PHYSICS · MASSACHUSETTS

Physics
Practice Test

Unit 4: Light and Modern Physics

25 Questions

Original practice test based on the Massachusetts curriculum. Work through each question, then check your answers at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

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Question 1

Light travels from air into glass and slows down. The ray bends

A) toward the normal

B) away from the normal

C) not at all

D) back on itself

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Question 2

Light in air hits a boundary at incidence angle 40 degrees. What is the angle between the incoming ray and the reflected ray?

A) 50 degrees

B) 80 degrees

C) 40 degrees

D) 20 degrees

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Question 3

A ray in a medium of refractive index 1.5 enters air. If $\sin\theta$ for the incident ray is 0.60, the sine of the refracted angle is

A) 0.40

B) 0.90

C) 1.50

D) 0.60

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Question 4

The critical angle is the incidence angle at which the refraction angle is

A) 0 degrees

B) 45 degrees

C) 180 degrees

D) 90 degrees

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Question 5

A converging lens can form a real image that is

A) always upright

B) always virtual

C) always the same size

D) inverted

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Question 6

An object 6 cm tall is magnified by 2. Its image height is

A) 3 cm

B) 8 cm

C) 12 cm

D) 4 cm

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Question 7

In the photoelectric effect, increasing the light intensity at fixed frequency increases the

A) maximum kinetic energy of electrons

B) number of electrons emitted per second

C) work function

D) threshold frequency

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Question 8

In the photoelectric effect, no electrons are emitted below the

A) threshold frequency

B) speed of light

C) critical angle

D) work function voltage

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Question 9

The energy of a photon is proportional to its

A) wavelength

B) frequency

C) speed

D) mass

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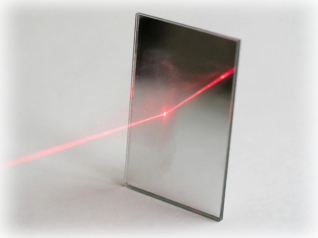

Question 10

Use $h = 6.63 \times 10^{-34}$ J s. A photon of frequency 2.0×10^{14} Hz has energy about

A) 1.33×10^{-19} J

B) 3.32×10^{-20} J

C) 1.33×10^{-48} J

D) 3.32×10^{-48} J

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Question 11

An atom emits light when an electron moves from a higher energy level to a

A) higher energy level

B) lower energy level

C) different atom

D) nucleus

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Question 12

The half life of a sample is 10 years. After 30 years, the fraction remaining is

A) one half

B) one fourth

C) one third

D) one eighth

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Question 13

In nuclear fission, a heavy nucleus splits into

A) two lighter nuclei

B) one heavier nucleus

C) only electrons

D) only photons

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Question 14

In nuclear fusion, light nuclei join to form a

A) heavier nucleus

B) lighter nucleus

C) photon only

D) neutron only

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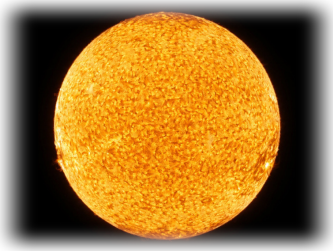

Question 15

The energy released when mass is converted follows

A) $E = mc$

B) $E = mc^2$

C) $E = mv^2$

D) $E = mgh$

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Question 16

A sample starts with 80 g of a radioactive isotope. After two half lives, the mass remaining is

A) 80 g

B) 40 g

C) 10 g

D) 20 g

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Question 17

Alpha radiation consists of

A) electrons

B) helium nuclei

C) photons

D) protons alone

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Question 18

Beta minus radiation consists of

A) helium nuclei

B) photons

C) electrons

D) neutrons

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Question 19

Gamma radiation consists of

A) electrons

B) helium nuclei

C) high energy photons

D) protons

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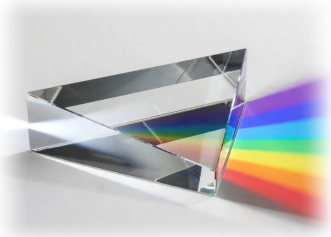

Question 20

White light passing through a prism spreads into colors because different colors

A) have the same speed in glass

B) refract by different amounts

C) are absorbed equally

D) travel in straight lines only

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Question 21

An object 4 cm tall is magnified by 3. Its image height, in centimeters, is ____

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Question 22

A sample starts with 64 g of a radioactive isotope. After one half life, the mass remaining, in grams, is ____

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Question 23

A photon has frequency 1.0×10^{15} Hz. Using $E = hf$ and $h = 6.63 \times 10^{-34}$ J s, its energy in joules is 6.63 $\times$ 10—

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Question 24

Light of wavelength 600 nm in air enters glass of refractive index 1.5. Its wavelength in glass, in nanometers, is ____

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Question 25

The speed of light in a vacuum divided by the speed of light in a medium gives the medium

A) critical angle

B) refractive index

C) focal length

D) work function

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ANSWER KEY

1.	A	**10.**	A	**18.**	C
2.	B	**11.**	B	**19.**	C
3.	B	**12.**	D	**20.**	B
4.	D	**13.**	A	**21.**	12
5.	D	**14.**	A	**22.**	32
6.	C	**15.**	B	**23.**	-19
7.	B	**16.**	D	**24.**	400
8.	A	**17.**	B	**25.**	B
9.	B				

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