



## Marbles – Try It

1. Find the probability in grabbing a group of 5 marbles; that 2 are blue and 2 are yellow.

Solution: We have 14 marbles, we want 5 so our denominator is  $C(14,5) = \frac{14!}{5!(14-5)!} = \frac{14!}{5!9!} = 2002$

For the numerator we look at specifics: Have 3 blue, want 2 AND THEN have 4 yellow, want 2 AND THEN have 7 others want 1 to make our total of five:

$$C(3,2) \times C(4,2) \times C(7,1) = 3 \times 6 \times 7 = 126$$

Our probability is then  $\frac{126}{2002} = \frac{63}{1001} = \frac{9}{143}$

2. Find the probability I grab 4 marbles and 3 of them are yellow.

Solution: We have 14 marbles, we want 4 so our denominator is  $C(14,4) = 1001$ .

For the numerator we look at specifics: Have 4 yellow, want 3 AND THEN have 10 others, want 1 to make our total of four:

$$C(4,3) \times C(10,1) = 4 \times 10 = 40$$

Our probability is then  $\frac{40}{1001}$

3. Find the probability in grabbing four marbles that I have at least 1 red.

Solution: We have 14 marbles, we want 4 so our denominator is  $C(14,4) = 1001$ .

For the numerator we look at specifics: At least one red means one red or more. We have two total reds so we use alternatives: Have 2 red, want 1 AND THEN have 12 others want 3 OR have 2 red, want 2 AND THEN have 12 others, want 2:

$$C(2,1) \times C(12,3) + C(2,2) \times C(12,2) = 2 \times 220 + 1 \times 66 = 440 + 66 = 506$$

Our probability is then  $\frac{506}{1001} = \frac{86}{143}$