

**IB MIDDLE YEARS PROGRAMME**  
**ACADEMIC SESSION 2024-2025**  
**Formative Assessment-4 October 2024**

Name: .....

Subject: Physics

Total Marks: 25

Q1.

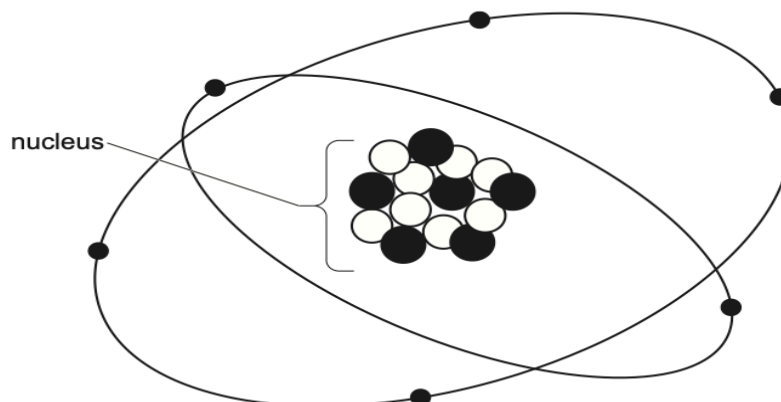
Grade: MYP 5 B

Duration : 40 Min

Date: .... /10/2024

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Fig. 11.1 represents all the particles in an atom which is a radioactive isotope of carbon.



**Fig. 11.1** (not to scale)

**(a)** Table 11.1 gives information about the particles shown in Fig. 11.1.

Using the information in Fig. 11.1, write in the empty boxes to complete Table 11.1.

**Table 11.1**

name of particle	number of particles	position of particle	relative charge of particle
electron			
neutron		in the nucleus	
	6		+1 (plus one)

[4]

**(b)** A museum displays an item made of ancient wood. When the wood was new, the item contained 8.00 mg of the isotope shown in Fig. 11.1. The item now contains 2.00 mg of the isotope. The half-life of the isotope is 5700 years.

Calculate the age of the wood in the item.

age of wood = ..... years [3]

[Total: 7]

Q2.

- (a) Fig. 12.1 represents the Earth and the Sun at one point in the Earth's orbit of the Sun.

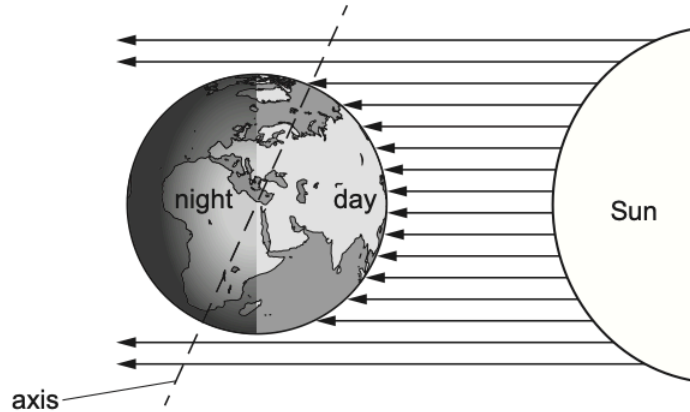


Fig. 12.1 (not to scale)

Explain the apparent daily motion of the Sun across the sky.

.....  
 .....  
 ..... [2]

- (b) List the four planets closest to the Sun in order of their distance from the Sun. One is done for you.

1 ..... 2 ..... 3 Earth 4 ..... [2]

- (c) The Sun mostly consists of two elements.

State the **two** elements.

1 .....  
 2 ..... [2]

- (d) The Sun is a star in a galaxy.

State the name of the galaxy.

..... [1]

[Total: 7]

Q3.

Americium-241 is a radioactive nuclide. The nuclide notation for a nucleus of americium-241 is



(a) Determine the number of:

protons in **one** nucleus of americium-241,

..... [1]

neutrons in **one** nucleus of americium-241.

..... [1]

(b) Americium-241 has a half-life of 430 years.

A radioactive source contains 12 mg of americium-241.

Calculate the mass of americium-241 that remains in the source after 860 years.

mass of americium-241 remaining = ..... mg [3]

[Total: 5]

Q4.

- (a) State, in order, the names of the **three** planets closest to the Sun.

Closest to the Sun .....

.....

Furthest from the Sun .....

[2]

- (b) Define a light-year.

.....

..... [2]

- (c) Jupiter is 780 000 000 000 m ( $7.8 \times 10^{11}$  m) from the Sun.

The speed of light is 300 000 000 m/s ( $3.0 \times 10^8$  m/s) .

Calculate the time for light to travel from the Sun to Jupiter.

time = ..... s [2]

[Total: 6]

Mark Scheme: Q1 and Q2.

Question	Answer	Marks
11(a)	name of particle	<b>B4</b>
	number of particles	
	position of particle	
	relative charge of particle	
	electron	<b>6</b>
	neutron	<b>8</b>
	proton	6
	orbiting / outside (nucleus)	<b>–1 OR minus one</b>
	in the nucleus	<b>0 OR zero OR none OR neutral</b>
	(in the) nucleus	+1 (plus one)
	1 mark for each correct column	
11(b)	(2 × 5700 =) 11 400 (years)	<b>A3</b>
	(change in mass takes place over / decay takes) 2 half-lives	(C2)
	8(.00) → 4(.00) → 2(.00) <b>OR</b> 8(.00) × ½ × ½ = 2(.00)	(C1)

Question	Answer	Marks
12(a)	Earth rotates / spins (on its axis)	<b>M1</b>
	(once) every 24 hours / day <b>OR</b> daily	<b>A1</b>
12(b)	Mercury Venus Earth Mars	
	3 correct planets	<b>M1</b>
	in correct order	<b>A1</b>
12(c)	hydrogen	<b>B1</b>
	helium	<b>B1</b>
12(d)	Milky Way	<b>B1</b>

Q3 and Q4

Question	Answer	Marks
11(a)	95	<b>B1</b>
	146	<b>B1</b>
11(b)	(amount remaining =) 3(.0) (mg)	<b>A3</b>
	(amount remaining =) $12 \times \frac{1}{2} \times \frac{1}{2}$ <b>OR</b> $12 \times \frac{1}{4}$	(C2)
	860 years is 2 half-lives	(C1)

Question	Answer	Marks
12(a)	(closest to Sun) Mercury (furthest from Sun) Venus Earth	<b>B2</b>
12(b)	distance	<b>M1</b>
	travelled by light (in the vacuum of space) in one year	<b>A1</b>
12(c)	$2.6 \times 10^3$ (s) <b>OR</b> 2600 (s)	<b>A2</b>
	time = distance ÷ speed <b>OR</b> $7.8 \times 10^{11} \div 3.0 \times 10^8$ <b>OR</b> 780 000 000 000 ÷ 300 000 000	(C1)