ALASKA PHYSICS · UNIT 4 · 25 QUESTIONS

Light and Modern Physics — Practice Test

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.

1

A ray of light hits a mirror at an angle of incidence of 35 degrees. What is the angle between the incoming ray and the reflected ray?

- A 35 degrees
- B 70 degrees
- C 0 degrees
- D 55 degrees

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2 **Light travels at 3.0×10^8 m/s in a vacuum. In a material with refractive index 1.5, its speed is**

- **A** 1.5×10^8 m/s
- **B** 2.0×10^8 m/s
- **C** 3.0×10^8 m/s
- **D** 4.5×10^8 m/s

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3 **Use $h = 6.63 \times 10^{-34}$ J s. A photon has frequency 5×10^{14} Hz. Its energy is closest to**

- **A** 3.32×10^{-19} J
- **B** 6.63×10^{-19} J
- **C** 2.50×10^{-19} J
- **D** 1.33×10^{-19} J

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4 **A photon of energy 4.0 eV hits a metal with work function 2.5 eV. The maximum kinetic energy of an emitted electron is**

- A 1.5 eV
- B 6.5 eV
- C 0.625 eV
- D 10 eV

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5 **In hydrogen, the energy of level n is $-13.6/n^2$ eV. The energy of level 2 is**

- A -6.8 eV
- B -13.6 eV
- C -3.4 eV
- D -27.2 eV

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6 **A sample of 80 g of a radioactive material has a half life of 4 days. After 12 days, the mass remaining is**

A 40 g

B 20 g

C 10 g

D 5 g

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7 **Alpha radiation is stopped by a sheet of**

A paper

B concrete

C steel

D lead

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8 **The energy of the Sun comes mainly from**

A fusion

B combustion

C chemical decay

D fission

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9 **The graph shows photon energy against wavelength. The photon energy at a wavelength of 620 nm is**

A 4 eV

B 6 eV

C 1 eV

D 2 eV

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10 **Light of frequency 6×10^{14} Hz travels at 3.0×10^{8} m/s. Its wavelength is**

- A 50 nm
- B 5 nm
- C 1800 nm
- D 500 nm

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11 **In hydrogen, level 3 has energy -1.51 eV and level 2 has energy -3.40 eV. A photon emitted in a 3 to 2 transition has energy closest to**

- A 1.89 eV
- B 0.44 eV
- C 1.51 eV
- D 4.91 eV

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12 **Light from a galaxy moving away from Earth is redshifted, which means its wavelength is**

A the same

B zero

C shorter

D longer

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13 **A converging lens forms a real image when the object is placed**

A inside the focal length

B at the lens

C at the focal point

D outside the focal length

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14 **Total internal reflection can happen when light travels from**

A a vacuum to air

B air to glass

C glass to air above the critical angle

D air to water

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15 **When a wave passes through a narrow gap and spreads out, the effect is**

A reflection

B diffraction

C refraction

D absorption

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16 **Which wave can be polarized**

A sound

B light

C both sound and light

D neither

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17 **In beta minus decay, a neutron changes into a**

A proton

B neutron

C positron

D photon

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18 **In $E = mc^2$, a small mass can release a large energy because**

- A mass is large
- B c^2 is very large
- C energy is small
- D light is slow

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19 **A hot gas gives a spectrum of bright lines. This is called an**

- A emission spectrum
- B continuous spectrum
- C absorption spectrum
- D diffraction spectrum

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20 **In the photoelectric effect, light below the threshold frequency gives**

- A many electrons
- B no electrons
- C faster electrons
- D more energy

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21 **A sample of 160 g of a radioactive material has a half life of 5 days. After 15 days, the mass remaining, in grams, is ____**

ANSWER _____

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22 **Use E = 1240/wavelength in nm in eV. A photon of wavelength 310 nm has energy, in electron volts, ____**

ANSWER _____

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23 **A sample of 96 g of a radioactive material has a half life of 6 hours. After 18 hours, the mass remaining, in grams, is _____**

ANSWER _____

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24 **Light of frequency 5×10^{14} Hz travels at 3.0×10^{8} m/s. Its wavelength, in nanometers, is _____**

ANSWER _____

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25 **Light shows both**

A. wave behaviour only

B. particle behaviour only

C. wave and particle behaviour

D. neither wave nor particle behaviour

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ANSWER KEY

1.	A	**10.**	D	**19.**	A
2.	B	**11.**	A	**20.**	B
3.	A	**12.**	D	**21.**	20
4.	A	**13.**	D	**22.**	4
5.	C	**14.**	C	**23.**	12
6.	C	**15.**	B	**24.**	600
7.	A	**16.**	B	**25.**	C
8.	A	**17.**	A		
9.	D	**18.**	B		

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