MATHEMATICS · GRADES 7-9

Probability of Complementary Events

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you work out the chance something does not happen, like the chance it does not rain today or you do not win a prize draw. A weather forecast that says there is a 30 percent chance of rain is also saying there is a 70 percent chance it stays dry. A raffle ticket buyer knows the chance of not winning is far bigger than the chance of winning, and that is the number that matters for planning. Sometimes the chance of something not happening is easier to work out, and it tells you exactly what you need to know.



Rule

An event and its complement add to 1: P(A) + P(not A) = 1.

The chance of an event not happening is P(not A) = 1 - P(A).

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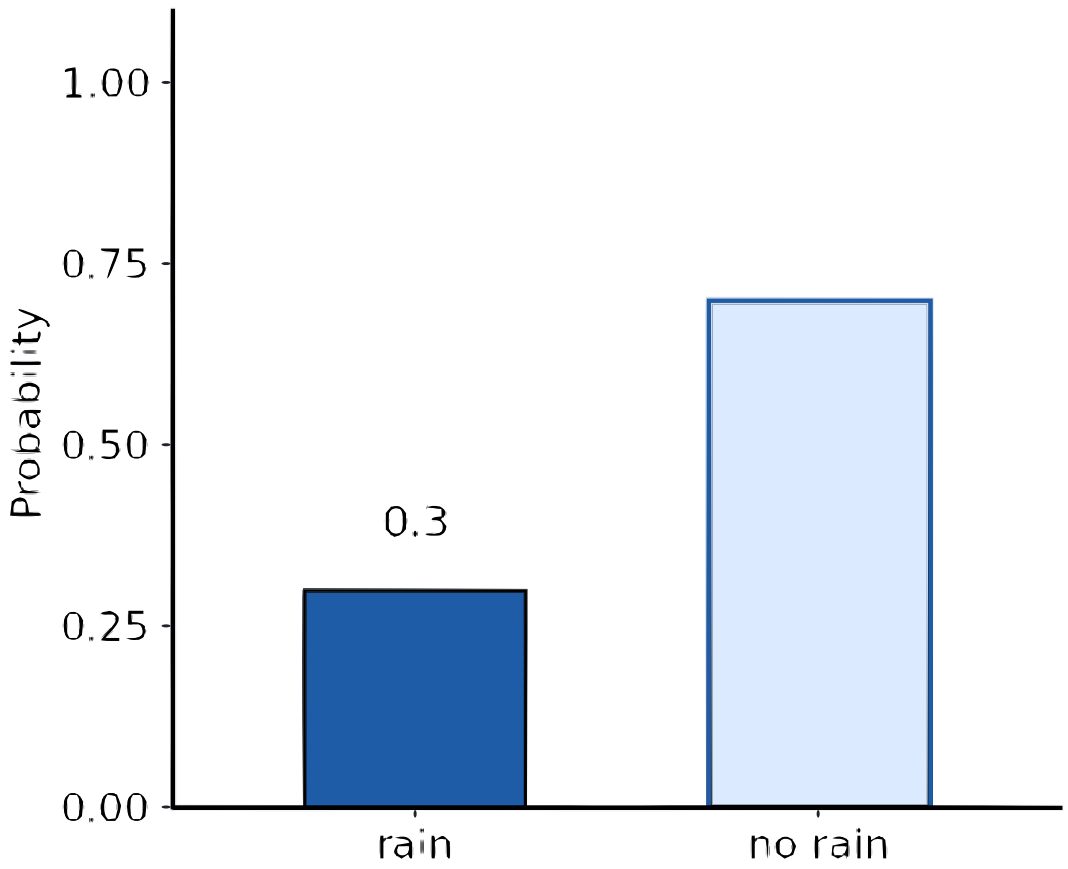
Worked examples

EXAMPLE 1

Q If P(rain) = 0.3, find P(no rain)



SOLUTION

An event and its complement always make 1 between them.

P(no rain) = 1 - 0.3 = 0.7

P(no rain) is 0.7.

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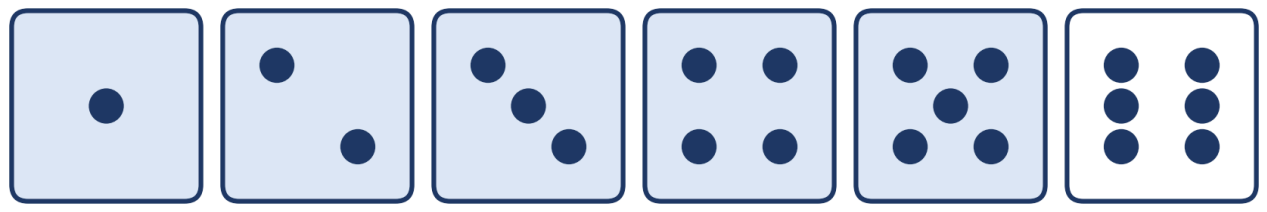
EXAMPLE 2

Q If P(rolling a 6) = $\frac{1}{6}$, find P(not rolling a 6)



SOLUTION

An event and its complement always make 1 between them.

P(not 6) = $1 - \frac{1}{6} = \frac{5}{6}$

P(not 6) is $\frac{5}{6}$.

Practice questions

1 The forecast says the chance of rain tomorrow is 0.3. Find the chance of no rain.

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2 A die is rolled. The chance of rolling a 5 is $\frac{1}{6}$. Find the chance of not rolling a 5.

- **A** $\frac{1}{6}$
- **B** $\frac{5}{6}$
- **C** $\frac{1}{5}$
- **D** $\frac{2}{3}$

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3 The chance of an event happening is 0.4. What is the chance of the event not happening?

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4 The chance of an event not happening is $\frac{3}{4}$. What is the chance of it happening?

- **A** $\frac{1}{4}$
- **B** $\frac{3}{4}$
- **C** $\frac{1}{2}$
- **D** 1

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5 P(A) = 0.3 and P(not A) = 0.8. Can both be correct?

- **A** Yes, they are complements
- **B** No, they must add to 1, and 0.3 + 0.8 = 1.1
- **C** Yes, if A is likely
- **D** No, because 0.8 is too big

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6 In the last 10 days it rained on 3 days. What is the chance it does not rain tomorrow? Give your answer as a decimal.

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7 A coin is flipped. The chance of heads is $\frac{1}{2}$. Find the chance of not heads.

A $\frac{1}{4}$

B $\frac{3}{4}$

C $\frac{1}{2}$

D $\frac{1}{3}$

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8 The chance of rain is 0.3 and the chance of no rain is 0.7. What do these two chances add to?

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9 An event is certain to happen, with chance 1. What is the chance of the event not happening?

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10 An event is impossible, with chance 0. What is the chance of the event not happening?

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ANSWER KEY

1. 0.7

2. $\frac{5}{6}$

3. 0.6

4. $\frac{1}{4}$

5. No, they must add to 1, and 0.3 + 0.8 = 1.1

6. 0.7

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

8. 1

9. 0

10. 1

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