Conditional language and restricted sample spaces

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. A fair six-sided die result is known to exceed 3. Find $P(\text{even})$. [2 marks]

Restrict to 4,5,6;4 and 6 are even.

Answer: $\frac{2}{3}$.

2. A fair six-sided die result is known to be even. Find $P(\text{greater than } 3)$. [2 marks]

Restrict to 2,4,6;4 and 6 exceed 3.

Answer: $\frac{2}{3}$.

3. Find $P(\text{cycle} \mid \text{girl})$ from the 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

$\frac{12}{30} = \frac{2}{5}$.

Answer: $\frac{2}{5}$.

4. Find $P(\text{girl} \mid \text{cycle})$ from the 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

$\frac{12}{20} = \frac{3}{5}$.

Answer: $\frac{3}{5}$.

5. Using the travel table, explain why $P(\text{cycle} \mid \text{girl})$ and $P(\text{girl} \mid \text{cycle})$ have different denominators. [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

Girls total 30, cyclists total 20.

The same overlap 12 is divided by different totals.

Answer: They condition on different groups.

6. $P(A \cap B) = 0.12$ and $P(B) = 0.3$. Find $P(A \mid B)$. [2 marks]

$\frac{0.12}{0.3} = 0.4$.

Answer: 0.4.