

Unit 2 Day 1:
Probability
(4-1) Basic Probability and Sample
Space

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Definitions!

Probability: Chance of an event happening.

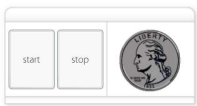
Event: results of a probability experiment


Outcome: the result of a single trial of a probability experiment.

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Sample Space- set of all possible outcomes.

<u>Experiment</u>	<u>Sample Space</u>
Toss one coin	Head, Tail
Roll a die	1,2,3,4,5, 6
Toss two coins	HH, HT, TT, TH





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Example

Find the sample space for rolling two dice.

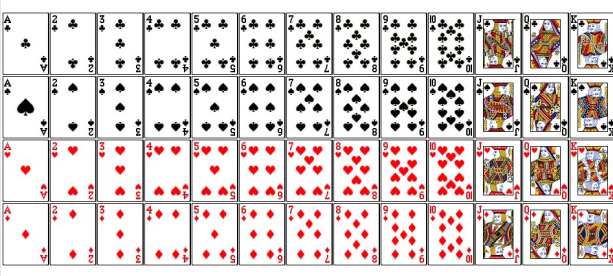
Sums Chart

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

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Example

Find the sample space for drawing one card from an ordinary deck of playing cards.



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tree diagram- used to determine all possible outcomes

Example

Find the sample space for tossing a coin 3 times.

1st

H

T

2nd

H

T

3rd

H

T

HHH

HHT

HTH

HTT

TTH

THT

TTH

TTT

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Classical Probability: uses sample spaces to determine the numerical probability that an event will happen.

$$\text{Probability} = \frac{\text{\# of outcomes}}{\text{Total \# of possible outcomes}}$$

Rounding Rule: Probabilities should be expressed as fractions or rounded to three decimal places. *simplify*

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Example

Find the probability of getting a red face card.

$$\frac{6}{52} = \frac{3}{26}$$

In a family with three children, find the probability that exactly two of the three children are girls.

If you roll a pair of dice, find the probability that you roll a sum of 5.



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The word "and": at the same time

Example

What is the probability of drawing a red card and a 10? *red 10* $\frac{2}{52} = \frac{1}{26}$

The word "exclusive or": add both

Example

What is the probability of drawing a face card or a 10? *face card 12/52 + 10's 4/52 = 16/52 = 4/13*

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The **complement of an event** is the set of outcomes in the sample space that are not included in the outcomes of the event.

In other words: It's everything BUT what it's asking.

Notation: \bar{E}

How to find: $1 - P(E)$

Example

- Selecting a day of the week that begins with the letter T. *day of week not starting with T 5/7*
- Rolling two dice and getting a sum that is an odd number. *rolling 2 dice + getting a sum that is not odd # 1/2*

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Find the probability that... **Example**


Type	Frequency
A	22
B	5
AB	2
O	21

- A person has type O
- A person has type A or type B
- A person does not have type AB

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6-sided dice

What is the probability of rolling a 7?
What is the probability of rolling a 1-6?



RULES:

- Probability of an event is between 0 and 1.
- If an event cannot occur, its prob. is 0
- If the event is certain to occur, its prob is 1.
- The sum of probabilities of all outcomes in a sample space is 1.

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3 types of probability:

1. Classical 2. Empirical 3. Subjective

1.) **Classical Probability** uses sample spaces

2.) **Empirical probability** relies on actual **experience** to determine the likelihood of outcomes.

3.) **Subjective Probability**-probability value based on an educated guess or estimate that an event will occur. (**refers to the future**)

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Classify each statement as an example of classical, empirical, or subjective probability.

Example

a.) The teacher says that the probability that a student will get a C or better in a statistics course is about 85%. **S**

b.) The probability of winning at plunko is $1/415,000$. **C**

c.) A studies results showed the probability that a person will get in a wreck within 5 miles of their home is 45%. **E**

d.) The probability of getting a black jack. **C**

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