$f(x) = (x-1)^2 + 2$

1) $2f(x+4) - 3$

$2\left[(x+4-1)^2 + 2\right] - 3$

$2\left[(x+3)^2 + 2\right] - 3$

$2(x+3)^2 + 4 - 3$

$2(x+3)^2 + 1$

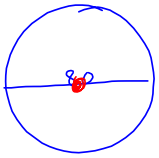
$(x+3)(x+3)$

$2(x^2+6x+9)+1$

$2x^2 + 12x + 19$

31) $\frac{1}{12}$

23)



$\frac{\pi r^2}{\pi r^2} = \frac{\pi 8^2}{\pi (40)^2}$

$= \frac{64}{1600} = \frac{1}{25}$

Probabilities of compound events

$$P(A \text{ or } B) = P(A)+P(B) - P(A \text{ and } B)$$

events over lap

$$P(A \text{ or } B) = P(A) + P(B)$$

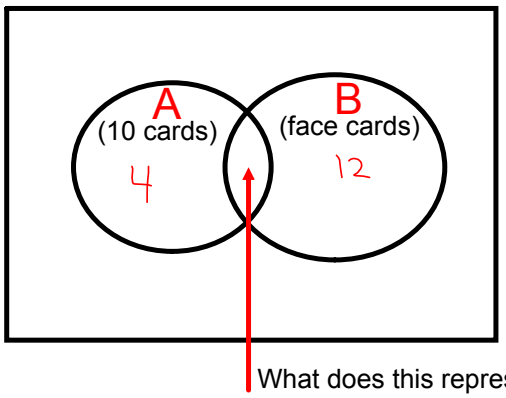
disjoint or mutually exclusive events

no over lap

Use Venn diagrams to calculate the probabilities

Example of disjoint:

A card is randomly selected from a standard deck of 52 cards. What is the probability that it is a 10 or face card?



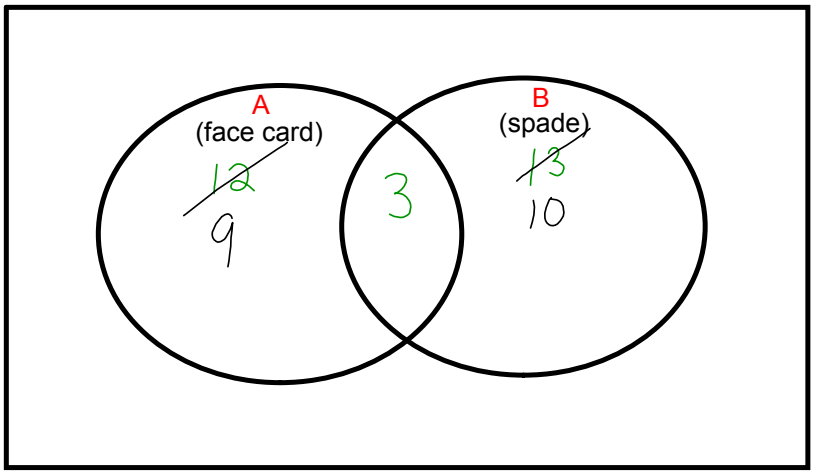
$\frac{16}{52} = \frac{4}{13}$

ten and face card overlap

$\frac{4}{52} + \frac{12}{52} = \frac{16}{52} = \frac{4}{13}$

Example of compound event:

A card is randomly selected from a standard deck of 52 cards. What is the probability that it is a face card or a spade?



$= \frac{22}{52} = \frac{11}{26}$

$\frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$

Independent events: if the occurence of one has no effect on the occurence of the other.

Ex: Replacement Spinners

flipping coin

rolling dice

Probability of independent events: $P(A \text{ and } B) = P(A) \cdot P(B)$

For a fundraiser, a class sells 150 raffle tickets for a mall gift certificate and 200 raffle tickets for a booklet of movie passes. You buy 5 raffle tickets for each prize. What is the probability that you win both prizes.

$$\frac{5}{150} \cdot \frac{5}{200} = \frac{1}{30} \cdot \frac{1}{40} = \frac{1}{1200}$$

Find the probability of spinning the given colors:

a) green, then blue

$$\frac{4}{12} \cdot \frac{3}{12} = \frac{1}{12}$$

b) blue, then red

$$\frac{3}{12} \cdot \frac{2}{12} = \frac{1}{24}$$

c) blue, then green, then red

$$\frac{3}{12} \cdot \frac{4}{12} \cdot \frac{2}{12} =$$

$$\frac{1}{4} \cdot \frac{1}{3} \cdot \frac{1}{6} = \frac{1}{72}$$

Dependent events: if the occurence of one has an effect on the occurence of the other.

Ex: No Replacement

Probability of dependent events: $P(A \text{ and } B) = P(A) \cdot P(B \mid A)$

A bag contains 4 blue marbles, 3 red marbles and 2 white marbles. What is the probability of selecting a blue marble and then a white marble? No Replacement

$$\frac{4}{9} \cdot \frac{2}{8} = \frac{1}{9}$$

Independent / Dependent Events

Replacement / without Replacement

Find the probability of drawing the given cards from a standard deck of 52 cards (a) with replacement (b) without replacement

1. A spade, then a club

replace a) $\frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$

No replace b) $\frac{13}{52} \cdot \frac{13}{51} = \frac{13}{204}$

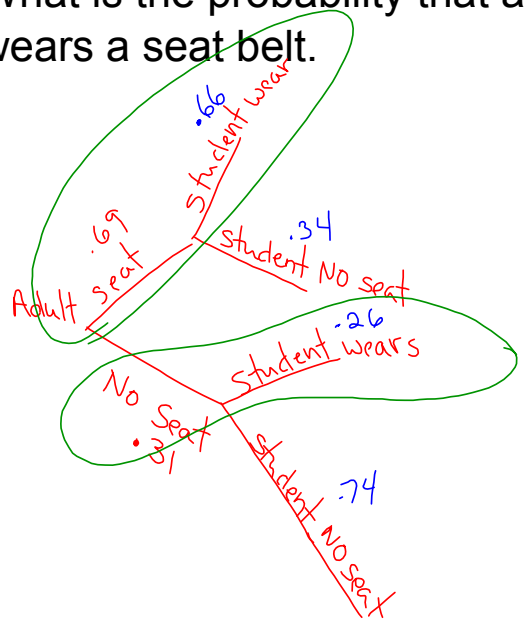
2. A jack, then another jack

replace a) $\frac{4}{52} \cdot \frac{4}{52} = \frac{1}{169}$

No replace b) $\frac{4}{52} \cdot \frac{3}{51} = \frac{1}{221}$

Probability Tree Diagram

Using observations made of drivers arriving at a certain high school, a study reports that 69% of adults wear seat belts while driving. A high school student also in the car wears a seat belt 66% of the time when the adult wears a seat belt, and 26% of the time when the adult does not wear a seat belt. What is the probability that a high school student in the study wears a seat belt.



$(.69)(.66) + (.31)(.26) = .536$

53.6%

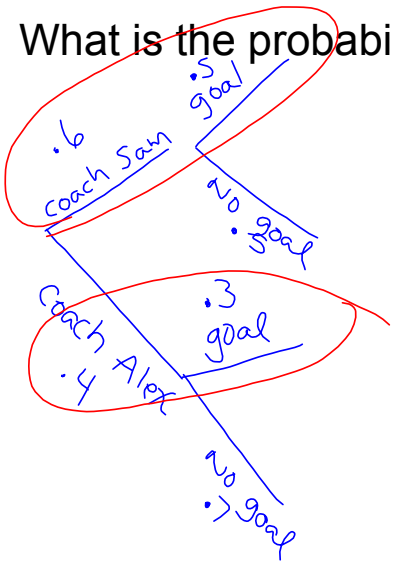
You are off to soccer, and love being the Goalkeeper, but that depends who is the Coach today:

*with Coach Sam the probability of being Goalkeeper is 0.5

*with Coach Alex the probability of being Goalkeeper is 0.3

Sam is Coach more often...about 6 out of every 10 games.

What is the probability you will be a Goalkeeper today?



$(.6)(.5) + (.4)(.3) = .42$

42%