Past-paper walk-through

Respiration ▪ 12.1

eXercise

Questions in this set

- 0610/62 N25 Q1 ▪ 19 marks
- 0610/63 N25 Q2 ▪ 14 marks
- 0610/21 J25 Q19 ▪ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- // separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = "or words to that effect" – the wording need not match.

Question 1

0610/62 N25 ▪ Q1 ▪ 19 marks

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%**.

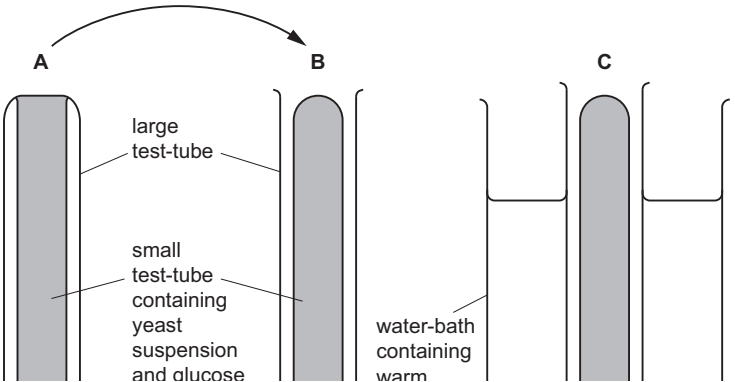
Step 3 Use a clean syringe to put 4 cm^3 of distilled water into the small test-tube labelled **1%**.

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.

Question 1

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**.



Question 1

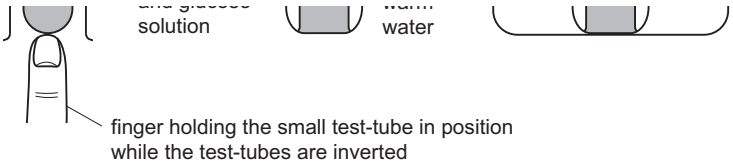


Fig. 1.1

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.

Question 1

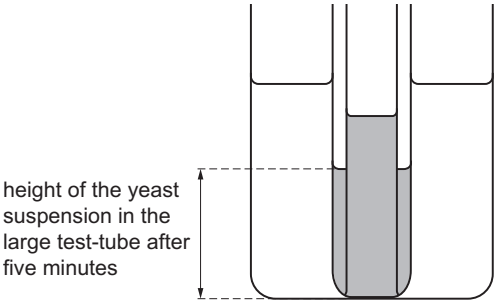


Fig. 1.2

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.

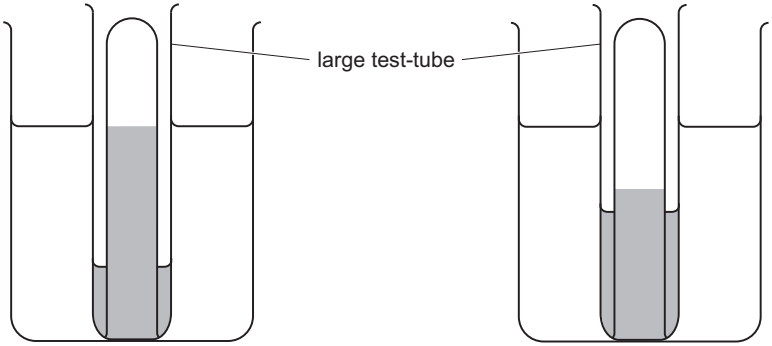
Question 1

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

Question 1

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.



Question 1

Question 1

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.

Question 1

Question 1

[4]

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

Question 1

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

Question 1

[2]

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

Question 1

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

Question 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.

Question 1

Question 1

[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.

Question 1

(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.

Question 1

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

Question 1

[Total: 14]

Solution 1

(a)(i)

Mark scheme

- table drawn with a minimum of two columns and a header line ;
- appropriate column / row headings, with units for height ;
- recording two (final) heights ;
- (1%) 13 ± 1 (mm) and (4%) 23 ± 1 (mm) recorded ;
- 4

Solution 1

(a)(ii)

Mark scheme

- the higher concentration (of glucose solution) the, greater / faster, the
- (rate of) respiration (in yeast) ; ora
- 1

Solution 1

(a)(iii)

Mark scheme

- independent variable: concentration of glucose ;
- dependent variable: height (of the yeast in the large
- test-tube) ;

Solution 1

(a)(iv)

Mark scheme

- (use a) thermostatically controlled water-bath / AVP ;
- 1

(a)(v)

Mark scheme

- to avoid, contamination / AW ;
- 1

Solution 1

(b)

Mark scheme

- glucose: 3 (cm3) and distilled water: 2 (cm3) ;
- 1

Solution 1

(c)

Mark scheme

- add Benedict's (reagent) ;
- heat ;
- 2

Solution 1

(d)(i)

Mark scheme

- cloudy / white / milky ;
- 1

Solution 1

(d)(ii) Mark scheme

- any one from:
- keep away from, flames / fire / Bunsen / burner ;
- cover the container (to prevent evaporation) ;
- (use in a) well-ventilated area / fume cupboard / AW ;
- wear goggles ;
- 1
- 0610/62
- October/November 2025

Solution 1

- Guidance
- 2
- 1 independent variable
- different intensities of exercise / different exercises / exercise for different
- lengths of time ;
- 2 dependent variable
- after / during, exercise measure, heart rate / pulse rate ;
- 3 and 4 detail of method ;;
- ▪
- description of named exercise of different intensities

Solution 1

- ▪
- ensuring heart rate returns to resting rate
- ▪
- use of a heart rate monitor
- 5, 6 and 7 constant variables ;;;
- ▪
- same speed / distance / time, of exercise
- ▪
- same age of people
- ▪

Solution 1

- same sex of people
- ▪
- same, person / fitness level / mass of person / height of person / BMI
- ▪
- same, place / time of day / temperature / weather
- 8 at least three trials / two more repeats ;
- 9 relevant safety precaution ;
- 6
- 0610/62
- October/November 2025

Solution 1

- Guidance

Question 2

0610/63 N25 ▪ Q2 ▪ 14 marks

2 A student investigated the effect of temperature on the rate of respiration in yeast cells.

They used the apparatus shown in Fig. 2.1.

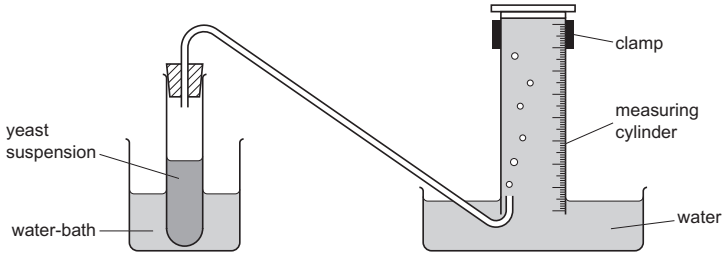


Fig. 2.1

Question 2

The student used this method:

- Put 25 cm^3 of yeast suspension into a test-tube.
- Put the test-tube into a water-bath and add water at 10 °C to the water-bath.
- Leave the apparatus for five minutes before moving on to the next step.
- Start a stop-clock and count the number of bubbles produced by the respiring yeast cells in three minutes.
- Repeat the procedure using a water-bath maintained at different temperatures.

(a) (i) State **two** variables that the student kept constant in this investigation.

Question 2

[2]

(ii) State **one** possible source of error when measuring the dependent variable **and** suggest an improvement to this method of measuring.

Question 2

[2]

(b) Table 2.1 shows the results of the investigation.

Table 2.1

water-bath temperature / °C	number of bubbles produced in 3 minutes	rate of bubble production / bubbles per minute
10	33	11
20	45	15
30	79	
40	112	37

Question 2

Question 2

50	124	41
60	37	12

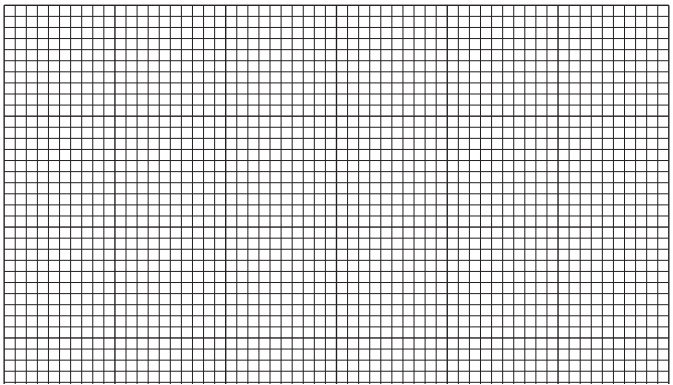
(i) Calculate the rate of bubble production at 30 °C.

Give your answer to an appropriate number of significant figures.

Space for working.

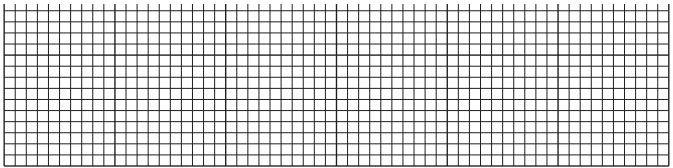
Question 2

(ii) Plot the data in Table 2.1 on the grid to show the effect of temperature on the **rate** of bubble production.



Question 2

Question 2



[4]

(iii) Describe the results of this investigation.

Question 2

(c) Describe how the student could confirm that the gas produced is carbon dioxide.

Question 2

[Total: 14]

Solution 2

(a)(i)

Mark scheme

- any two from:
- volume of yeast ;
- time for equilibration / AW ;
- same time for, counting bubbles / respiration ;
- same type of yeast ;
- 2

Solution 2

(a)(ii)

Mark scheme

- error:
- bubbles may be different sizes / too fast to count / AW ;
- improvement:
- measure the volume ;
- 2

Solution 2

(b)(i)

Mark scheme

- 26 ;;
- 2 MP1 correct division by 3 = 26.33333
- MP2 correct rounding to two significant figures to match
- table values

Solution 2

(b)(ii) Mark scheme

- axes labelled ;
- suitable linear scale and plotted area occupies at least half
- the grid in both directions ;
- plots accurate to ± half small square ;
- smooth line / curve of best fit or points joined with straight
- lines ;
- 4 (water) temperature / °C and rate (of bubble production) /
- bubbles per minute

Solution 2

(b)(iii)

Mark scheme

- as temperature increases, the number of bubbles / rate of
- bubble production, increases and then decreases ;
- reference to, peak / AW, at 50°C ;
- 2

Solution 2

(c) Mark scheme

- use limewater ;
- turns cloudy / milky / forms a white precipitate ;
- OR
- hydrogencarbonate indicator ;
- turns yellow ;
- 2
- 0610/63
- October/November 2025

Solution 2

- Guidance

Question 19

0610/21 J25 ▪ Q19 ▪ 1 mark

19 The processes listed occur in living organisms.

1 cell division

2 diffusion

3 muscle contraction

4 osmosis

Which processes require energy from respiration?

A 1, 2, 3 and 4 **B** 1 and 3 only **C** 2 and 3 only **D** 3 and 4 only

Solution 19

Answer: **B**

Why

- Cell division and muscle contraction both need ATP from respiration.
- Diffusion and osmosis are passive – they use the particles' own kinetic energy.
- So only the first and third require energy from respiration.