Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A213/01

TWENTY FIRST CENTURY SCIENCE

SCIENCE A

Unit 3: Modules B3 C3 P3
(Foundation Tier)

WEDNESDAY 20 JANUARY 2010: Morning
DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (NF/SW) MEP10198 24247/1

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer ALL the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 42.

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Answer ALL the questions.

1 The government plans to build new nuclear power stations. High level radioactive waste could be buried in waste dumps underground.

People living near one planned waste dump have different views about these plans.

BRIAN **'I don't want this dangerous radioactive waste to be stored near where I live. I'm afraid that it will make us a target for terrorist attacks.'**

HILARY **'I'm against this crazy scheme. There's a chance that this waste will leak into our water supplies. The government shouldn't take any risks with the lives of our children.'**

MARION **'I used to work in the nuclear industry as an inspector. My job was to check that any leakage of radioactive chemicals was less than the legal limit allowed. I'm sure this dump will be safe. We need this industry locally to bring in more jobs.'**

ROHIT **'I know that this plan will bring jobs into the area, and that making electricity without releasing carbon dioxide will cut down global warming.**
But I'm not at all happy about radioactive waste being brought here in trains and lorries. There's bound to be an accident sooner or later. I'm against this plan.'

(a) **Which two people mention a benefit of the waste dump?**

Put ticks (✔) in the boxes next to the TWO correct answers.

Brian	☐
Hilary	☐
Marion	☐
Rohit	☐

[2]

(b) **Which one of these people talks about both bad and good points for the planned waste dump?**

Put a tick (✔) in the box next to the ONE correct answer.

Brian	☐
Hilary	☐
Marion	☐
Rohit	☐

[1]

(c) **Which one of these people talks about laws to protect the environment?**

Put a tick (✔) in the box next to the <u>ONE</u> correct answer.

Brian	☐
Hilary	☐
Marion	☐
Rohit	☐

[1]

[Total: 4]

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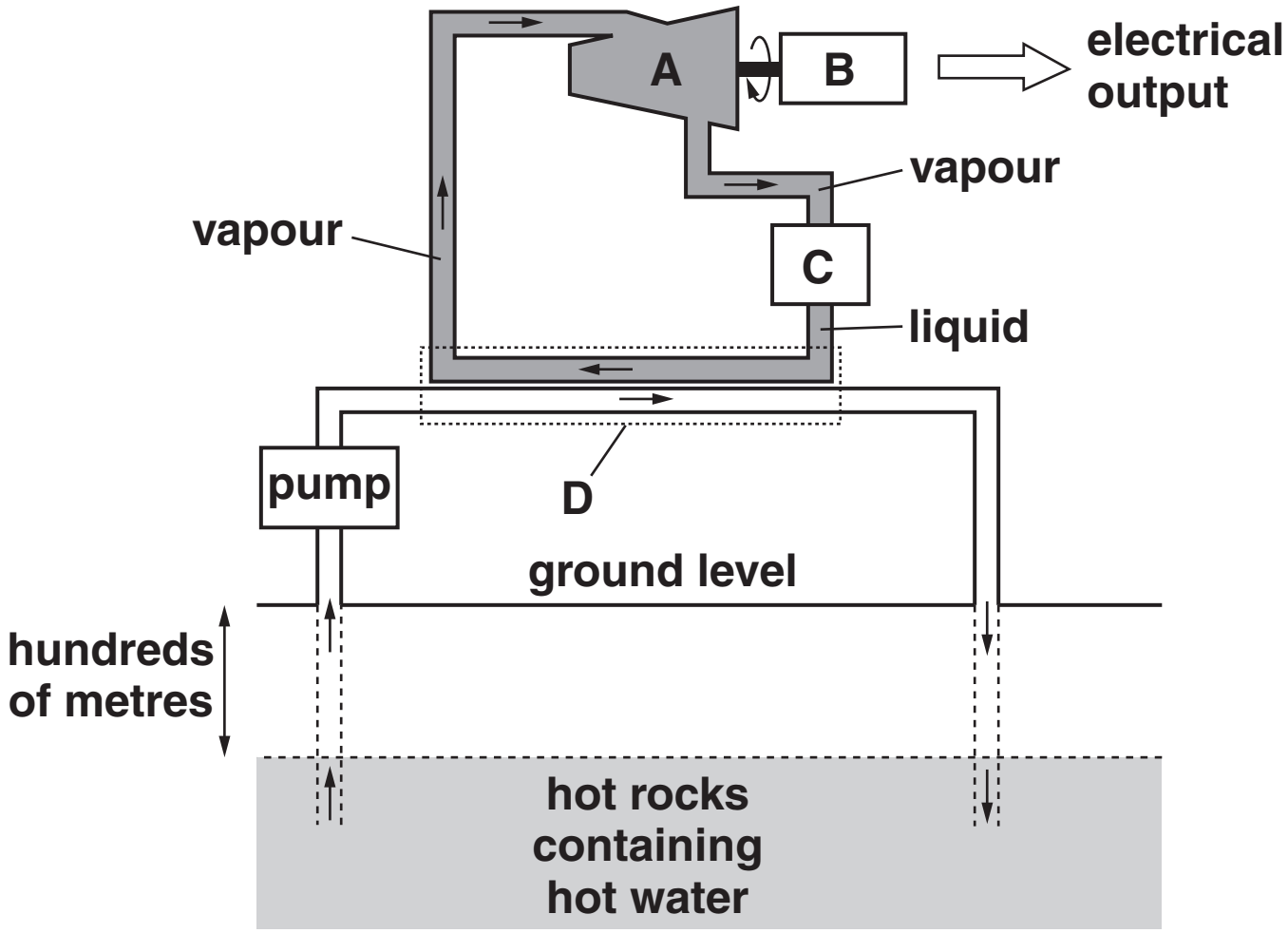
2 The diagram shows one type of geothermal power station.
It gets its energy from hot rocks deep underground.



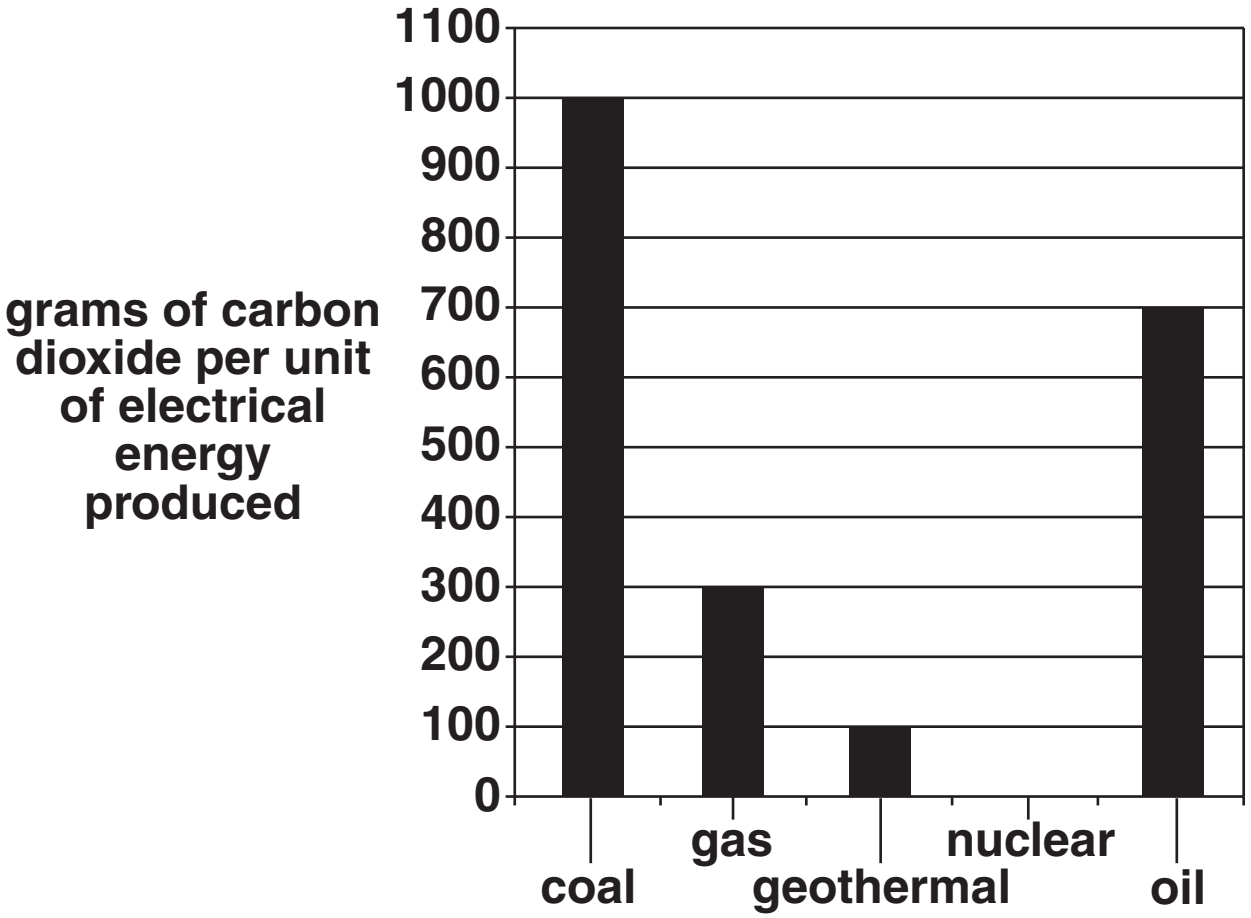
(a) The four parts A, B, C and D in the diagram are a CONDENSER, a GENERATOR, a HEAT EXCHANGER and a TURBINE.

Draw a line to join each PART of the power station to the correct DESCRIPTION of what happens there.
One has been done for you.

PART	DESCRIPTION
A	Hot water from underground is pumped through the HEAT EXCHANGER which boils a liquid into vapour. The cooled water then goes back underground.
B	The vapour goes into a TURBINE.
C	A GENERATOR is turned to make electricity.
D	A CONDENSER turns the vapour back into a liquid ready to be used again.

[2]

(b) A big problem with many power stations is that they give out carbon dioxide.
The bar chart shows how much carbon dioxide is given off by different types of power station while they are running.



(i) Here are some statements about the data in the bar chart.

They are NOT all correct.

Put a tick (✔) in ONE box after each statement to show whether it is TRUE or FALSE.

	TRUE	FALSE
Nuclear power stations do not produce carbon dioxide when running.	☐	☐
Coal power stations produce more carbon dioxide than the other types of power station, per unit of energy produced.	☐	☐
Using gas instead of coal saves 600 grams of carbon dioxide, per unit of energy produced.	☐	☐
Gas power stations produce less than half of the carbon dioxide produced by oil power stations, per unit of energy produced.	☐	☐

[3]

(ii) **The data in the bar chart do not give all the relevant information about the carbon dioxide produced by these power stations.**

Which ONE of the following statements explains this?

Put a tick (✔) in the box next to the ONE correct answer.

Only three of the five energy sources are fossil fuels.	☐
Other forms of renewable energy are not included in this data.	☐
The data do not include details about building the power stations.	☐
Nuclear power stations produce radioactive waste.	☐

[1]

[Total: 6]

3 Radioactive materials give off ionising radiation.

(a) This radiation can be useful.

Describe TWO different uses for ionising radiation.

1 _____

_____

2 _____

_____ [2]

(b) Some people work with radioactive materials.

They are exposed to risk from radiation.

(i) Name or describe one job where a person is at risk from radiation from radioactive materials.

_____

(ii) Describe how the risk for people with this job is made as low as possible.

_____

_____ [2]

[Total: 4]

4 (a) Use words from this list to complete the sentences.

EXPLANATIONS

IMAGINATION

PREDICTIONS

THEORIES

When thinking up a new hypothesis (a scientific explanation), scientists need

supporting data and _____ .

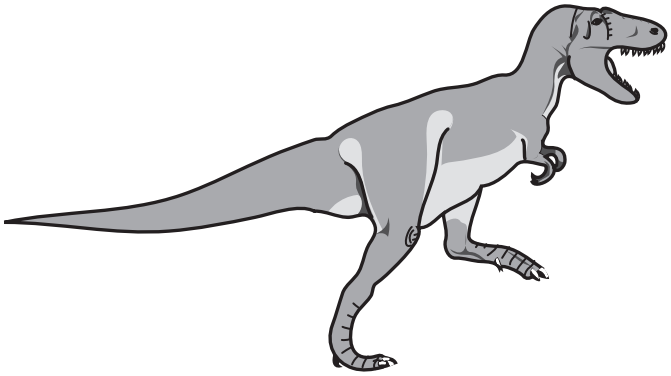
A new hypothesis should account for all the known data and observations and make

testable _____ . [2]

(b) Read the newspaper article.

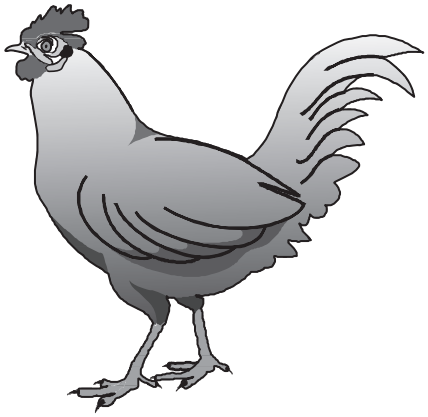
ARE BIRDS DINOSAURS?

Tyrannosaurus rex (*T. rex*) is the most famous of all dinosaurs.



A 68-million-year-old fossil of a *T. rex* bone was found that still contained seven proteins.

Three of the proteins were very similar to proteins found in birds such as chickens.



Therefore, some scientists have suggested that birds evolved from dinosaurs.

(i) Put a tick (✔) in the box by the <u>EXPLANATION</u> reported in the article.

T. rex was the same as a chicken. ☐

Chickens evolved from dinosaurs. ☐

Dinosaurs evolved from chickens. ☐

T. rex is not related to chickens. ☐

[1]

(ii) Put a tick (✔) in the box next to the one <u>OBSERVATION</u> that supports this explanation.

Seven proteins were found in a *T. rex* fossil.	☐
A 68-million-year-old *T. rex* fossil was found.	☐
Three proteins from *T. rex* matched proteins found in chickens.	☐

[1]

[Total: 4]

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5 (a) Grey squirrels were introduced into the UK by humans over 100 years ago.
The grey squirrels have replaced red squirrels in all but a few places.
Some scientists are worried that the red squirrel may die out in the UK.

Which of the following factors may make a species die out?

Put ticks (✔) in the boxes next to the TWO correct factors.

FACTOR	
an increase in food supply	☐
rapid environmental change	☐
the arrival of a new disease	☐
the extinction of its predator	☐

[2]

(b) Read the newspaper article.

BLACK IS THE NEW GREY

Some grey squirrels produce black offspring. The black colour is caused by a change in a single gene.

In the south east of the UK, the number of grey squirrels is now falling and the number of BLACK SQUIRRELS is increasing.

Female grey squirrels prefer to mate with black males. This is called sex selection.

Explain the recent increase in the number of black squirrels using ideas about natural selection.

In your answer write about:

- variation
- selection
- competition
- the effect over a number of generations.

_____

_____

_____

_____

_____

_____ [4]

[Total: 6]

6 Communication systems have evolved in animals. They coordinate responses to internal and external changes.

(a) Use straight lines to link each COMMUNICATION SYSTEM to the correct DESCRIPTIONS.

Each communication system should be joined to TWO descriptions.

COMMUNICATION SYSTEM	DESCRIPTION
	fast, short-lived responses
nervous	slower, longer-lasting responses
hormonal	information transmitted by chemicals in the blood
	information transmitted by electrical impulses

[2]

(b) During a game of football, Ryan sees the ball.

He responds by kicking it towards the goal.

Use straight lines to link each NAME on the left to the PART OF RYAN'S BODY involved in this nervous response.

NAME	PART OF RYAN'S BODY
receptor	leg muscle
coordinator	cells in his eye
effector	brain and spinal cord

[2]

[Total: 4]

7 Read the following newspaper article.

NO COLOUR FOR MUSHY PEAS

The Food Standards Agency wants six artificial colourings to be removed from food and drink. Their use is associated with hyperactive behaviour in children.

The food industry has been working on removing colourings from food, but alternative colourings for mushy peas and Turkish delight have not yet been found.

(a) Some students in a science class are discussing the newspaper article.

SUSIE 'Hazardous chemicals can occur naturally in food or may be made when food is cooked.'

CHRIS 'Some people will not like the lack of colour and so will stop buying the foods.'

JACK 'Foods look much more attractive when these colours are added and they've never affected me.'

ANWER 'I want the government to ban these colourings because they may affect children.'

TANYA 'Pesticides and fertilizers are often left on crops.'

(i) Which TWO students explain why colourings are added to foods such as mushy peas?

answer _____

and _____ [1]

(ii) Who gives a reason for taking a risk?

answer _____ [1]

(iii) Which TWO students give reasons why food is never completely safe?

answer _____

and _____ [1]

(b) Why does the Food Standards Agency want to ban some colourings?

Put a tick (✔) in the box next to the BEST answer.

All artificial additives are harmful.	☐
People will only buy foods without colourings.	☐
The colourings may make some children hyperactive.	☐
All children who eat these additives become unhealthy.	☐

[1]

[Total: 4]

8 Sam is trying to eat a sensible diet.

She knows she has to include protein in her diet.

The sentences below describe what happens when we eat proteins.

Draw a straight line from the BEGINNING of each sentence to the correct ENDING.

BEGINNING	ENDING
Digestion breaks down proteins to …	... proteins.
Cells in our body grow by building up amino acids into …	... liver.
Excess amino acids are broken down to urea by the …	... urine.
The waste products are excreted in ...	... amino acids.

[3]

[Total: 3]

9 **Dave is a farmer.**

He has changed from intensive farming to organic farming.

(a) Look at the statements about ORGANIC farming.

Some of the statements are true and some are false.

Put a tick (✔) in ONE box after each statement to show whether it is true or false.

STATEMENT	TRUE	FALSE
Organic farms produce less food than intensive farms of the same size.	☐	☐
Organic farmers use pesticides from non-renewable sources.	☐	☐
Organic farms have smaller fields, with hedges that shelter animals that feed on pests.	☐	☐
Organic farmers rotate crops in their fields to prevent disease.	☐	☐

[3]

(b) Farmers must make sure their crops grow well.

All farmers add fertilizers containing nitrogen compounds to the soil.

(i) What is added to the soil on <u>INTENSIVE</u> farms and on <u>ORGANIC</u> farms to do this?

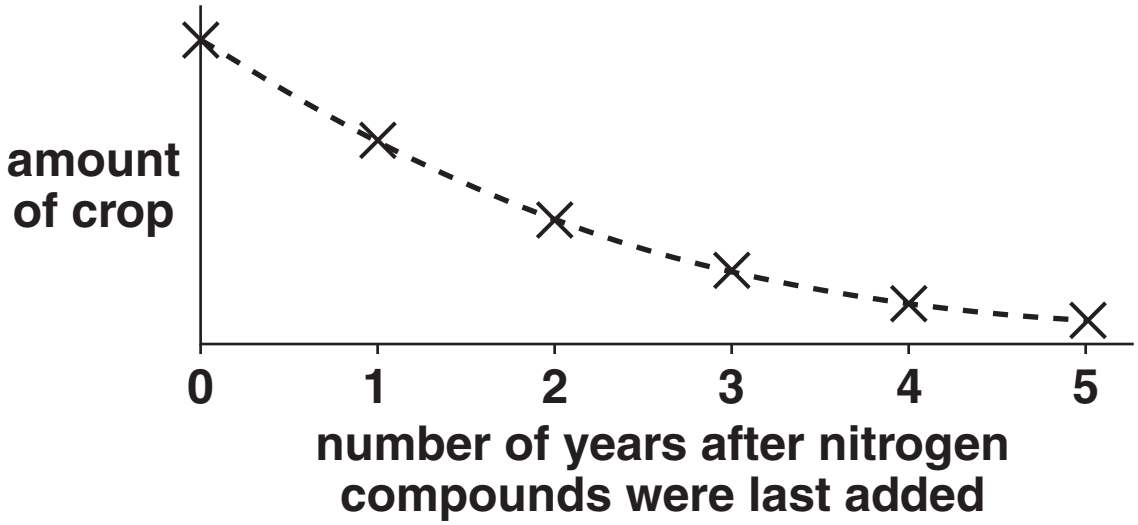
<u>INTENSIVE</u> _____

_____

<u>ORGANIC</u> _____

_____ **[2]**

(ii) **The graph shows what happens to the amount of crop when the farmer stops adding nitrogen compounds to the soil.**



Describe <u>AND</u> explain the trend shown by this graph.

_____

_____

_____

_____ **[2]**

[Total: 7]

<u>END OF QUESTION PAPER</u>