

P.1 What is Probability?

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Probability is the measure of how likely an event is to occur.

$$P(\text{event } A) = \frac{n(A)}{n(U)} = \frac{\text{number of outcomes favorable to } A}{\text{total number of possible outcomes}}$$

A is the event you want to occur.
 U is the universal set of all possibilities.

Probability of an event A :	$P(A) = \frac{n(A)}{n(U)}$
Complementary events:	$P(A') = 1 - P(A)$
Combined events:	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Mutually exclusive events:	$P(A \cup B) = P(A) + P(B)$
Independent events:	$P(A \cap B) = P(A) P(B)$
Conditional probability:	$P(A B) = \frac{P(A \cap B)}{P(B)}$

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Red



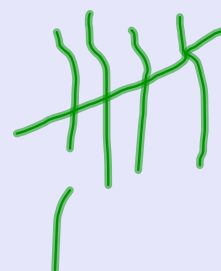
Yellow



Blue



Green



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1. A spinner has 4 equal sectors colored yellow, blue, green and red.
What are the chances of landing on blue after spinning the spinner?



$$P(\text{blue}) = \frac{1}{4}$$

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2. A glass jar contains 6 red, 5 green, 8 blue and 3 yellow marbles. If a single marble is chosen at random from the jar, what is the probability of choosing a red marble? a green or a yellow marble?



$$P(\text{red}) = \frac{6}{22} = \frac{3}{11}$$

$$P(\text{G} \cup \text{Y}) = \frac{8}{22} = \frac{4}{11}$$

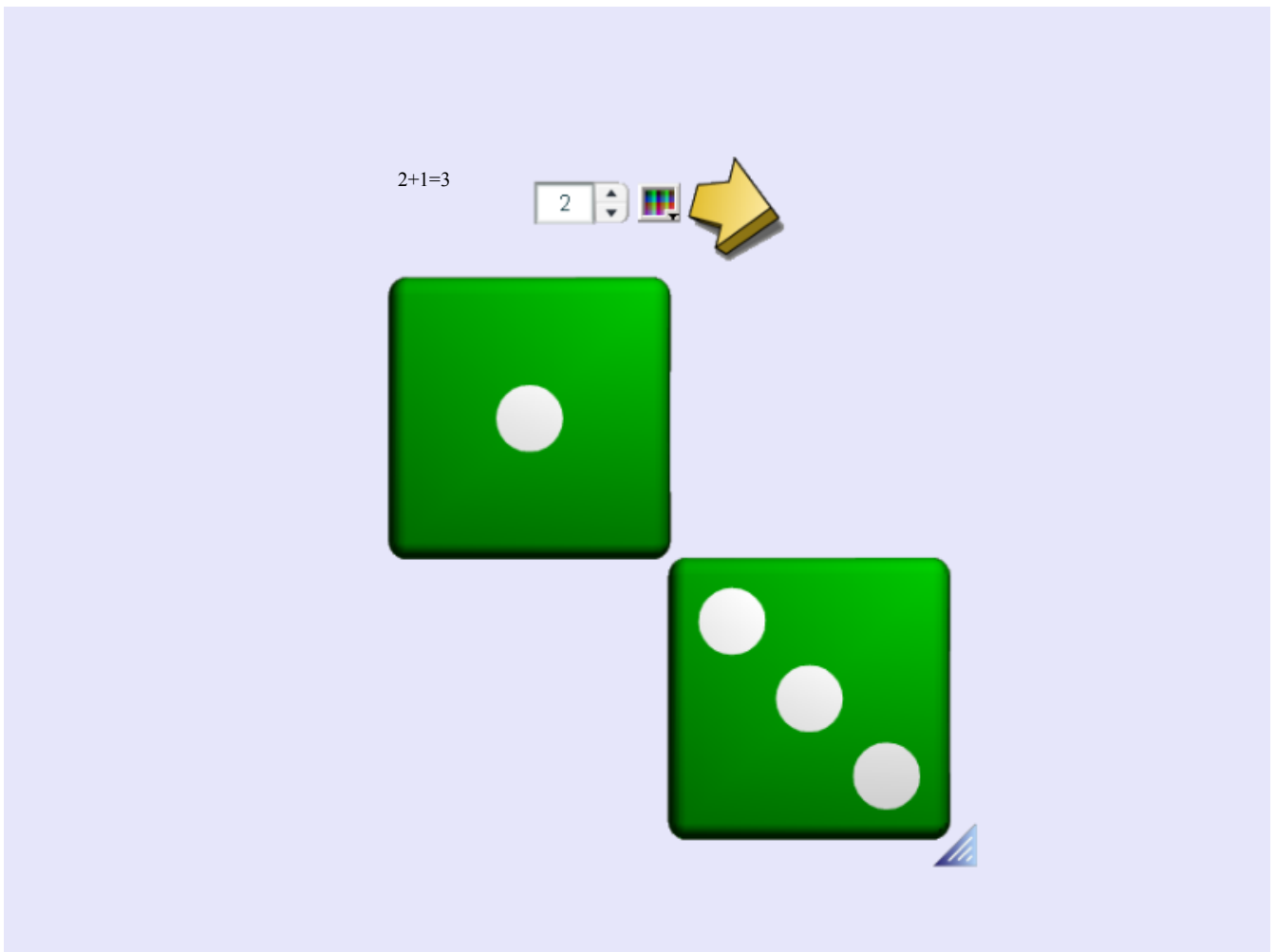
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3. A teacher chooses a student at random from a class of 30 girls. What is the probability that the teacher chooses a girl? a boy?

$$P(\text{girl}) = \frac{30}{30} = 1$$

$$P(\text{boy}) = \frac{0}{30} = 0$$

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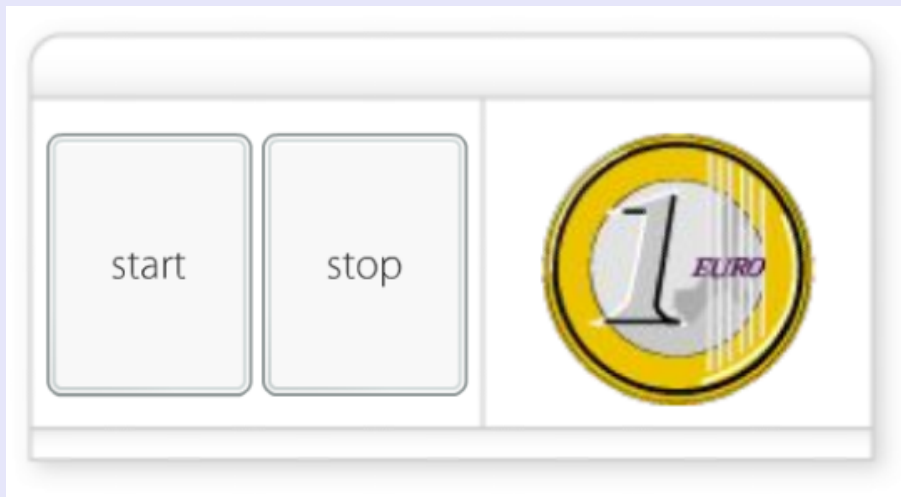
A "sample space" is a listing of all possible outcomes of an event. There are three common ways to show a sample space: lattice, tree, and Venn diagrams.

4. A red die and a white die are thrown. What is the probability that the sum of the numbers showing on the dice is 9 or 10? [lattice diagram]

White \ Red	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

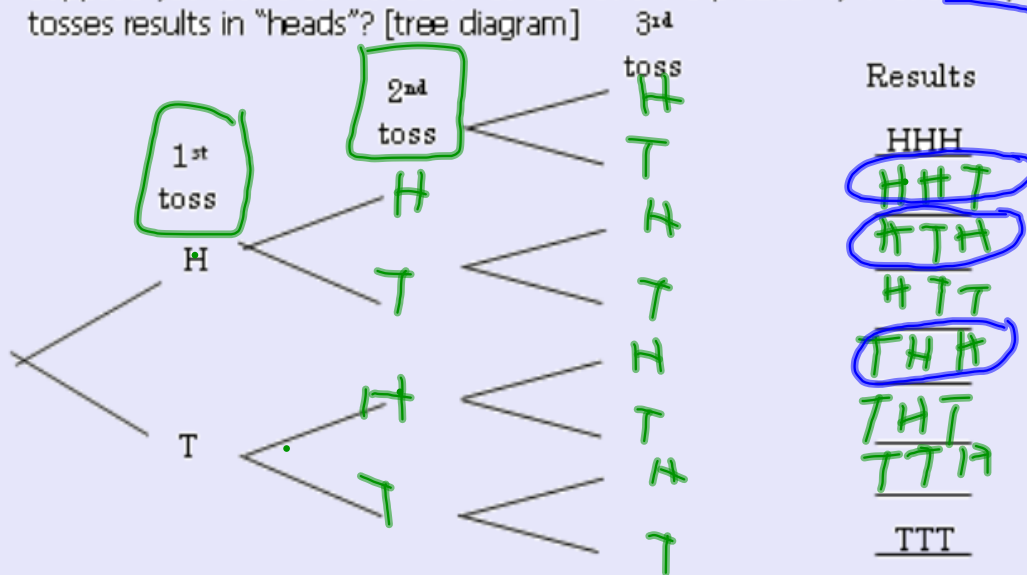
$$P(9 \cup 10) = \frac{7}{36}$$

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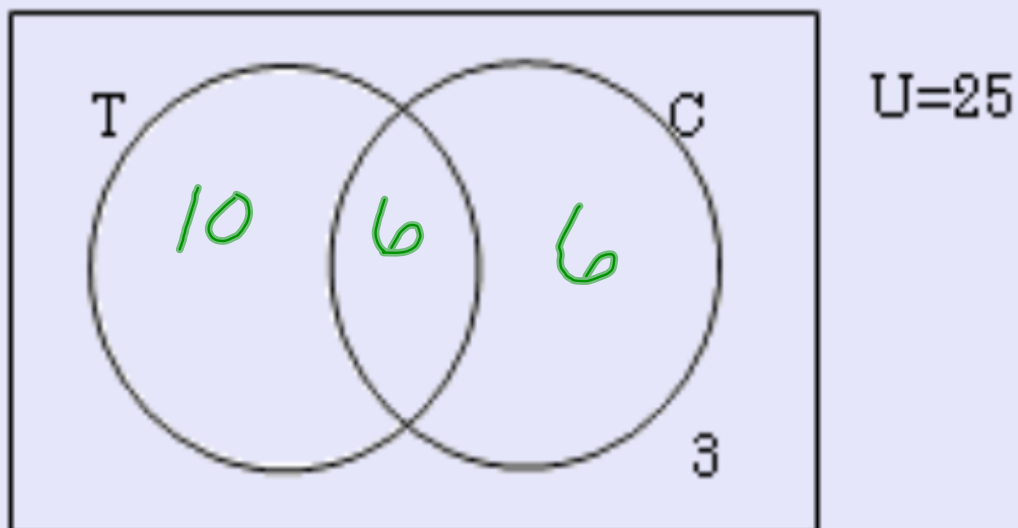
5. Suppose you toss a coin three times. What is the probability that exactly two of the tosses results in "heads"? [tree diagram]



$$P(HH) = \frac{3}{8}$$

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6. In a class of 25 students, it is found that 16 of the students play tennis, 6 play both tennis and chess, and 3 do not participate in any activities at all. Find the probability that a student plays chess. [Venn diagram]



$$P(\text{Chess}) = \frac{12}{25}$$

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7. A collection of 38 computer disks contain four that are defective. One is chosen at random?

What is the probability it's defective? it's not defective?

$$A = \text{defective} \quad P(A) = \frac{4}{38} = \frac{2}{19}$$

$$P(A') = 1 - \frac{4}{38} = \frac{34}{38} = \frac{17}{19}$$

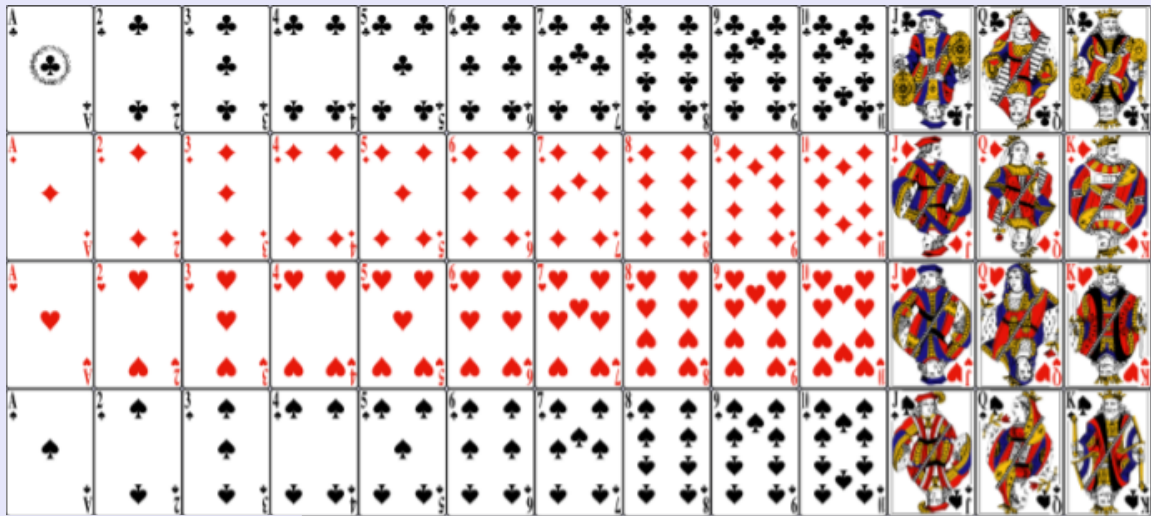
8. Of seventeen students in a class, five have blue eyes. One student is chosen at random.

What is the probability the student has blue eyes? doesn't have blue eyes?

$$P(B) = \frac{5}{17}$$

$$P(B') = \frac{12}{17}$$

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