AND

Section 12.3 HW 1-12, 23-28, 33-36, 53-56, 62, 67-73

Quiz on Thursday

Warm-up (Use any method):

1. A card is drawn from a deck and replaced before a second card is drawn. Find the probability that both cards are jacks.

$$\left(\frac{4}{52}\right)\left(\frac{4}{52}\right)$$

2. Two cards are drawn from a deck. Find the probability that both cards are jacks.

$$\left(\frac{4}{52}\right)\left(\frac{3}{51}\right)$$

$$\frac{C(4,2)}{C(52,2)} = \frac{\frac{4\times 3}{2!}\cdot 2!}{\frac{52\times 51}{2!}}$$

Sep 16-8:30 AM

Independent Events

Two events are independent if knowing that one of them has occurred does not affect the probability of the other one occurring.

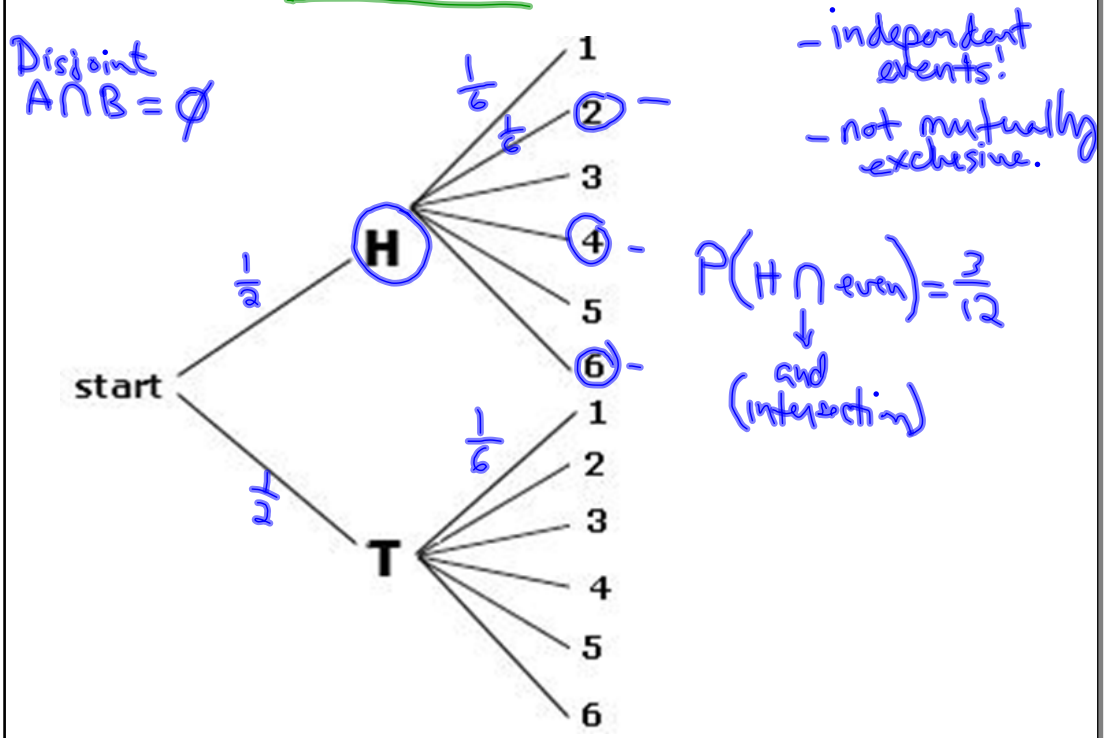
A single card is drawn from a standard 52-deck card. Let A be the event that the card is red, and B be the event that it is a spade. Are events A and B independent? Are events A and B mutually exclusive?

not independent

yes!

Sep 16-8:30 AM

If a coin is tossed and a number cube is rolled simultaneously, find the probability of getting head on the coin and an even number on the number cube.

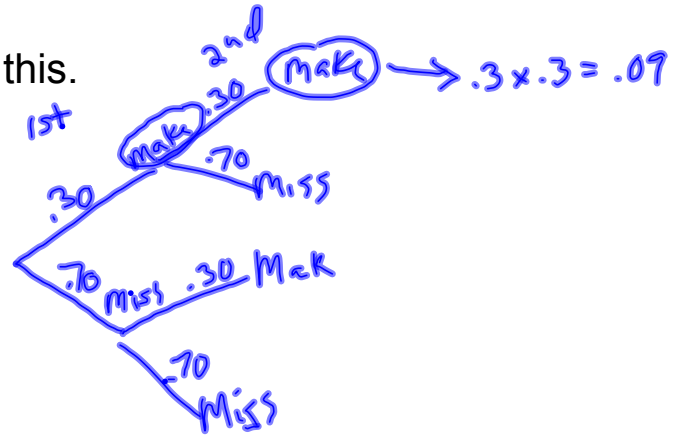


Sep 16-8:30 AM

Shaq's free throw percentage is 30%. Assuming that shooting free throws are independent events, find the probability that Shaq will make two consecutive free throws.

Use an area model to show this.

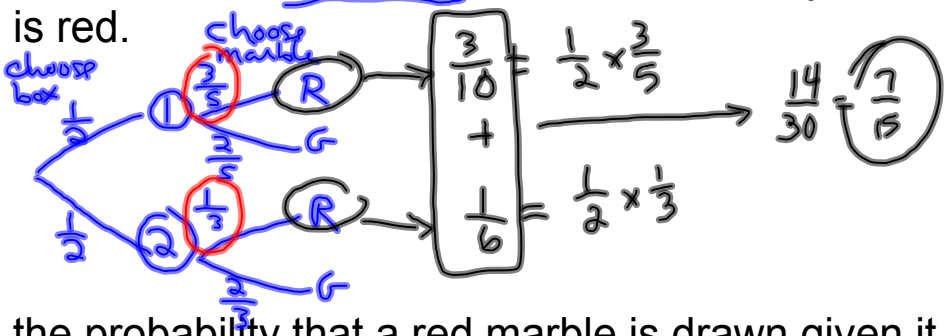
Use a tree to show this.



Sep 16-8:30 AM

Box 1 contains 3 red and 2 green marbles. Box 2 contains 1 red and 2 green marbles.

1. If a box is chosen at random, find the probability that the marble is red.



2. Find the probability that a red marble is drawn given it came from box 1.

$\frac{3}{5}$ (easy!)

Sep 16-8:30 AM

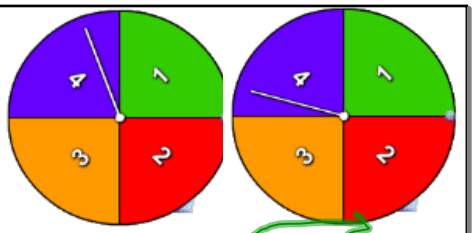
Conditional Probability

The probability of event B, computed on the assumption that event A has happened, is called the **conditional probability of B, given A**, and is denoted $P(B \mid A)$.

p of B "given" A

Sep 16-8:30 AM

Spin both spinners



Let A be the event that the sum of the spinners is odd.
Let B be the event that the sum is a multiple of 4?
Let C be the event that the sum is at least 4?

S = {(1,1), (1,2), (1,3), (1,4),
(2,1), (2,2), (2,3), (2,4),
(3,1), (3,2), (3,3), (3,4),
(4,1), (4,2), (4,3), (4,4)}

1. What is the probability that the sum is odd **given** it is a multiple of 4?

$P(A|B) = 0$

2. What is the probability that the sum is odd **given** that the sum is at least four? (what if this said **and** instead of **given**?)

$P(A \cap C) = \frac{6}{16}$

$P(A|C) = \frac{6}{13}$

3. What is the probability that the sum is at least four **given** the sum is odd?

$P(C|A) = \frac{6}{8}$

Sep 16-8:30 AM

Redefined Independent Events

- Two events A and B are independent if

$$P(B \mid A) = P(B)$$

and

$$P(A \mid B) = P(A)$$

Sep 16-8:30 AM

- If A and B are independent events , then

Special Case

$$P(A \cap B) = P(A)P(B)$$

- **OTHERWISE**

General Multiplication Probability Principle

$$P(A \cap B) = P(A)P(B \mid A)$$

Sep 16-8:30 AM

Let A be the event the student is male, let B be the event that the student is from Grade 10, let C be the event that the student is from Grade 12.

Blue Dolphin High School		
Grade	Male	Female
9	120	150
10	100	100
11	130	110
12	150	175
	500	535

A, B, C

1. P(A and B) $= \frac{100}{1035}$
2. P(A or B) $= P(A) + P(B) - P(A \cap B) = \frac{500}{1035} + \frac{200}{1035} - \frac{100}{1035} = \frac{600}{1035}$
3. P(A|B) $= \frac{100}{200}$
4. P(C|A) $\frac{150}{500}$
5. Are any pair of these events independent? No

Sep 16-8:30 AM

AND

Section 12.3 HW 1-12, 23-28, 33-36, 53-56, 62, 67-73

Quiz on Thursday

Reflect:

1. What is the general multiplication rule for P(A and B)?

2. How can this rule be demonstrated and remembered using a tree diagram?

Sep 16-9:13 AM