Theoretical Probability

1) a) $n(A) = [A\ \spadesuit]$, Simple event
b) $n(4) = [4\clubsuit, 4\spadesuit, 4\heartsuit, 4\diamondsuit]$, not a simple event
c) $n(\text{even}) = [10\clubsuit, 10\spadesuit, 10\heartsuit, 10\diamondsuit]$, not a simple event
d) $n(2\text{ heads}) = [HHT, HTH, THH]$, not a simple event
e) $n(1) = [1]$, simple event
f) $n(\text{not } 2) = [1, 3, 4, 5, 6]$, not a simple event

2) a) $n(S) = 52$
b) $n(S) = 54$
c) $n(S) = 24$
d) $n(S) = 8$
e) $n(S) = 6$
f) $n(S) = 6$

3) a) $P(A) = \frac{1}{52}$
b) $P(4) = \frac{4}{54} = \frac{2}{27}$
c) $P(\text{even}) = \frac{4}{24} = \frac{1}{6}$
d) $P(2\text{ heads}) = \frac{3}{8}$
e) $P(1) = \frac{1}{6}$
f) $P(\text{not } 2) = \frac{5}{6}$

4) $n(S) = 5 + 3 + 7 = 15$
a) $n(R) = 5$
$P(R) = \frac{5}{15} = \frac{1}{3}$
b) $n(B) = 7$
$P(B) = \frac{7}{15} = 0.467$
c) $n(B) = 3$
$P(B) = \frac{3}{15} = \frac{1}{5} = 20\%$
d) $P(\text{not Red}) = 1 - P(\text{Red}) = 1 - \frac{1}{3} = \frac{2}{3}$

5) $n(S) = 4 + 10 = 14$
a) $n(D) = 1$
$P(D) = \frac{1}{14}$
b) $n(A) = 4$
$P(A) = \frac{4}{14} = \frac{2}{7}$
c) $n(\text{vowel}) = 6$
$P(\text{vowel}) = \frac{6}{14} = \frac{3}{7}$
d) $P(\text{consonant}) = 1 - P(\text{vowel}) = \frac{4}{7}$

6) a) $n(S) = [HHHH, HHHT, HHTH, HHTT, HTHH, HTHT, HTTH, HTTT, THHH, THHT, THTH, THTT, TTHH, TTHT, TTTH, TTTT]$
b) $n(1\text{ head}) = 4$
$P(1\text{ head}) = \frac{4}{16} = \frac{1}{4}$
c) Flipping no tails
d) $n(\text{at least 1 tail}) = 15$
$P(\text{at least 1 tail}) = \frac{15}{16}$
e) $n(2\text{ tail}) = 6$
$P(2\text{ tail}) = \frac{6}{16} = \frac{3}{8}$

7) $n(PS) = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]$
$n(S) = 100$
$P(PS) = \frac{10}{100} = \frac{1}{10}$

8) a) $n(S) = 36$
b) $n(SE) = [2, 12]$
c) $n(\text{Seven}) = 6$
$P(\text{Seven}) = \frac{6}{36} = \frac{1}{6}$
d) $n(12) = 1$
$P(12) = \frac{1}{36}$
$P(\text{less than } 12) = 1 - P(12) = 1 - \frac{1}{36} = \frac{35}{36}$

9) Let x rep. the amount of unknown b/g marbles.
$n(S) = 14 + 10 + 9 + 22 + 21 + x = x + 76$
$n(g) = 9 + 21 + x = x + 30$
$P(g) = 0.425$
$P(g) = \frac{n(g)}{n(S)}$
$0.425 = \frac{x+30}{x+76}$
$0.425(x + 823) = x + 30$
$0.575x = 2.3$
$x = 4$
$\therefore$ there are 4 b/g marbles