

Conditional Probability: Two-way Tables *extend*

ANSWERS

1



Of 100 students, 12 are boys who cycle.
 $P(\text{cycles} | \text{boy}) = \frac{1}{4}$ and
 $P(\text{boy} | \text{cycles}) = \frac{1}{3}$. Given that a student is a girl, find the probability that she cycles.

	Cycle	Other	Total
Boy	12	36	48
Girl	24	28	52
Total	36	64	100

48 boys, 36 cycle; 24 out of 52

Answer $\frac{6}{13}$

2



A netball team's results are shown. Winning is independent of playing at home or away. Find x .

	Won	Lost	Total
Home	12	18	30
Away	x	27	
Total		45	

$$P(\text{won} | \text{home}) = P(\text{won} | \text{away})$$

$$\frac{12}{30} = \frac{x}{x+27}, \text{ so } 2x + 54 = 5x$$

Answer $x = 18$

3



$P(\text{express}) = 0.3$, $P(\text{next day} | \text{express}) = 0.9$ and $P(\text{next day} | \text{standard}) = 0.4$. Complete the table. Given that a parcel arrives the next day, find the probability that it was sent express.

	Next day	Later	Total
Express	0.27	0.03	0.3
Standard	0.28	0.42	0.7
Total	0.55	0.45	1

$$0.27 \div (0.27 + 0.28)$$

Answer $\frac{27}{55}$

4



Given that a student walks or is in Year 11, find the probability that they are a Year 11 student who walks.

	Walk	Bus	Car	Total
Year 10	15	20	10	45
Year 11	25	12	18	55
Total	40	32	28	100

$$\text{walk or Year 11: } 40 + 55 - 25 = 70$$

Answer $\frac{5}{14}$

5



At a leisure club, 40% of members are juniors. $\frac{3}{4}$ of the juniors swim and half of the seniors swim. 120 members swim. How many seniors do not swim?

$$P(\text{swim}) = 0.4 \times 0.75 + 0.6 \times 0.5 = 0.6$$

$$120 \div 0.6 = 200 \text{ members; } 120 \text{ seniors}$$

Answer 60

6



The ratio of boys to girls in a year group is 4:5. 30% of the boys and $\frac{1}{3}$ of the girls have school dinners. Given that a student has school dinners, find the probability that they are a boy.

$$\text{say 120 boys and 150 girls: 36 and 50}$$

$$36 \text{ out of } 86$$

Answer $\frac{18}{43}$

7



Two different swimmers are chosen at random. The probability that both are juniors is $\frac{3}{8}$. Find x .

	Swim	Gym	Total
Junior	x	8	
Senior	6	11	17
Total		19	

$$\frac{x(x-1)}{(x+6)(x+5)} = \frac{3}{8}$$

$$(5x+9)(x-10) = 0$$

Answer $x = 10$

8



Prove that $P(\text{boy} | \text{cycles}) = P(\text{cycles} | \text{boy})$ only when the number of boys is the same as the number who cycle.

	Cycle	Other	Total
Boy	a	b	
Girl	c	d	
Total			

$$\frac{a}{a+c} = \frac{a}{a+b}$$

$$\text{so } a+c = a+b$$

Proof $a+b = a+c$