



## Too Many Boys? - Solutions

### TASK A

Let  $G$  be the event a baby is born a girl.

Let  $B$  be the event a baby is born a boy.

1.  $P(B) = 0.5$

2. No

3.  $P(B \text{ and } B) = 0.5 \times 0.5 = 0.25$

4.  $P(B \text{ and } B) = 0.25$  (from question 3)

The probability of having a boy and girl can happen in two ways.

$$P(B \text{ and } G) + P(G \text{ and } B) = 0.5 \times 0.5 + 0.5 \times 0.5 = 0.25 + 0.25 = 0.5$$

Therefore it is less likely they will have 2 boys rather than a girl and a boy.

5.

a)  $P(B \text{ and } B \text{ and } B) = 0.5 \times 0.5 \times 0.5 = 0.125$   
 $= 0.13$  2 sf

b)  $P(B \text{ and } B \text{ and } G) + P(B \text{ and } G \text{ and } B) + P(G \text{ and } B \text{ and } B) = 3(0.5 \times 0.5 \times 0.5) = 0.38$  2 sf

c)  $P(B \text{ and } G \text{ and } G) + P(G \text{ and } G \text{ and } B) + P(G \text{ and } B \text{ and } G) = 3(0.5 \times 0.5 \times 0.5) = 0.38$  2 sf

d)  $P(G \text{ and } G \text{ and } G) = (0.5 \times 0.5 \times 0.5) = 0.13$  2 sf

6.  $P(B \text{ and } B \text{ and } B \text{ and } B \text{ and } B \text{ and } B \text{ and } B) = 0.0039$  2 sf

7.  $P(B \text{ and } B \text{ and } B) = 0.13$  2 sf (from question 5 a)

$$P(B \text{ and } B \text{ and } B \text{ and } G) + P(B \text{ and } B \text{ and } G \text{ and } B) + P(B \text{ and } G \text{ and } B \text{ and } B) + P(G \text{ and } B \text{ and } B \text{ and } B) = 4 \times 0.5^4 = 0.25$$

### TASK B

8.  $P(2 \text{ boys given they plan to have 2 children}) = P(B \cap B | 2 \text{ children})$   
 $= \frac{6280}{27782} = 0.23$  2sf

9. If a couple plan to have 3 children what are the probabilities that they will have:

a)  $P(3 \text{ boys given they plan to have 3 children})$

b)  $P(2 \text{ boys and 1 girl given they plan to have 3 children})$   
 $= \frac{5275}{14264} = 0.37$  2 sf

c)  $P(1 \text{ boy and 2 girls given they plan to have 3 children})$   
 $= \frac{5266}{14264} = 0.37$  2 sf

d)  $P(3 \text{ girls given they plan to have 3 children})$   
 $= \frac{1788}{14264} = 0.13$  2 sf