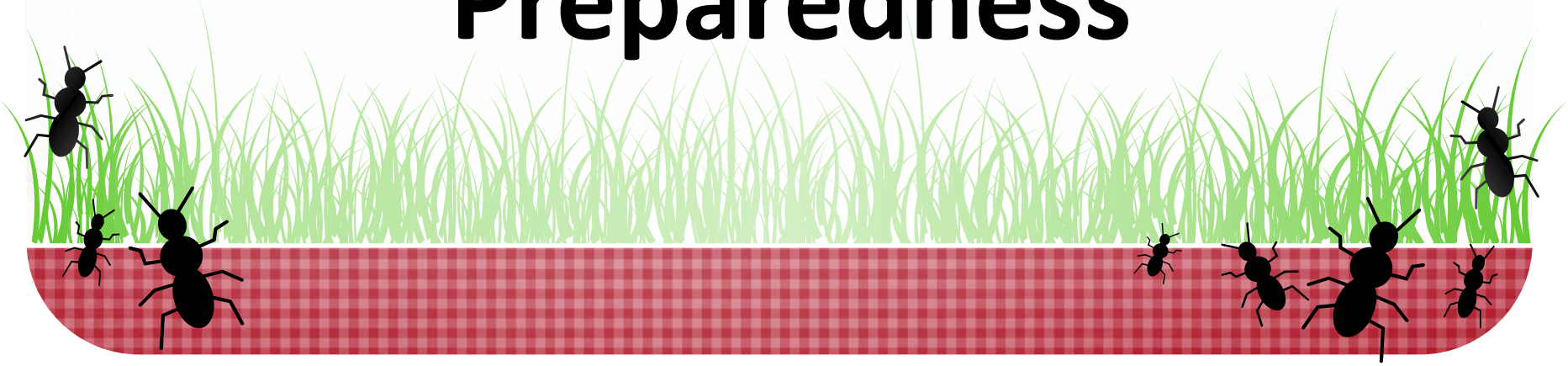
Solar Energy

In Emergency Preparedness

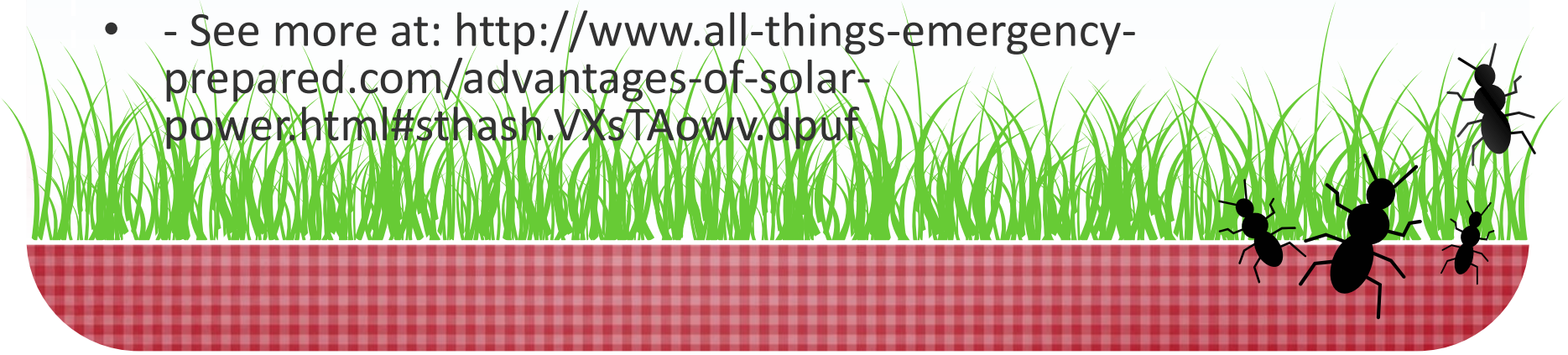


Why Solar for Preparedness?

- Alternate power source for when the power goes out
  - No fuel or electricity needs to be stored
    - If you live where there is a lot of sunshine
- Emergency lighting
- Once purchased - save money and benefit from it for a long time
- Stored energy can be used any time – night, bad weather, outage
- Portable chargers can be carried wherever you go

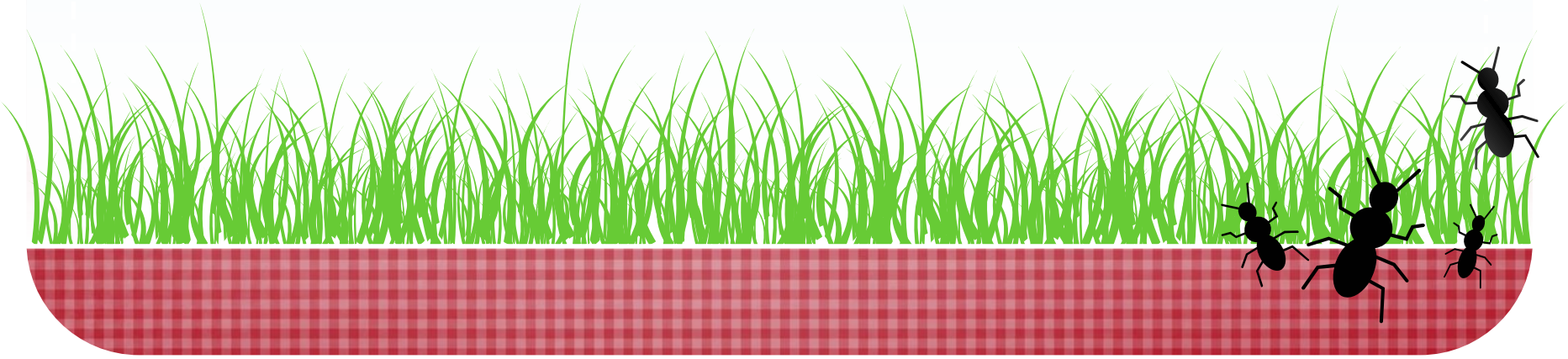
Examples of Solar Devices

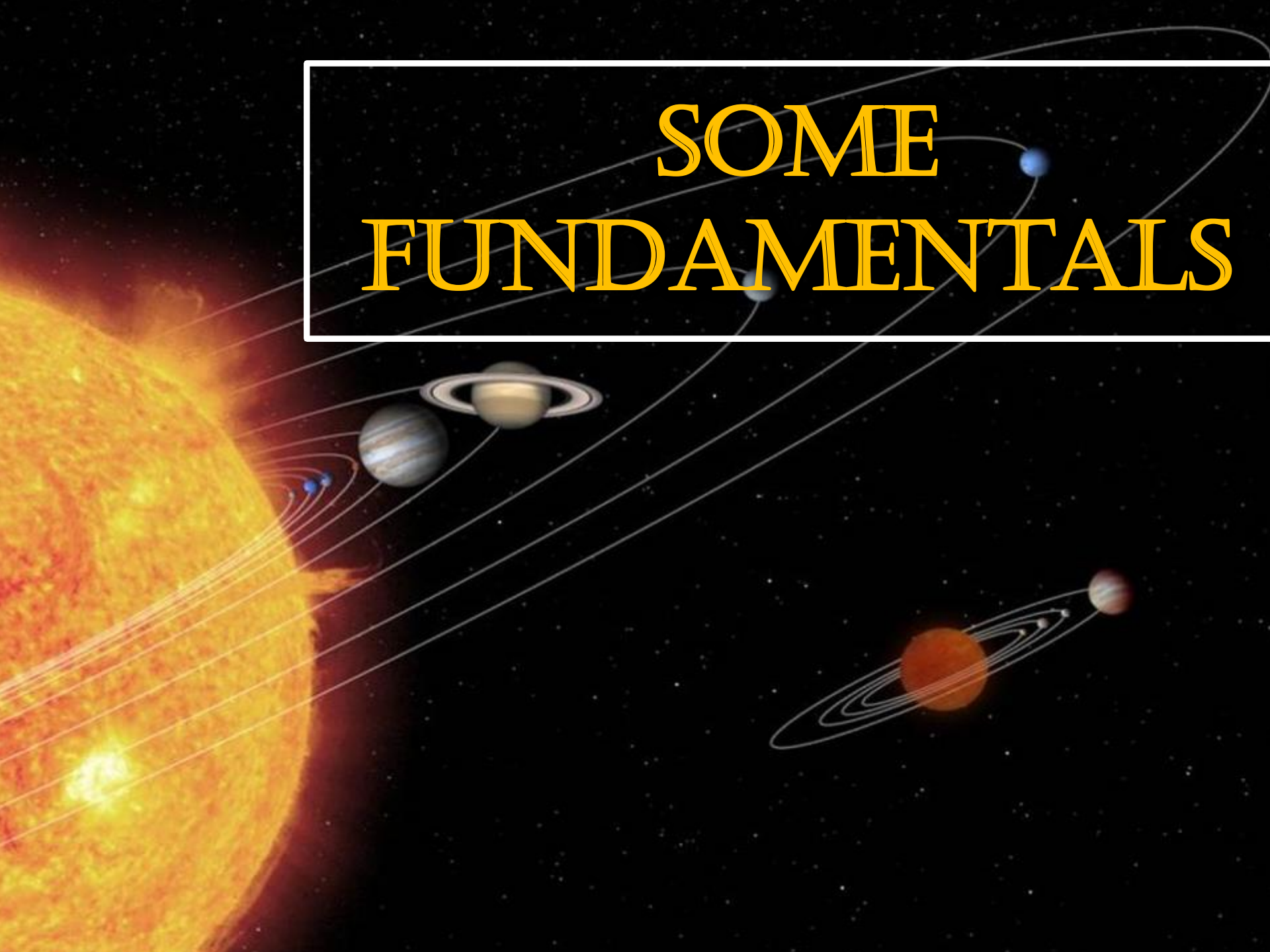
- Solar ovens emergency cooking, garden & outdoor lighting
- Battery chargers - for small portable devices
- Portable generators – can power household appliances and tools
- Solar thermal hot water systems - heats water in your home and can also benefit you by decreasing your monthly electric bills
- Solar mirror kits - capture sunlight and provide high temperatures needed for solar furnaces
- Solar water pump kits - pump water to supply your house, gardens, and animals
- - See more at: http://www.all-things-emergency-prepared.com/advantages-of-solar-power.html#sthash.VXsTAowv.dpuf



Resources

- Solar calculator
  - http://www.solar-estimate.org/?page=solar-calculator
- Integration of Solar Energy in Emergency Planning
  - http://www.nycedc.com/system/files/files/resource/SolarNYCReport.pdf

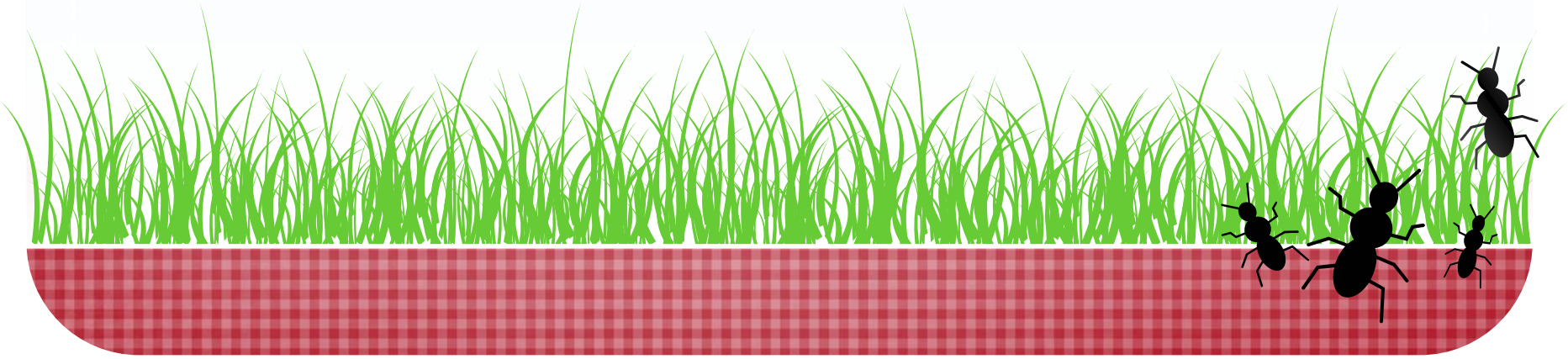



SOME
FUNDAMENTALS

Light is like sound

- and sound vibrations
- There are sounds we can hear
  - They are low on the sound range band
- There are sounds we can't hear
  - Lower frequency, too low to hear, infrasonic
  - Pre earthquake vibrations
  - Certain whale sounds

- Some sounds are too high to hear
  - Ultrasonic
- bats
- Dog whistles

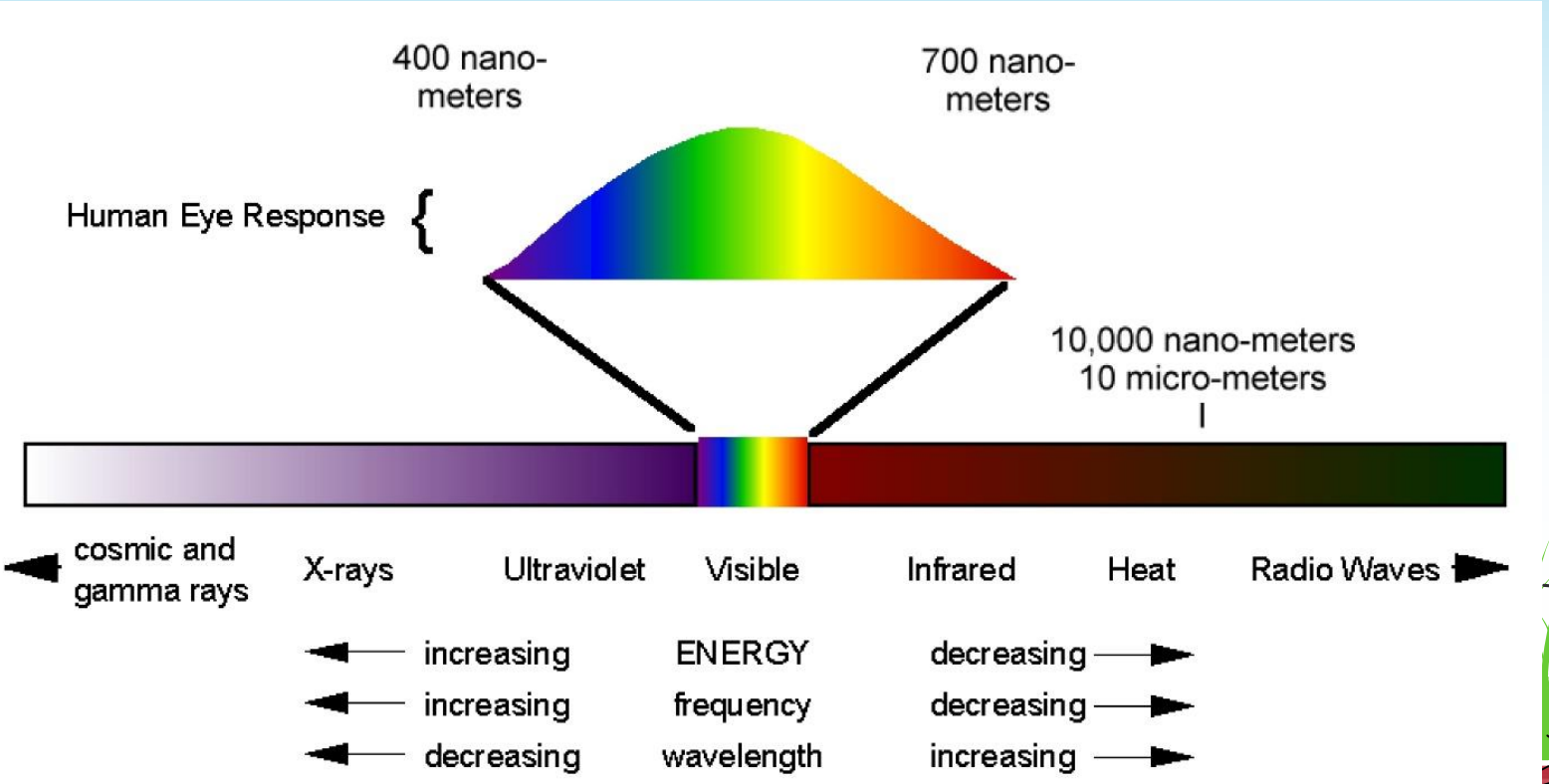


Some light we can see…

- Just like sound, we can see some forms of light, and not others
- We can see red/yellow/blue
  - Located in a low area of the scale
- We can't see lower scale light
  - Infra-red/heat
- Or the high scale light
  - Ultraviolet

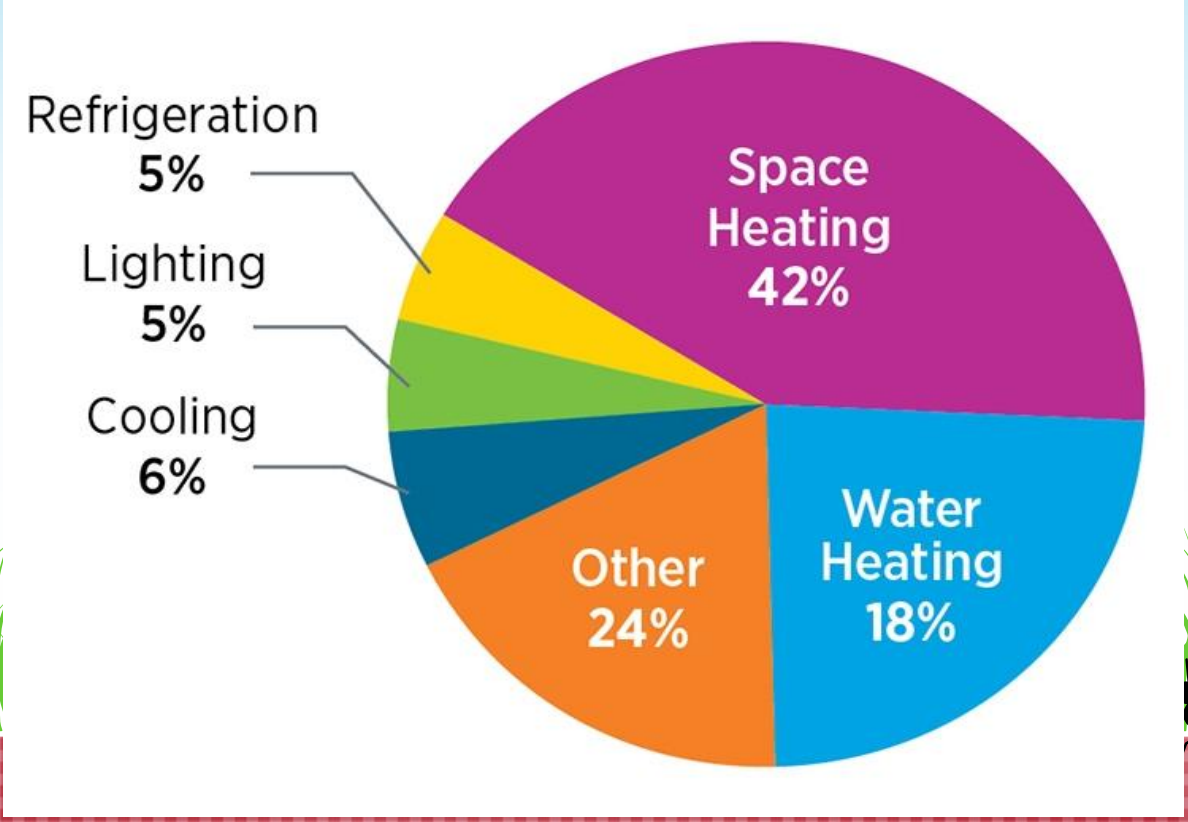
Sunlight Transmits Light in the Form of…

- Infrared/heat, visible light and ultraviolet light



Energy Use In The Home

- Where does the power go?

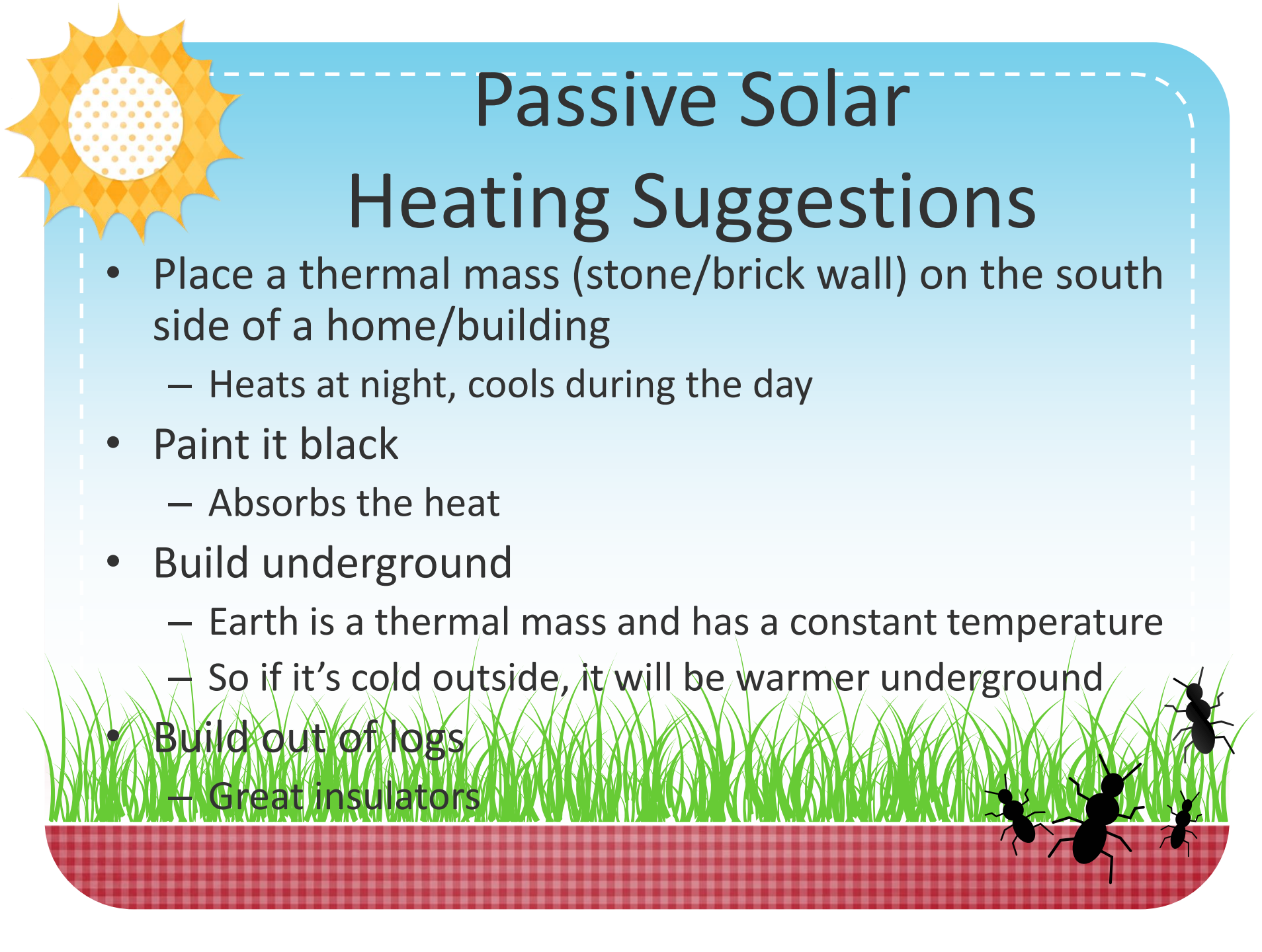


Types of solar energy

- Passive – Direct heat from the sun
  - Doesn't involve mechanical devices or the use of conventional energy sources
  - E.g. Greenhouses, sunrooms, and solariums, Heating water, air drying clothes
- Active - Conversion of sunlight to some other form of energy
  - Uses external sources to collect, store and convert solar energy
  - Once energy is absorbed, it is stored for later use
  - E.g. Solar panels and generators, heliostatic furnaces

Passive Solar Heating Suggestions

- Place a thermal mass (stone/brick wall) on the south side of a home/building
  - Heats at night, cools during the day
- Paint it black
  - Absorbs the heat
- Build underground
  - Earth is a thermal mass and has a constant temperature
  - So if it's cold outside, it will be warmer underground
- Build out of logs
  - Great insulators



Passive Solar Cooling Suggestions

- Reflective or light colored surfaces
  - Bounces heat off
- Place a tarp over anything
  - Creates shade
- Wet sheets where a breeze may be (in low humidity areas)
- Build underground
  - Earth has a constant temperature, so if it's warm outside, it will cooler underground
- Build out of logs – great insulators

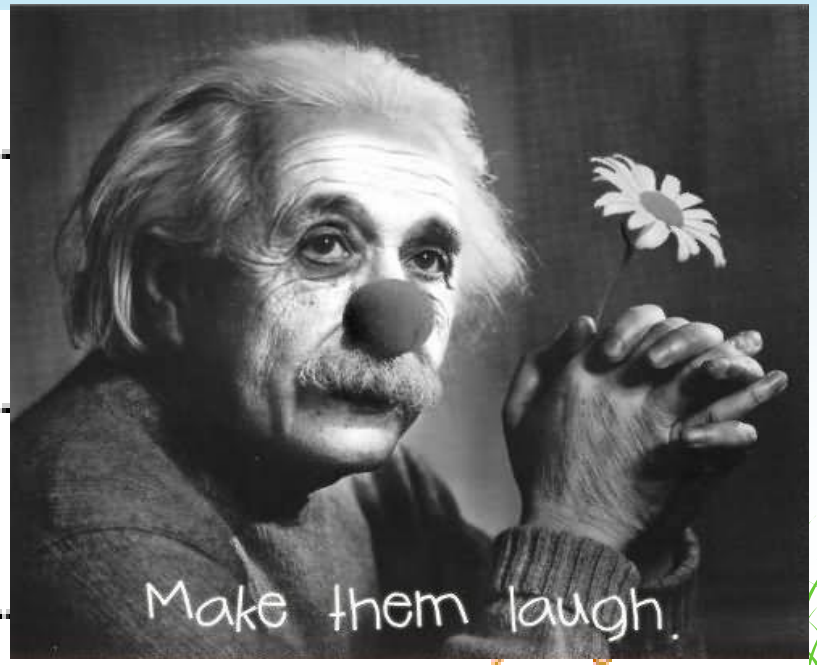
Active Solar

- Now, let's discuss the photovoltaic equation

$$hc\left(\frac{1}{\lambda} - \frac{1}{\lambda_o}\right) = V_o.e$$

$$V_o.e = \frac{hc}{\lambda} - \phi_o$$

$$V_o.e = h\nu - \phi_o$$



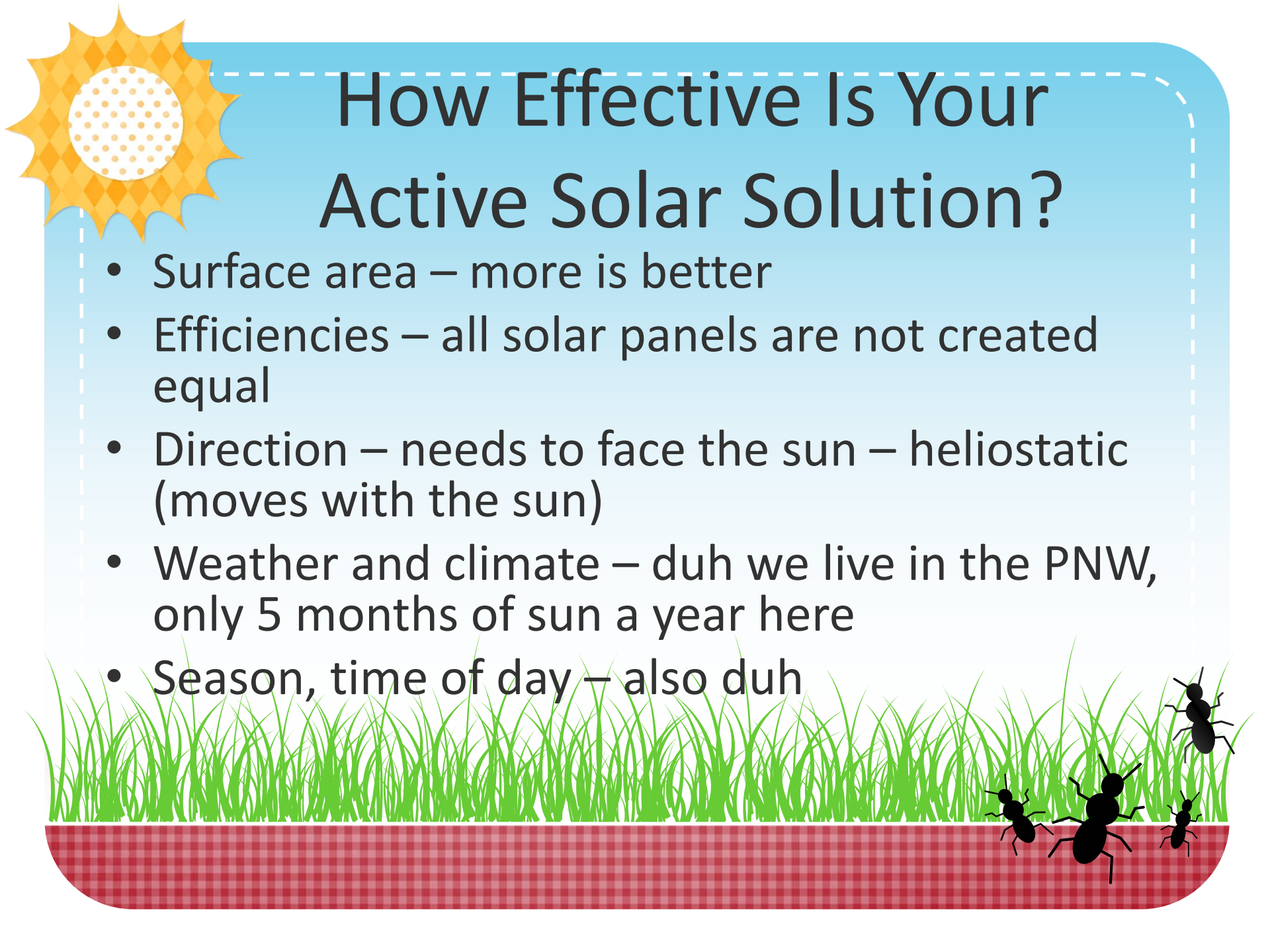
JUST KIDDING!

Active Solar Solutions

- Generators
- Panels – large systems
- Lanterns
- Small portable device chargers

How Effective Is Your Active Solar Solution?

- Surface area – more is better
- Efficiencies – all solar panels are not created equal
- Direction – needs to face the sun – heliostatic (moves with the sun)
- Weather and climate – duh we live in the PNW, only 5 months of sun a year here
- Season, time of day – also duh



Purchasing a Solar Solution

- Panel system cost
  - What can you afford?
- Power output (size of the panels)
  - How much energy do you need?
- Ruggedness
  - How well will it hold up, how much of a beating can it take?
- Portability
  - How much can you carry?

Demo Time

- Hoses on the roof
- Large systems (panels)
- Portable device chargers
- Lanterns
- Radios
- Solar Generators
  - Goal Zero - Yeti