ACTIVITIES 5.1 - 5.11 *Notes and Solutions*

Notes and solutions are only given where appropriate.

5.2 3 'odds' and 3 'evens' in the first six throws of the dice. This has a probability of

$$\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{2}\right)^3 \times 20 = 0.3125$$

since there are 20 distinct ways of arranging three 'evens' and three 'odds'.

5.4 1. 3 small loops ; 1 small loop and 1 medium loop ; 1 large loop.

2. Probabilities $\frac{1}{15}, \frac{6}{15}, \frac{8}{15}$

4. About 16!

5.5 1.

Stake	**Win/Lose**	**Outcome**	**Balance**
£10	L	– £10	– £10
£20	L	– £20	– £30
£40	L	– £40	– £70
£80	L	– £80	– £150
£160	W	+ £160	+ £10

2. For the same sequence of L's and W's, the final answer and number of plays is not affected - the maximum negative balance could be though.

5.6 1. Yes, you should change choice; or, at least toss a coin to show which of the two doors you now go for - if you stay with your original choice, your original chance of winning, $\left(\frac{1}{3}\right)$, will not change!

(You might need to write a computer simulation, as suggested, to argue this!)

5.7 2. (a) 2 (b) 800 (c) $\frac{1}{4000}$

Continued...

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5.7 *Continued...*

3.

Symbols	**Number of ways**	**Probability**	
3 STRAWBERRIES	56	$\frac{56}{8000}$	$(1 \times 8 \times 7 = 56)$
3 GRAPES	42	$\frac{42}{8000}$	
3 APPLES	64	$\frac{64}{8000}$	
3 BARS	94	$\frac{94}{8000}$	$(2 \times 1 \times 19 + 2 \times 19 \times 1 + 18 \times 1 \times 1 = 94)$
2 CHERRIES	280	$\frac{280}{8000}$	$(2 \times 7 \times 20 = 280)$

4. On average, you will lose almost 5p per go.

5.8 2. (a) $\frac{2}{3}$ (b) $\frac{1}{3}$ 3. (a) $\frac{7}{11}$ (b) $\frac{4}{11}$

5. $p\,(\text{PCPP}) = \frac{56}{495}$, $p\,(\text{PPP}) = \frac{14}{55}$, $p\,(\text{PPCP}) = \frac{56}{495}$, $p\,(\text{CPPP}) = \frac{56}{495}$

6. $\frac{98}{165} \approx 0.6$

5.10 1. $\frac{364}{365}$ 2. $\frac{363}{365}$ 3. $1 - \frac{364}{365} \cdot \frac{363}{365} \approx 0.008$ 4. 0.0164

5. $n = 10 \Rightarrow p = 0.117$; $n = 30 \Rightarrow p = 0.706$; $n = 10 \Rightarrow p = 0.117$

5.11 1. $(0.25)^{10} \approx 9.54 \times 10^{-7} \Rightarrow$ approx 1 in a million

2. $(0.5)^{10} \approx 9.76 \times 10^{-4} \Rightarrow$ 1 in 1024 chance

3. 15 bands should suffice.