U6 Week3 MCQ

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

Name: _____

Class: _____

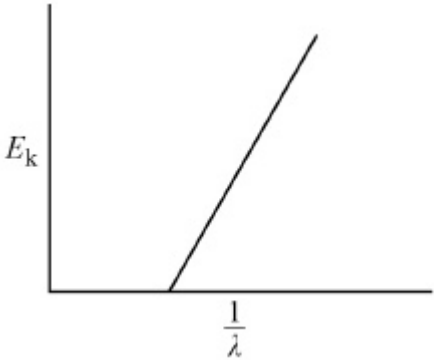Date: _____

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 The graph shows how the maximum kinetic energy E_k of photoelectrons emitted from a metal surface varies with the reciprocal of the wavelength λ of the incident radiation.

What is the gradient of this graph?

A c ⬭

B h ⬭

C hc ⬭

D $\dfrac{h}{c}$ ⬭

(Total 1 mark)

2 Which list puts the forces in order of increasing magnitude?

A   2 pN < 2 fN < 2 TN < 2 GN   ⬭

B   2 pN < 2 fN < 2 GN < 2 TN   ⬭

C   2 fN < 2 pN < 2 TN < 2 GN   ⬭

D   2 fN < 2 pN < 2 GN < 2 TN   ⬭

(Total 1 mark)

3 A diffraction grating has 500 lines per mm. When monochromatic light is incident normally on the grating the third-order spectral line is formed at an angle of 60° from the normal to the grating.
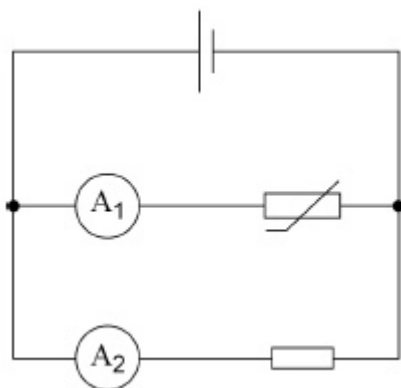
What is the wavelength of the monochromatic light?

A   220 nm

B   580 nm

C   960 nm

D   1700 nm

(Total 1 mark)

4 A circuit consists of a cell, a thermistor, a fixed resistor and two ammeters.

The cell has a constant electromotive force and negligible internal resistance. Readings from the two ammeters are taken.

Which row describes what happens to the current in each ammeter when the temperature of the thermistor decreases?

	Current in ammeter A_1	Current in ammeter A_2	
A	Decreases	Unchanged	
B	Decreases	Increases	
C	Increases	Decreases	
D	Increases	Unchanged	

(Total 1 mark)

5 What is a correct unit for the area under a force−time graph?

A   N m ☐

B   kg m s^{-1} ☐

C   kg m s^{-2} ☐

D   N s^{-1} ☐

(Total 1 mark)

6 The graph shows how the resultant force F on a football, which is initially at rest, varies with time t.

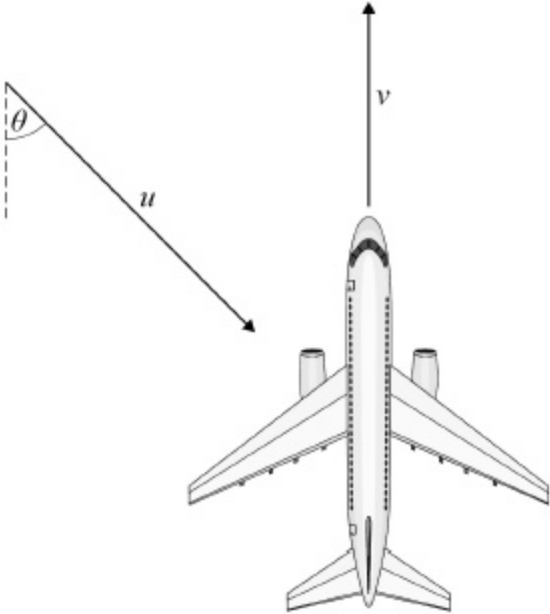Which graph shows how the momentum p of the football varies with time t?
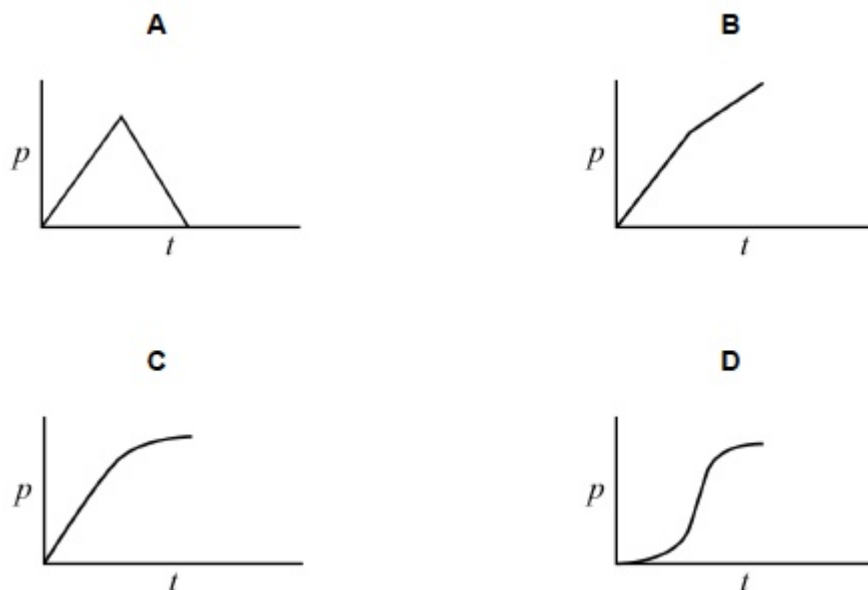
A   ☐

B   ☐

C   ☐

D   ☐

(Total 1 mark)

7 An aircraft is flying due north through still air with a speed v

The aircraft enters a region where the wind is blowing with a speed u from a direction which makes an angle of θ with due south.

What is the time taken for the aircraft to fly a distance D due north of its current position in this windy region?

A $\dfrac{D}{v - u\cos\theta}$ ⬭
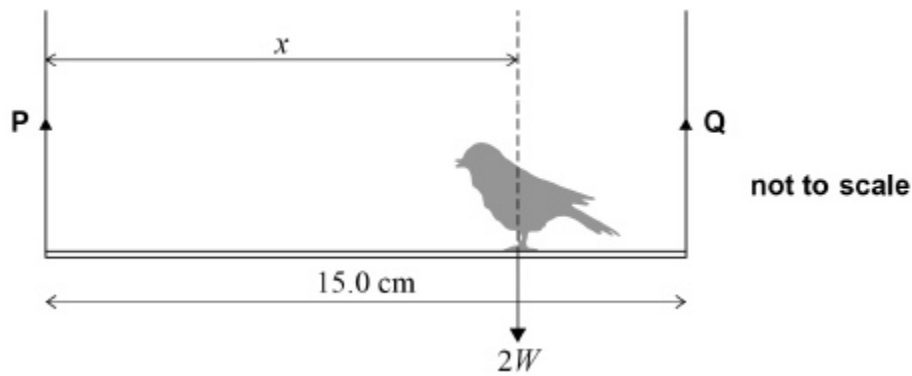
B $\dfrac{D}{v - u\sin\theta}$ ⬭

C $\dfrac{D}{v + u\cos\theta}$ ⬭

D $\dfrac{D}{v + u\sin\theta}$ ⬭

(Total 1 mark)

8 A bird sits on a uniform rod suspended from vertical wires **P** and **Q**.

not to scale

The rod has a weight W and is 15.0 cm long.
The weight of the bird is $2W$ and acts at a distance x from **P**.

What is the value of x when the tension in **P** is half the tension in **Q**?

A   7.50 cm

B   10.0 cm

C   11.3 cm

D   15.0 cm

(Total 1 mark)

9 Two spheres, **P** and **Q**, have the same volume but **P** has a greater mass. The spheres fall in air at their terminal velocities v_P and v_Q respectively.

Which row states the relationship between v_P and v_Q and the reason?

|	Relationship between v_P and v_Q	Reason	
A	$v_P = v_Q$	Terminal velocity is unaffected by mass	
B	$v_Q > v_P$	The mass of **Q** is less and it accelerates more	
C	$v_Q > v_P$	**P** reaches equilibrium at a lower terminal velocity	
D	$v_P > v_Q$	**Q** reaches equilibrium at a lower terminal velocity	

(Total 1 mark)

10 1.0 kilowatt-hour (kW h) is equivalent to

A 6.3×10^{18} eV ⬭

B 6.3×10^{21} eV ⬭

C 2.3×10^{22} eV ⬭

D 2.3×10^{25} eV ⬭

(Total 1 mark)

11 The circuit shows a cell with negligible internal resistance connected in a circuit with three resistors, an ammeter and a voltmeter.
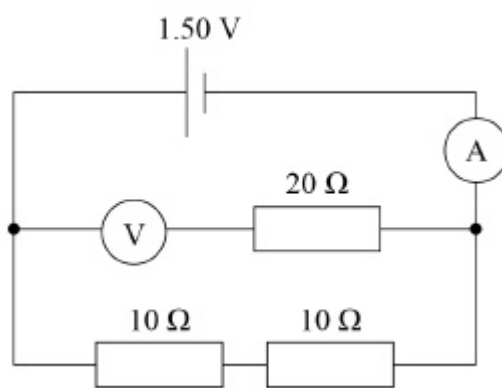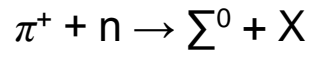

Which row shows the readings on the ammeter and voltmeter?

	Current / A	Voltage / V	
A	0.075	0.75	⬭
B	0.075	1.50	⬭
C	0.150	0.75	⬭
D	0.150	1.50	⬭

(Total 1 mark)

12 The Σ^0 baryon, composed of the quark combination uds, is produced through the strong interaction between a π^+ meson and a neutron.

$$\pi^+ + n \rightarrow \Sigma^0 + X$$

What is the quark composition of X?

A $u\bar{s}$ ⊙

B   ud   ⊙

C $u\bar{d}$ ⊙

D $ud\bar{s}$ ⊙

(Total 1 mark)

13 A mobile phone operates at a constant power of 200 mW
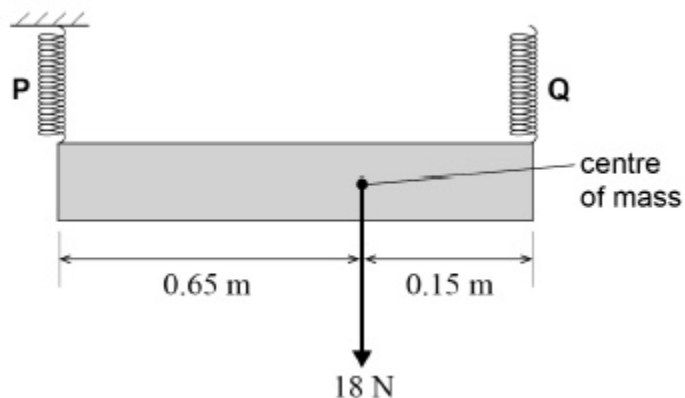It has a 3.7 V lithium-ion battery that has a charge capacity of 9400 C

What is the time taken for the battery to discharge completely?

A   2 hours   ⊙

B   48 hours   ⊙

C   120 hours   ⊙

D   140 hours   ⊙

(Total 1 mark)

14 A non-uniform sign is 0.80 m long and has a weight of 18 N
It is suspended from two vertical springs **P** and **Q**. The springs obey Hooke's law and the spring constant of each spring is 240 N m^{-1}

The top end of spring **P** is fixed and the top end of spring **Q** is adjusted until the sign is horizontal and in equilibrium.
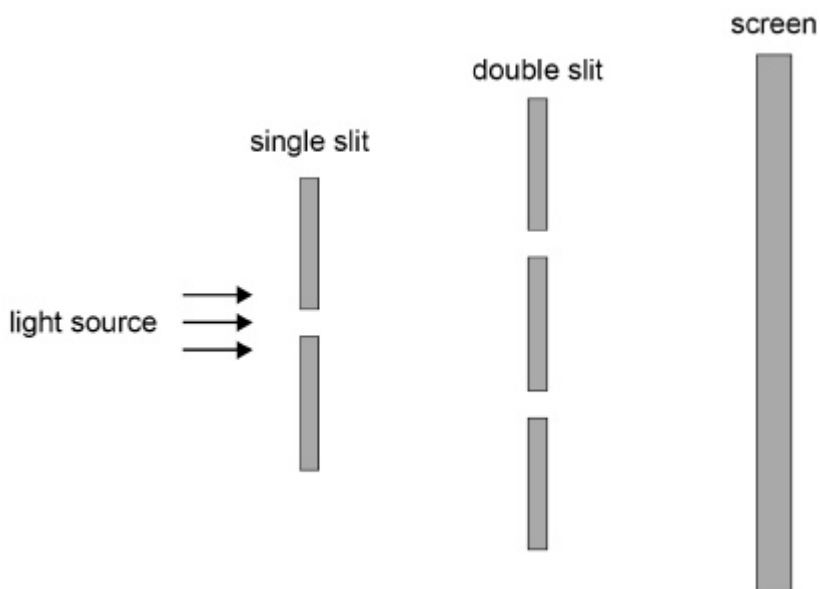
What is the extension of spring **Q**?

A   0.014 m

B   0.038 m

C   0.049 m

D   0.061 m

(Total 1 mark)

15 Light from a point source passes through a single slit and is then incident on a double-slit arrangement. An interference pattern is observed on the screen.

What will increase the fringe spacing?

A   increasing the separation of the single slit and the double slit   ○

B   increasing the width of the single slit   ○

C   decreasing the distance between the double slits and the screen   ○

D   decreasing the separation of the double slits   ○

(Total 1 mark)