Conditional versus unconditional probabilities

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Find P(cycle) from the travel table. [2 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

20/60=1/3.

Answer: 1/3.

2. Find P(boy and cycle). [2 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

8/60=2/15.

Answer: 2/15.

3. Find P(boy|cycle). [2 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

8/20=2/5.

Answer: 2/5.

4. Are being a boy and cycling independent in this table? [3 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

P(boy)=1/2, but P(boy|cycle)=2/5.

Answer: No.

5. P(A)=0.25 and P(A|B)=0.25, with P(B)>0. What can you conclude? [2 marks]

The condition does not change the probability of A.

Answer: A and B are independent.

6. A survey links extra tutoring with higher scores. Explain why a conditional proportion alone does not prove tutoring caused the increase. [3 marks]

Prior attainment, motivation and sampling can affect both groups.

A probability comparison alone does not isolate a cause.

Answer: Other differences may explain the association.