Answer Key

1.

	G 1	**G 2**	**G 3**	**G 4**	**G 5**	**G 6**
R 1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
R 2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
R 3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
R 4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
R 5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
R 6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

a. $n(E) = 6$, $n(S) = 6 \cdot 6 = 36$, $Prob(E) = \frac{6}{36} = \frac{1}{6}$

b. Outcomes are (2, 2), (3, 1), and (1, 3).
$n(E) = 3$, $n(S) = 36$, $Prob(E) = \frac{3}{36} = \frac{1}{12}$

c. Outcomes are (1, 4), (2, 4), (3, 4), (5, 4), (6, 4), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6)
$n(E) = 10$, $n(S) = 36$, $Prob(E) = \frac{10}{36} = \frac{5}{18}$

d. Outcomes are (1, 4), (2, 4), (3, 4), (4, 4) (5, 4), (6, 4), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6)
$n(E) = 11$, $n(S) = 36$, $Prob(E) = \frac{11}{36}$

2.

Dice sum	**Outcomes**	$n(E)$
2	*(1, 1)*	1
3	*(2, 1), (1, 2)*	2
4	(1, 3), (2, 2), (3, 1)	3
5	(1, 4), (2, 3), (3, 2), (4, 1)	4
6	(1, 5), (2, 4), (3, 3), (4, 2), (5, 1)	5
7	(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)	6
8	(2, 6), (3, 5), (4, 4), (5, 3), (6, 2)	5
9	(3, 6), (4, 5), (5, 4), (6, 4)	4
10	(4, 6), (5, 5), (6, 4)	3
11	(5, 6), (6, 5)	2
12	*(6, 6)*	1

a. $n(S) = 36$

b. $n(E) = 1$, $Prob(E) = \frac{1}{36}$

c. $n(E) = 5$, $Prob(E) = \frac{5}{36}$

d. $n(E) = 5 + 4 + 3 + 2 + 1 = 15$, $Prob(E) = \frac{15}{36}$

3. a. Permutation, $P(52, 2)$ is the sample space ($n(S)$).

b. $n(E) = 52(3) = 156$

c. $\frac{(52)(3)}{(52)(51)}$

4. a. This is an ordered list problem. $n = 2$, $r = 5$, so $n(S) = 2^5 = 32$.

   b. End in heads: $2 \cdot 2 \cdot 2 \cdot 1 \cdot 1 = 8$

   c. End in tails: $2 \cdot 2 \cdot 2 \cdot 1 \cdot 1 = 8$

   d. Use the rule of sums.

   e. $n(E) = 8 + 8 = 16$

   f. $Prob(E) = \frac{n(E)}{n(S)} = \frac{16}{32} = \frac{1}{2}$

5. a. $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$.

   b. $\bar{E} =$ All results are different numbers.

   c. Permutation, $n = 6$, $r = 3$

   d. $Prob(\bar{E}) = n(\bar{E})/n(S) = \frac{P(6,3)}{6^3} = \frac{5}{9} = 0.\bar{5}$

   e. $Prob(E) = 1 - Prob(\bar{E}) = 1 - 0.55 \approx 0.44$