

"Given" Discovery- Using formula with tree diagrams

Some "given" problems can be solved by looking at the information. Others require this formula:

$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$$

**Ex:** Suppose you manage a restaurant that serves chicken wings that are mild or hot, and boneless or regular. From your experience you know that of boneless wings bought, 75% of them are mild, and of the regular wings bought, 70% are hot. Only 4 out of 10 costumers buy boneless wings.

- Use the information to calculate the following. (Hint: in some problems you can use the "given")

1) Create a tree diagram for the scenario displaying all the possibilities and probabilities.

2) P(boneless and hot wings)

6) P( mild wings)

3) P(hot | boneless)

7) If a person orders regular wings, what is the probability they choose mild?

4) P(hot)

8) P(boneless |mild)

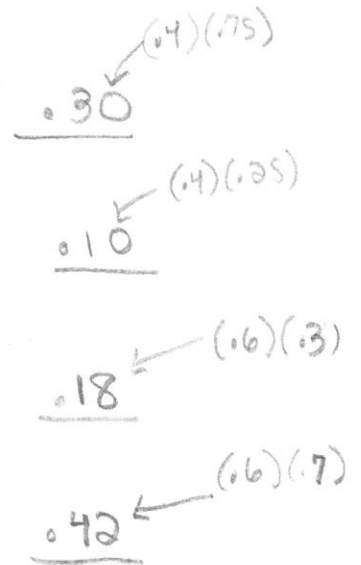
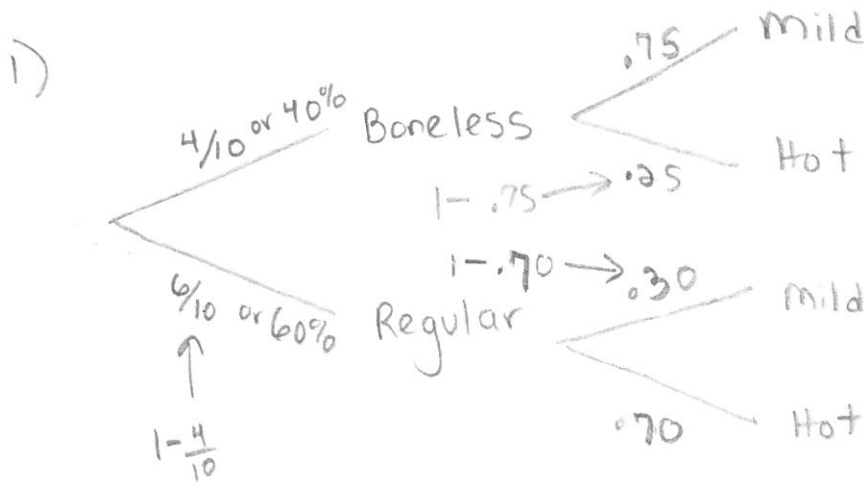
5) P(boneless |hot)

9) Of the boneless wings, what is the probability someone orders hot?

\*NOTE: None of your prior answers should be equal. If they are, check your work!

Key

# Given with Tree Diagrams Wings Problem



2)  $P(\text{boneless and hot})$

$$(.40)(.25) = \boxed{.10}$$

3)  $P(\text{hot} | \text{boneless}) = \boxed{.25}$

↑  
1 - .75  
↑ means "given" so go to or "zoom in" on the appropriate part of the diagram.

4)  $P(\text{hot}) = P(\text{boneless and hot OR regular and hot})$

$$= P(\text{boneless and hot}) + P(\text{regular and hot})$$
$$(.40)(.25) + (.60)(.70)$$
$$.10 + .42 = \boxed{.52}$$

5)  $P(\text{boneless} | \text{hot})$

↑  
"given" but the hot is in two places so you can't just "zoom in", you must use the formula

$$= \frac{P(\text{boneless and hot})}{P(\text{hot})} = \frac{(.40)(.25)}{(.40)(.25) + (.60)(.70)}$$

$$= \frac{.10}{.52} = \boxed{.1923}$$

6)  $P(\text{mild wings})$

$$= P(\text{boneless and mild OR regular and mild})$$
$$= P(\text{boneless and mild}) + P(\text{regular and mild})$$
$$(.40)(.75) + (.60)(.30)$$
$$.30 + .18 = \boxed{.48}$$

or do  $P(\text{mild}) = 1 - P(\text{hot})$   
 $= 1 - .52$

7) If regular, find prob mild.

$$= P(\text{mild} | \text{regular})$$

↑ the "if" part tells what "zoom in on diagram" is given

$$= \boxed{.30} = 1 - .70$$

8)  $P(\text{boneless} | \text{mild})$

$$= \frac{P(\text{boneless and mild})}{P(\text{mild})} = \frac{(.40)(.75)}{(.40)(.75) + (.60)(.30)}$$
$$= \frac{.30}{.48} = \boxed{.625}$$

9) Of boneless, what is prob. someone orders hot? =  $P(\text{hot} | \text{boneless})$

$$= 1 - .25 = \boxed{.75}$$

↑ "zoom in" on "boneless" part of diagram

## Given - using formula with tree diagrams

Some "given" problems can be solved by looking at the information. Others require this formula.  skip... if given in notes

Remember  $P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$

Suppose you manage a restaurant that sells chicken wings that are mild or hot, and boneless or regular. From your experience you know that of boneless wings bought, 75% of them are mild, and of the regular wings bought, 70% are hot. Only 4 out of 10 customers buy boneless wings.

Use this information to calculate the following.

- 1) Create a tree diagram for the scenario displaying all the possibilities and probabilities.

Hint:  
For some problems you must use the "given" formula

2)  $P(\text{boneless and hot wings})$

3)  $P(\text{hot} | \text{boneless})$

4)  $P(\text{hot})$

5)  $P(\text{boneless} | \text{hot})$

6)  $P(\text{mild wings})$

7) If a person orders regular wings, what is the probability they chose mild?

8)  $P(\text{boneless} | \text{mild})$

9) of the boneless wings, what is the probability someone orders hot?

\*NOTE: none of your prior answers should be equal. If they are, check your work!