

**GCSE**

**PHYSICS A**

Physics A Unit 3 Ideas in Context plus P7

**Pre - release Material**

**To be opened immediately**

**For issue to candidates on or after**

**DATE            MARCH            YEAR**

**F A333/01**

This version is for FOUNDATION tier candidates who will be entered for A333/01.

Sufficient time should be allowed for study of the material in the classroom.

### **INSTRUCTIONS TO CANDIDATES**

- Take the article and read it through carefully. Spend time looking up any technical terms or phrases you do not understand. You are **not** required to do more research of your own on this topic.
- For the examination you will be given a fresh copy of this article, together with the question paper. You will not be able to take this original copy into the examination with you.

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**This Pre-release paper consists of 1 printed page.**

## X-Rays – seeing the ‘invisible’

### Discovery of X-rays

In the late 19<sup>th</sup> Century many scientists were investigating the way an electric current was carried through a gas in a glass tube.

The gas inside the tube glowed when an electric current passed through.

Wilhelm Röntgen was a German scientist. In November 1895 he was investigating the glowing gas when he made an unexpected observation.

Some fluorescent material, the other side of the room, was glowing. The gas tube was covered with a dark cloth, so it was not the light from the glowing gas which made the fluorescent material shine.

Over the following seven weeks Röntgen investigated what was causing the fluorescence. He discovered that the rays that were coming from the end of the glass tube penetrated wood, a thick book and metal sheets.



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Strangest of all he saw the bones of his hand on the fluorescent screen.

During these investigations Röntgen had his meals served in the laboratory and even moved his bed there so he could work undisturbed. Only once did he mention his work to colleagues, he said “I have discovered something quite interesting but I do not know whether my observations are correct”.

On 1<sup>st</sup> January 1896 Röntgen sent his first report and some examples of X-ray photographs to scientific colleagues in several countries. These new rays became known as X-rays.

During 1896 other scientists investigated X-rays and found similar results. Many scientists gave lectures, with members of the audience paying a fee to have their hands or purses X-rayed.



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The first X-ray photograph of a human being shows the hand of Röntgen's wife, who was wearing a ring.

### Dangers from X-rays

In the first few years after the discovery of X-rays there was no awareness of the risks of working with this new radiation.

The first known death from X-ray exposure was in 1904. At this time many radiologists suffered radiation burns as they used self-exposure experiments to determine exposure times for patients.

It was not until 1921 that the first recommendations were made to limit exposure to X-rays in hospitals. Commercial and industrial applications of X-rays were not controlled until much later.

Up until the late 1950s buying new shoes for children included the chance to see images of your feet inside the shoes to check the fit.

Governments now provide strict guidelines about the amount of exposure to ionising radiation – both for workers and for the public.