

## 1 Single events

A bag holds red, blue and green counters. There are 3 times as many blue as green, and 12 more blue than green.  $P(\text{red}) = 0.25$

- a) How many red counters are there?  
b) Some red counters are added, and now  $P(\text{red}) = 0.4$ . How many?

$$a) 2g = 12, g = 6, b = 18$$

$$24 \text{ is } 0.75 \text{ of the bag: } 32, \text{ red} = 8$$

$$b) \frac{8+k}{32+k} = \frac{2}{5}, k = 8$$

## 2 Relative frequency

A spinner numbered 1 to 4 is spun 200 times. The relative frequencies of 1 to 4 are 0.2, 0.32,  $x$  and  $2x$ .

- a) Find  $x$ .  
b) How many 4s were there? Is the spinner fair? Why?

$$a) 0.52 + 3x = 1, x = 0.16$$

$$b) 64; \text{ no: } 40, 64, 32, 64 \text{ are far from } 50 \text{ each}$$

## 3 Expected outcomes

In  $n$  games, a player expects 24 wins. In  $n + 50$  games, the player expects 39 wins.

- a) Find  $P(\text{win})$  and  $n$ .  
b) A game costs 50p and a win pays £2. Is the game worth playing? Show why.

$$a) 15 \text{ wins in } 50 \text{ games: } 0.3, n = 80$$

$$b) 0.3 \times £2 = 60p > 50p, \text{ so yes}$$

## 4 Sample space diagrams

A fair dice and a fair spinner (1, 2, 3) are used. The scores are multiplied.

- a) Find  $P(\text{a square number})$ .  
b) The product is even. Find  $P(\text{more than } 6)$ .

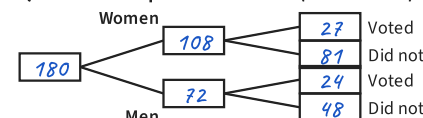
| Dice | x | 1 | 2 | 3 | 4  | 5  | 6  |
|------|---|---|---|---|----|----|----|
| Spin | 1 | 1 | 2 | 3 | 4  | 5  | 6  |
|      | 2 | 2 | 4 | 6 | 8  | 10 | 12 |
|      | 3 | 3 | 6 | 9 | 12 | 15 | 18 |

$$a) \frac{4}{18} = \frac{2}{9} \quad b) \frac{5}{12}$$

## 5 Frequency trees

Three fifths of a club are women. A quarter of the women and a third of the men voted: 51 in all.

- a) Complete the frequency tree.  
b) A voter is picked. Find  $P(\text{a woman})$ .



$$a) N = 180 \quad b) \frac{27}{51} = \frac{9}{17}$$

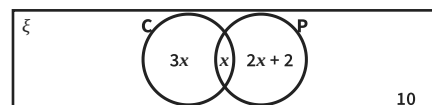
# Probability

## revision mat answers

## 7 Venn diagrams

60 students. C: cello. P: piano.

- a) Find  $x$ .  
b) A pianist is picked. Find  $P(C)$ .



$$a) 6x + 12 = 60, x = 8$$

$$b) \frac{8}{26} = \frac{4}{13}$$

## 8 The AND and OR rules

A and B are independent.  $P(A) = 0.4$  and  $P(A \text{ or } B \text{ or both}) = 0.7$

- a) Find  $P(B)$ .  
b) Find  $P(\text{exactly one of } A \text{ and } B)$ .

$$a) 0.4 + b - 0.4b = 0.7, 0.6b = 0.3, P(B) = 0.5$$

$$b) 0.4 \times 0.5 + 0.6 \times 0.5 = 0.5$$

## 9 Tree diagrams

$n$  counters, 3 of them red. Two are taken without replacement.  $P(\text{both red}) = \frac{1}{15}$

- a) Show that  $n^2 - n - 90 = 0$ , and find  $n$ .  
b) Find  $P(\text{at least one is red})$ .

$$a) \frac{3}{n} \times \frac{2}{n-1} = \frac{1}{15}, \text{ so } n^2 - n - 90 = 0$$

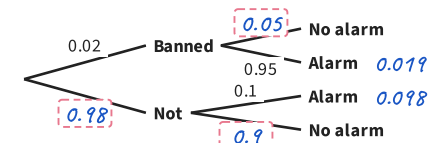
$$(n-10)(n+9) = 0, n = 10$$

$$b) 1 - \frac{7}{10} \times \frac{6}{9} = \frac{8}{15}$$

## 10 Conditional probability

A scanner checks bags for a banned item.

- a) Find  $P(\text{alarm})$ .  
b) The scanner alarms. Find  $P(\text{banned})$ , to 3 significant figures.



$$a) 0.117 \quad b) \frac{0.019}{0.117} = 0.162$$