Warm Up Question 1

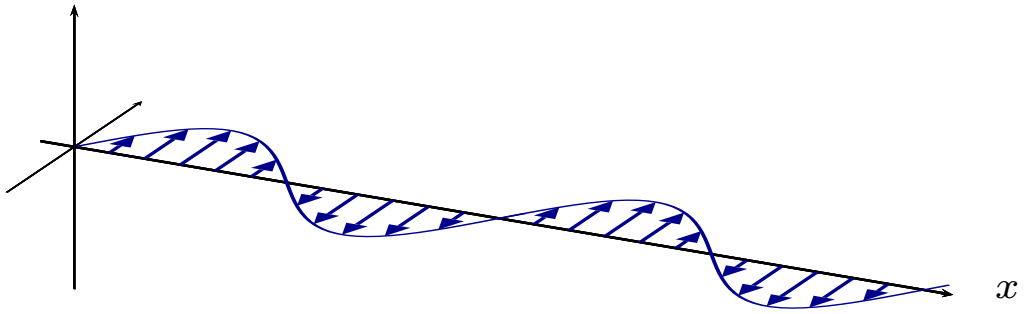
A tiny LED (light emitting diode) light source emits electromagnetic waves with a constant power. The intensity of the light is observed at two points: point A is 1 m from the source and point B is 5 m from the source. Describe as precisely as possible how the intensity of the light at A is related to the intensity at B. Explain your answer.

1. Same. The source provides the same power.
2. Larger at A. It's closer.
3. 5 times larger at A. B is 5 times as distant.
4. 25 times larger at A. $I = \dfrac{P_{\text{source}}}{4\pi r^2}$.

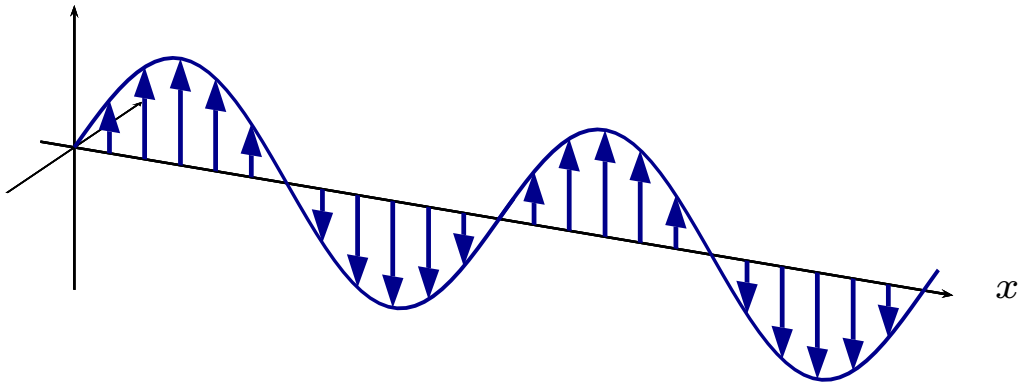
Linearly Polarized Electromagnetic Waves

Electromagnetic wave propagating along $+x$ direction. Only the electric field is indicated.

Horizontally Polarized

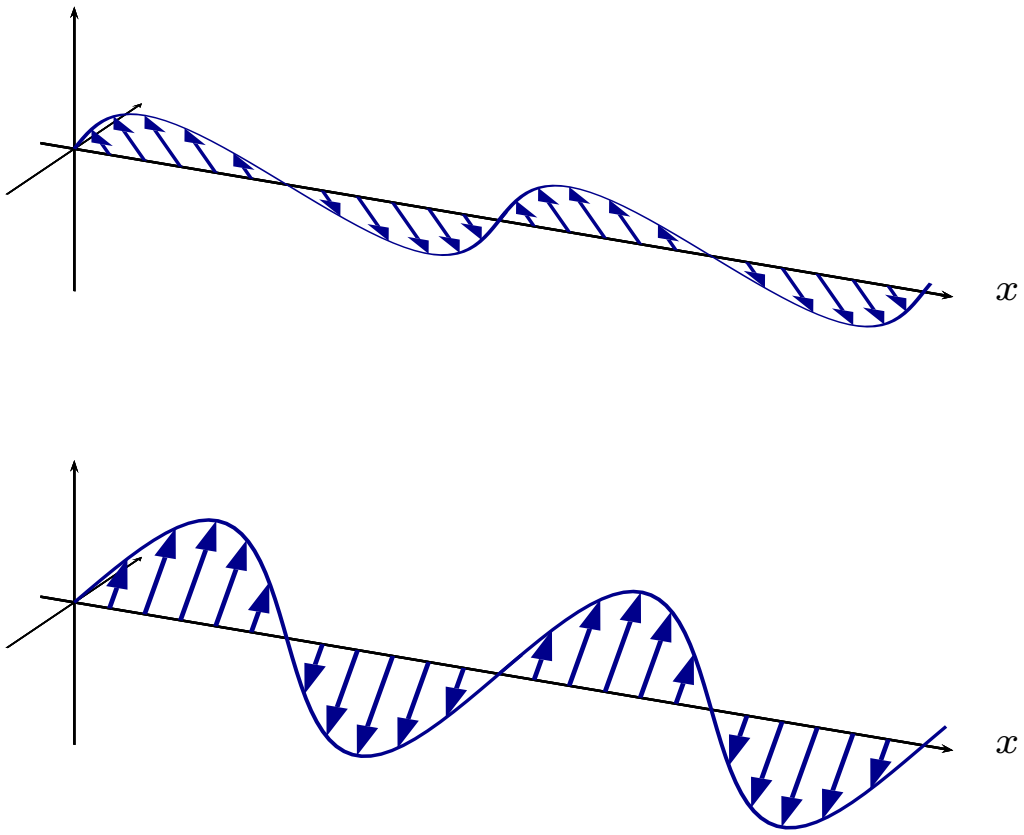


Vertically Polarized



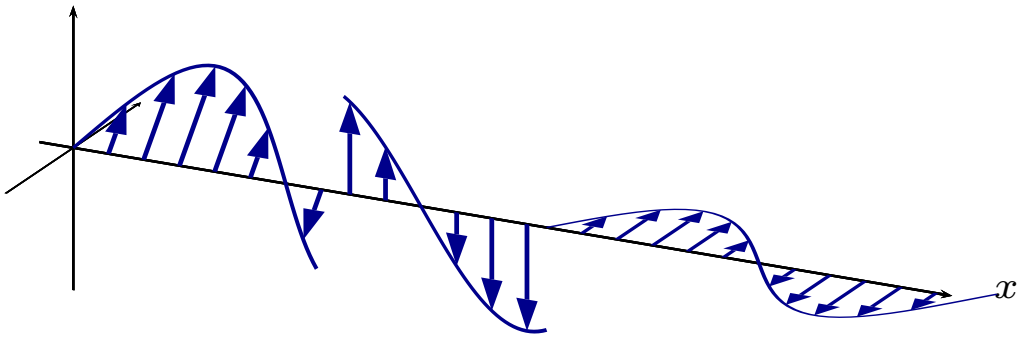
More Linearly Polarized Electromagnetic Waves

Electromagnetic wave propagating along $+x$ direction. Only the electric field is indicated.



Unpolarized Electromagnetic Waves

Electromagnetic wave propagating along $+x$ direction. Only the electric field is indicated.



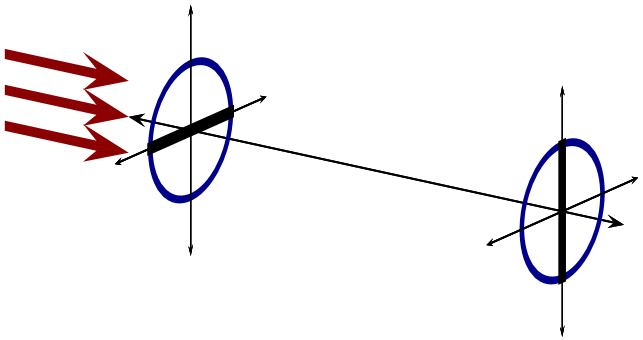
Warm Up Question 2

A beam of light produced by a laser pointer has a circular cross section with a diameter of about 5 mm. The light is unpolarized and incident on a polarizing filter whose polarizer axis is vertical. The light that is transmitted through the filter is observed on a screen. A person claims that, because the polarizing filter only transmits a vertical component of the electric field, the transmitted light will appear as a series of vertical stripes on the screen. Is this claim true or false? Explain your answer. (Hint: there is at least one picture in the text which will help.)

1. True. Only vertical components survive.
2. False. The horizontal parts will be transmitted and there will be horizontal stripes.
3. False. It will appear as a dot on the screen.

Question 1

Unpolarized light, whose intensity is I_{incident}, is incident upon a linear polarizer, whose axis of transmission is oriented horizontally. A second polarizer has transmission axis oriented vertically.

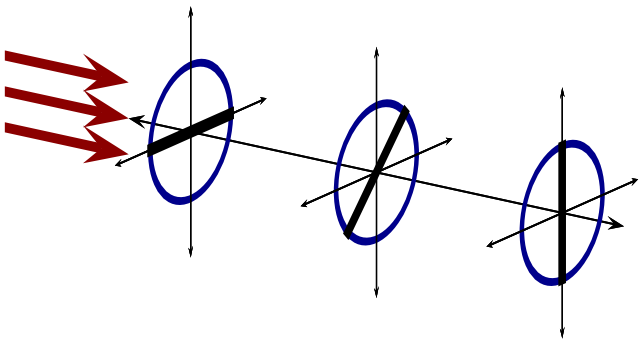


Which of the following represents the intensity of the light transmitted by the final polarizer?

1. 0
2. $\frac{1}{4} I_{\text{incident}}$
3. $\frac{1}{2} I_{\text{incident}}$
4. $\frac{1}{\sqrt{2}} I_{\text{incident}}$

Question 2

Unpolarized light is incident upon a linear polarizer, whose axis of transmission is oriented horizontally. A second polarizer has transmission axis at an angle of 45° degrees above the horizontal and a third has transmission axis oriented vertically.



The middle polarizer is removed. What does this do to the intensity of the light after the final polarizer?

1. Reduces the intensity.
2. Increases the intensity.
3. Intensity stays the same.