MBF3C Date: _____

Experimental Probability

TERMINOLOGY

Probability: A measure of the likelihood (chance) an event will occur.

Trial: One round in a probability experiment.

Outcome: A possible result of an experiment (eg possibilities of a coin toss)

Event: A set of outcomes with the same result. (eg getting heads)

Frequency: Total # of outcomes for an event. (eg getting heads 3 times)

Where is probability used? Weather forecasts, sports statistics, gambling odds, census data, accident statistics

Probability is always a value between 0 and 1 and can be represented as a fraction ($\frac{2}{5}$), decimal (0.4), percent 40%

Experimental Probability is determined using the results of an experiment

Experimental Probability Formula: $P(\text{event}) = \frac{\#\text{ successful trials}}{\text{total \# trials}}$

EXAMPLE 1

a) Two six-sided dice were rolled 20 times. Doubles were rolled 4 times. Determine the experimental probability of rolling doubles. Express your answer as a fraction in lowest terms, as a decimal, and as a percent.

Event = doubles

$P(\text{doubles}) = \frac{\#\text{ successful trials}}{\text{total \# trials}}$

$= \frac{4}{20}$

$= \frac{1}{5}$

As decimal $\frac{1}{5} = 0.2$

As a percent $\frac{1}{5} = 20\%$

∴ the experimental probability of rolling doubles is $\frac{1}{5}$ or 20%

b) Write the probability of NOT rolling doubles as a fraction in lowest terms, as a decimal and as a percent. Event = no doubles.

$P(\text{no doubles}) = \frac{\#\text{ successes}}{\text{total trials}}$

$= \frac{16}{20}$

$= \frac{4}{5}$

$= 0.8$

$= 80\%$

OR

$P(\text{no doubles}) = 1 - P(\text{doubles})$

$= 1 - \frac{1}{5}$

$= \frac{5}{5} - \frac{1}{5}$

$= \frac{4}{5}$

$= 0.8$

$= 80\%$

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EXAMPLE 2

A coin was tossed 30 times. The experimental probability of turning up heads was $\frac{2}{5}$.

a) How many times did the coin turn up heads?

event = heads

$P(\text{heads}) = \frac{\#\text{successful trials}}{\#\text{total trials}}$

$\frac{2}{5} = \frac{x}{30}$

$\frac{2(30)}{5} = x$

$12 = x$

∴ the coin turned up heads 12 times.

b) How many times did the coin turn up tails?

$\#\text{tails} = \text{total trials} - \#\text{heads}$

$= 30 - 12$

$= 18$

∴ the coin turned up tails 18 times

c) What was the experimental probability of it turning up tails?

$P(\text{tails}) = 1 - P(\text{heads})$

$= 1 - \frac{2}{5}$

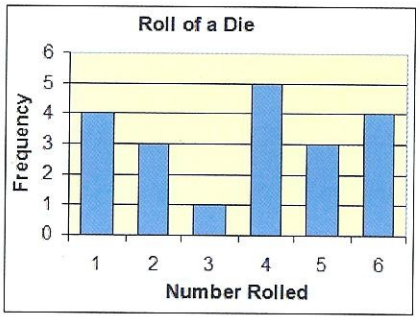
$= \frac{5}{5} - \frac{2}{5}$

$= \frac{3}{5}$

∴ the experimental probability of turning up tails is $\frac{3}{5}$ or 60%.

EXAMPLE 3

The results of rolling a six-sided die are displayed in the graph.



a) How many trials were there?

$4+3+1+5+3+4 = 20$

∴ there were 20 trials.

b) How many times was a 5 rolled?

3 times

c) Find the experimental probability of rolling a 6.

$P(\text{roll a 6}) = \frac{\#\text{successes}}{\text{total trials}}$

$= \frac{4}{20} = \frac{1}{5}$

∴ the experimental probability of rolling a six is $\frac{1}{5}$ or 20%.

d) Find the experimental probability of rolling a 3 or 5.

$P(\text{roll a 3 or 5}) = \frac{\#\text{successes}}{\text{total trials}}$

$= \frac{1+3}{20}$

$= \frac{4}{20} = \frac{1}{5}$

∴ the experimental probability of rolling a 3 or 5 is $\frac{1}{5}$ or 20%.