uses it when rain or snow are the two options for one afternoon. Knowing how to combine those chances tells you the real odds of either outcome happening.



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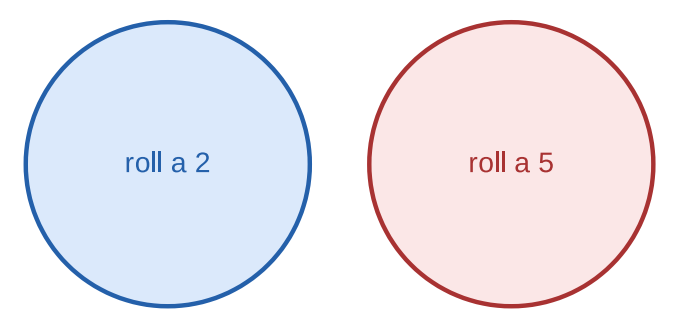
Rule

Two events are mutually exclusive when both cannot happen at once, and then P(A or B) = P(A) + P(B).

If both can happen on one trial, they are not mutually exclusive and you cannot just add.



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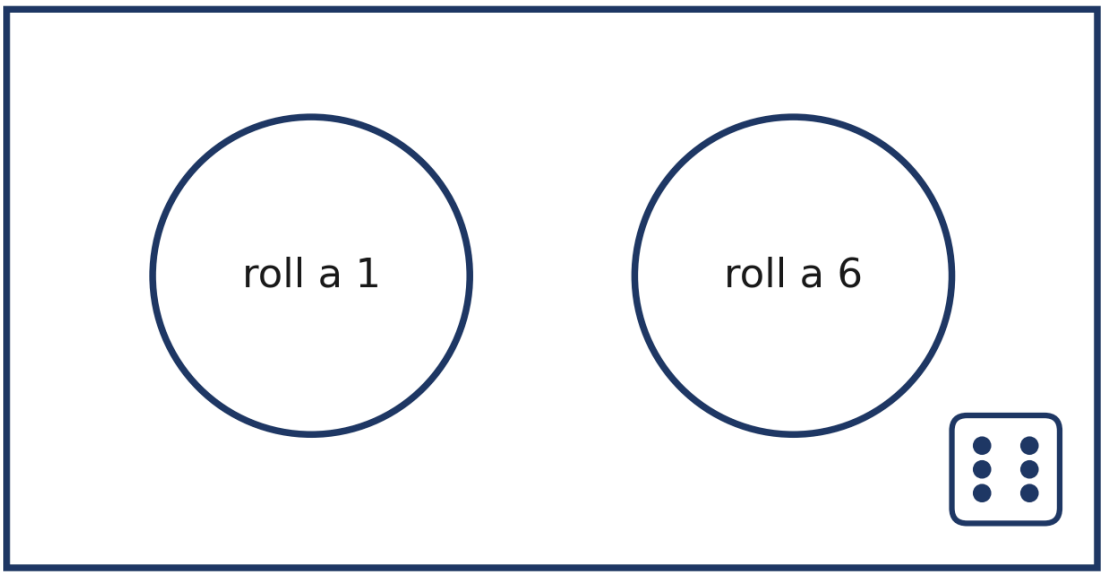
Worked examples

EXAMPLE 1

Q One die is rolled. What is the chance of a 1 or a 6?



SOLUTION

A single roll cannot be both 1 and 6, so the events are mutually exclusive.

Chance of 1 is $\frac{1}{6}$, chance of 6 is $\frac{1}{6}$.

Chance of either = $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$

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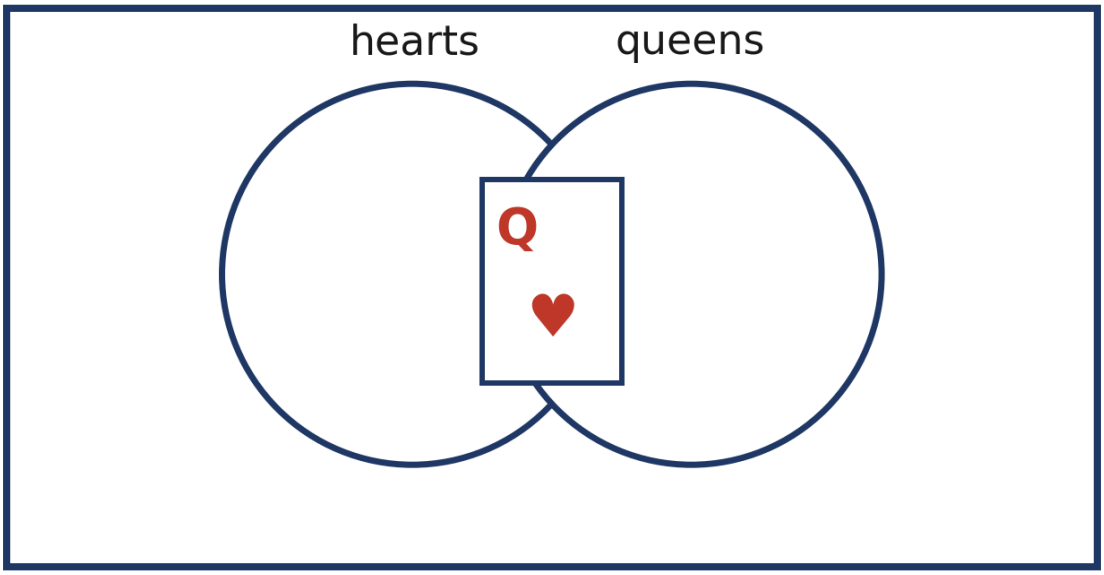
EXAMPLE 2

Q Are drawing a heart and drawing a queen mutually exclusive?



SOLUTION

The queen of hearts is both a heart and a queen.

So both can happen on one draw.

No, not mutually exclusive.

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Practice questions

1

One die roll: chance of a 2 or a 5?

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2

One card draw: chance of an ace or a king?

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3 What does mutually exclusive mean?

- A Two events that cannot both happen
- B Two events that can both happen
- C Two events with the same chance
- D Two events that always happen together

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4 One die roll: are even and odd mutually exclusive?

- A Yes
- B No

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5

One card draw: are red and black mutually exclusive?

A Yes

B No

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6

One die roll: chance of a 3 or a 4 or a 5?

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7

One coin toss: are heads and tails mutually exclusive?

A Yes

B No

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8 What is P(A or B) for mutually exclusive events?

A P(A) + P(B)

B P(A) × P(B)

C P(A) + P(B) + P(A and B)

D P(A and B)

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9 One die roll: are rolling a 6 and rolling an even number mutually exclusive?

A Yes

B No

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10

One card draw: chance of a heart or a spade?

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ANSWER KEY

1. $\frac{1}{3}$

2. $\frac{2}{13}$

3. Two events that cannot both happen

4. Yes

5. Yes

6. $\frac{1}{2}$

7. Yes

8. P(A) + P(B)

9. No

10. $\frac{1}{2}$

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