



U6 Week 5 MCQ

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

Name: _____

Class: _____

Date: _____

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

Which statement suggests that electrons have wave properties?

Tick (✓) the correct answer.

Electrons are emitted in photoelectric effect experiments.

Electrons are released when atoms are ionised.

Electrons produce dark rings in diffraction experiments.

Electron transitions in atoms produce line spectra.

(Total 1 mark)**2**

A bullet of mass 10 g is fired with a velocity of 100 m s^{-1} from a stationary rifle of mass 4.0 kg. Consider the rifle and bullet to be an isolated system.

What are the recoil velocity of the rifle and the total momentum of the rifle and bullet just after firing?

	Recoil velocity / m s^{-1}	Total momentum / kg m s^{-1}	
A	0.25	0	<input type="checkbox"/>
B	0.25	1.0	<input type="checkbox"/>
C	0.40	0	<input type="checkbox"/>
D	0.40	1.0	<input type="checkbox"/>

(Total 1 mark)

3

Which row gives two features of graphs that provide the same information?

	Feature 1	Feature 2	
A	Gradient of a displacement–time graph	Area under a velocity–time graph	<input type="checkbox"/>
B	Gradient of a displacement–time graph	Area under an acceleration–time graph	<input type="checkbox"/>
C	Gradient of a velocity–time graph	Area under a displacement–time graph	<input type="checkbox"/>
D	Gradient of a velocity–time graph	Area under an acceleration–time graph	<input type="checkbox"/>

(Total 1 mark)

4

When a nucleus of the radioactive isotope ${}^{65}_{28}\text{Ni}$ decays, a β^- particle and an electron antineutrino are emitted.

How many protons and neutrons are there in the resulting daughter nucleus?

	Number of protons	Number of neutrons	
A	28	65	<input type="checkbox"/>
B	29	65	<input type="checkbox"/>
C	29	36	<input type="checkbox"/>
D	30	35	<input type="checkbox"/>

(Total 1 mark)

5

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

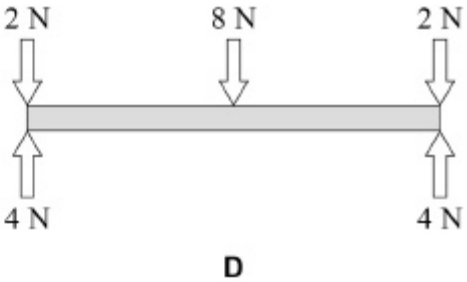
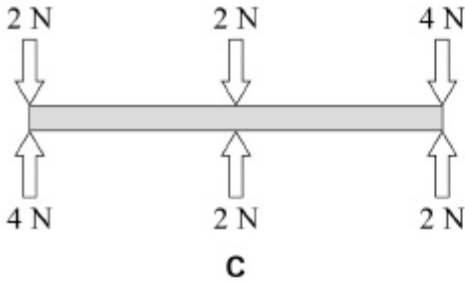
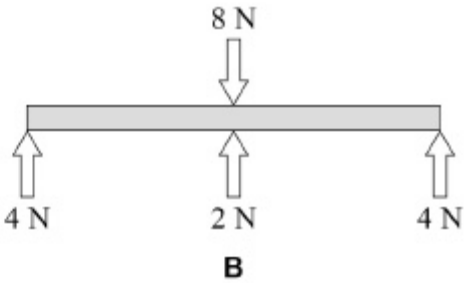
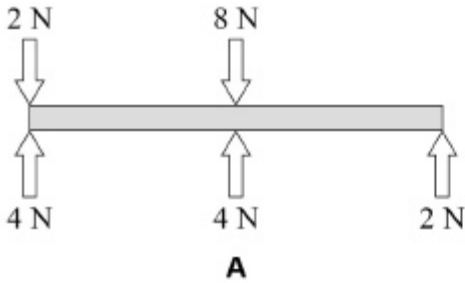
- A Plastic
- B Brittle
- C Stiff
- D Elastic

(Total 1 mark)

6

A light uniform rigid bar is pivoted at its centre. Forces act on the bar at its ends and at the centre.

Which diagram shows the bar in equilibrium?



- A
- B
- C
- D

(Total 1 mark)

7

Which statement about superconductors is correct?

- A When a material becomes a superconductor, its resistivity is almost zero.
- B The temperature at which a material becomes a superconductor is called the critical temperature.
- C When current passes through a superconductor the pd across it becomes a maximum.
- D Copper is a superconductor at room temperature.

(Total 1 mark)

8

When light of a certain frequency greater than the threshold frequency of a metal is directed at the metal, photoelectrons are emitted from the surface.

The power of the light incident on the metal surface is doubled.

Which row shows the effect on the maximum kinetic energy and the number of photoelectrons emitted per second?

	Maximum kinetic energy	Number of photoelectrons emitted per second	
A	remains unchanged	remains unchanged	<input type="checkbox"/>
B	doubles	remains unchanged	<input type="checkbox"/>
C	remains unchanged	doubles	<input type="checkbox"/>
D	doubles	doubles	<input type="checkbox"/>

(Total 1 mark)

9

A sample of wire has a Young modulus E . A second sample of wire made from an identical material has three times the length and half the diameter of the first sample.

What is the Young modulus of the second sample of wire in terms of E ?

A $0.25E$

B E

C $6E$

D $12E$

(Total 1 mark)

10

Which statement is **not** correct for ultrasound and X-rays?

A Both can be refracted

B Both can be diffracted

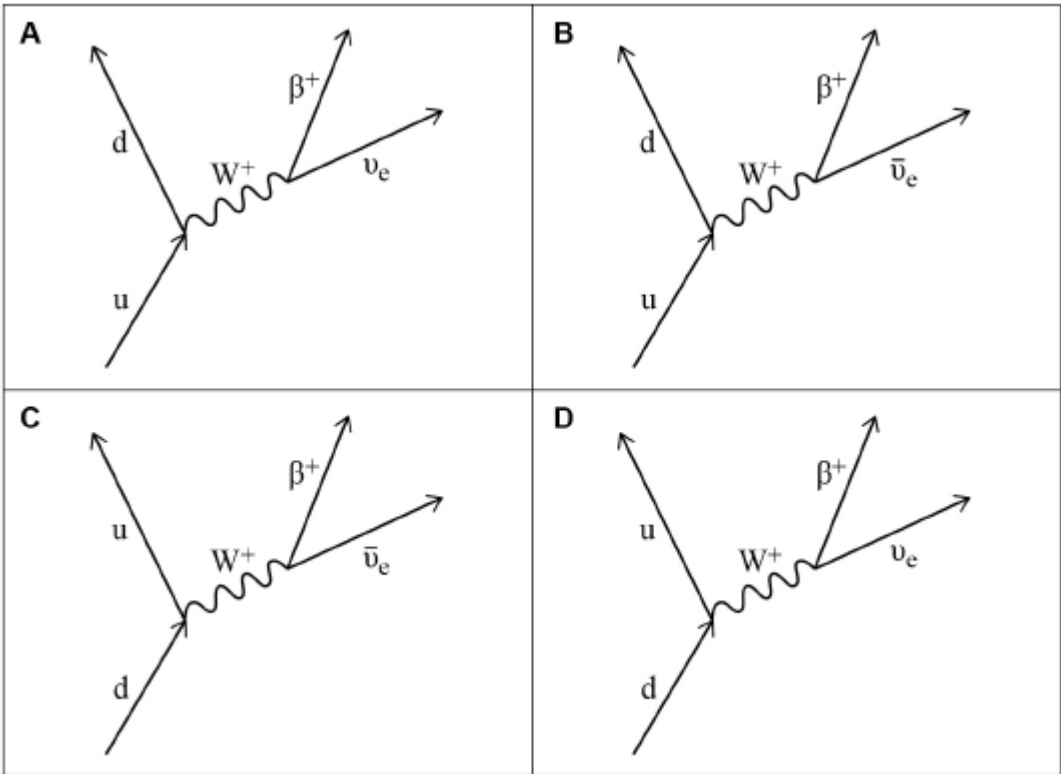
C Both can be polarised

D Both can be reflected

(Total 1 mark)

11

Which diagram represents the process of beta-plus decay?

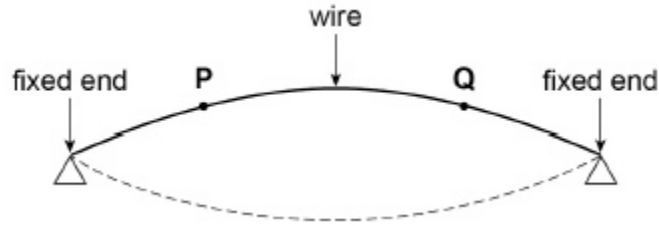


- A
- B
- C
- D

(Total 1 mark)

12

A uniform wire, fixed at both ends, is plucked in the middle so that it vibrates at the first harmonic as shown.



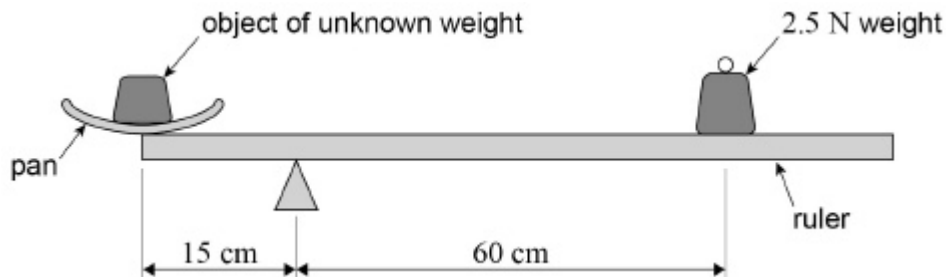
What is the phase difference between the oscillations of the particles at P and Q?

- A zero
- B $\frac{\pi}{4}$ rad
- C $\frac{\pi}{2}$ rad
- D $\frac{3\pi}{4}$ rad

(Total 1 mark)

13

The diagram shows a uniform metre ruler of weight 1.5 N pivoted 15 cm from one end for use as a simple balance.



A scale pan of weight 0.5 N is placed at the end of the ruler and an object of unknown weight is placed in the pan. The ruler moves to a steady horizontal position when a weight of 2.5 N is added at a distance of 60 cm from the pivot as shown.

What is the weight of the object?

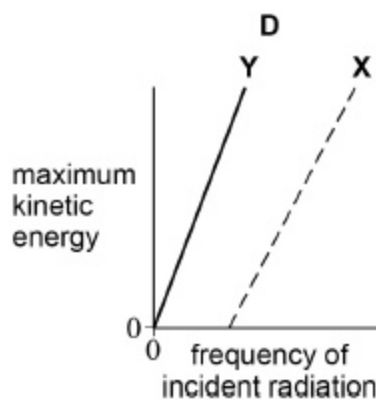
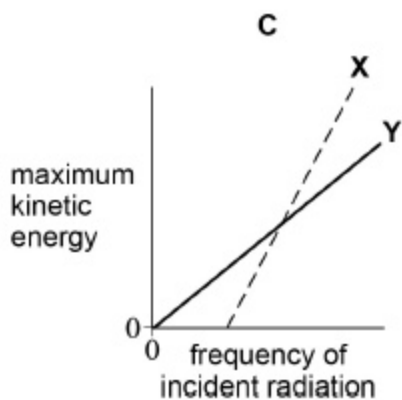
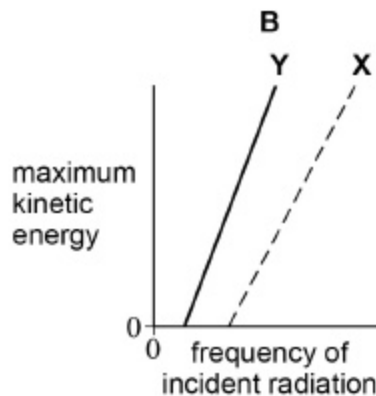
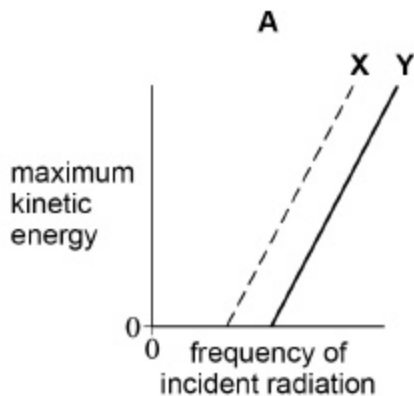
- A 9.5 N
- B 10.0 N
- C 13.0 N
- D 13.5 N

(Total 1 mark)

14

Line **X** on the graphs below shows how the maximum kinetic energy of emitted photoelectrons varies with the frequency of incident radiation for a particular metal.

Which graph shows the results for a metal **Y** that has a higher work function than **X**?



A

B

C

D

(Total 1 mark)

15

What **cannot** be used as a unit for the Young modulus?

A N m^{-2}

B Pa

C $\text{kg m}^{-2} \text{s}^{-2}$

D $\text{kg m}^{-1} \text{s}^{-2}$

(Total 1 mark)