



## U6 Week4 MCQ

All working must be shown in full on the M.A.T

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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Time: **30 minutes**

Marks: **30 marks**

Comments: **1 mark correct for workings, 1 mark correct answer. Do not write on and submit this paper. USE THE MCQ Answer Template on GoL**

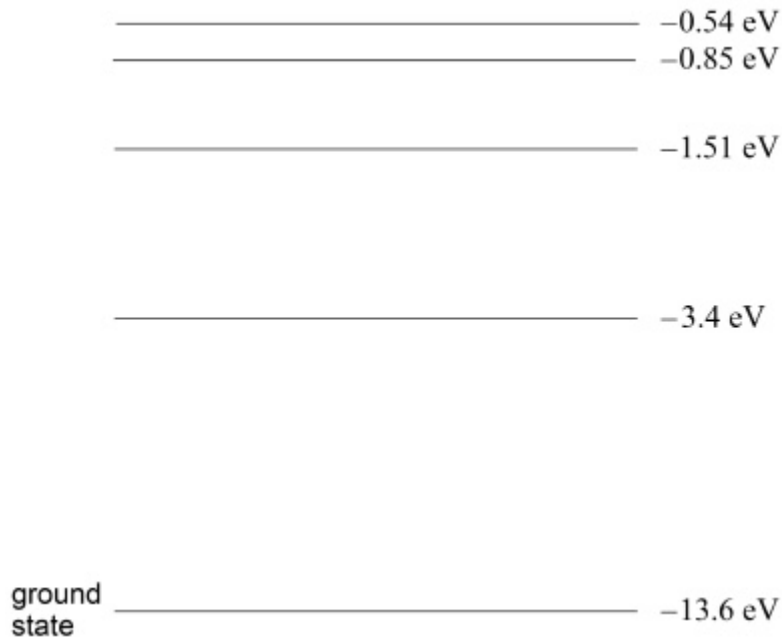
- 1 A student carries out an experiment to determine the resistivity of a metal wire. She determines the resistance from measurements of potential difference between the ends of the wire and the corresponding current. She measures the length of the wire with a ruler and the diameter of the wire using a micrometer. Each measurement is made with an uncertainty of 1%

Which measurement gives the largest uncertainty in the calculated value of the resistivity?

- A current
- B diameter
- C length
- D potential difference

(Total 1 mark)

- 2 The diagram shows an energy-level diagram for a hydrogen atom.



Electrons, each having a kinetic energy of  $2.0 \times 10^{-18}$  J, collide with atoms of hydrogen in their ground state. Photons are emitted when the atoms de-excite.

How many different wavelengths can be observed with incident electrons of this energy?

- A 1
- B 3
- C 6
- D 7

(Total 1 mark)

3

A voltmeter is used to measure potential difference for a component X.

Which row gives the position and ideal resistance for the voltmeter?

	Position	Ideal resistance	
A	in series with X	infinite	<input type="checkbox"/>
B	in series with X	zero	<input type="checkbox"/>
C	in parallel with X	infinite	<input type="checkbox"/>
D	in parallel with X	zero	<input type="checkbox"/>

(Total 1 mark)

4

An electromagnetic wave enters a fibre-optic cable from air. On entering the cable, the wave slows down to three-fifths of its original speed.

What is the refractive index of the core of the fibre-optic cable?

- A 0.67
- B 1.33
- C 1.50
- D 1.67

(Total 1 mark)

5

A rocket of mass 12 000 kg accelerates vertically upwards from the surface of the Earth at  $1.4 \text{ m s}^{-2}$ .

What is the thrust of the rocket?

A  $1.7 \times 10^4 \text{ N}$

B  $1.7 \times 10^5 \text{ N}$

C  $1.3 \times 10^5 \text{ N}$

D  $1.6 \times 10^5 \text{ N}$

(Total 1 mark)

6

A wire has a resistance  $R$ .

What is the resistance when both the length and radius of the wire are doubled?

A  $\frac{R}{4}$

B  $\frac{R}{2}$

C  $2R$

D  $4R$

(Total 1 mark)

7

A stationary wave is set up on a stretched string of length  $l$  and diameter  $d$ . Another stationary wave is also set up on a second string made from the same material and with the same tension as the first.

What length and diameter are required for the second string so that both strings have the same first-harmonic frequency?

	Length of second string	Diameter of second string	
A	$2l$	$2d$	<input type="checkbox"/>
B	$l$	$2d$	<input type="checkbox"/>
C	$\frac{l}{2}$	$2d$	<input type="checkbox"/>
D	$l$	$\frac{d}{2}$	<input type="checkbox"/>

(Total 1 mark)

8

A beam of light of wavelength  $\lambda$  is incident on a clean metal surface and photoelectrons are emitted. The wavelength of the light is halved but energy incident per second is kept the same.

Which row in the table is correct?

	Maximum kinetic energy of the emitted photoelectrons	Number of photoelectrons emitted per second	
A	Increases	Unchanged	<input type="checkbox"/>
B	Decreases	Increases	<input type="checkbox"/>
C	Increases	Decreases	<input type="checkbox"/>
D	Decreases	Unchanged	<input type="checkbox"/>

(Total 1 mark)

**9** Which row correctly states whether momentum, mass and velocity are scalar or vector quantities?

	Momentum	Mass	Velocity	
<b>A</b>	scalar	scalar	vector	<input type="checkbox"/>
<b>B</b>	vector	scalar	scalar	<input type="checkbox"/>
<b>C</b>	scalar	vector	scalar	<input type="checkbox"/>
<b>D</b>	vector	scalar	vector	<input type="checkbox"/>

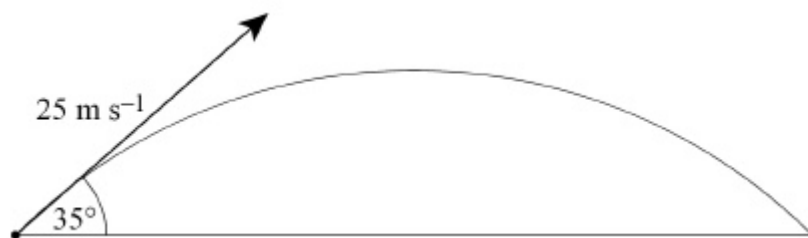
(Total 1 mark)

**10** Light of wavelength 500 nm is passed through a diffraction grating which has 400 lines per mm.  
What is the angular separation between the two second-order maxima?

- A** 11.5°
- B** 23.1°
- C** 23.6°
- D** 47.2°

(Total 1 mark)

**11** A projectile is launched with a speed of  $25 \text{ m s}^{-1}$  at an angle of  $35^\circ$  to the horizontal, as shown in the diagram.



Air resistance is negligible.

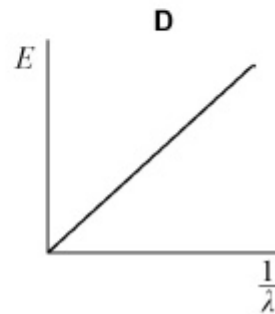
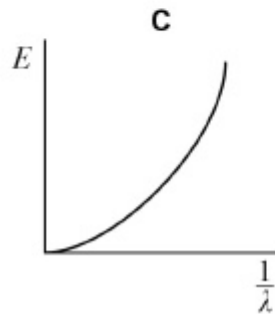
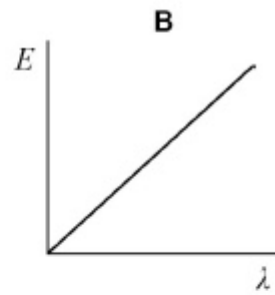
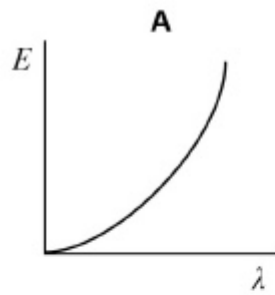
What is the time taken for the projectile to return to the ground?

- A 1.5 s
- B 2.1 s
- C 2.9 s
- D 4.2 s

(Total 1 mark)

12

Which graph best shows the relationship between photon energy  $E$  and wavelength  $\lambda$  of a photon of electromagnetic radiation?



- A
- B
- C
- D

(Total 1 mark)

**13**

What is the name given to a material that breaks without deformation when a force is applied to it?

A Plastic

B Brittle

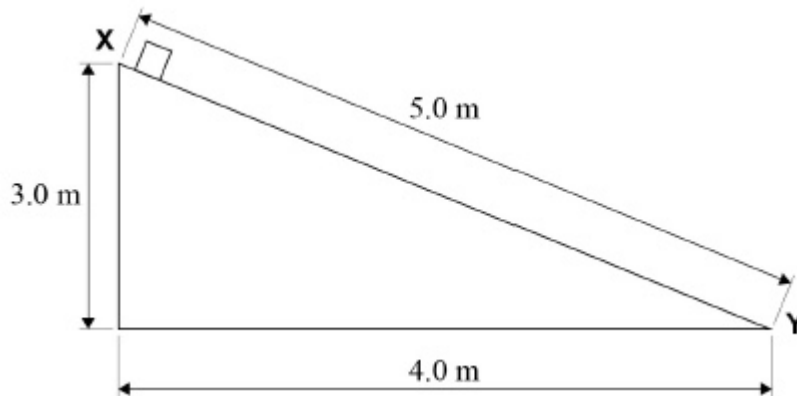
C Stiff

D Elastic

(Total 1 mark)

**14**

A mass of 2.5 kg is released from rest at **X** and slides down a ramp, of height 3.0 m, to point **Y** as shown.



When the mass reaches **Y** at the bottom of the ramp it has a velocity of  $5.0 \text{ m s}^{-1}$ .

What is the average frictional force between the mass and the ramp?

A 8.5 N

B 10.6 N

C 14.7 N

D 24.5 N

(Total 1 mark)



15

Which row correctly shows electromagnetic radiations in order of decreasing wavelength?

A gamma > ultraviolet > microwave

B ultraviolet > gamma > microwave

C microwave > ultraviolet > gamma

D gamma > microwave > ultraviolet

(Total 1 mark)