

Mark schemes

Q1.

(a)

*in either order, both required for mark
allow phonetic spellings*

nitrogen

allow N₂ for nitrogen

and

methane

allow CH₄ for methane

1

(b)

*ignore width of bars
ignore additional bars*

nitrogen bar to 78%

1

oxygen bar to 21%

1

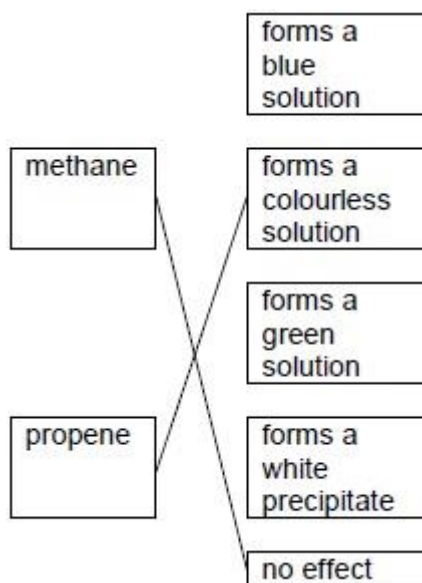
(c) Titan's atmosphere contains too little carbon dioxide.

1

(d) long wavelength radiation is reflected back to the surface of Titan.

1

(e)



*an extra line from a gas to an effect on
bromine water negates that mark*

2

(f)

$$\frac{7 \times 21}{3}$$

an answer of 49 (g) scores 2 marks.

1

= 49 (g)

1

[9]**Q2.**

(a) (Titan has) little / no oxygen

ignore references to respiration

1

(so) photosynthesis has not occurred (on Titan)

allow (so) no plants / algae to produce oxygen (on Titan)

1

(therefore) little / no carbon dioxide present (on Titan)

or

(therefore) oxygen-using animals cannot have evolved (on Titan)

1

(b) (methane) allows short(er) wavelength radiation to pass through (from the sun)

allow (methane) allows uv / ultraviolet radiation to pass through (from the sun)

1

(which is) re-emitted from the surface as long(er) wavelength radiation

allow (which is) re-emitted from the surface as ir / infra-red radiation

1

(which is) absorbed (by methane in the atmosphere)

allow (which is) trapped (by methane in the atmosphere)

1

if no other mark is awarded, allow 1 mark for methane absorbs long(er) wavelength radiation

or

methane absorbs ir / infra-red radiation

(c) (add) bromine (water)

*do **not** accept bromide*

1

(changes from) orange to colourless

dependent on correct test in MP1

allow (changes from) brown to

*colourless
ignore clear*

1

[8]**Q3.**

(a) 1836 – 1768

both required

1

= 68 (ppb)

allow ecf from graph values

1

(b) methane levels rose and fell

1

(c) any **two** from:

- rice growing
- farm animals
- landfill

allow other valid activities

2

(d) there was a fall in GMAT in some years

1

there was an overall increase in GMAT

1

(e) any **one** from:

- melting polar ice caps
- water expansion

1

(f) flooding of low lying areas

1

(g) 100 mm

1

[10]**Q4.**

(a) 72/24

an answer of 3 (mm / year) scores 2 marks

1

= 3 (mm / year)

an answer of 3.125 (mm / year) scores 1 mark

1

(b) **Level 3 (5-6 marks):**

Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 2 (3-4 marks):

Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0

No relevant content

Indicative content**description**

- global air temperature has risen overall / erratically
- mean sea level has risen (steadily)
- carbon dioxide has risen steadily
- methane has risen overall / erratically

explanations

- (carbon dioxide increase because) increase in fossil fuel combustion
or
- (carbon dioxide increase because) increase in deforestation
- methane from cattle / landfill / rice plantations
- carbon dioxide and / or methane trap heat
or
- carbon dioxide and / or methane are greenhouse gases
- polar ice caps melt
or
- seawater expands

linked explanation

- greenhouse gases linked to temperature rise
- temperature rise linked to seawater level

6

(c) any **two** from:

- bias
- simplified models
- lack of peer review
ignore reproducible

2

[10]**Q5.**

- (a) Methane 1
- (b) Sea levels rising 1
- (c) Burning of fossil fuels 1
- (d) carbon dioxide concentration stayed constant from 1850 to 1900 1
- carbon dioxide concentration slowly increased from 1900 1
- carbon dioxide concentration increased more rapidly from 1965
allow values from 1965 – 1975 1
- [6]

Q6.

- (a) any **one** from:
- complex systems
 - many different variables
 - many alternative theories
- 1
- (b) carbon dioxide allows short wavelength radiation to pass through
allow greenhouse gas(es) for carbon dioxide 1
- the atmosphere to the Earth's surface 1
- carbon dioxide absorbs outgoing long wavelength radiation 1
- (c) general increase in temperature caused by increase in greenhouse gases 1
- any **two** human activities correctly linked to a named greenhouse gas
- eg*
- increased burning of fossil fuels causes more carbon dioxide* 2
- deforestation causes more carbon dioxide*
- more cattle production causes more methane*
- use of landfill causes more methane*
- [7]

Q7.

- (a) the Earth's (surface) temperature was high **or** at/above 100 °C

allow the Earth's (surface) temperature was too / very hot or water evaporated / boiled or turned to steam / gas

allow because of heat from volcanoes

ignore the Earth's (surface) was covered by volcanoes

ignore water turned to water vapour

1

(b) (i) air _____ mixture

1

carbon dioxide _____ compound

1

argon _____ element

1

allow only one line from each substance

(ii) oxygen

1

(iii) about 80 %

1

(c) (i) 0.03(0) (%)

1

(ii) increased

1

slowly then rapidly

1

allow figures from graph to indicate increase

(iii) any **two** from:

- use of fossil fuels
- deforestation

allow less trees / plants

- cars/transport
- industry/factories

ignore more people

2

[11]