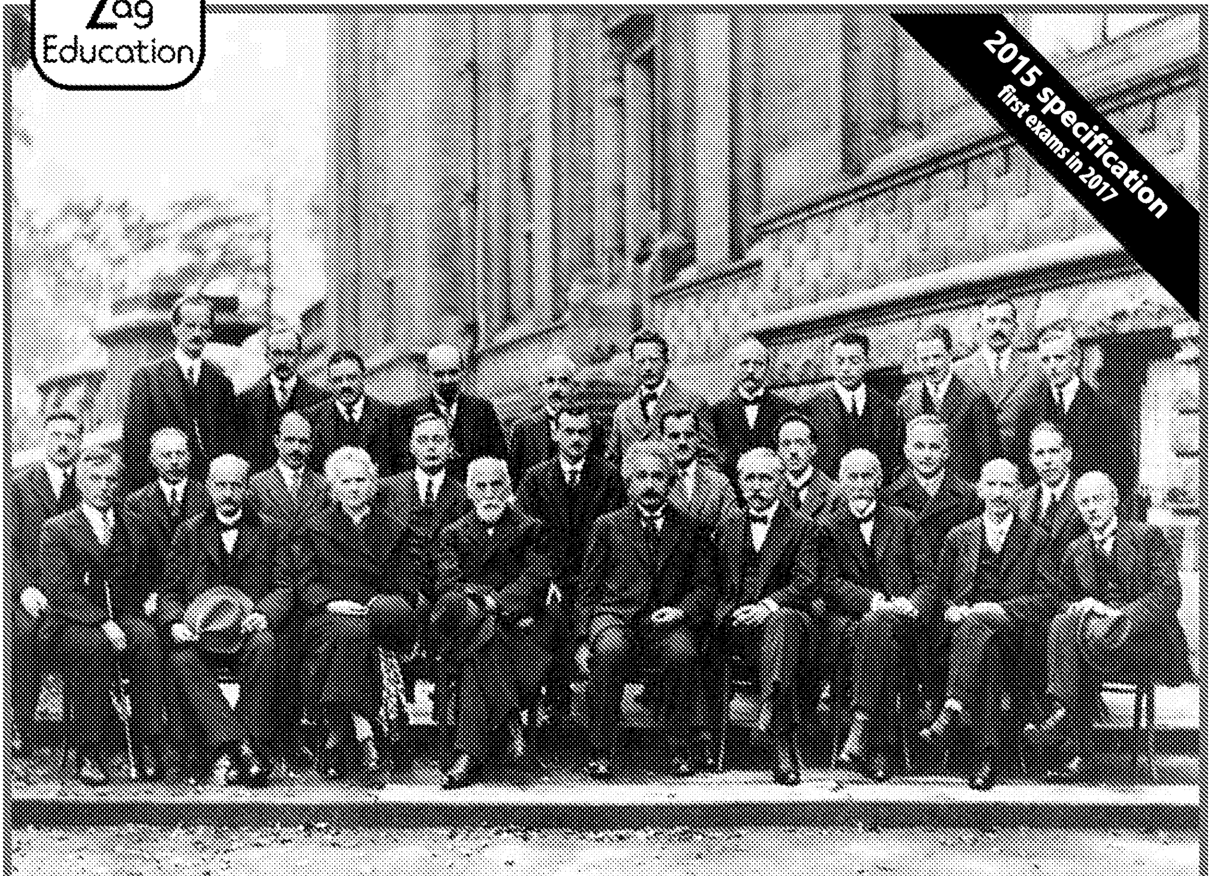
Physics

A Level | AQA | 7408



Topic Tests for A Level AQA Physics

Option 12: Turning Points in Physics

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Contents

Teacher's Introduction

These topic tests have been designed to help you and your students assess their knowledge of a topic after you have taught each part of **A Level AQA Physics Option 12: Turning Points in Physics** (specification for first teaching from September 2015).

Each topic test closely follows the content of the specification and includes:

- **Factual questions**: Some simpler factual questions are included to ensure that all the content and basics are covered, and to allow weaker learners access to some marks.
- **Short-answer questions**: These are not in exam style, and the purpose of these is to test different elements, knowledge and skills from the specification in a variety of styles.
- **Exam-style questions**: Where appropriate, topics may contain one or more exam-style questions, to prepare students for what they might meet in the exam, and to test exam skills.

Mathematical and practical skills are also covered in these topic tests.

Tests have been designed to take approximately 25–40 minutes and are worth on average between 20 and 35 marks. Please note that some tests have been split, as shown in the table:

Topic Number	Number of Marks
3.12.1	27
3.12.2 (i)	23
3.12.2 (ii)	20
3.12.3	36

The topic tests are suitable for a classroom assessment, revision aid or homework task and are, therefore, suitable for use immediately after a topic is completed in class or at the end of teaching the course.

Students are able to see the number of marks awarded for each question, allowing them to gauge the level of detail they will require for the answers, as in exam conditions. Full answers with marks are included at the end of the resource. Additionally, it makes the resource a suitable tool for students to use independently.

It is recommended that students have access to a calculator to complete the questions.

Students may also need a sheet containing Physics data and formulae, which can be found on the exam board website.

I hope you find these tests useful during your teaching.

3.12.2 (i) Wave–Particle Duality

1. a) What was the main difference between Newton's and Huygens' theorie

....

....

b) Why did scientists at the time favour Newton's theory?

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....

....

c) Explain how Yo... ...e Slits experiment subsequently suggested t

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2. a) Describe the wave nature of light.

....

....

b) i) State which fields are related to each constant:

permittivity of free space (ε_0) ....

permeability of free space (μ_0) ....

ii) Show how the speed of light in a vacuum can be derived from thes

....

....

....

c) Describe how Hertz di...ve... ...dio waves.

....

....

....

....

3. a) Describe how photoelectric emission is affected by:

   i) frequency of incident light

   ii) brightness of incident light

   b) How did observations of photoelectric emission change our understand

4. a) What was the ‘ultraviolet catastrophe’?

   b) How did Planck interpret the ‘ultraviolet catastrophe’?

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   ii) brightness of incident light

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Preview of Questions Ends Here

Answers

3.12.1 The Discovery of the Electron

1. a) filament is heated ✓ causing electrons to be emitted ✓
which are accelerated ✓ through a potential difference / towards an anode ✓

b) KE = 2000 × 1.6 × 10^{-19} ✓ = 3.2 × 10^{-16} J ✓
3.2 × 10^{-16} = ½ × 9.11 × 10^{-31} × v^2 ✓
v = 2.7 × 10^{7} ✓ ms^{-1}

c) $\frac{2000}{0.020} = \frac{F}{1.6\times10^{-19}}$ ✓

F = 1.6 × 10^{-14} ✓ N

2. a) it was quantised / only came in certain sized bits ✓ it was a particle ✓

b) $\frac{1.6\times10^{-19}}{9.11\times10^{-31}}$ ✓ = 1.8 × 10^{11} ✓ Ckg^{-1}

c) $\frac{1.6 [illegible]}{1. [illegible]}$ ✓ [illegible]4 × 10^{7} ✓ Ckg^{-1}

3. a) 0.60 × 1.6 × 10^{-19} × 100 ✓ = 9.6 × 10^{-18} ✓ N ✓

b) 9.6 × 10^{-18} = $\frac{9.1\times10^{-31}\times100^2}{r}$ ✓
r = 9.5 × 10-^{10} ✓ m

4. a) W = 6.5 × 10^{-15} × 9.8 ✓ = 6.4 × 10^{-14} ✓ N
$\frac{4000}{0.030} = \frac{6.4\times10^{-14}}{Q}$ ✓
Q = 4.8 × 10^{-19} ✓ C

b) 6.4 × 10^{-14} = 6π × 1.8 × 10^{-5} × r × 1.0 × 10^{-4} ✓
$r = \frac{6.4\times10^{-14}}{3.4\times10^{-8}}$ ✓
r = 1.9 × 10^{-6} ✓ m

c) $\frac{m}{q} = \frac{6.5\times10^{-15}}{4.8\times10^{-19}}$ ✓
$\frac{m}{q} = 1.4 \times 10^4$ ✓ kg C^{-1}

d) the charge was quantised ✓ so it was carried by particles ✓

Preview of Answers Ends Here