The results of the investigation are shown in the table below.

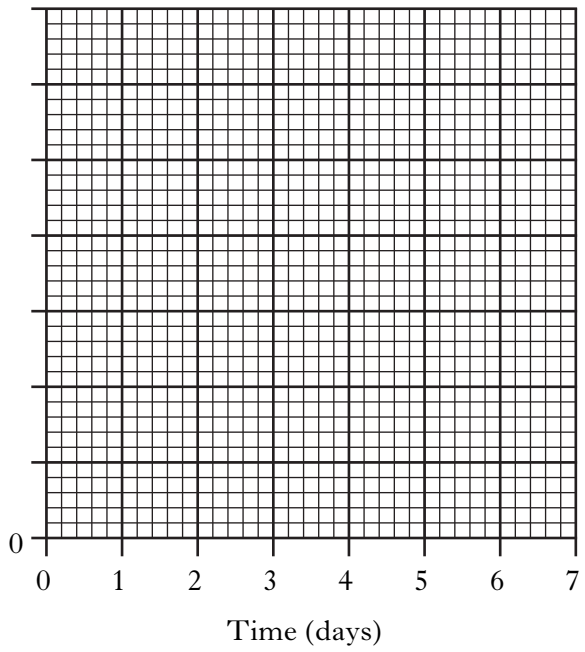
Time (days)	*Rise in temperature* (°C)
0	0·0
1	0·2
2	2·0
3	4·0
4	5·0
5	5·4
6	5·6
7	5·6

Use the results to complete the line graph by:

(i) completing the scale on the y axis;

(ii) adding a label to the y axis;

(iii) plotting the graph.



The table below shows the production of alcohol for use as an alternative fuel from 1998 to 2008.

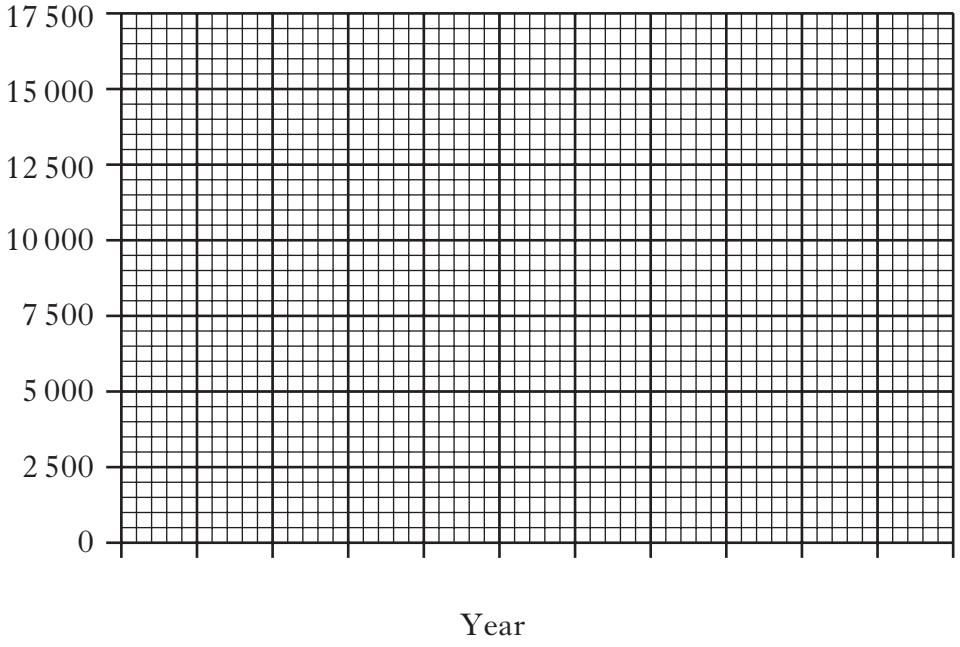
Year	*Alcohol production (megalitres)*
1998	4 000
2000	6 500
2002	11 000
2004	12 000
2006	13 500
2008	17 500

On the grid below, complete a line graph by:

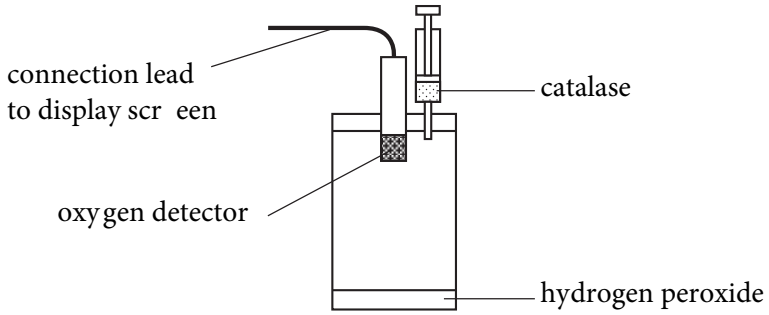
(i) labelling the vertical axis;

(ii) adding an appropriate scale to the horizontal axis;

(iii) plotting the graph.



The apparatus shown below was used to study the effect of different temperatures on the activity of the enzyme catalase.

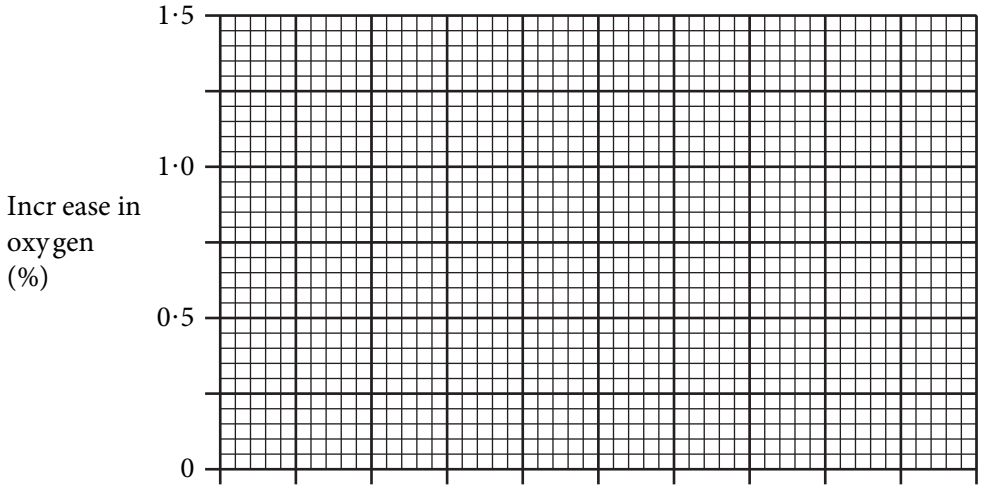


The catalase was added and reacted with the hydrogen peroxide to release oxygen. The increase in oxygen compared to the starting value was recorded as a percentage.

This was carried out at five different temperatures and the results are shown below.

Temperature (°C)	*Increase in oxygen* (%)
4	0·55
21	0·80
34	1·45
40	1·05
50	0·05

Use the results to draw a line graph.

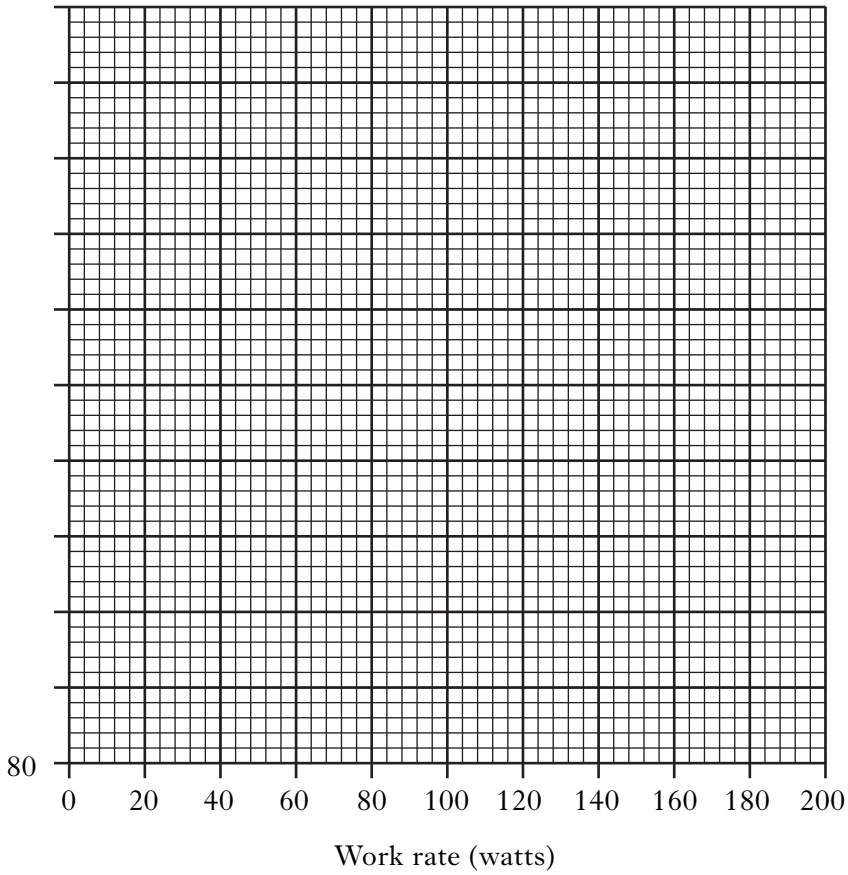


A pupil carried out an investigation into the effect of exercise on the body's heart rate. Using an exercise bike, he pedalled at different work rates for three minutes with a one minute rest between each exercise period.

During the exercise periods his heart rate was measured. The results are shown in the table.

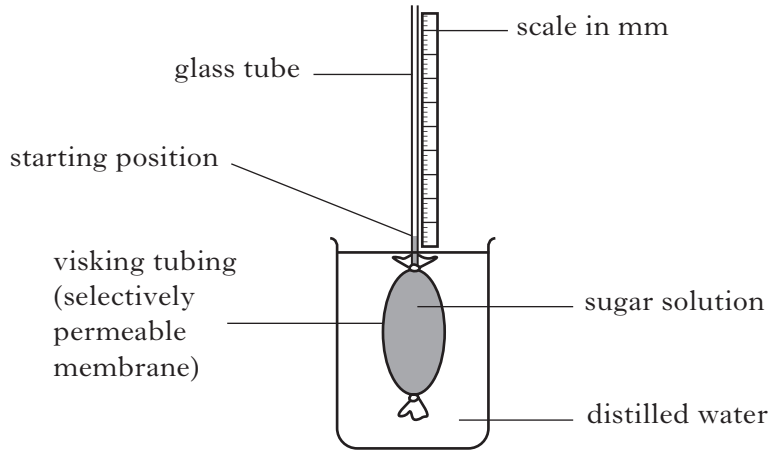
Work rate (watts)	*Heart rate* (beats per minute)
0 (at rest)	80
60	104
80	110
120	128
140	140
160	158
200	180

Use the results to complete a line graph of the pupil's heart rate over the range of work rates



An investigation was carried out into the movement of water through a selectively permeable membrane.

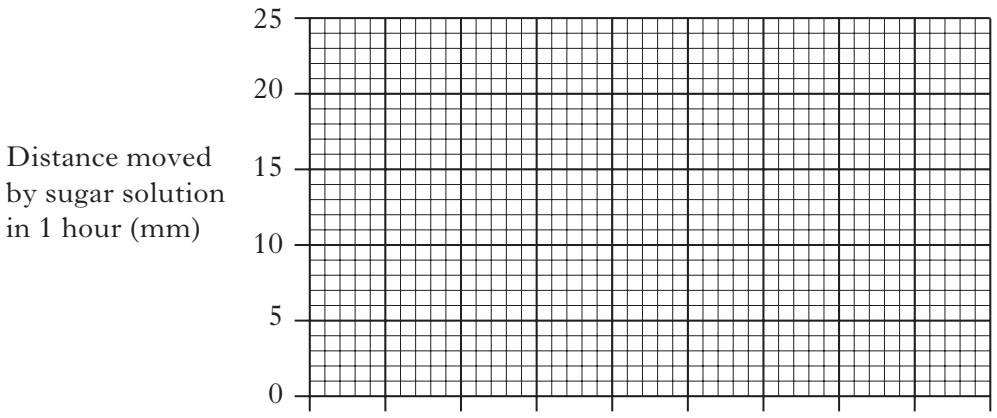
The apparatus used is shown in the diagram below.



The results are shown in the following table.

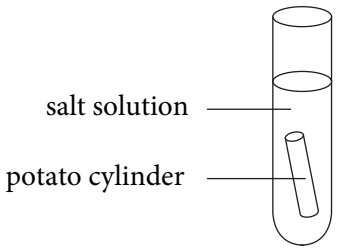
Concentration of sugar solution (%)	*Distance moved by sugar solution in 1 hour* (mm)
0·5	3
1·0	6
2·0	12
3·0	18
3·5	21

Use the results to plot a line graph on the grid below of distance moved by the sugar solution in one hour against the concentration of the sugar



Source: SQA Subject Area: Biology Level: 5

An investigation was carried out to find the effect of salt solutions of different concentrations on the mass of potato tissue. Five test tubes were set up as shown below, each containing a different concentration of salt solution.

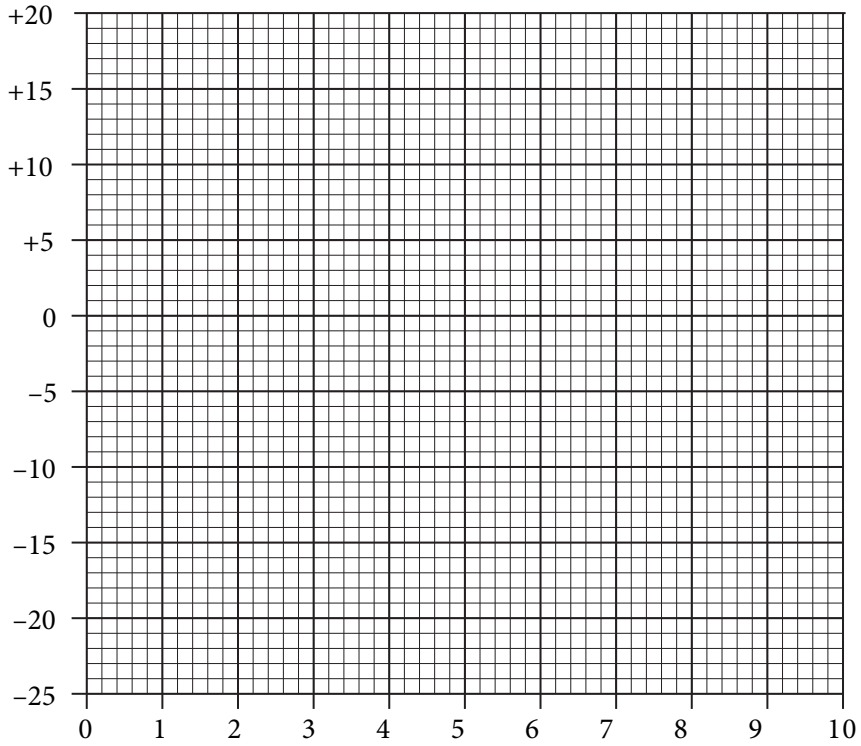


Each potato cylinder was weighed, placed in the solution and left for an hour. Each cylinder was then reweighed and the percentage (%) change in mass was calculated.

The table below shows the results of the investigation.

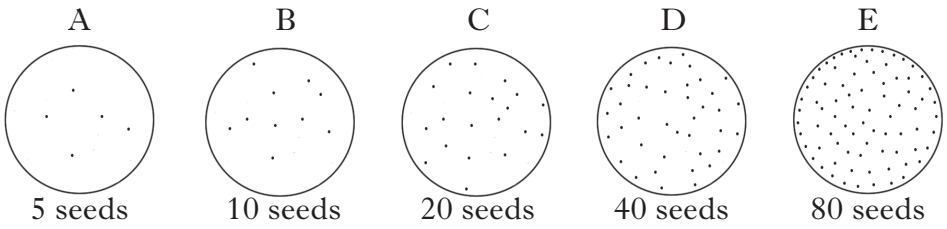
Salt concentration ($g/100\ cm^3$)	*Change in mass* (%)
1	+15
3	+10
6	–5
8	–15
10	–20

(Construct a **line graph** using the results given in the table.



Source: SQA Subject Area: Biology Level: 5

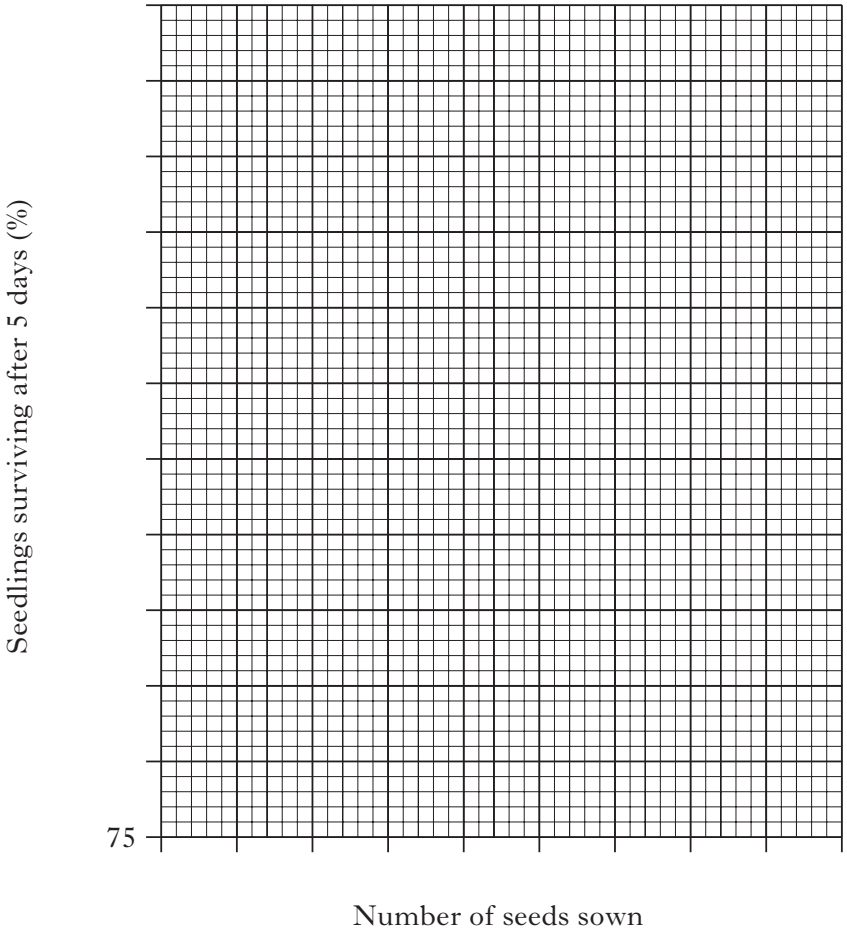
A student set up 5 petri dishes to investigate the effect of competition on the percentage of seedlings surviving after five days. Each dish contained a thin layer of wet cotton wool with different numbers of seeds placed evenly across its surface, as shown below.



The table of results for this investigation is shown below.

Dish	*Number of seeds sown*	*Seedlings surviving after five days* (%)
A	5	100
B	10	100
C	20	95
D	40	85
E	80	75

Construct a **line graph** to show the number of seeds sown against percentage of seedlings surviving after five days.

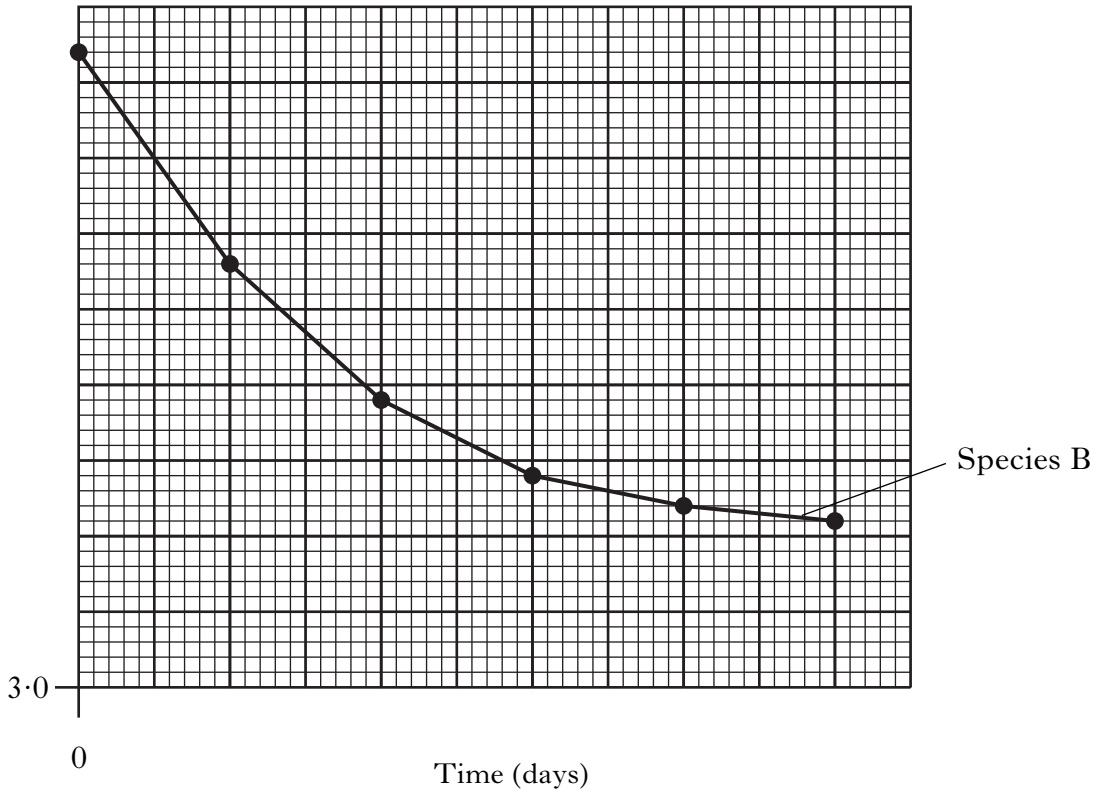


Source: SQA Subject Area: Biotechnology Level: 5

An investigation was set up to look at the effect of two species of micro-organisms (Species A and Species B) on silage production. The pH of the developing silage was measured over 20 days. The results are shown in the table below.

Time (days)	*pH of developing silage*	
	Species A	*Species B*
0	7·2	7·2
4	5·6	5·8
8	4·2	4·9
12	3·6	4·4
16	3·4	4·2
20	3·4	4·1

Use the information in the table to draw a line graph to show the change in the pH of the developing silage with Species A. (The graph for Species B is shown as an example of a similar graph).

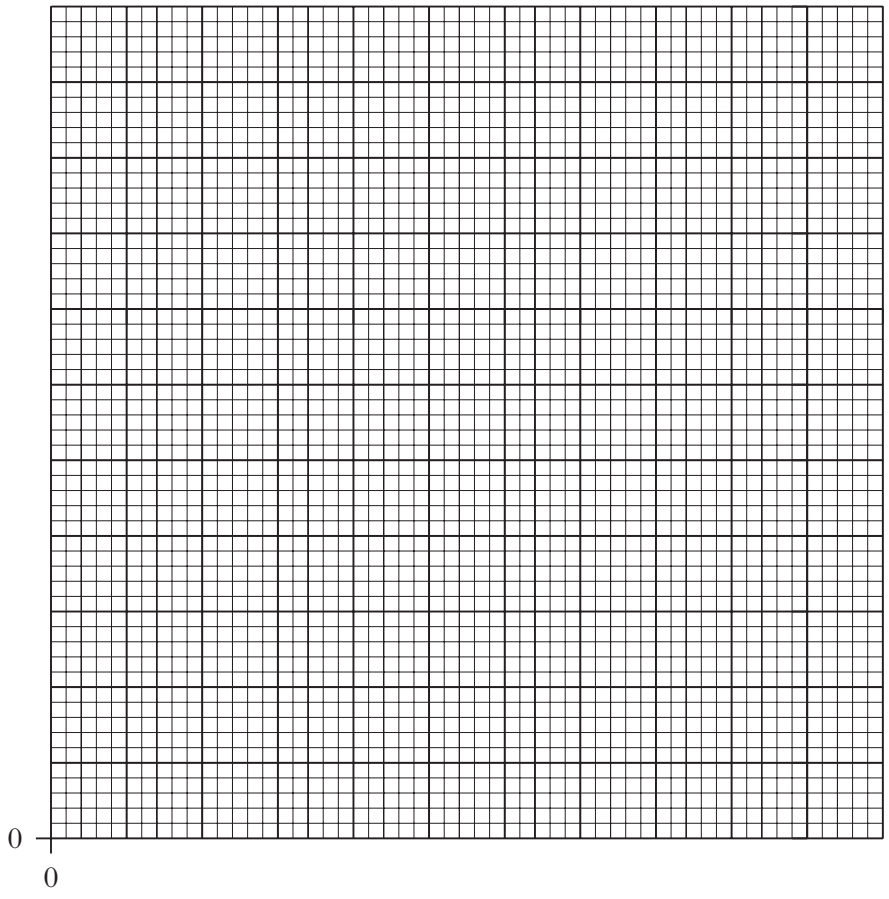


An algal culture was grown in media containing nitrate.

After one week, the effect of light intensity on the change in the oxygen concentration in the algal culture was measured. The table below shows the results from this experiment.

Light intensity (units)	*Oxygen concentration* (%)
0	0
20	10
40	16
60	18
80	18
100	18

Draw a line graph below by plotting light intensity (units) against oxygen concentration (%).

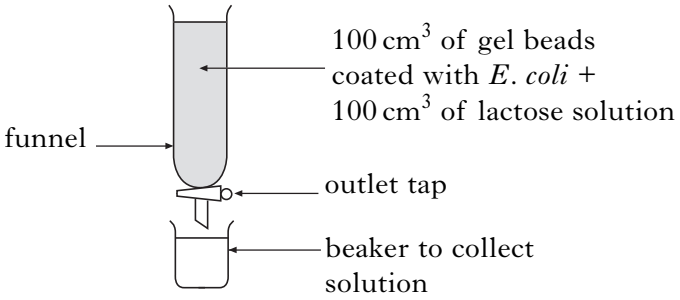


The Jacob-Monod hypothesis describes lactose metabolism in the bacterium *Escherichia coli*. Lactose acts as an inducer of the enzyme β-galactosidase in the bacterium. This enzyme breaks down lactose as shown.

$$\text{lactose} \xrightarrow{\beta\text{-galactosidase}} \text{glucose} + \text{galactose}$$

An investigation of this reaction in *E. coli* at 25 °C was carried out as described below.

- 100 cm^3 of gel beads coated with *E. coli* were placed into each of seven identical funnels fitted with outlet taps.
- 100 cm^3 of solution containing 2 grams of lactose was poured into each funnel.
- At each time shown in the table, the solution from one of the funnels was collected.
- The mass of lactose in each solution was measured.



The results are shown in the table below.

Funnel	*Time* (minutes)	*Mass of lactose in the solution collected* (g)
1	0	2·00
2	10	2·00
3	20	1·48
4	30	0·92
5	40	0·40
6	50	0·12
7	60	0·04

Draw a line graph to show the mass of lactose in the solution collected against time.

Gibberellic acid (GA) is needed to break dormancy of rice grains allowing them to germinate.

An experiment was carried out to investigate the effects of GA on the germination of rice grains.

30 cm^3 of different concentrations of GA solution was placed into separate beakers. 50 rice grains were added to each beaker. Each beaker was then covered with plastic film.

After 12 hours, the grains were removed from the solutions and evenly spaced in separate dishes on filter paper soaked with 20 cm^3 of water.

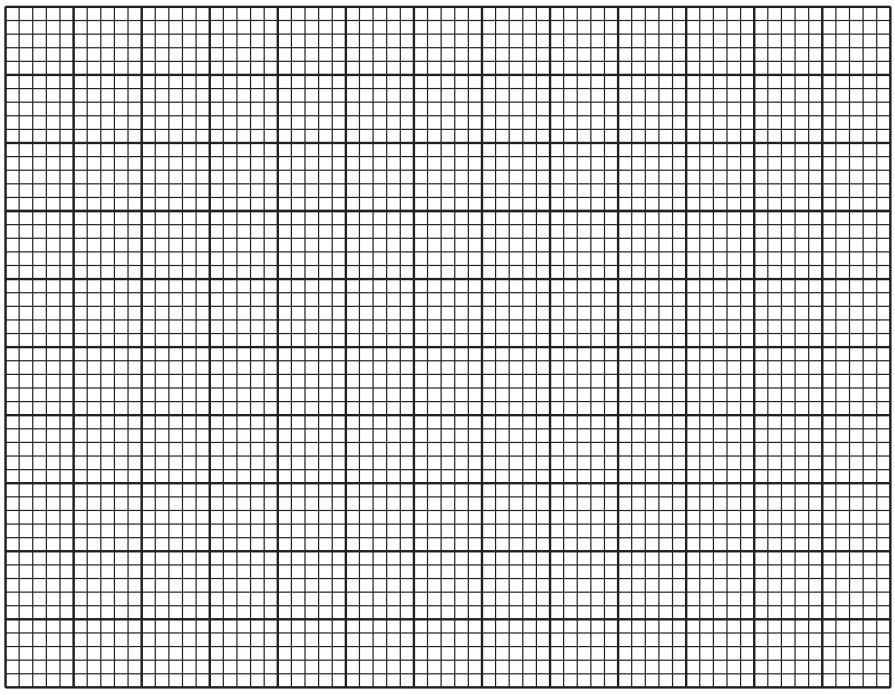
The dishes were covered and kept in the dark for 10 days and the number of germinated grains in each dish was counted.

A second batch of grains was treated in the same way but these were left in the GA solutions for 36 hours.

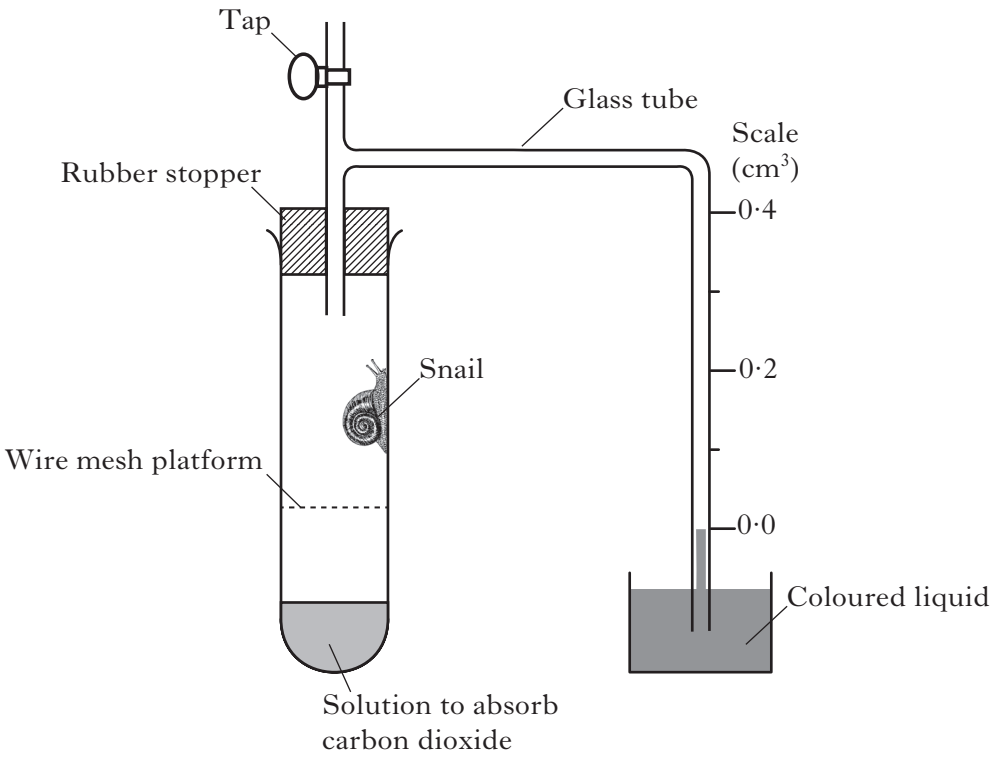
The results are shown in the table.

Concentration of GA solution (mg per litre)	*Number of rice grains germinated*	
	After 12 hours in GA solution	*After 36 hours in GA solution*
0	5	6
5	7	14
10	16	31
20	23	35
30	28	41
60	31	43

Draw a line graph to show the number of grains germinated after 36 hours in the different concentration of GA solution.



The diagram shows apparatus used in an investigation of aerobic respiration in snails.



The tap was kept open to the air for 15 minutes, and to start the experiment the tap was closed and the reading on the scale recorded. Every 2 minutes for 10 minutes the reading on the scale was again recorded and the results shown in the table below. The apparatus was kept at 20 °C throughout.

Time after tap closed (minutes)	*Reading on scale* (cm^3)
0	0·00
2	0·04
4	0·08
6	0·12
8	0·16
10	0·20

Draw a line graph to show the reading on the scale against time.

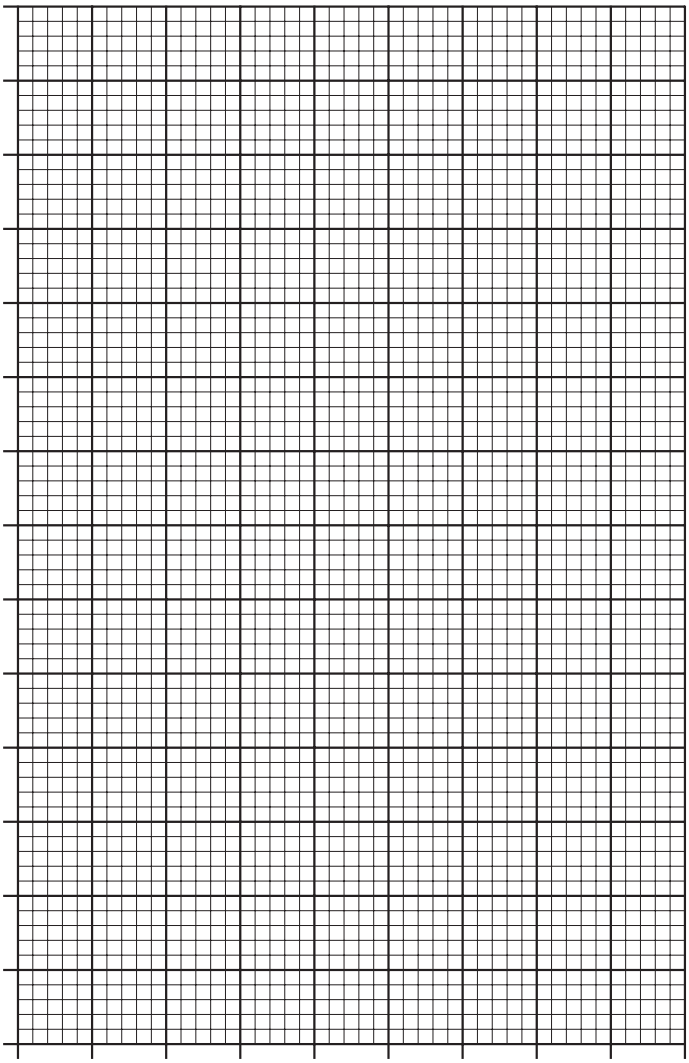
Source: SQA Subject Area: Biotechnology Level: 6

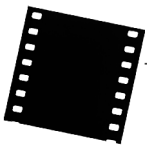
Sourdough is a traditional bread with its characteristic taste due to the combination of *Candida* yeast and *Lactobacilli* bacteria used in its production.

The effect of temperature on the growth of each of these micro-organisms in liquid culture was investigated and the results are shown in the table below.

Temperature (°C)	*Cell growth* (relative increase in mass per hour)	
	Candida	*Lactobacillus*
5	0·00	0·00
10	0·05	0·05
15	0·11	0·16
20	0·23	0·29
25	0·33	0·50
30	0·40	0·66
35	0·07	0·48
40	0·00	0·14

Plot line graphs of cell growth against temperature for **either** micro-organism.





Photographic film consists of a clear sheet of plastic coated with chemicals that give it a dark appearance. The chemicals are stuck to the plastic by the protein gelatine.

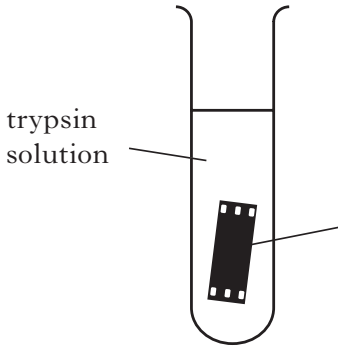
An investigation was carried out using photographic film and the enzyme trypsin which digests protein.

A piece of photographic film was placed in a test tube containing a solution of trypsin, as shown in **Figure 1** below.

The time taken for the film to turn clear was measured.

The procedure was then repeated using different concentrations of trypsin solution.

The results of the investigation are shown in the table below.



Trypsin concentration (%)	*Time taken for film to clear* (s)
1	112
2	102
3	93
4	84
5	84
6	84

Plot a line graph to illustrate the results of the investigation.