TWENTY FIRST CENTURY
science

Module C1

AIR QUALITY

Practice test

FOUNDATION

Name:.....

Form/teaching set:.....

Answer all of the questions.

Write your answers in the spaces provided on this paper.

1 This question is about gases in the air.

(a) The table shows the percentage of gases in dry air.

Finish the table by writing the correct gas next to each percentage.

Choose from these gases.

argon **carbon dioxide** **hydrogen** **nitrogen** **oxygen**

Gas	Percentage
	1
	21
	78

[3]

(b) Fossil fuels are burned in some power stations and motor vehicles.

The table is to show how the burning of fossil fuels changes the proportion of different gases in the air.

Finish this table by putting a tick (✓) in the correct box for each gas.

The tick for oxygen has been put in for you.

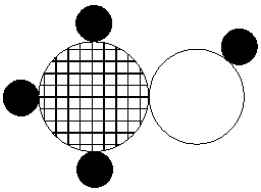
Gas	Increases	No change	Decreases
oxygen			✓
sulfur dioxide			
carbon dioxide			
carbon monoxide			

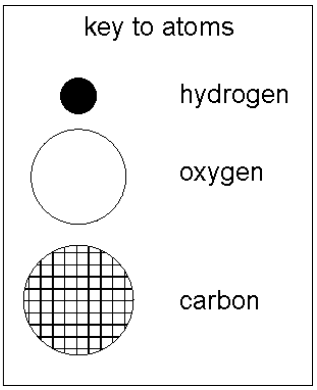
[3]

[Total marks: 6]

2 Methanol can be used as a fuel.

The diagram represents a molecule of methanol.





(a) **(i)** How many different elements are in a molecule of methanol?

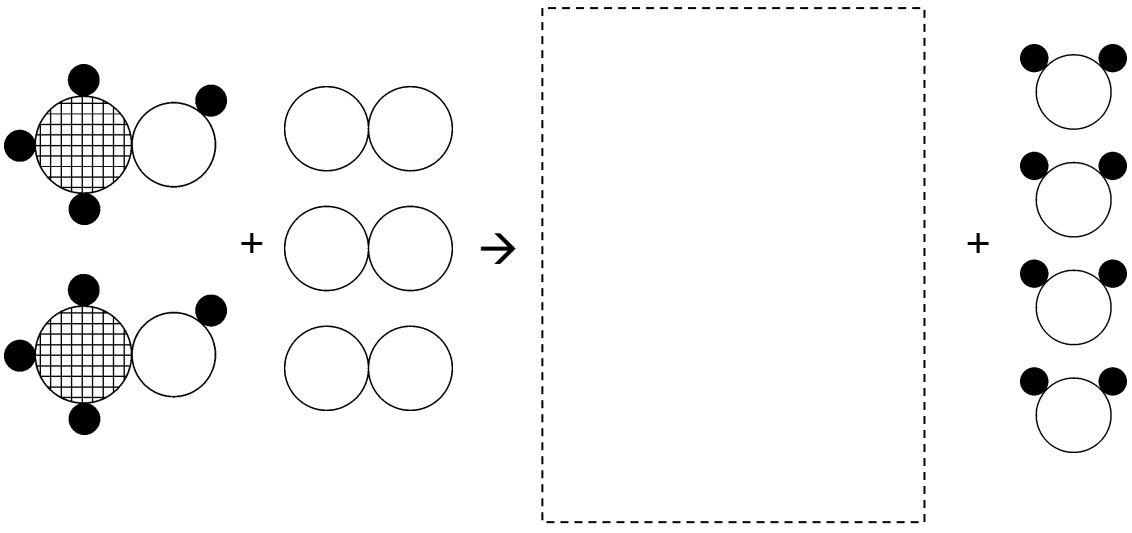
……

(ii) How many atoms are in a molecule of methanol?

…… [2]

(b) When methanol burns completely, it reacts with oxygen (O_2) and produces carbon dioxide (CO_2) and water (H_2O).

Complete this diagram to show the products of the reaction when methanol is burned completely.



[2]

[Total marks: 4]

3 Students measured the pH of rain falling on their school playground.

They collected and tested six samples of water on the same day.

To get a best estimate, they worked out an average pH from their results.

Their results are shown in the table.

Sample	1	2	3	4	5	6
pH	5.8	5.6	5.8	4.2	5.7	5.6

(a) When the students worked out the average value for their results, why did they not include the value for sample 4?

Put a tick (✓) in the box next to the best answer.

It is above the mean. ☐

It is the highest value. ☐

It is an outlier. ☐ [1]

(b) (**i**) Ignoring the value for sample 4, write down the range of the results.

range = ……. to ……. [1]

(ii) Ignoring the value for sample 4, calculate the mean (average).

You should show your working.

mean = ……. [2]

[Total marks: 4]

4 Read this newspaper article about asthma.

Road traffic doubles the risk of asthma

Asthma affects about one million children in the UK, including one in three teenagers. Asthma rates have doubled in 20 years. Air pollution is suspected as the cause because of the huge increase in traffic during that time.

Two recent studies show that there may be a causal link between airborne pollution and asthma.

Researchers in Munich compared the health of 4000 children aged 5 to 11 years and levels of air pollutants. Children who lived within 50 metres of very busy roads were almost twice as likely to suffer from asthma as the general population.

In a second study covering 312 000 children aged 12 to 15 in Taiwan, researchers compared air pollution data with figures for classic hay fever symptoms – runny nose, itching eyes, and sneezing fits. They found a clear connection between these symptoms and exposure to air pollution, with an increased risk of around 17 per cent.

A spokesman for the National Asthma Campaign said that the charity wants action to reduce pollutants by using cleaner fuel and more low-emission vehicles. 'The public should be given more information about local air quality, and people with asthma should have a say in traffic planning and transport policies.'

Use information from the article to answer the following questions.

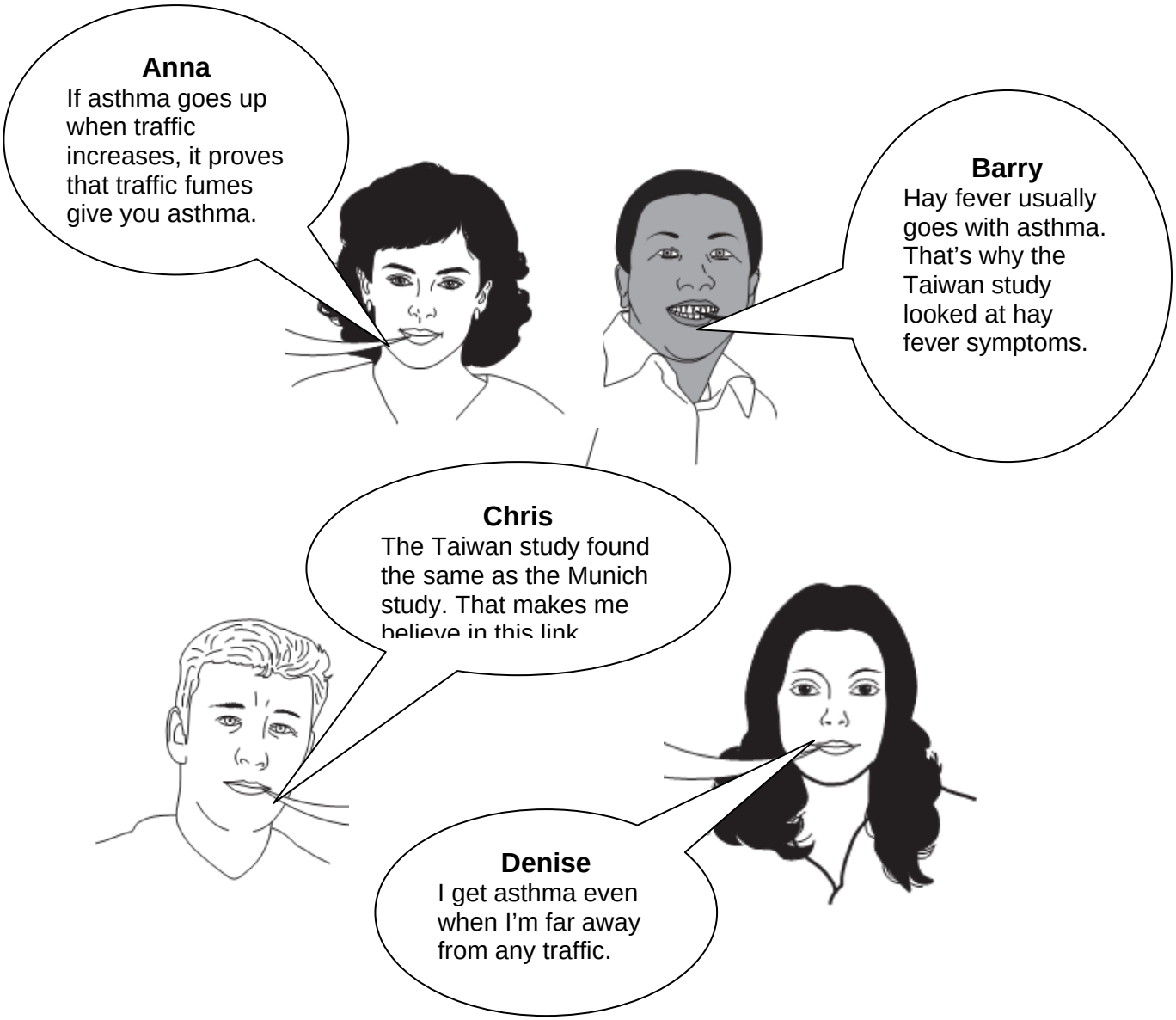
(a) Asthma rates have doubled in the past 20 years.

Why do people suspect that road traffic has caused this increase?

……..…….

……..……. [1]

(b) Some friends are discussing this article.



(i) Which two people describe a correlation?

Put ticks (✓) in the boxes next to the **two** correct answers.

Anna	
Barry	
Chris	
Denise	

[2]

(ii) Which person is confusing cause and correlation?

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

Anna	
Barry	
Chris	
Denise	

[1]

(c) Which person is talking about replication of results?

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

Anna	
Barry	
Chris	
Denise	

[1]

(c) How might giving the public more information about local air quality help people with asthma?

……

…… [1]

[Total marks: 6]

[Total marks for test: 20]

TWENTY FIRST CENTURY
science

Module C1

AIR QUALITY

Practice test

HIGHER

Name:.....

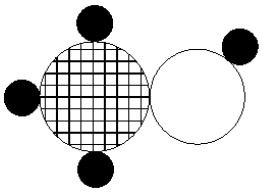
Form/teaching set:.....

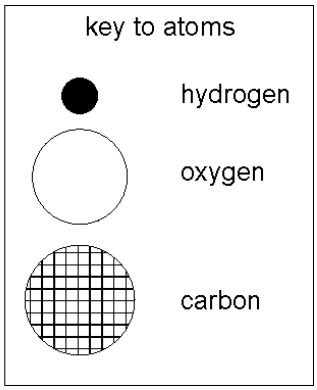
Answer all of the questions.

Write your answers in the spaces provided on this paper.

1 **(a)** Methanol can be used as a fuel.

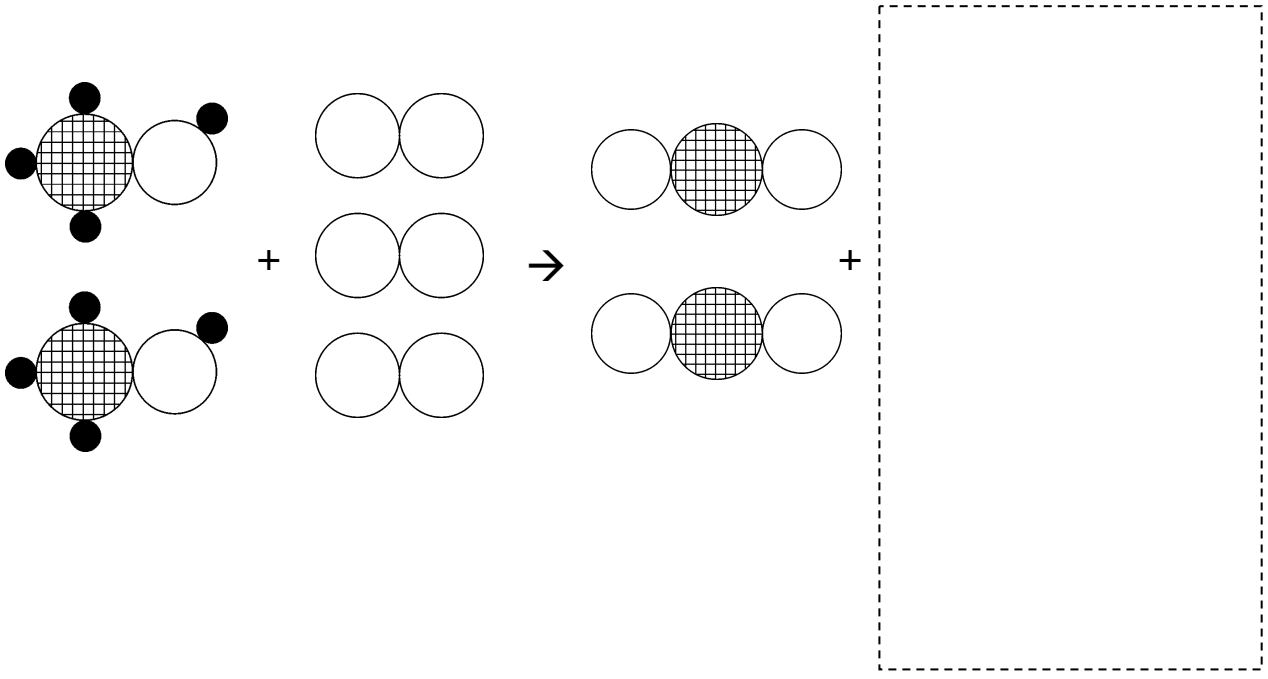
The diagram represents a molecule of methanol.





When pure methanol burns completely, it reacts with oxygen (O_2) and produces carbon dioxide (CO_2) and water (H_2O) as the only products.

Complete this diagram to show the products of the reaction when methanol is burned completely.



[2]

(b) When pure methanol is burned in a restricted supply of oxygen, which of these pollutants are formed?

Put ticks (✓) in the boxes next to **each** correct answer.

carbon	☐
carbon monoxide	☐
nitrogen monoxide	☐
nitrogen dioxide	☐
sulfur dioxide	☐

[2]

[Total marks: 4]

2 Students measured the pH of rain falling on their school playground.

They collected and tested six samples of water on the same day.

To get a best estimate, they worked out an average pH from their results.

Their results are shown in the table.

sample	1	2	3	4	5	6
pH	5.8	5.6	5.8	4.2	5.7	5.6

(a) Use the data to calculate the best estimate of the mean (average) pH.

You should show your working.

mean = …… [2]

(b) The students repeated this experiment on another day.

Their results are shown in the table.

sample	1	2	3	4	5	6
pH	5.8	5.7	5.6	5.5	5.4	5.6

Which of the following indicates that there is **not** a real difference between the best estimates from measurements made on each of the two days?

Put ticks (✓) in the boxes next to the **two** correct answers.

The range of measurements on the second day is different to the range on the first day. ☐

The best estimate from the first day is not outside the range for the second day. ☐

There are no outliers in the measurements taken on the second day. ☐

The best estimate from the second day is not outside the range for the first day. ☐

The best estimate from the second day outside the range for the first day. ☐

[2]

[Total marks: 4]

3 The fumes that are released into the air from a car exhaust cause pollution.

(a) Nitrogen monoxide is made as fuel burns in a car engine.

Which chemicals react to make nitrogen monoxide?

Put a (ring) around each correct answer.

ammonia **carbon dioxide** **hydrogen** **nitrogen** **oxygen** **sulfur** [1]

(b) When nitrogen monoxide is released into the air, it reacts with oxygen to form nitrogen dioxide.

Which one of the following explains why nitrogen dioxide is not formed in the car engine?

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

It is too hot in the car engine. ☐

There is not enough oxygen present. ☐

It does not react quickly enough. ☐

There is not enough nitrogen present. ☐ [1]

(c) Which of the following measures could reduce the amount of nitrogen dioxide pollution in the air?

Put ticks (✓) in the boxes next to **each** correct answer.

make car engines that are more efficient	☐
use low sulfur fuels	☐
adjust the balance between public and private transport	☐
encourage people to use less electricity	☐

[1]

(d) In addition to nitrogen dioxide, several other pollutants are released from car exhaust systems.

These pollutants do not stay in the air. Over a period of time they are removed by a number of processes.

Which pollutants are removed by each of the processes described in the table?

Process	**Pollutants**
dissolves in rain water to form acid rain	
deposited on surfaces, making them dirty	
used by plants and dissolves in sea water	

[3]

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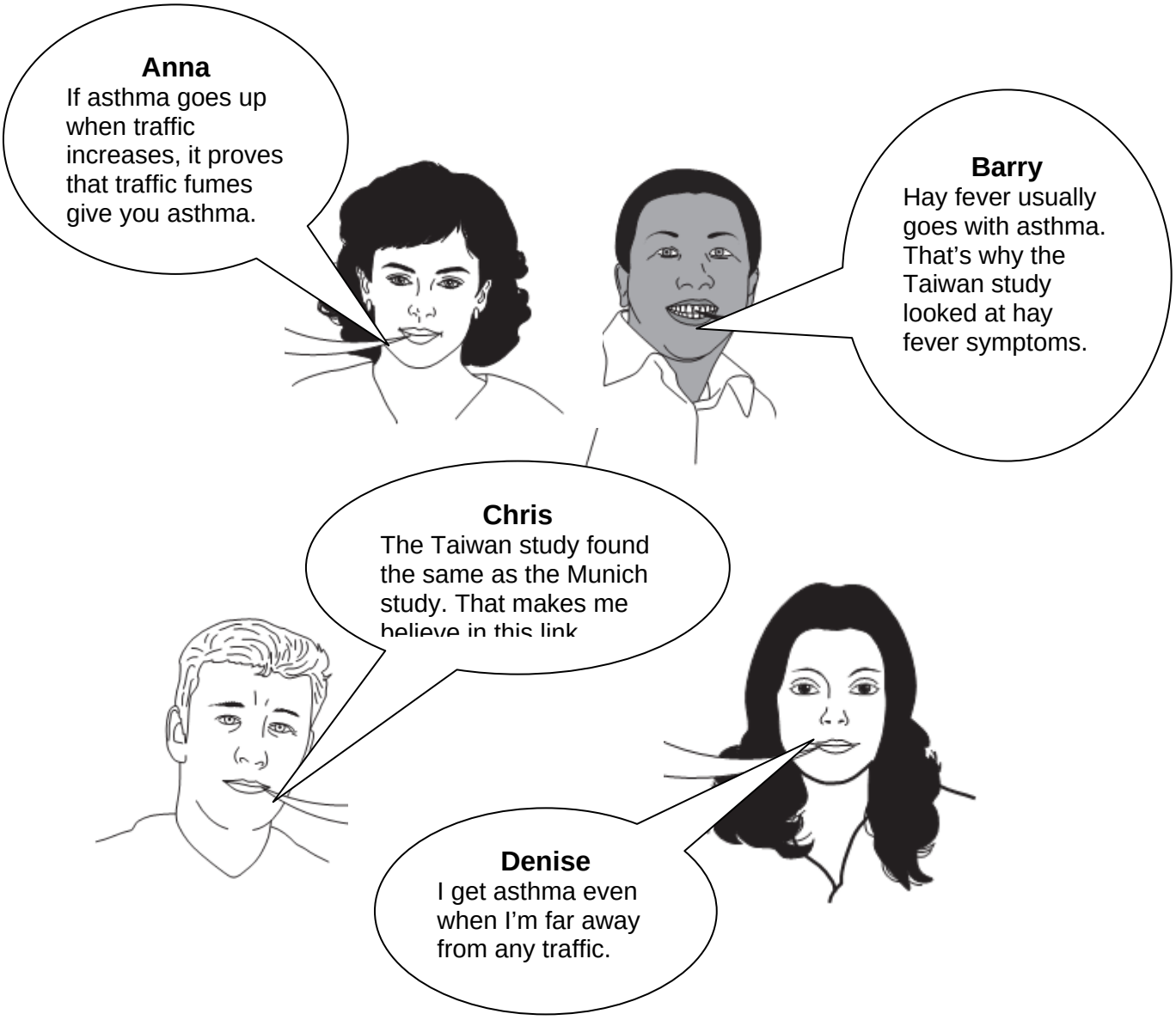
(a) Some friends are discussing this article.



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Chris	
Denise	

[1]

(b) The article states 'there may be a causal link'. Explain what is needed before a causal link can be definitely established.

……

……

…… [2]

[Total marks: 6]

[Total marks for test: 20]