

Stand Far away from the bulb.
Step closer.
As you get closer, when can you begin reading the text?

Almost heaven.
West Virginia
Blue Ridge Mountain
Shenandoah River
Life is old there.
Older than the trees
Younger than the mountains
Growing like a breeze

5 point font

Do you ever feel
Like a plastic bag?
Drifting through the wind
Wanting to start again.
Do you ever feel
Feel so paper thin?
Like a house of cards.
One blow from caving in.

4 point font

I got the horses in the back
Horse tack is attached.
Hat is matte black
Got the boots that's black to match
Ridin' on a horse, ha
You can whip your Porsche
I been in the valley
You ain't been up off that porch, now

3 point font

The Point:

Complete the problems in a room with a single bare light bulb.

As you do the activities, walk closer and far away from the bulb, in order to experience how the intensity of light on your paper changes as you do the assignment.

It can be frustrating, but remember you have a chance to *experience* physics.

Reference:

Formula for Power: (P)

$$P = \frac{\Delta E}{\Delta t} = \frac{\text{energy emitted}}{\text{time elapsed}}$$

The SI unit for power is Watts (W).

1 Watt = 1 Joule per Second

Speed of light = 300,000,000 m/s

Surface area of a sphere:

$$A = 4\pi r^2$$

Energy of a visible light photon (approximate):

$$E = 4.8 \times 10^{-19} \text{ J}$$

Intensity of light

PROBLEMS

1. Light moves at a rate of 300,000,000 m/s. Determine the time it takes light from the light bulb to reach the door to Mr. Jenkins room.

2. The light bulb emits 5 Watts of light (as per the package).
This is a measurement of POWER

Determine how many Joules of light energy are emitted in one minute.

3. Determine the surface area of a sphere that has a radius of 2 meters surrounding the light bulb.

4. The **intensity** of light is defined as the “power per area.”

Determine the **intensity** at a sphere with a radius of 2 meters. This means the total amount of power going through that sphere divided by the area.**

** Light Intensity is officially defined slightly differently, and you can look that up if you like.

However, our purpose is only to explain the *relationship* between intensity and distance from the bulb, which we can show with this definition.

4b. Light is emitted in tiny pieces called photons. Each photon has a specific amount of energy listed above. Determine the total amount number of photons being emitted by the light in a single second. The light emits 5 Joules of energy per second.

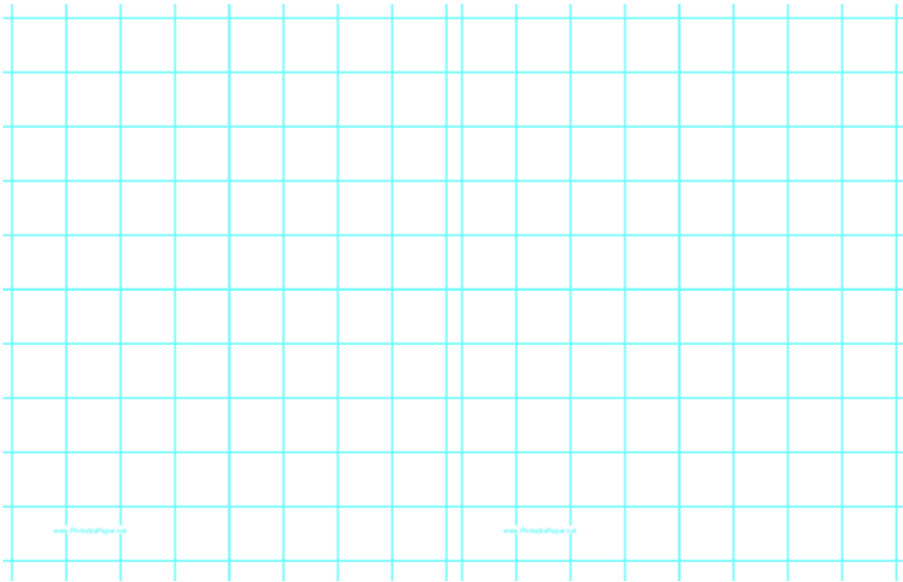
5. Determine the time it take the light to reach the main door.

6. Continue the same analysis to determine the intensity of the light bulb at different points:

	Distance From Bulb	Surface area of Sphere	Intensity (Power Per Area)
	0.5 m		
	1.0 m		
	1.5 m		
	2.0 m		
	2.5 m		
	3 m		

7.

the
axis
on



Draw a quick
graph that
represents the
distance from
bulb on the x-
and the intensity
the y-axis:

8.
What type of proportionality is represented here?

9. Walk around the light for awhile. Walk around in circles centered at the light bulb. Does the intensity change as you do this?

10. Walk back and forth from the light bulb. Does the intensity change as you do this?

11.

Use proportionality to solve these problems:

A person is 2 m away from a light bulb and experiences an intensity of 100 W / m^2 .

a) How much intensity will they experience if they are 4 m away from the bulb?

b) How much intensity will they experience if they are 6 m away from the bulb?

c) How much intensity will they experience if they are 1 m away from the bulb?

More Practice Problems:

$$F_g = G \frac{m_1 m_2}{d^2}$$

11. What does the variable d mean in this equation?

12. How is this formula similar to the formula for the intensity of light?

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13. If you are on a planet with a radius of 4000 kilometers and a mass of $3 \times 10^{30} \text{ kg}$, What is the force of gravity between you and the planet?

14. Why is the radius of the planet relevant to the previous problem?

15. A *series circuit* consists of a 12 Volt battery connected to two 4 Ohm resistors:
Draw this circuit. Then, determine the *total current* in the circuit:

16. A *parallel circuit* consists of a 12 Volt battery connected to two 4 Ohm resistors:
Draw this circuit. Then, determine the *total current* in the circuit: