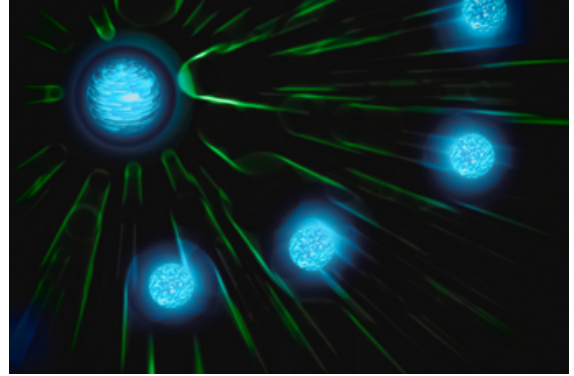


QUESTION 13



Drag and drop the best terms.

A ✓ is a particle of
light that contains one
 ✓ of energy.



↕ proton

↕ wavelength

↕ photoelectron

↕ fraction

QUESTION 14



Select the correct answer.

Which physicist first proposed that light behaved as particles rather than waves, giving it a dual nature?

☒ Albert Einstein ✓

☐ Max Planck

☐ Louis de Broglie



Erwin Schrödinger

QUESTION 15



Select the correct answer.

According to the wave theory of light, which two properties of light are directly related?



frequency and wavelength



intensity and wavelength



amplitude and intensity



amplitude and frequency

QUESTION 16



Drag and drop the correct term.

To explain the photoelectric effect, Albert Einstein proposed in 1905 that light has

a dual nature



a wave nature



neither a wave nor a particle nature

QUESTION 17



Select the correct answer.

A photon has a frequency of

$$5 \times 10^{14}$$

hertz. How much energy does the photon have?



$$3.3 \times 10^{-19}$$

J



$$6.3 \times 10^{-20}$$

J



$$6.3 \times 10^{-19}$$

J



$$3.3 \times 10^{-20}$$

J

QUESTION 18



Fill in the blank with the correct NUMBER. (Round to the nearest tenth).

Given:

$$h = 6.62 \times 10^{-34} \text{ J.s}$$

A photon has

$$3.4 \times 10^{-19}$$

joules of energy. The frequency of the photon is

5.1



$$\times 10^{14}$$

hertz.

QUESTION 19



Drag and drop the correct answers.

According to the equation

$$E = h\nu$$

, the energy of light is

directly



proportional to its

frequency



↕ indirectly

↕ wavelength

↕ twice

↕ intensity

QUESTION 20



Fill in the blanks with the correct terms from the Word Bank.

Word Bank

wavelength	speed	intensity	frequency	amplitude
------------	-------	-----------	-----------	-----------

Theoretical physicists believed that the kinetic energy of photoelectrons depended on the

intensity ✓ of the light.

However, experiments showed that it depends on the light's

frequency ✓.



QUESTION 21



Select your answer from the drop-down menu.

According to the wave theory of light, a light wave with a higher

amplitude ✓ ▼

carries more energy than another wave with the same frequency.

QUESTION 22



Fill in the blank with the correct term from the Word Bank.

Word Bank				
metallic	fraction	massless	heavy	

A photon is a massless ✓ particle of light that contains one quantum of energy.

QUESTION 23



Select the correct answer.

What did the wave model of light predict about the photoelectric effect?



All light, even that of a low frequency, will cause electrons to be ejected from metal if given enough time.



Certain metallic elements have properties that make them immune to the photoelectric effect altogether.



If electrons are not ejected from metal by light, the metal only contains positively-charged ions.



Metals will eject electrons when you direct enough light waves at the metal for at least two hours.

QUESTION 24



Select the correct answer.

A photon of blue light has

$$4.4 \times 10^{-19}$$

joules of energy.

What is the frequency of a photon of blue light?



$$6.6 \times 10^{14}$$

Hz



☐

$$3.6 \times 10^{14}$$

Hz

☐

$$6.6 \times 10^{-14}$$

Hz

☐

$$3.6 \times 10^{-14}$$

Hz

QUESTION 25



Select the correct answer.

According to Planck and Einstein's mathematical demonstrations, which properties of light are directly proportional?

☒

energy and frequency

☐

intensity and frequency

☐

energy and intensity

☐

frequency and wavelength

QUESTION 26



Drag and drop the correct answers.

Experiments on photoelectrons showed that their energy stayed the same ✓ as light intensity increased.

The energy of photoelectrons increased ✓ as light frequency increased.

↕ decreased

↕ varied randomly

QUESTION 27



*Fill in the blank with the correct NUMBER.
(Round to the nearest tenth.)*

A photon of red light has a frequency of 4.3×10^{14} hertz.

The energy of the photon of red light is

2.8 ✓

$\times 10^{-19}$

joules.

