Delegate Booklet

Understanding Assessment and Improving Delivery in International GCSE Physics

About this event

Course Title:
Understanding Assessment and Improving Delivery in International GCSE Physics

Course Code: 4PH1-20IF1

Aims and Objectives of the event

During the day you will:

- be introduced to the idea of assessment objectives: what are they and why they are used when writing examination papers,
- analyse recent question papers and learn which types of question match the different assessment objectives,
- investigate different assessment objectives, considering how questions in these areas have been answered by looking at feedback from previous exam series,
- discuss strategies for teaching to try and make sure students can access questions targeting different assessment objectives,
- review the support Pearson offers for the qualification,
- network, discuss best practice and share ideas with other teachers.

Agenda

Time	Item
9.30 – 10.00	Welcome Tea & Coffee
10.00 – 10.10	Agenda & Introductions – Housekeeping, Trainer, Delegates
10.10 – 11.10	Session 1: Explanation of assessment objectives
11.10 – 11.30	Tea and coffee
11.30– 12.45	Session 2: AO1
12.45 – 13.45	Lunch
13.45 – 15.00	Session 3: AO2
15.00 – 15.30	Session 4: AO3
15.30 – 16.00	Plenary session for questions and discussion
16.00	Course ends

Activity 1 – Identifying AOs

Purpose:

To familiarise delegates with the three assessment objectives and how they may be identified in questions.

Identify which assessment objective (AO1, AO2 or AO3) is being targeted in each part of the following questions taken from 1906 4PH1 1P.

	AO1	AO2	AO3
Q3(a)			
Q3(b)			
Q6(a)(i)			
Q6(a)(ii)			
Q6(b)(i)			
Q6(b)(ii)			
Q6(b)(iii)			
Q7(a)			
Q7(b)(i)			
Q7(b)(ii)			
Q7(b)(iii)			
Q7(c)(i)			
Q7(c)(ii)			
Q7(c)(iii)			
Q7(c)(iv)			

Activity 2 – Marking exercise

Purpose:

To familiarise delegates with the requirements of AO1 questions by marking students responses.

1906 4PH1 1PR Q2 mark scheme

Question number	Answer	Notes	Marks
2 (a) (i)	reduce the kinetic energy of <u>neutrons</u>;	allow 'slow down' <u>neutrons</u>	1
(ii)	to absorb (high energy) neutrons;	allow absorb / reduce strength of neutron radiation condone "stop neutrons escaping"	
	use of (concrete / lead) shielding;	allow "concrete walls"	
(iii)	idea that contamination is when a non-radioactive object comes into contact with a radioactive material; idea that irradiation is when radiation is present;	Condone idea of exposure for 1 mark if no other mark scored	2
(b) (i)	any two from: MP1. creation of a (large) nucleus from small <u>nuclei</u>; MP2. resulting in a loss of mass; MP3. and the release of energy;	condone "fusing of two nuclei" accept reference to $E=mc^2$ condone "converted to energy"	2
(ii)	(in) star(s);	allow named star e.g. The Sun	1
(iii)	any three from: MP1. high temperature required; MP2. to increase kinetic energy of nuclei; MP3. high pressure required; MP4. (because) <u>nuclei</u> need to be close enough to collide; MP5. (since) <u>nuclei</u> repel each other;	 allow to make nuclei move faster allow particles or atoms for this MP allow higher level answers in terms of short range strong nuclear force	3

Total for Question 2 = 11 marks

Q2(a)(iii) Example A

(iii) The daughter nuclei can cause contamination and irradiation.

Describe the difference between contamination and irradiation.

(2)

Contamination is when substances contain radioactive materials that are absorbed. Irradiation is the process in which bacteria are killed in order to sterilise materials.

Q2(a)(iii) Example B

(iii) The daughter nuclei can cause contamination and irradiation.

Describe the difference between contamination and irradiation.

(2)

Contamination is when the daughter nuclei reacts with the an atom forming a waste material around it.

Q2(a)(iii) Example C

(iii) The daughter nuclei can cause contamination and irradiation.

Describe the difference between contamination and irradiation.

(2)

Contamination is if a radioactive source enters an object, the object will emmit radiation as long as the source is inside

Irradiation is when radiation is directed to the surface of an object, then the internals of that object won't be affected by radiation.

Q2(b)(i) Example A

(b) Nuclear fusion is another process that could be used to generate electricity.

(i) Describe the process of nuclear fusion.

(2)

Nuclear fusion is the process where two nuclei ~~of combind~~ combine and join to form a daughter nucleus of higher mass than the parent nuclei while releasing energy.

Q2(b)(i) Example B

(b) Nuclear fusion is another process that could be used to generate electricity.

(i) Describe the process of nuclear fusion.

(2)

Nuclear fusion is the reaction of the atoms in a star which ~~are~~ creates large amounts of energy ~~at~~ after the fusion.

Q2(b)(i) Example C

(b) Nuclear fusion is another process that could be used to generate electricity.

(i) Describe the process of nuclear fusion.

(2)

It is the combining of two light atoms into one heavier atom.

Q2(b)(iii) Example A

(iii) Generating electricity from nuclear fusion is very difficult as the conditions needed are hard to achieve and maintain.

Explain the conditions required for nuclear fusion.

(3)

Nuclear fusion needs to take place in high temperatures, and in very safe conditions. It also requires neutrons with high energy within them.

Q2(b)(iii) Example B

(iii) Generating electricity from nuclear fusion is very difficult as the conditions needed are hard to achieve and maintain.

Explain the conditions required for nuclear fusion.

(3)

Nuclear fusion requires high temperature and pressure for the ~~smaller~~ nuclei to fuse together as to overcome the electrostatic repulsion of the protons. By providing this high temperature and pressure, the nuclei receive enough kinetic energy to come ~~to~~ close enough to fuse together.

Q2(b)(iii) Example C

(iii) Generating electricity from nuclear fusion is very difficult as the conditions needed are hard to achieve and maintain.

Explain the conditions required for nuclear fusion.

(3)

For nuclear fusion to take place, extremely high temperatures of ~~at~~ that similar to our sun is required. High pressure similar to that of at the center of stars are require. Therefore, machinery that can withstand such temperature and pressure and be able to prevent energy escape is required.

1906 4PH1 1PR Q2 mark scheme

Question number	Answer	Notes	Marks
9 (a) (i)	light ray refracting and bending in the correct direction;	ignore any response in the air e.g. reflected wavefronts or direction of travel of reflected ray	3
	wavefronts in water drawn closer together by eye;	allow wherever seen in diagram	
	wavefronts drawn in water join up with wavefronts in air;		
(ii)	wavelength decreases;		2
	(because) wave speed decreases **and** frequency remains constant;		
(b) (i)	normal drawn at right angles where light ray meets boundary;	judge by eye	1
(ii)	55°;	allow range 54-56°	1
(iii)	substitution into sin c = 1/n;		3
	rearrangement;		
	evaluation;	condone intermediate rounding	
	e.g. sin c = 1/1.6 (c =) $\sin^{-1}$ (1/1.6) (c =) 39°	allow 38.682...	
(iv)	(path shows) total internal reflection;	allow TIR	3
	(because) ray is travelling from high to low refractive index;	however expressed e.g. reduction of (optical) density / increase in speed from glass to air	
	(and) angle of incidence is greater than the critical angle;		

Total for Question 9 = 13 marks

Q9(a)(i) Example A

9 (a) A light ray travels from air into water.

Diagram 1 shows the direction of the light ray and the wavefronts in air.

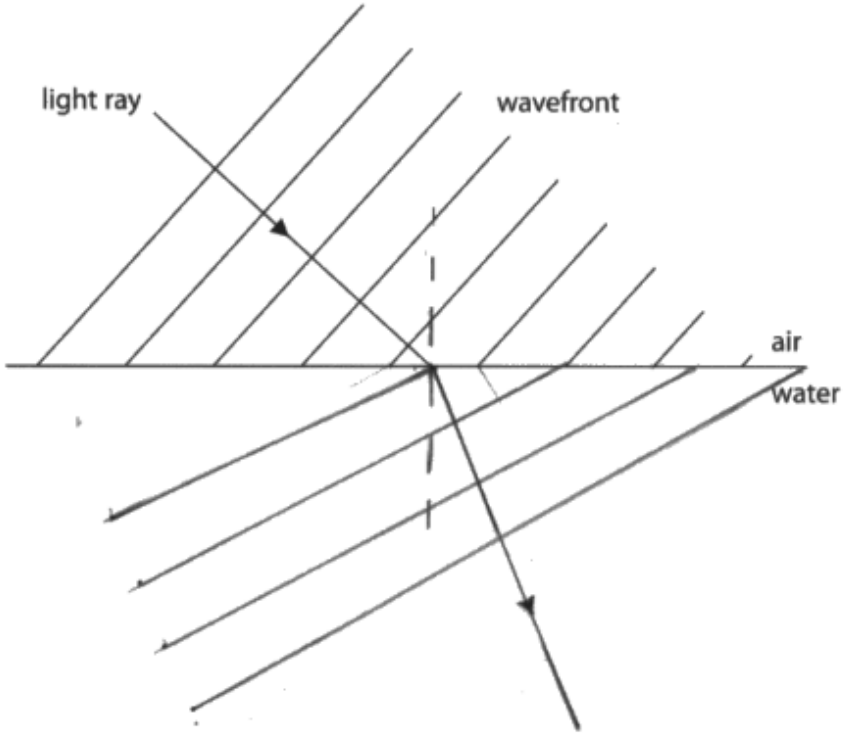

Diagram 1

The refractive index of water is greater than the refractive index of air.

(i) Complete diagram 1 by showing

- the wavefronts in the water
- the path of the light ray in the water

(3)

Q9(a)(i) Example B

9 (a) A light ray travels from air into water.

Diagram 1 shows the direction of the light ray and the wavefronts in air.

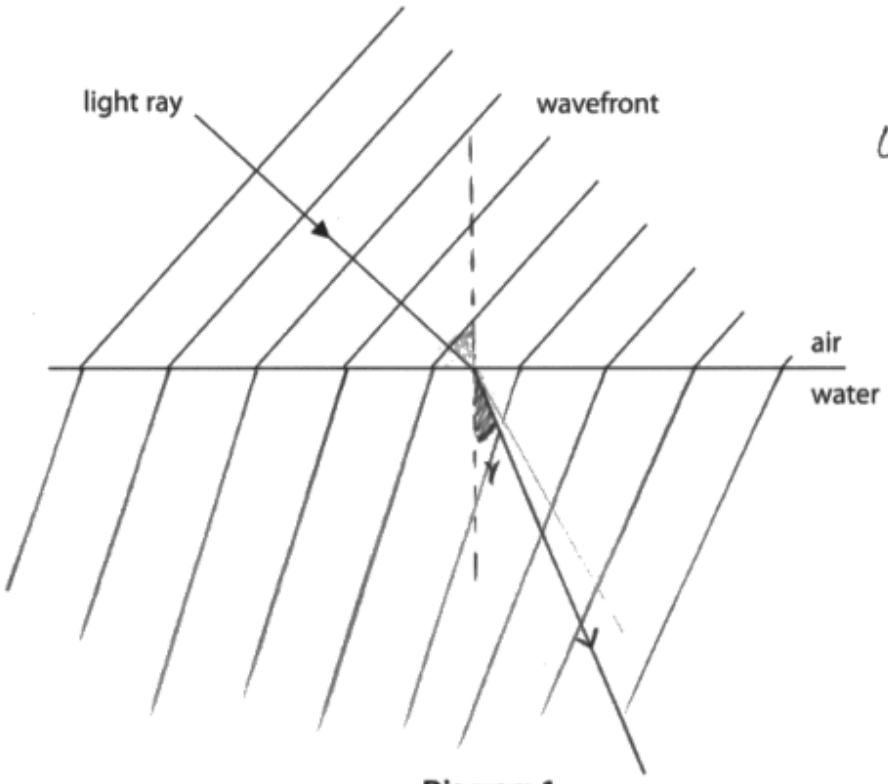

Diagram 1

The refractive index of water is greater than the refractive index of air.

(i) Complete diagram 1 by showing

- the wavefronts in the water
- the path of the light ray in the water

(3)

Q9(a)(i) Example C

9 (a) A light ray travels from air into water.

Diagram 1 shows the direction of the light ray and the wavefronts in air.

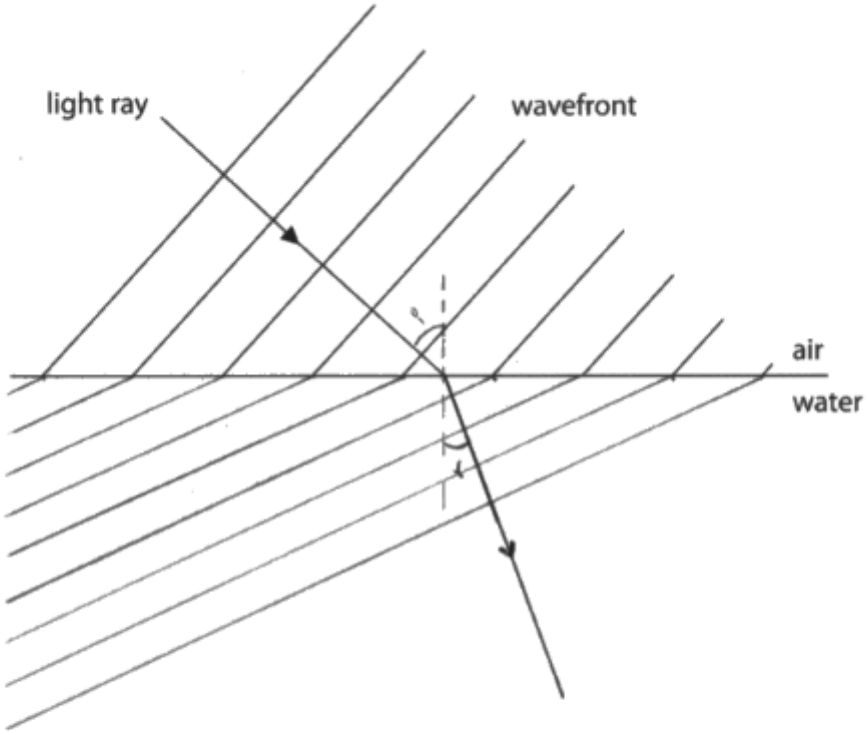

Diagram 1

The refractive index of water is greater than the refractive index of air.

(i) Complete diagram 1 by showing

- the wavefronts in the water
- the path of the light ray in the water

(3)

Activity 3 – Facilitating Achievement in AO1 Questions

Purpose:

To introduce and share strategies to allow students to succeed in AO1 questions.

As teachers, what strategies can we use to help students succeed when attempting AO1 questions?

Discuss, with other delegates on your table, teaching and revision strategies that may improve students' performance in AO1 questions.

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Activity 4 – Question writing (AO2 questions)

Purpose:

To write questions that target applying students' knowledge and understanding from different areas of the specification.

Consider the context of a space rocket being launched from Earth. This context could be used to ask questions about any of the 8 topics in the specification.

For example:

1. Forces and Motion – links to forces or equations of motion
2. Electricity – circuits used inside the rocket
3. Waves – sound and light waves received by an observer watching the launch
4. Energy – conservation of energy during the launch
5. Solids, Liquids and Gases – liquid oxygen used in the fuel tanks becoming a gas before ignition
6. Magnetism and Electromagnetism – motors used to operate doors etc.
7. Radioactivity and Particles – radioisotope thermal generator used for heating
8. Astrophysics – rocket orbit around the Earth / moon

Task

Write two questions that would require students to apply their knowledge and understanding to solve a problem set in this context.

Write a mark scheme to accompany each question. Remember – AO2 is for **applying** knowledge and understanding, not simply recalling it.

Question 1

Mark scheme 1

Question number	Answer	Notes	Marks
1			

Question 2

Mark scheme 2

Question number	Answer	Notes	Marks
2			

PERSONAL LEARNING

Things to do:

-
-
-
-
-

Things to avoid

-
-
-
-
-