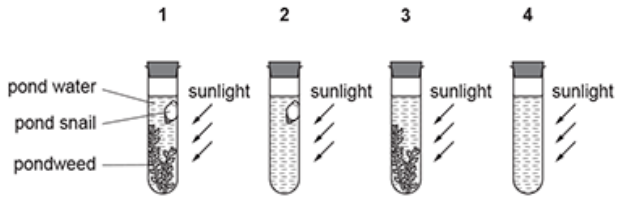
Respiration (F)

1. Which monomer is used to make proteins?

A Amino acid
B Fatty acid
C Glucose
D Glycerol

Your answer ☐ **[1]**

2. Pond snails and pondweed are living in water in sealed test tubes.



Carbon dioxide dissolves in water and forms an acid.

In which test tube would the water become most acidic?

A 1
B 2
C 3
D 4

Your answer ☐ **[1]**

3. A student wants to test for **protein.**

What would they use to test for protein?

A Benedict's reagent
B Biuret reagent
C Iodine solution
D Ethanol

Your answer ☐ **[1]**

4. Which two substances are products of **anaerobic** respiration in **yeast**?

A Carbon dioxide and ethanol
B Carbon dioxide and water
C Oxygen and ethano
D Oxygen and water

Your answer ☐ **[1]**

5. A chemical in stevia leaves makes them taste sweet. This chemical is **not** a sugar.
People with diabetes need to know if the food they eat contains sugar.

i. Describe how you could test some stevia leaves to prove that they do **not** contain sugar.

Reagent used

Method

Expected result

---

[3]

ii. Will using stevia in foods help people with type 2 diabetes?

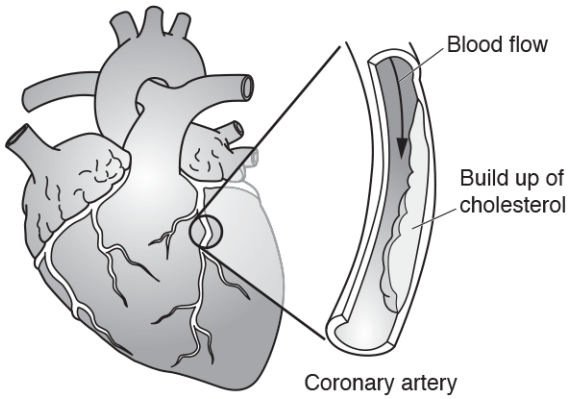
Explain your answer.

---

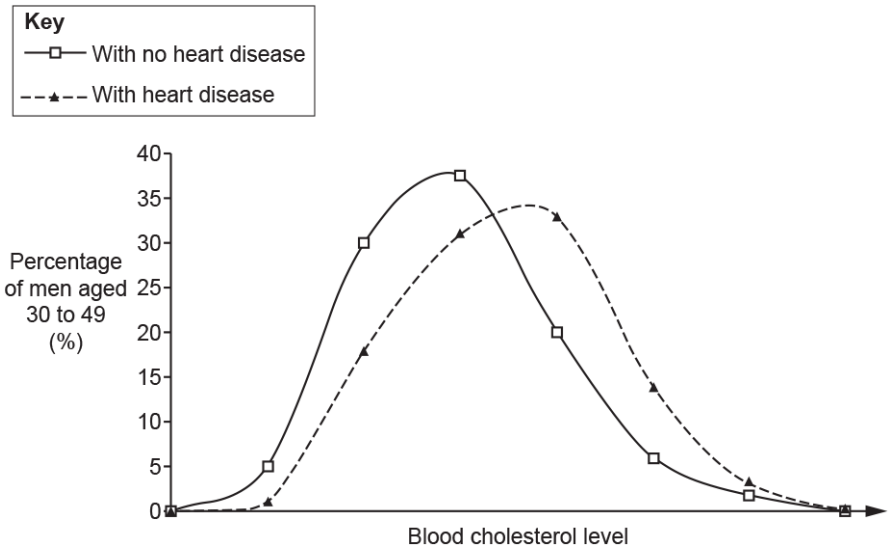
[2]

6. Hypercholesterolemia (HC) is caused by a dominant allele on chromosome 19. This allele has mutations which cause a change in the order of DNA nucleotides.

* People with HC are more likely to get heart disease. The diagram shows the heart of a person who has heart disease.



The graph shows the results of a study of men aged 30 to 49. The study measured the cholesterol levels in the blood of the men. It also recorded if the men developed signs of heart disease.



Explain the possible link between cholesterol and heart disease and if this link is supported by the graph.

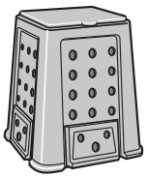
Use evidence from the diagram and the graph in your answer.

[6]

7 (a). Gardeners use dead plant material to make compost. They add this compost to soil where they are growing plants.

Compost can be made in a composting bin. In the bin **aerobic** bacteria turn dead plant material into compost.

The drawing shows a composting bin.



Explain why the composting bin needs holes in it.

[2]

(b). A new way of making compost is called bokashi. In this process the compost is made **anaerobically** in a different type of composter.

Scientists compare the normal methods of making compost with bokashi.

This is their method:

- Take one large pile of dead plant material
- Divide the material into two samples of equal mass
- Place one sample into the normal composter and place one sample into the bokashi composter
- Measure the temperature in each composter every 10 days
- After 40 days, measure the mass of the compost.

Why did the scientists put the same mass of compost in each composter?

Tick (✓) **one** box.

To allow valid comparisons of the results. ☐

To decrease the temperature. ☐

To make the measurements more accurate. ☐

To make the results repeatable. ☐

[1]

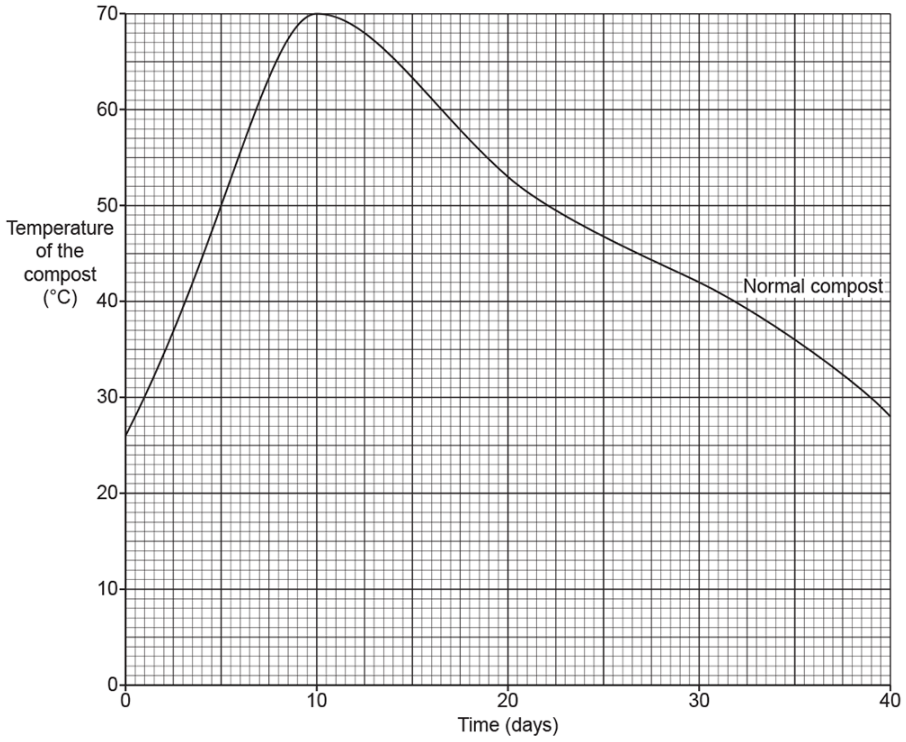
(c). Table 20.1 shows the scientists' temperature measurements.

	Temperature of the compost (°C)	
Time (days)	**Normal compost**	**Bokashi compost**
0	26	26
10	70	27
20	53	29
30	42	31
40	28	28

Table 20.1

i. The scientists' results for the normal compost are plotted on the grid.

Complete the graph by plotting the results for the **bokashi** compost and draw a curve of best fit.



[3]

ii. Describe the change in the temperature of the **normal** compost during the investigation.

---**[2]**

iii. Use data from **Table 20.1** to calculate the difference between the maximum temperature of the normal compost and the maximum temperature of the bokashi compost.

Difference = ... °C **[2]**

iv. Which **two** statements explain this difference in temperature between the two types of compost?
Tick (✓) **two** boxes.

Both types of compost are made by aerobic respiration.	☐
Normal compost is made by aerobic respiration.	☐
Normal compost is made by anaerobic respiration.	☐
Aerobic respiration and anaerobic respiration release the same amount of energy.	☐
Aerobic respiration releases more energy than anaerobic respiration.	☐
Aerobic respiration releases less energy than anaerobic respiration.	☐

[2]

(d). Table 20.2 shows the scientists' results for the mass of the compost.

	Normal compost	**Bokashi compost**
Mass at start (kg)	1500	1500
Mass after 40 days (kg)	760	1200

Table 20.2

i. The mass of the normal compost has decreased by 19 kg per day.

Calculate the decrease in mass of the bokashi compost per day.

Give your answer to the nearest **whole** number.

Decrease = ...kg per day **[3]**

ii. Carbon dioxide is given off in the making of the compost. This causes most of the decrease in mass.

Scientists think that the bokashi method of composting might be better for the environment.

Use your answer from part **(i)** to justify the scientists' conclusion.

---**[1]**

8. Modern hair shampoos contain cleaning agents. One cleaning agent is made from fatty acids.

Explain how a **polymer** found in plants and animals can be treated to obtain these fatty acids.

---**[2]**

9. Respiration is a reaction that happens in all cells.

i. Why do cells need respiration?

---**[1]**

ii. Cells use aerobic respiration when oxygen is available.

What are the **two** products of aerobic respiration?

1

2
---
[2]

iii. Aerobic respiration releases heat energy.

What term describes a reaction that releases heat energy?

---**[1]**

10(a). Rats are a major pest in many areas of the world. They can reduce food security and spread diseases.

Warfarin is a chemical that is used as a rat poison. It stops platelets working in the blood.

Describe the function of platelets in the blood.

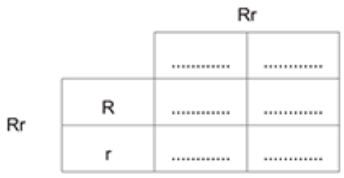
---**[2]**

(b). Some rats are resistant to warfarin. When fed with large amounts of warfarin the rats do not die.

Scientists found that the resistance is due to the dominant allele **R**.

Two resistant rats (**Rr**) mate.

Complete this genetic diagram to find the ratio of resistant rats to non-resistant rats that would be expected to be produced.



Ratio = ... **[3]**

(c). After several years, the percentage of resistant rats in the population had increased.

Use Darwin's theory of natural selection to explain this observation.

---

[3]

(d). Scientists are now trying to find another poison to use on rats.

They have introduced a chemical called phosphine. This blocks the action of mitochondria in rat cells.

Explain why this might kill rats.

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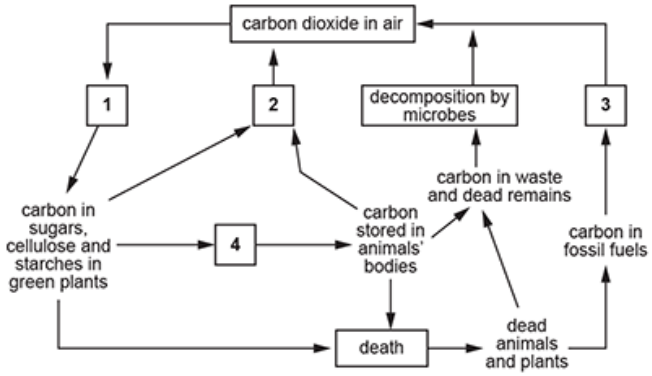
[3]

11. The diagram shows the carbon cycle.



Scientists investigated if crops can be grown on the planet Mars.

They used a soil that was similar to the soil found on Mars. The soil contained some minerals but no living organisms.

i. The scientists managed to grow crops in the soil. However on Mars, the minerals in the soil would soon run out.

Explain why.

---

[2]

ii. Living organisms could be added to the soil but there is no air on Mars. The plants would need to be grown in an enclosed structure.

At first, air would need to be added, but after a while the organisms in the soil and the plants would supply each other with the gases they need.

Explain how this would happen.

---

[2]

12 (a). Date fruits contain three different sugars, fructose, glucose and sucrose.

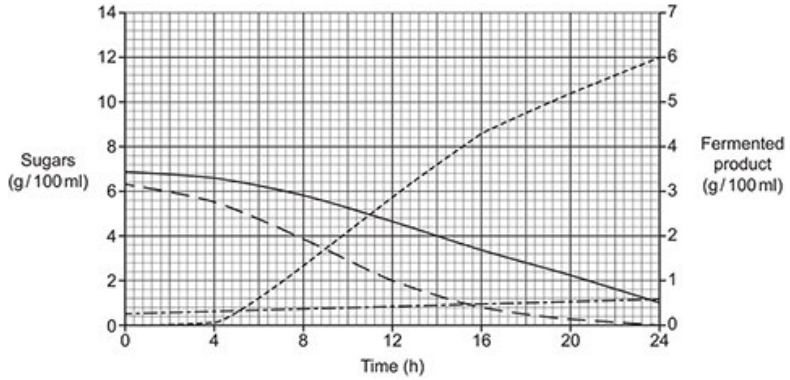
Different strains of yeast can ferment different sugars to produce a fermented product.

Scientists investigate how two different strains of yeast, **A** and **B**, ferment sugars inside date fruits.

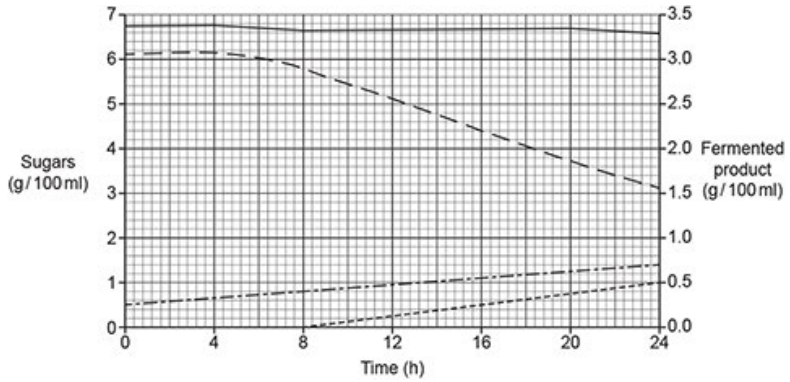
Look at their results.

Key
———— fructose —— —— glucose – - — - – sucrose ----- fermented product

Yeast A



Yeast B



i. Which sugar is **not** fermented by either strain of yeast?

Tick (✓) **one** box.

Fructose ☐

Glucose ☐

Sucrose ☐

[1]

ii. After 24 hours, how many times higher is the fermented product yield of yeast **A** compared to yeast **B**?

Number of times higher = ... **[2]**

iii. Which sugar would increase fermentation the **most** if added to either yeast **A** or yeast **B**?

Tick (✓) **one** box.

Fructose ☐

Glucose ☐

Sucrose ☐

[1]

iv. Fermented dates are used to supply both fructose and fermented product.

Explain why it would be best to use yeast **B** to ferment dates to supply both fructose and fermented product.

---

[2]

(b). Yeast cells can respire anaerobically.

Complete the word equation for **anaerobic** respiration in yeast.

glucose → ..... + ... **[1]**

(c). Write down **two** ways in which anaerobic respiration in yeast cells is different from anaerobic respiration in human muscle cells.

1

2

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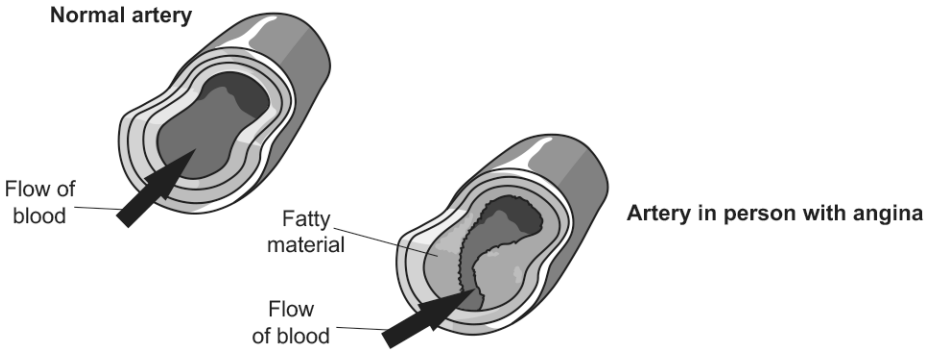
[2]

13. Angina is caused by a problem in the arteries that supply the heart muscle.

Fatty material (cholesterol) builds up in these arteries.



In angina the heart muscle starts to carry out anaerobic respiration.

Explain why this happens.

Use the information in the diagram and your biological knowledge.

_____

_____

_____

_____

_____ **[3]**

14. Compost decomposes more slowly above 60°C or below 30°C.

Use ideas about enzymes and decomposition to explain why this is.

_____

_____

_____ **[2]**

15. A group of students investigate the effect of temperature on the breakdown of the fat in milk by the enzyme lipase.

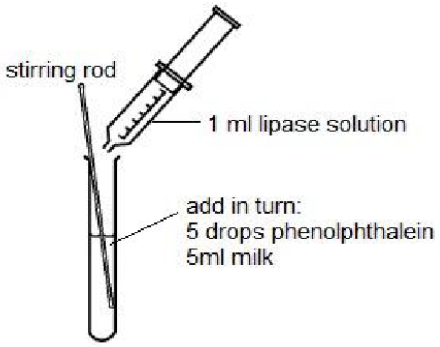
In their investigation they use an indicator called phenolphthalein.

Phenolphthalein is pink in alkali conditions but becomes colourless when the pH falls below pH 8.

A student puts 5 drops of phenolphthalein and 5 ml of full fat milk in to a test tube.

She adds 1 ml of lipase, stirs the mixture and times how long it takes to lose the pink colour.

Other students repeat this but at different temperatures.



The table shows the group's results.

Temperature (°C)	Time for pink colour to disappear (s)
20	480
40	240
60	270
80	960

Explain why the pH falls when lipase breaks down the fat in milk.

_____

_____

_____ **[2]**

16. Compost decomposes more slowly above 60 °C or below 30 °C.

Use ideas about enzymes and decomposition to explain why this is.

_____

_____

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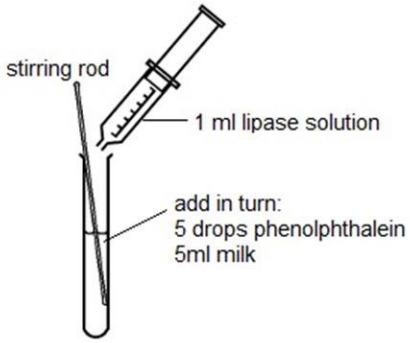

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80	960

Explain why the pH falls when lipase breaks down the fat in milk.

_____

_____

_____ **[2]**

18 (a). What is the gas given off in photosynthesis?

_____ **[1]**

(b). Explain why the amount of this gas given off is **not** a true measure of the rate of photosynthesis.

_____

_____

_____

_____ **[2]**

19. Which molecule is **not** a polymer?

A. DNA
B. lipid
C. protein
D. starch

Your answer ☐

[1]

20. What substance does Benedict's reagent test for?

A. lipid
B. protein
C. starch
D. sugar

Your answer ☐

[1]

21. What type of reactions are photosynthesis and respiration?

	photosynthesis	**respiration**
A	endothermic	endothermic
B	endothermic	exothermic
C	exothermic	endothermic
D	exothermic	exothermic

Your answer ☐

[1]

22. What is the word equation for aerobic respiration?

A. carbon dioxide + water → glucose + oxygen
B. glucose + carbon dioxide → oxygen + water
C. glucose + oxygen → carbon dioxide + water
D. oxygen + water → glucose + carbon dioxide

Your answer ☐

[1]

23. What are proteins made of?

A. amino acids
B. fatty acids
C. nucleotides
D. sugars

Your answer ☐

[1]

END OF QUESTION PAPER