All questions are for both separate science and combined science students

Q1.

This question is about burning coal.

A power station has four coal-burning furnaces.

Each furnace burns 3000 kg of coal per minute.

The table below shows some information about this coal burning power station

Number of furnaces in use	Mass of coal burned per minute in kilograms	Mass of sulfur dioxide produced per minute in kilograms	Mass of carbon dioxide produced per minute in kilograms
0	0	0	0
1	3000	100	7000
2	6000	200	14 000
3	9000	300	21 000
4	12 000	400	28 000

(a) Carbon dioxide is a greenhouse gas.

What is the effect on the rate of global climate change of using more furnaces in this power station?

Complete the sentence.

Choose the answer from the box.

decreases	stays the same	increases

Use the table above.

The rate of global climate change _____ .

(1)

(b) 7000 kg of carbon dioxide are produced when 3000 kg of coal are burned.

Calculate the mass of carbon dioxide produced when 1 kilogram of coal is burned.

_____

_____

_____

Mass of carbon dioxide = _____ kg

(2)

(c) Complete the sentence.

Sulfur dioxide causes an environmental effect called acid _____ .

(1)

The table is repeated below.

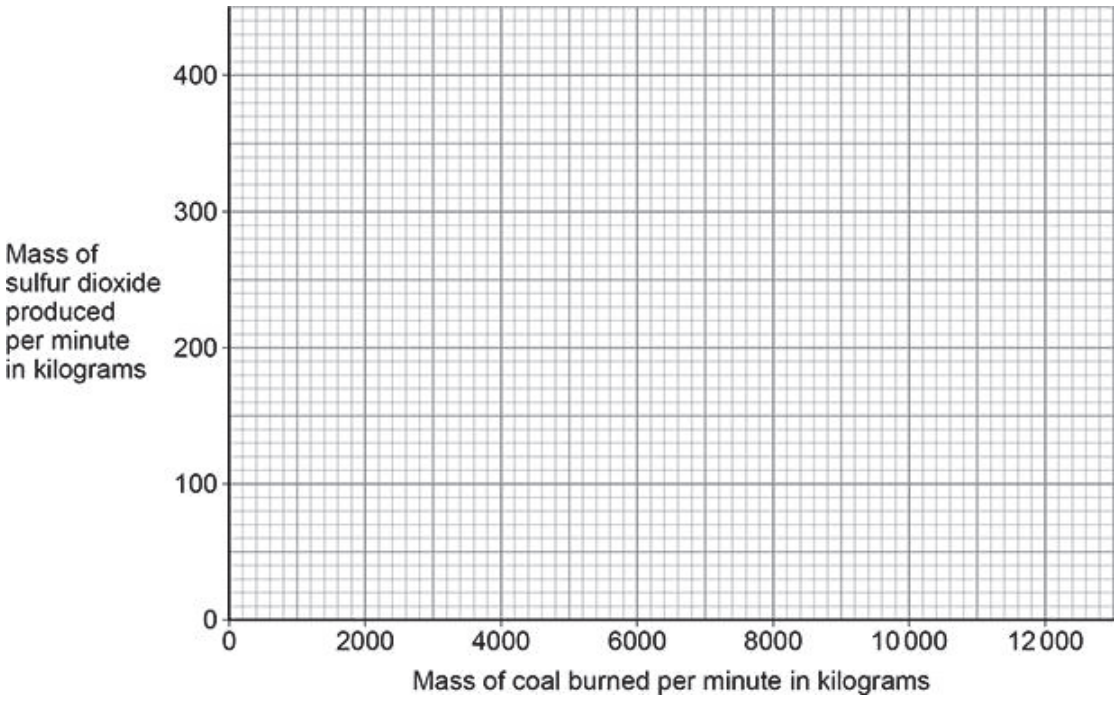
Number of furnaces in use	Mass of coal burned per minute in kilograms	Mass of sulfur dioxide produced per minute in kilograms	Mass of carbon dioxide produced per minute in kilograms
0	0	0	0
1	3000	100	7000
2	6000	200	14 000
3	9000	300	21 000
4	12 000	400	28 000

(d) The figure below shows how the mass of sulfur dioxide produced per minute varies with the mass of coal burned per minute.

Complete the figure below.

You should:

- plot data the table above on the figure below
- draw a line of best fit.



(3)

(e) Complete the sentence.

Use the table and figure above.

As the mass of coal burned per minute increases, the mass of sulfur dioxide produced per minute _____.

(1)

(f) This power station also releases particulates into the air.

Complete the sentence.

The release of particulates into the air causes global _____.

(1)

(Total 9 marks)

Q2.

This question is about fuels.

The energy produced by burning fuels is used to generate electricity in power stations.

The table below shows information about three fuels used to generate electricity.

	Fuel		
	Coal	**Oil**	**Natural gas**
State of fuel at room temperature	solid	liquid	gas
Transportation of fuel to power station	train	pipeline	pipeline
Percentage by mass of sulfur in fuel (%)	5	1	0.001
Relative quantity of solid particles produced when fuel is burned	high	medium	low

(a) Explain why coal is usually transported to power stations by train and **not** by pipeline.

Use the table above.

_____

_____

_____

_____

(2)

Sulfur dioxide and particulates are atmospheric pollutants produced when fuels are burned.

(b) 1 kg of each fuel in the table above is burned.

Which fuel produces the **most** sulfur dioxide?

Give **one** reason for your choice.

Fuel _____

Reason _____

_____

(2)

(c) Give **one** problem caused by sulfur dioxide.

_____

_____

(1)

(d) Particulates are formed from solid particles.

1 kg of each fuel in the table above is burned.

Which fuel produces the **least** particulates?

Give **one** reason for your choice.

Fuel _____

Reason _____

_____

(2)

(e) Give **one** problem caused by particulates.

_____

_____

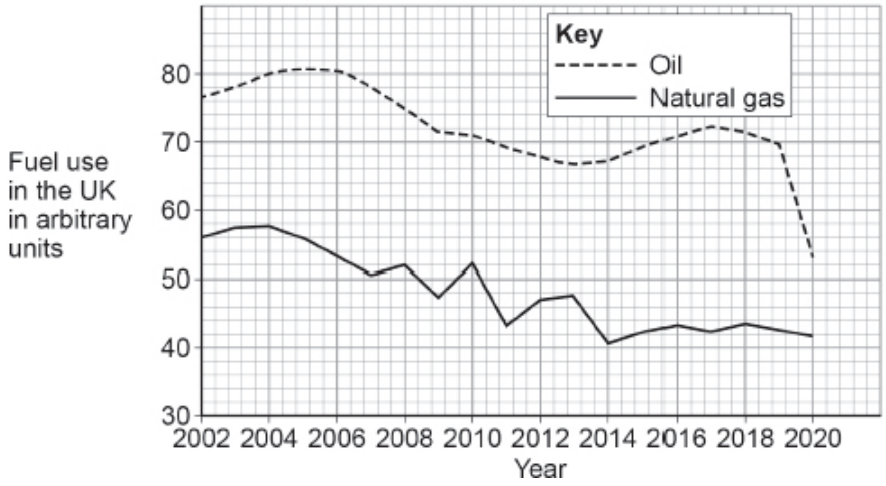
(1)

(f) Complete the sentence.

Solid particles are formed when fuels undergo incomplete _____.

(1)

(g) The figure below shows how the use of oil and of natural gas as fuels changed in the UK between 2002 and 2020.



Describe the trends shown in the figure.

_____

_____

_____

_____

_____

_____

(3)

(Total 12 marks)