**5** The diagram shows the order of bases along part of one strand of DNA.

A—C—T—T—A—G—A—T

What is the order of bases on the complementary part of the other strand?

**A** A—C—T—T—A—G—A—T

**B** C—A—G—G—C—T—C—G

**C** T—A—G—A—T—T—C—A

**D** T—G—A—A—T—C—T—A



**3** **(a)** Scientists investigated the relationship between height and the vital capacity of the lungs in people.

The vital capacity is the maximum volume of air that can be expelled from the lungs after taking the deepest possible breath.

Table 3.1 shows the results of the investigation.

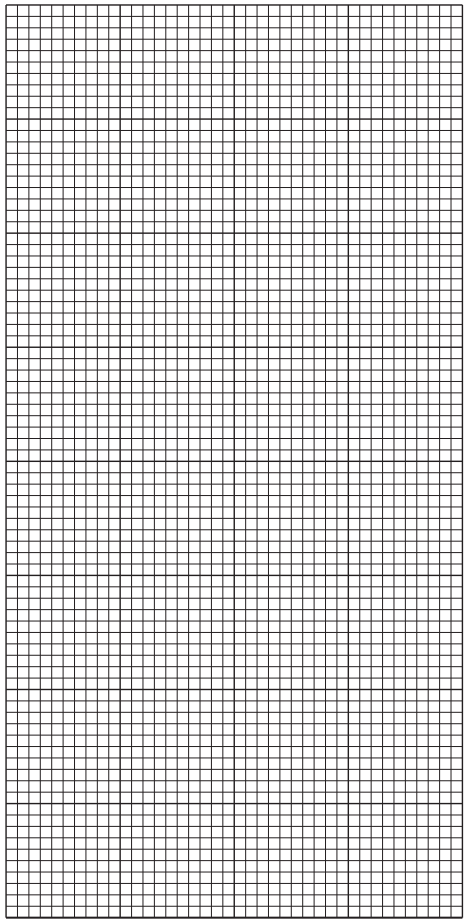
**Table 3.1**

| height of the person / cm | vital capacity / $dm^3$ |
|---|---|
| 130 | 1.9 |
| 140 | 2.2 |
| 150 | 2.9 |
| 160 | 3.4 |
| 170 | 4.1 |
| 180 | 5.1 |
| 190 | 6.2 |
| 200 | 7.2 |





**(i)** Plot a line graph on the grid of the data in Table 3.1.



[4]

**(ii)** Describe the relationship shown in your graph between height and vital capacity.

.....

.....

..... [1]

**(iii)** Use your graph to estimate the vital capacity of a person with a height of 175 cm.

Indicate **on your graph** how you obtained your estimate.

..... $dm^3$ [2]

**(b)** In people with certain lung diseases, the enzyme elastase is more active. Elastase is a protein.

State the name of the reagent that is used to test for protein.

..... [1]

[Total: 8]





**1** A student investigated the rate of respiration in yeast using different concentrations of glucose.

They used a 5% glucose solution to make a 1% glucose solution and a 4% glucose solution.

The student used this method:

Step 1 Label two small test-tubes **1%** and **4%**.

Step 2 Use a syringe to put 1 $cm^3$ of 5% glucose solution into the small test-tube labelled **1%**.

Put 4 $cm^3$ of 5% glucose solution into the small test-tube labelled **4%**.

Step 3 Use a clean syringe to put 4 $cm^3$ of distilled water into the small test-tube labelled **1%**.

Put 1 $cm^3$ of distilled water into the small test-tube labelled **4%**.

Step 4 Pour yeast suspension into the small test-tube labelled **1%** until it is completely full.

Step 5 Keep the small test-tube upright and carefully place a large test-tube over the top of the small test-tube labelled **1%**. Push the small test-tube up to the top of the large test-tube, as shown in Fig. 1.1**A**. Quickly invert the test-tubes, as shown in Fig. 1.1**B**.

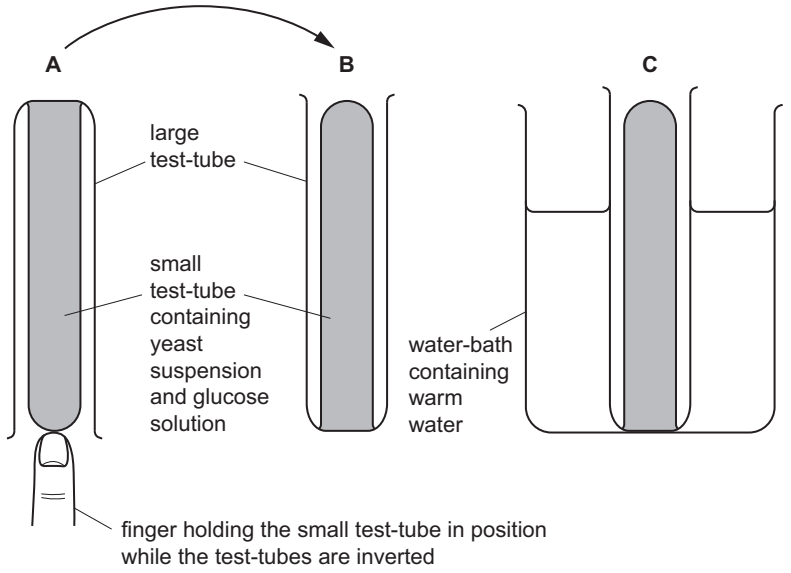



**Fig. 1.1**

Step 6 Put the large test-tube and the small test-tube labelled **1%** into a warm water-bath, as shown in Fig. 1.1**C**.

Step 7 Start the stop-clock and wait for five minutes.

Step 8 After five minutes, stop the stop-clock and use a ruler to measure the height of the yeast suspension in the **large** test-tube, as shown in Fig. 1.2.

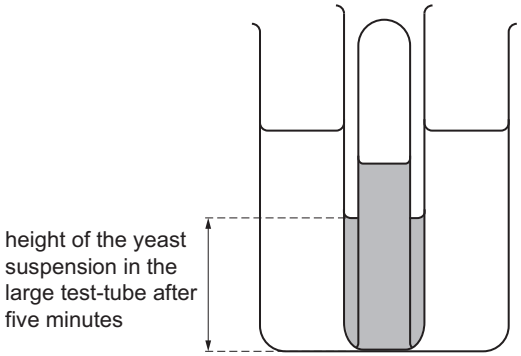



**Fig. 1.2**

Step 9 Remove the test-tubes from the warm water-bath and discard them.

Step 10 Pour yeast suspension into the small test-tube labelled **4%** until it is completely full.

Step 11 Repeat steps 5 to 8 with the small test-tube labelled **4%**.





**(a)** Fig. 1.3 is a diagram of the water-baths in steps 8 and 11.

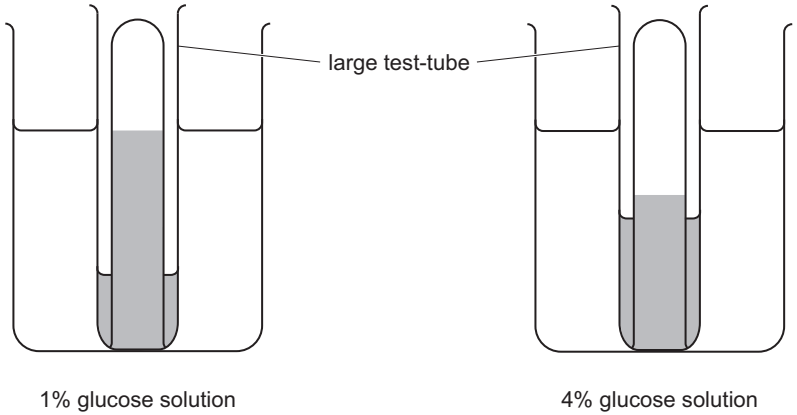



**Fig. 1.3**

**(i)** Measure the height of the yeast suspension in each of the **large** test-tubes shown in Fig. 1.3.

Prepare a table for the results and record your measurements from Fig. 1.3.

[4]

**(ii)** State a conclusion for the results of this investigation.

.....

.....

..... [1]

**(iii)** State the independent and dependent variables in this investigation.

independent variable .....

.....

dependent variable .....

.....
[2]

**(iv)** Describe how the temperature of the water-bath could be maintained.

.....

.....

..... [1]

**(v)** Explain why a clean syringe was used in step 3.

.....

.....

..... [1]





**(b)** A student extended the investigation by using more concentrations of glucose solution.

Calculate the volumes of 5% glucose solution and distilled water that are needed to make 5 $cm^3$ of a 3% glucose solution.

volume of 5% glucose solution ..... $cm^3$

volume of distilled water ..... $cm^3$
[1]

**(c)** Sports drinks often contain glucose, which is a reducing sugar.

State how you could test a sample of a sports drink for reducing sugar.

.....

.....

.....

.....

..... [2]

**(d)** **(i)** The ethanol emulsion test can be used to show that a sample of food contains fat.

State the result of a positive test.

..... [1]

**(ii)** Suggest **one** safety precaution that should be followed when using ethanol.

.....

.....

..... [1]

[Total: 14]

**1** Yeast cells produce an enzyme called invertase. Invertase catalyses the breakdown of sucrose into reducing sugars. Sucrose is **not** a reducing sugar.

A student investigated the effect of two different concentrations of invertase extract on a sucrose solution.

The student used this method:

Step 1 Label three test-tubes **A**, **B** and **W**.

Step 2 Use a syringe to put 2 $cm^3$ of sucrose solution into all three test-tubes.

Step 3 Use a clean syringe to put 2 $cm^3$ of 100% invertase extract into test-tube **A**.

Step 4 Use a clean syringe to put 2 $cm^3$ of 10% invertase extract into test-tube **B**.

Step 5 Use a clean syringe to put 2 $cm^3$ of distilled water into test-tube **W**.

Step 6 Put all three test-tubes in a warm water-bath at 40 °C for 15 minutes.

Step 7 Measure the temperature of the liquid in the test-tubes.

**(a)** State the name of the piece of equipment that is used to measure temperature.

..... [1]

Step 8 Use a clean syringe to add 4 $cm^3$ of Benedict's solution to all three test-tubes.

Step 9 Place all three test-tubes into a hot water-bath for five minutes.

Step 10 After five minutes, record the colour of the liquid in each test-tube.

Fig. 1.1 shows the notes the student made about their observations in step 10.

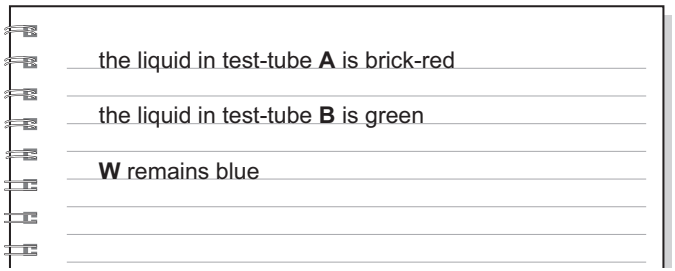



**Fig. 1.1**





**(b)** Prepare a table and record the results of this investigation using the information in Fig. 1.1.

[3]

**(c)** State a conclusion for the results shown in test-tube **A** and test-tube **B**.

.....

.....

..... [1]

**(d)** Explain the purpose of test-tube **W**.

.....

.....

.....

..... [2]

**(e)** State the independent variable in this investigation.

..... [1]

**(f)** Explain why the test-tubes were placed in the warm water-bath in step 6.

.....

.....

..... [1]

**(g)** Explain why a clean syringe was used in steps 3, 4 and 5.

.....

.....

..... [1]

**(h)** Invertase is a protein.

State the reagent used to test for the presence of protein.

..... [1]

[Total: 11]



**7** A section of a chromosome contains 4500 bases. There are 1450 G bases.

How many A bases are there?

**A** 800 **B** 1450 **C** 1600 **D** 2900