A Level Physics

17th May 2021 – Mixed Physics Topics

Suitable for ALL exam boards

MCQs

Don't forget to **subscribe** on **YouTube** and turn on **notification** to be reminded about the **weekly livestreams** to support you as you prepare for any exams.

Question taken from:

Edexcel IAL Physics – Jan 2019 – Unit 5: Physics from Creation to Collapse – Questions 1 to 10

For questions 1–10, in Section A, select one answer from A to D and put a cross in the box ⊠.
If you change your mind, put a line through the box ⊠ and then
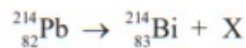mark your new answer with a cross ⊠.

1   A standard candle is a stellar object of known

   ☐   **A** distance.

   ☐   **B** luminosity.

   ☐   **C** radiation flux.

   ☐   **D** surface temperature.

<div align="right">(Total for Question 1 = 1 mark)</div>

2   Pb-214 is a radioactive isotope of lead. This isotope decays by emitting a particle X
    shown by the equation

$$^{214}_{82}\text{Pb} \rightarrow {}^{214}_{83}\text{Bi} + \text{X}$$

Particle X is

   ☐   **A** an alpha particle.

   ☐   **B** an electron.

   ☐   **C** a neutron.

   ☐   **D** a positron.

<div align="right">(Total for Question 2 = 1 mark)</div>

3   Which of the following statements is a correct description of the binding energy of a nucleus?

   ☐   **A** The energy released when the nucleus forms from individual nucleons.

   ☐   **B** The energy released when radiation is emitted from the nucleus.

   ☐   **C** The energy required to overcome the force between nuclei.

   ☐   **D** The energy required to remove a nucleon from the nucleus.

<div align="right">(Total for Question 3 = 1 mark)</div>

4 Two simple harmonic oscillators have the same frequency.

The first has a mass of 0.50 kg and an amplitude of 30 cm. Its energy of oscillation is E_0.
The second has a mass of 0.25 kg and an amplitude of 60 cm.

What is the energy of oscillation of the second oscillator?

☐ **A** $E_0/4$

☐ **B** $E_0/2$

☐ **C** E_0

☐ **D** $2E_0$

(Total for Question 4 = 1 mark)

5 The half-life of protactinium is 70 s.

After which of the times below would the activity of a sample of protactinium have
decreased to less than 2% of its initial value?

☒ **A** 70 s

☒ **B** 210 s

☒ **C** 350 s

☒ **D** 420 s

(Total for Question 5 = 1 mark)

6 Quasars are thought to be discs of matter moving around black holes. Light received
from all quasars shows large red shifts.

Which of the following can be concluded from this?

☐ **A** Quasars are accelerating away from the Earth at a large rate.

☒ **B** Quasars are accelerating towards the Earth at a large rate.

☐ **C** Quasars are moving away from the Earth very quickly.

☐ **D** Quasars are moving towards the Earth very quickly.

(Total for Question 6 = 1 mark)

7 The gravitational field strength on the surface of Mars is *g*. The Moon has about the same density as Mars but only half the radius.

What is the gravitational field strength on the surface of the Moon?

☐ A $g/4$

☐ B $g/2$

☐ C $2g$

☐ D $4g$

(Total for Question 7 = 1 mark)

8 The Hubble constant has been determined to be 2.2×10^{-18} s^{-1}, although there is a large uncertainty in this value. Astronomers have used this value to calculate the age of the universe.

Previous data gave a value for the Hubble constant of 2.0×10^{-18} s^{-1}.
The age of the universe calculated from this value would be

☐ A 20% smaller.

☐ B 10% smaller.

☐ C 10% bigger.

☐ D 20% bigger.

(Total for Question 8 = 1 mark)

9 Cosmologists predict a number of alternatives for the future evolution of the universe.

Which of the following statements describes an open universe?

☐ A The density of the universe equals the critical density.

☐ B The universe eventually reaches a maximum size.

☐ C The universe will keep on expanding forever.

☐ D We cannot predict the eventual fate of the universe.

(Total for Question 9 = 1 mark)

10 A star has a surface temperature of 5700K. The surface temperature increases to 6000K and the surface area stays constant.

By what factor would the luminosity of the star change?

☒ **A** 0.8

☒ **B** 0.9

☒ **C** 1.0

☒ **D** 1.2

(Total for Question 10 = 1 mark)

TOTAL FOR SECTION A = 10 MARKS