

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCE

General Studies

Advanced

Unit 3: Change and Progress

Monday 30 January 2012 – Morning

Time: 1 hour 30 minutes

Paper Reference

6GS03/01

You must have:

Insert (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions in Sections A and B and **one** question in Section C.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Do not return the insert with the question paper.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Quality of written communication will be taken into account in the marking of your answers
– *you should take particular care with your spelling, punctuation, grammar and clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

SECTION A

Answer ALL questions.

You should aim to spend no more than 30 minutes on this section.

Read Source 1 on the separate insert and then answer questions 1–5.

- 1** Give three ways in which ecological footprints measure the impact of humans on the planet.

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(Total for Question 1 = 3 marks)



2 Technology helps us to acquire energy from an area of land. Using your own knowledge, explain how this may be done.

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(Total for Question 2 = 3 marks)

3 Using information in the source, and your own knowledge, present an argument in support of vegetarianism.

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(Total for Question 3 = 4 marks)



4 The ecological footprint of a UK citizen is about six times larger than that of a citizen of the Philippines (SE Asia). Describe briefly three moral issues that arise from this comparison.

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(Total for Question 4 = 6 marks)



Handwriting practice area with 18 horizontal dotted lines.

(Total for Question 5 = 14 marks)

includes 4 marks for Quality of Written Communication

TOTAL FOR SECTION A = 30 MARKS



SECTION B

Answer ALL questions.

You should aim to spend no more than 30 minutes on this section.

Read Source 2 on the separate insert and then answer questions 6–10.

6 Leonardo da Vinci was a major figure of the Renaissance.

Identify **two** statements below which correctly describe key features of the Renaissance.

A – a revived interest in the art and teaching of the ancient world

B – acceptance of religious authority in scientific matters

C – the rapid spread of new ideas as a result of improvements in printing

D – the use of the microscope and similar scientific instruments

E – resistance to any processes which were unknown to the ancient world

F – less emphasis on realism and the secular

Statement 1.....

Statement 2.....

(Total for Question 6 = 2 marks)



7 From the evidence in the source, explain why Leonardo has only recently been recognised as a scientist.

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(Total for Question 7 = 4 marks)



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TOTAL FOR SECTION C = 30 MARKS

TOTAL FOR PAPER = 90 MARKS



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PEARSON

Source material

Source 1

Putting our foot down

There is no doubt that humans have had a profound effect on the Earth, possibly as much as any natural event. There may be controversy over the existence or extent of global warming and climate change, based on different interpretations of huge amounts of data. However, there is one ecological statistic that is relatively easy to calculate and which may lead us to question many aspects of our lifestyle and even political policies.

An **ecological footprint** measures the area of the Earth's surface in terms of the energy required to sustain an organism, activity or even produce a manufactured product. For example, a powerful car with a 4.6 litre engine, driven for 10 000 km a year uses as much energy, including fuel and the energy to build it, as can be produced by about 4500 square metres of surface a year. The footprint is interesting when we compare similar calculations for other organisms and people. For example it takes the energy from 43.3 square metres of surface to produce 1 kg of chicken per year. Other ecological footprints are shown in the table.

Organism	Ecological footprint (square metres)
Goldfish	3.4
Cereals e.g. wheat (1kg)	13.4
Hamster	140
Cat	1500
Philippines citizen	8000
Large dog	11000
Average human	26000
UK citizen	61000
USA citizen	90000

Many controversial issues arise from these estimates and comparisons. For example, each living person, on average, requires 26000 square metres; however, the amount of land available for production is 18000 square metres per person, a deficit of 8000 square metres. What are the implications for the future?

A generously sized dog is more ecologically demanding than a generously sized car, and more demanding than citizens of many less-developed countries. Doesn't this lead us to question our need for companion animals? National governments should consider legislation to restrict both pet and car ownership, on the basis that the world cannot support more humans, pets and cars.

Source 2

Leonardo da Vinci – scientist?

Leonardo was and is best known as an artist, the creator of such masterpieces as the *Mona Lisa*. Yet Leonardo was far more than a great artist: he had one of the best scientific minds of his time. He made painstaking observations and carried out research in fields ranging from architecture and civil engineering to anatomy, zoology, geology and palaeontology.

Leonardo's scientific and technical observations are found in his handwritten manuscripts. After his death his notes were scattered to libraries and collections all over Europe. While portions of Leonardo's technical treatises on painting were published as early as 1651, the scope and calibre of much of his scientific work remained unknown until the 19th century. This was well after the Newtonian scientific revolution. Yet his geological and palaeontological observations and theories foreshadow many later breakthroughs.

Leonardo knew well the rocks and fossils found in his native north Italy. He observed them during his service as an engineer and artist from 1482 to 1499. In Leonardo's day there were several hypotheses of how it was that shells were found in rocks on the tops of mountains. Some believed the shells to have been carried there by the Biblical Flood; others thought that these shells had grown in the rocks. Leonardo refuted both hypotheses using his careful observations. Concerning the second hypothesis, he wrote that "such an opinion cannot exist in a brain of much reason; because here are the years of their growth, numbered on their shells, and there are large and small ones to be seen which could not have grown without food, and could not have fed without motion, and here they could not move". There was every sign that these shells had once been living organisms.

What about the Biblical Flood? Leonardo doubted the existence of a single worldwide flood, noting that there would have been no place for the water to go when it receded. He also noted that "if the shells had been carried by the muddy deluge they would have been mixed up, and separated from each other amidst the mud, and not in regular steps and layers – as we see them now in our time". He noted that rain falling on mountains rushed downhill, not uphill, and suggested that any flood would have carried fossils away from the land, not towards it.

How did those shells come to lie at the tops of mountains? Leonardo's answer was remarkably close to the modern one: fossils were once living organisms that had been buried at a time before the mountains were raised. It was possible, Leonardo thought, that some fossils were buried by floods (this idea probably came from his observations of the floods of rivers of north Italy, but these floods had been repeated, local catastrophes, not a single Great Flood). To Leonardo da Vinci, as to modern palaeontologists, fossils indicated the history of the Earth, which extends far beyond human records.

Source: adapted from www.ucmp.berkeley.edu

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