Observations vs. Inferences

“You can observe a lot just by watching.”

-Yogi Berra

Observations

- An observation is the gathering of information by using our five senses:
  - *Sight*
  - *Smell*
  - *Hearing*
  - *Taste*
  - *Touch*

- There are two types of observations
  - *Qualitative*
  - *Quantitative*

Observations

Qualitative Observations

- Qualitative observations ***describe*** what we observe.
- "Qualitative" = quality (descriptive)
- These observations use adjectives to describe something.

- **Example:** *The flower has white petals*.
- **Example:** *Mr. M has blue eyes*.

Qualitative Observations

Quantitative Observations

- Quantitative observations ***measure*** what we observe.
- "Quantitative" = quantity (numerical)
- These observations use numbers to measure something in a quantitative way.

- **Example:** *The flower has seven petals.*
- **Example:** *Mr. M has two eyes.*

Quantitative Observations

Side by Side Comparison

Example 1: ***Oil Painting***  **Qualitative data:** • blue/green color, gold frame • smells old and musty • texture shows brush strokes of oil paint • peaceful scene of the country • masterful brush strokes	**Example 1:** ***Oil Painting***  **Quantitative data:** • picture is 10" by 14" • with frame 14" by 18" • weighs 8.5 pounds • surface area of painting is 140 sq. in. • cost $300
Example 2: ***Latte***  **Qualitative data:** • robust aroma • frothy appearance • strong taste • burgundy cup	**Example 2:** ***Latte***  **Quantitative data:** • 12 ounces of latte • serving temperature 150° F. • serving cup 7 inches in height • cost $4.95

Which is better?

- Both types of observations are valuable in science. In an experiment though, quantitative observations can be precisely and objectively compared.

Qualitative: *The road is long*. (describes)

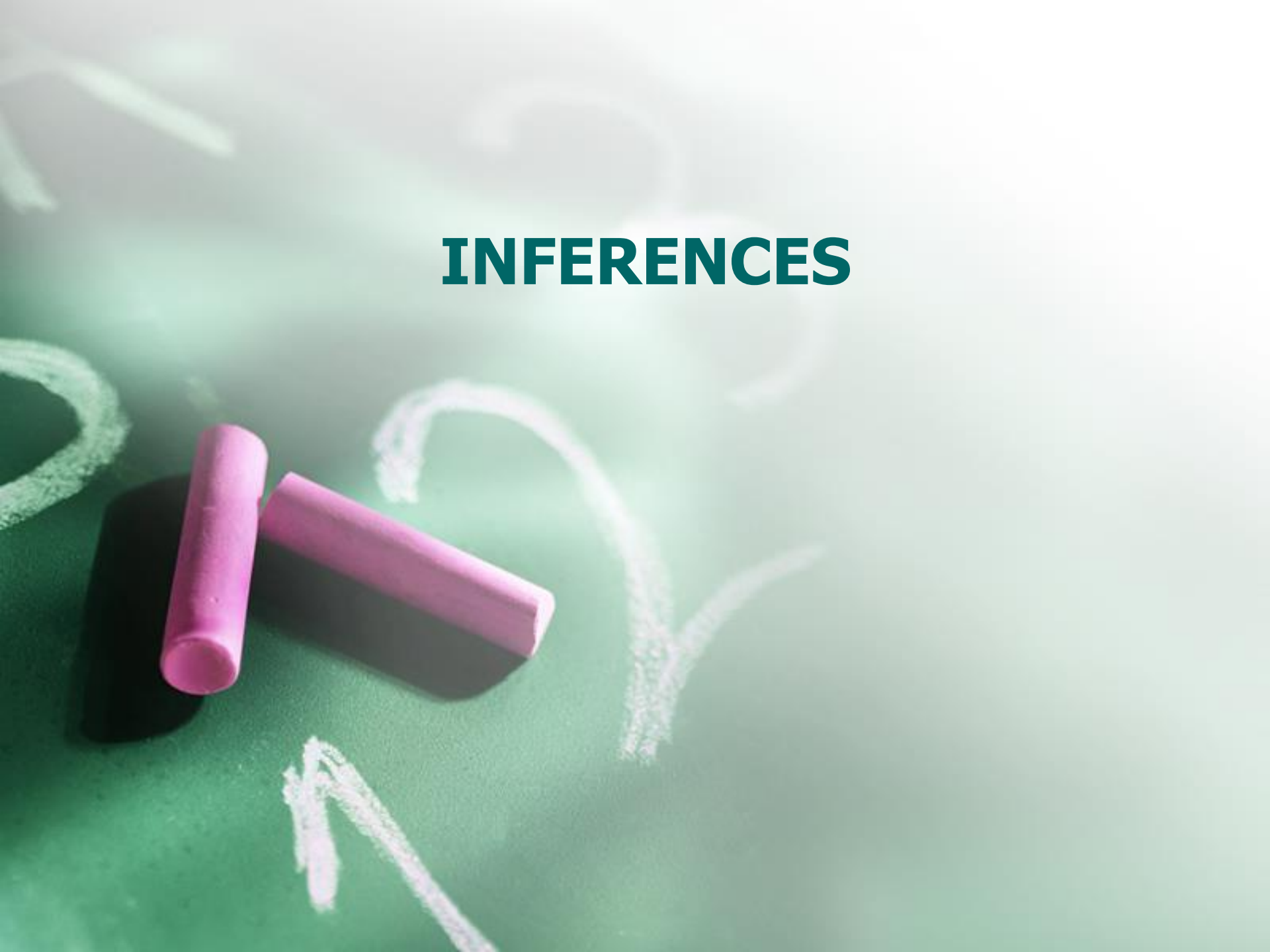
Quantitative: *The road is 5 km long*. (measures)

- Some things are easier to quantify than others. Scientists use innovative ways of turning qualitative into quantitative.

Which is better?

- For example, someone might say that a dead fish is smelly.
- It is hard to know just how smelly the fish is though.
- To make this quantitative, the scientist could ask the person to rate the “smelliness” on a scale of 1-5.
- This would then allow you to compare how smelly the fish is!

INFERENCES



Inferences

- Inferences are an explanation for an observation you have made.
- They are based on your past experiences and prior knowledge.
- Inferences are often changed when new observations are made.
- Again, observations are information we gather directly through our five senses….inferences help explain those observations!

Here are some examples!

- **Observation**: *The grass on the school's front lawn is wet.*
- **Possible inferences**:
  - *It rained.*
  - *The sprinkler was on.*
  - *There is dew on the grass from the morning.*
  - *A dog urinated on the grass!*
- All of these inferences could possibly explain why the grass is wet. They are all based on prior experiences. We have all seen rain, sprinklers, morning dew, and dogs going to the bathroom.


FIRE

Here are some examples!

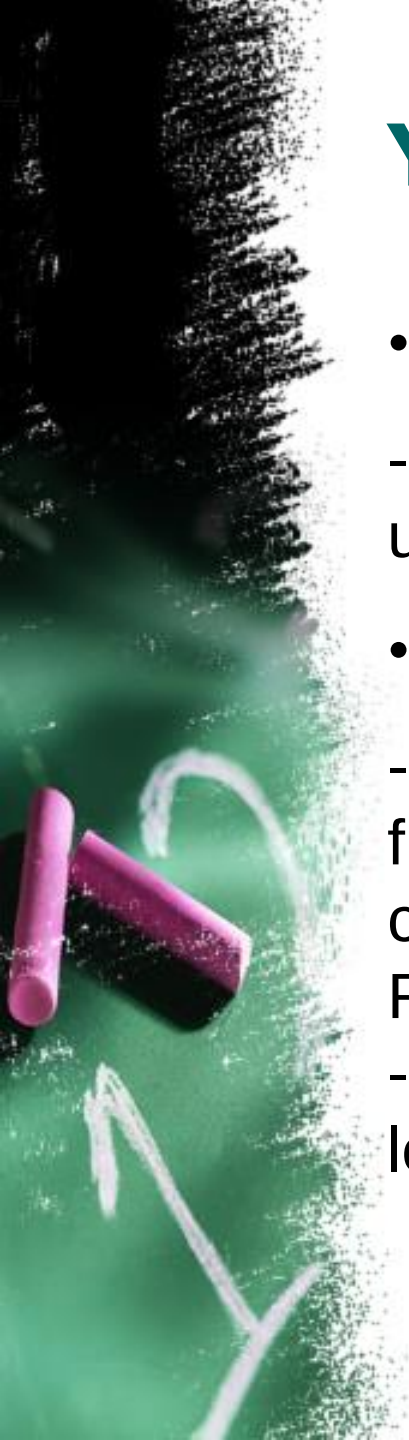
- **Observation**: *The school fire alarm is going off.*
- **Possible inferences**:
  - *The school is on fire.*
  - *We are having a fire drill.*
  - *A student pulled the fire alarm.*
- Again, these are all logical explanations for why the fire alarm is going off.

You Try!

- **Observation**: *A student is sitting in the main office.*
- **Possible inferences**:

?

Why might a student be sitting there?



You Try!

- **Observation**:

- Four legs - Big ears - Golden color - White underneath - Has whiskers - Has fur

- **Possible inferences**:

- Can hear well because it has large ears - Hides from its prey because of camouflage - Lives in a cold climate – fur and snow in the picture - Related to a cat – ear shape, face shape, long tail - Can jump far – jumping in the picture, muscular legs

Compare and Contrast

Observations	Inferences
• That plant is extremely wilted.	• That plant is extremely wilted due to a lack of water.
• The car stopped running.	• The car stopped running because it was out of gas.
• The Red's are leading there division.	• The Red's are leading there division because they are playing well right now.

Note the Difference.

- In laboratory exercises, record observations ***NOT*** inferences
- Observations are used to summarize

- Inferences may be used when writing the conclusion in your lab
- Inferences are used to