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RECOGNISING ACHIEVEMENT

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A333/02

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
PHYSICS A

Ideas in Context and Unit P7 (Higher Tier)

INSERT

MONDAY 12 MAY 2008

Afternoon

Time: 60 minutes

CUP/T58149

INSTRUCTIONS TO CANDIDATES

- This insert contains the article required to answer question 1.

[Turn over

Should We Build New Nuclear Reactors?

The government is considering the future of nuclear power in the UK.
The UK relies on nuclear power for 20% of its electricity, but by 2023 only one of the existing power stations will still be working and will only supply about 7%.
No new reactors have been built since the 1980s because there have been problems with accidents, high decommissioning costs and the problem of nuclear waste. These problems have reduced political and public enthusiasm. But, with soaring oil and gas prices, dwindling domestic fossil fuel reserves and pressure to tackle climate change, many argue that a new generation of reactors has to be considered.

As well as producing electricity, nuclear reactors also produce radioactive materials. These are used in medicine to treat cancer, track chemicals in the body and sterilise surgical instruments. Radioactive materials are also used to sterilise food and are used in smoke detectors.

The main risk from nuclear power is exposure to radioactivity. The ionising radiation produced is harmful to living cells. This can be a hazard to health, and exposure to too much radiation is very dangerous.

The naturally occurring metal uranium (a heavy, unstable element) is most commonly used in power stations. There are several different types – called isotopes – of uranium, which produce different kinds of ionising radiation.

isotope	half life	type of radiation produced
U-235	700 million years	alpha
U-238	4.5 billion years	alpha
U-239	24 minutes	beta

The worst type of accident in a nuclear power station is a melt-down, when the nuclear chain reaction gets out of control and generates enough heat to melt down the reactor. Modern reactors are designed in such a way that they shut themselves down if left alone. Constant intervention is needed to keep them operating – in contrast to the older reactor designs, which required constant intervention to keep the reaction under control. One recent design also has water stored above the reactor, which can be readily released onto the reactor.