Additional Assessment Materials

Summer 2021

Pearson Edexcel GCE AS Physics

Topic 6: The Particle Nature of Light

Test 1

(Public release version)

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Additional Assessment Materials, Summer 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

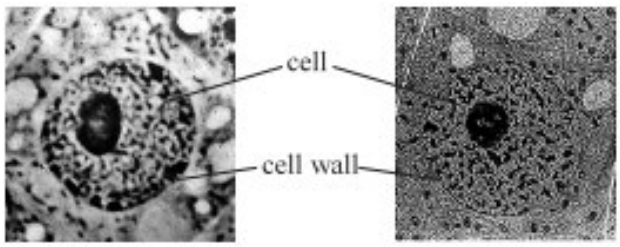
Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

1

14 An optical microscope uses a beam of visible light. An electron microscope uses a beam of electrons.

A biologist looked at an animal cell using both microscopes. The two images are shown; both have the same magnification.



using optical microscope using electron microscope

www.udel.edu

(a) An electron in the beam of the electron microscope has a velocity of 2% of the speed of light.

Calculate the de Broglie wavelength of the electron.

(3)

de Broglie wavelength = ...

2

13 Spacecraft in orbit will be exposed to ultraviolet radiation from the Sun. Due to the photoelectric effect they can become charged.

(a) Scientists have observed that one such spacecraft becomes charged when the frequency of the radiation is greater than 9.9×10^{14} Hz.

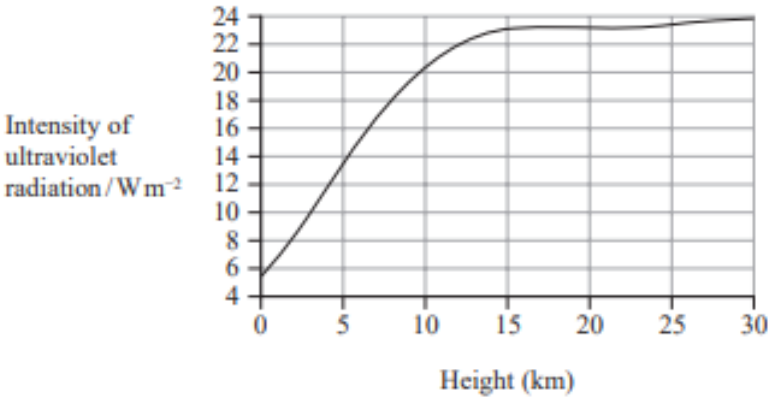
The table lists the work function of some metals.

metal	Work function eV
aluminium	4.1
caesium	2.1
nickel	5.0
platinum	3.3

Deduce the metal that covers the outside of the spacecraft.

(4)

*(b) The graph shows how the intensity of ultraviolet radiation varies with height above the surface of the Earth.



(Source: semanticscholar.org)

An aeroplane made of the same metal as the spacecraft is flying at a height of 10 km.

Explain why the aeroplane charges at a slower rate than the spacecraft due to the photoelectric effect.

(6)

(Total for Question 13 = 10 marks)

TOTAL FOR PAPER IS 13 MARKS