Which is more likely, rolling at least one 'six' on four throws of one die, or rolling at least one 'double six' on 24 throws with two dice?

Which option do you **think** is more likely? Why?

Unit 3 - Probability

Definitions

Event - the outcome of an experiment

EXPERIMENT - the process used to obtain an outcome

RANDOM EXPERIMENT - one in which the outcome is uncertain.

PROBABILITY - the <u>probability</u> of a particular outcome is denoted $P(A)$, read " the probability of event A occuring"

$\qquad$ - $\quad 0 \leq P(A) \leq 1$

THEORETICAL PROBABILITY

In __theory__, the probability of rolling a 1 on a six-sided die is $\frac{1}{6}$

SAMPLE SPACE

- list of all possible outcomes

$$n\,(u)$$

n - number

$$P(\text{Event}) = \frac{\text{\# of ways the event can occur}}{\text{\# total possible outcomes}} = \frac{n\,(A)}{n\,(u)}$$

* If the prob. of an event A is P, in n trials, you would expect the event to occur $n \times P$ times.

Ex. A fair 12-sided die is rolled. What is the probability of rolling an even number?

a) Sample Space: $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$ $n = 12$

$(A) = (even) = \{2, 4, 6, 8, 10, 12\}$ $n = 6$

$$P(A) = \frac{n(A)}{n(u)} = \frac{6}{12} = \frac{1}{2}$$

b) In 8 rolls, what is the expected number of even outcomes? $n = 8$

$$8 \times \frac{1}{2} = 4$$

$$\frac{1}{6} \cdot 4 = \left(\frac{4}{6}\right) = \frac{2}{3}$$

$$\frac{1}{6} \qquad \frac{2}{6} \quad \frac{1}{3}$$
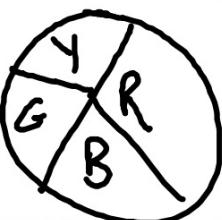
EXPERIMENTAL PROBABILITY

- you can use an experiment to estimate probabilities

$$P(A) = \frac{\text{\# of observed outcomes}}{\text{total \# tested}}$$
$$(\text{\# of trials})$$

- used in manufacturing
  (faulty parts)
  A company finds 5 out of 1000 lightbulbs
  are bad. $P(Bad) = \frac{5}{1000}$

- Spinner
  spun 20 times

R	7
G	2
Y	5
B	6

· Relative frequency
  of yellow = $\frac{5}{20}$

HW p. 67 1-7