Showdown – "Probability / Counting Methods"

A.

You have a bag containing three red, seven green, and six blue pens. You choose two pens at random. Find each probability. 16 TOTAL

1. *P*(blue and blue) with replacing
$\frac{6}{16} \cdot \frac{6}{16} = \frac{3}{8} \cdot \frac{3}{8} = \frac{9}{64}$ or 14.1%

2. *P*(red then green) without replacing
$\frac{3}{16} \cdot \frac{7}{15} = \frac{1}{16} \cdot \frac{7}{5} = \frac{7}{80}$ or 8.8%

3. *P*(red and blue) with replacing
$\frac{3}{16} \cdot \frac{6}{16} = \frac{3}{16} \cdot \frac{3}{8} = \frac{9}{128}$ or 7%

B.

1. In how many different ways can you choose three CDs from a selection of 10 CDs?
10 (CD #1) • 9 (CD #2) • 8 (CD #3) = 720 ways

2. You have enough money for three extra toppings on a pizza. If there are nine possible toppings, how many choices do you have?
9 (#1) • 8 (#2) • 7 (#3) = 504 choices

C.

1. A coin is tossed four times. What is the probability of getting 4 heads in a row? $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{16}$ or 6.3%

2. Is flipping a coin an independent or dependent event. Explain.
Independent. It does not depend on a previous event.

D.

1. You have six sizes of envelopes and three different kinds of stamps. How many different combinations of envelopes and a stamp are possible?
$6 \cdot 3 = 18$ combinations
envelopes • stamps
FUNDAMENTAL COUNTING PRINCIPLE

E.

Suppose you roll a number cube. Find each probability.

1. *P*(*even*) 2,4,6
$\frac{3}{6} = \frac{1}{2}$ or 50%

2. *P*(7 *or* 3) no chance
$\frac{1}{6}$ or 16.7%

3. *P*(*not* 3) 1,2,4,5,6
$\frac{5}{6}$ or 83.3%

4. *P*(4 *or* 2)
$\frac{2}{6} = \frac{1}{3}$ or 33.3%

F.

Six roles are being cast for a school play. Fifteen students show up for auditions.

1. How many different casts are possible? $15 \cdot 14 \cdot 13 \cdot 12 \cdot 11 \cdot 10$
3,603,600 different casts

G.

1. Is a 6-letter password or 6-digit password harder for someone to guess? EXPLAIN WHY.
26 • 26 • 26 • 26 • 26 • 26 = 308,915,776
Letters A-Z w/ replacement

10 • 10 • 10 • 10 • 10 • 10 = 1,000,000
Numbers 0-9 w/ replacement

*Much more possible 6-Letter combinations. $26^6 > 10^6$

H.

1. Think of an example of an event with a probability of zero. Explain what it means to have a probability of zero. Rolling an 8 on a 6-sides number cube with 1-6 on a side. No chance!

2. Patrice has a 40% chance of making a free throw. What is the probability that she will miss the free throw? 60%. Foul her ☺

I.

S O U T H W E S T

You *do not* replace the letter before the second pick. Find each probability.

1. ***P(T then E)*** $\frac{2}{9}\cdot\frac{1}{8}=\frac{2}{72}=\frac{1}{36}$ 2.8%
2. ***P(Vowel and then a S)*** $\frac{3}{9}\cdot\frac{2}{8}=\frac{1}{3}\cdot\frac{1}{4}=\frac{1}{12}$ 8.3%
3. ***P(T or U, and then O)*** $\frac{3}{9}\cdot\frac{1}{8}=\frac{1}{3}\cdot\frac{1}{8}=\frac{1}{24}$ 4.2%
4. ***P(T each time)*** $\frac{2}{9}\cdot\frac{1}{8}=\frac{2}{72}=\frac{1}{36}$ 2.8%

J.

You just won a free trip and have the option of flying or taking a peaceful train ride to your destination. You can choose to travel to Omaha, Phoenix, or New York. Create a tree diagram to determine how many different travel arrangements that can be made.

See below

Train: Omaha, Phoenix, New York

Plane: Omaha, Phoenix, New York

6 possibilities 2·3

K.

Explain the difference between theoretical and experimental probability.

Theoretical – "In theory". What SHOULD happen.

Experimental – What ACTUALLY happens after doing the experiment.

L.

Suppose you draw two balls at random from a bag containing seven pink, four white, three yellow, and two striped balls. Find each probability.

16 TOTAL

1. *P*(striped then striped) with replacing
2. *P*(striped then striped) without replacing
3. *P*(pink then white) with replacing
4. *P*(pink then white) without replacing

See below

1.) $\frac{2}{16}\cdot\frac{2}{16}=\frac{1}{8}\cdot\frac{1}{8}=\frac{1}{64}$ 1.6%

2.) $\frac{2}{16}\cdot\frac{1}{15}=\frac{1}{8}\cdot\frac{1}{15}=\frac{1}{120}$ 0.8%

3.) $\frac{7}{16}\cdot\frac{4}{16}=\frac{7}{16}\cdot\frac{1}{4}=\frac{7}{64}$ 10.9%

4.) $\frac{7}{\cancel{16}\,4}\cdot\frac{\cancel{4}\,1}{15}=\frac{7}{60}$ 11.7%