HOME SMOKE DETECTORS

Home Smoke Detectors

- **Developed in early 70’s**
- **Blossomed when Demanded by Local Codes**
- **Main Reason For Steady Decrease in Home Fire Deaths!**

FIRE: BASIC PHYSICS

- **Fires Generate:**
  - ***Heat*** **(Measured by Temperature)**
  - ***Radiation*** **(Measured by Visible Light, IR , UV)**
  - ***Gases*** **(CO, CO2, others)** *Will Discuss at End*
  - ***Smoke/Combustion Particles*** ***(Measured by Two Basic Principles Used in Smoke Detectors)***

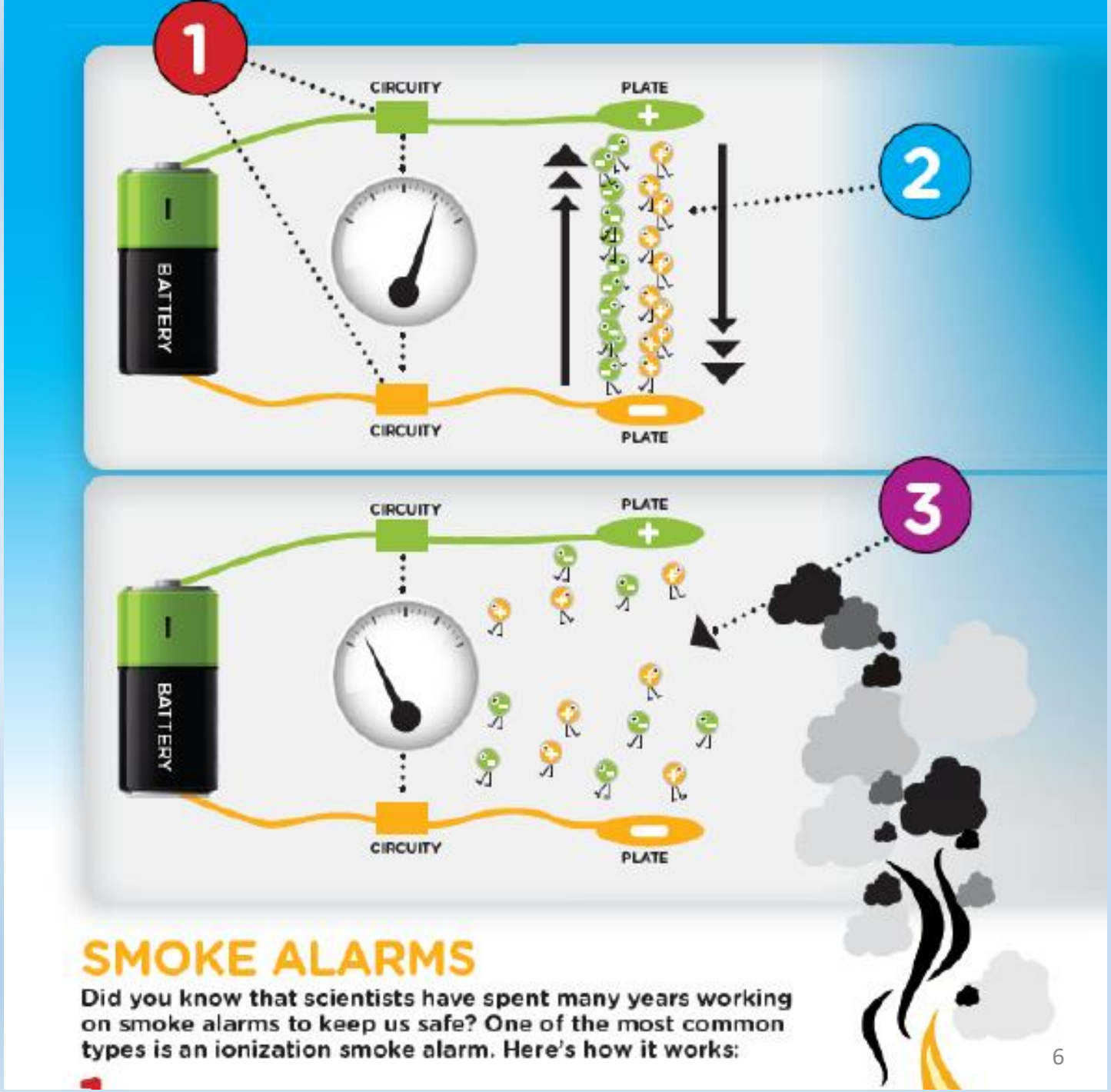
FIRE: BASIC PHYSICS

- **Smoke Occurs FIRST**
- **Most Fire Deaths Caused by Smoke Inhalation**
- **SMOKE DETECTION = Early Warning = Life Safety**

SMOKE PARTICLE DETECTION

- ***Two Basic Principles Utilized*:**
  - **IONIZATION**
  - **PHOTOELECTRIC**

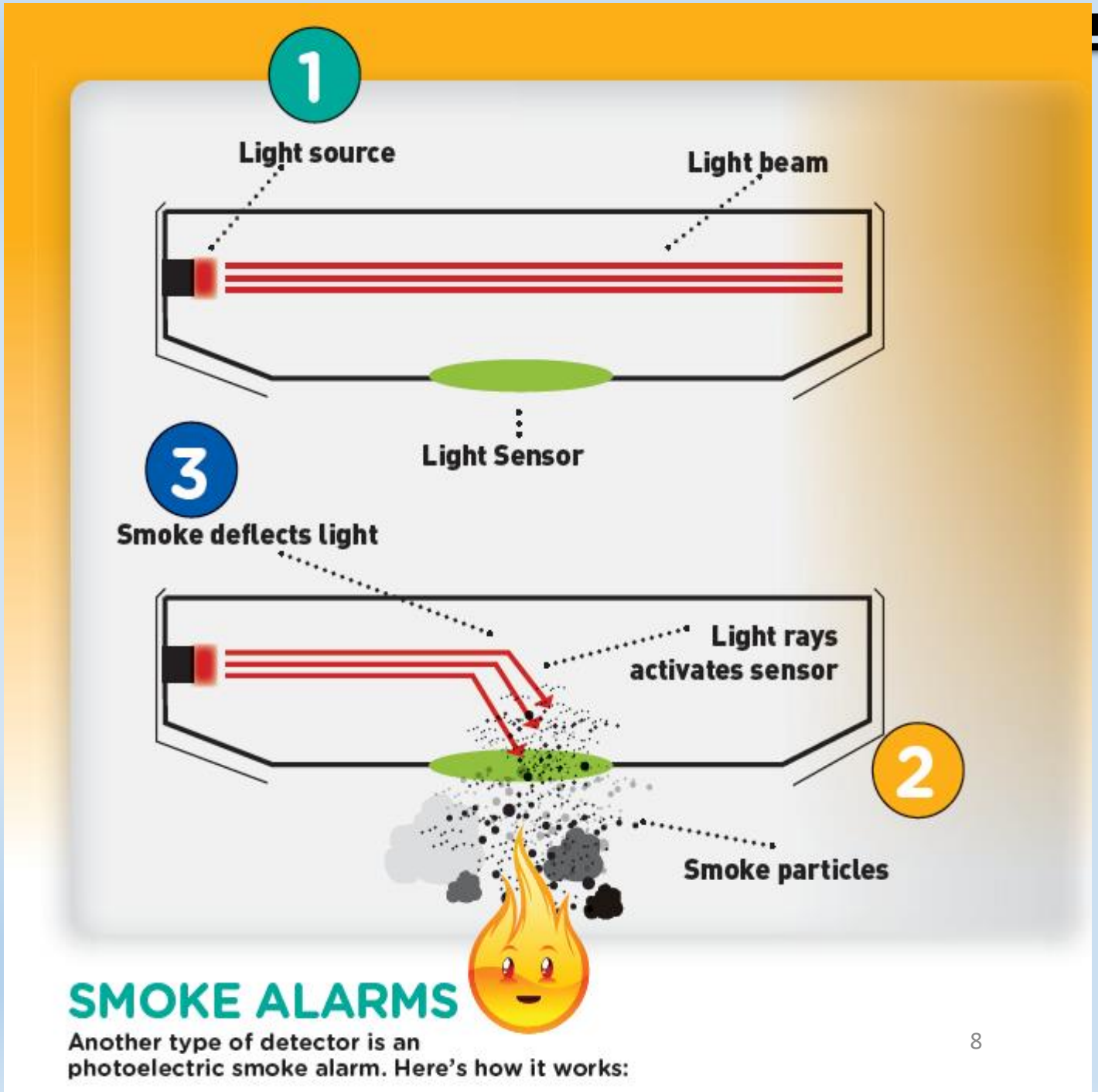
Ionization Detector Principle



Principle Discovery

- **After WW I Swiss Scientists Searched for Poison Gas Detector**
- **Scientists were Heavy Smokers**
- **Accidently Stumbled Upon Smoke Detection**

Photoelectric Detector Principle



Light Scattering Example

- **Remember When Smoking Allowed at Movies?**
- **Sitting Behind Smoking Section, Could See Smoke Rising!**
- **Example of Smoke Causing Light Scattering & Visibility**

Ion vs. Photo
Which Type is Better?

- **Fires Classified "Flaming" or "Smoldering" Depending on what's burning**

Which Type is Better?

- **Typical Flaming Fire: Burning Cooking Oil ; Little Visible Smoke.**
- **Ionization Sense Little Sooner**

Which Type is Better?

- **Typical Smoldering Fire: Burning Couch or Mattress; Lot's Visible Smoke.**
- **Photoelectric Sense Little Sooner**

Which Type is Better?

- **However, many fires are Combination.**
- **All Smoke Detectors MUST meet Same UL Standard which includes Both Flaming and Smoldering Fire Tests**
- **(Details Latter)**

False and Nuisance Alarms

- **Defined as Any Alarm Caused by Non-Life Threatening Event**
- **Causes Include Cooking, Cigarette Smoking, Steam from Showering, etc.**
- **Also, Rarely by Malfunction or Insect Inside Sensor.**

Effect of Household Dust

- **Dust Particles Can Slowly Collect Inside Detectors**
- **Effect Is Same for BOTH Ionization & Photoelectric Detectors.**
- **Dust Accumulation Makes Detector MORE Sensitive**

Effect of Household Dust

- **IT TAKES LESS SMOKE TO TRIGGER DIRTY DETECTOR!!**
- **Detector Alarming Frequently Could be Sign of Dust Build-Up**
- **Home Detectors NOT Designed for Disassembly & Cleaning**
- **Replacement Best Option**

Location & Power Source

- **Should be Located Outside Bed-Room Area**
- **Home Detectors Powered by Battery or Home A/C**
- **Imperative to Replace Weak Battery**

Codes & Standards

- **Local & State Building Codes Demand Smoke Detectors in All Homes**
- ***No Smoke Detectors, No CO, (Certificate of Occupancy)***
- **Codes Require Detectors MUST Have UL Label**

Underwriters Laboratories (UL):

- **A Private LLC that Provides Fire Safety-Related Services of Testing, Certification, Inspection, Auditing and Education**

- **Generate Standards, with Cooperation of Entire Fire Protection Industry (i.e. manuf's, code officials, firefighters, etc.)**

Underwriters Laboratories (UL):

- **For Home Detectors its UL Standard 217**
- **Passing Standard Allows Use Of UL Label**

UL Standard 217

- **It's Over 200 Pages Long**
- **It Contains Specific Details on Construction, Components, Manufacturing, and …**
- **MOST IMPORTANT: *Performance***

UL Standard 217

- **Performance is Determined by Detailed Inspection and Series of Fire Tests**
- **Tests are Defined in Meticulous Detail to Simulate Real-Life Fires**

UL 217 Tests

- **PAPER FIRE:** Use Stripes of Newsprint of Specific Size, Amount, Moisture Content, etc.
- **WOOD FIRE:** Use Kiln Dried Fir Strips of Specific Size, Amount, Moisture Content, etc.
- **Flammable Liquid Fire:** Use 25% Toluene and 75% Heptane at Specific Temperature, etc.
- **OTHERS**

UL 217 Tests

- **Specific Details Defined on ALL Aspects Including Test Equipment, Testing Methods, etc.**
- **To Insure Repeatability, Smoke Build-Up vs. Time MUST be in Specific Range for Valid Test**
- **Light Obscuration Meter Used to Measure Smoke Density**
- **Measurement is “%/Foot” Obscuration**

UL TEST ROOM

- **All Testing Done in Very Specialized TEST ROOM**
- **SIZE: 36 ft. Long, 22 ft. Wide, 10 Ft. High**

UL TEST ROOM

- **To Maximize Approval of New Designs, Manufacturers Copy Test Room and Run All UL 217 Tests, with UL Knowledge**

- **Episode in Moving from Cedar Knolls to Florham Park……..**

QUESTIONS? *

Comments on Carbon Monoxide Detectors

Carbon Monoxide Detectors

- **CO is Odorless, Colorless, Poisonous Gas Caused by Incomplete Combustion**
- **CO Detectors are Mandated IN ADDITION to Smoke Detectors**
- **CO Sensors, unlike Smoke Sensors, Have 5 to 7 Year LIFE and Must be REPLACED Regularly!**

QUESTIONS?