

Q1. Green plants are able to make their own food.

Complete each sentence by drawing a ring around the correct answer in the box.

(a) Green plants make their own food during the process of

diffusion
photosynthesis
respiration

(1)

(b) This process can be summarised by the equation:

carbon dioxide + water → glucose +

mineral salts
light
oxygen

(1)

(c) The energy needed for this process is trapped for the plant by

chlorophyll
glucose
light

(1)

(d) Some of the food made by plants is stored as insoluble

chlorophyll
glucose
starch

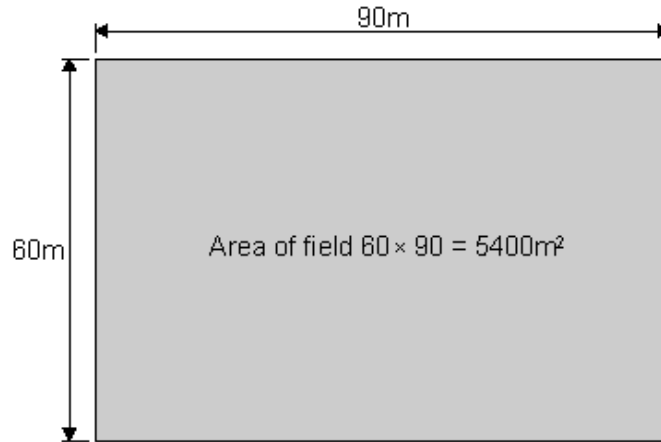
(1)

(Total 4 marks)

Q2. A class of students was set the task of estimating the number of dandelions on the school field.

To do this, they decided to use sampling squares called quadrats.
Each quadrat had an area of 1 m².

The diagram shows the dimensions of the school field.



(a) Which is the best way of using quadrats in this investigation?

Tick (✓) **one** box.

| Statement | Tick (✓) |
|---|----------|
| Place all the quadrats where there are lots of plants. | |
| Place all the quadrats randomly in two different sample areas. | |
| Place all the quadrats where all four types of plant are growing. | |

(1)

(b) Each student collected data by using 10 quadrats.

These are the results for one student, Mary.

| Quadrat number | Number of dandelions |
|----------------|----------------------|
| 1 | 3 |
| 2 | 3 |
| 3 | 6 |
| 4 | 2 |
| 5 | 1 |
| 6 | 2 |
| 7 | 0 |
| 8 | 3 |
| 9 | 2 |
| 10 | 0 |

Calculate the mean number of dandelions per quadrat counted by Mary.
Show clearly how you work out your answer.

.....
.....

Mean number of dandelions

(2)

(c) Another student, Sharon, calculated a mean of 2.8 dandelions per quadrat from her results.

Estimate the number of dandelions in the whole field by using:

- a mean of 2.8 dandelions per quadrat
- information from the diagram on the opposite page
- the equation below.

Show clearly how you work out your answer.

estimated number of dandelions on field = mean number of dandelions per quadrat × number of quadrats that would fit into the field

.....
.....

Estimated number of dandelions

(2)
(Total 5 marks)

Q3. Enzymes are used in many industrial processes.

(a) Draw a ring around the correct answer to complete each sentence.

(i) An enzyme is

an antibody.
a catalyst.
a mineral.

(1)

(ii) In industry, enzymes are used so that reactions work well at

all pH values.
higher pressures.
lower
temperatures.

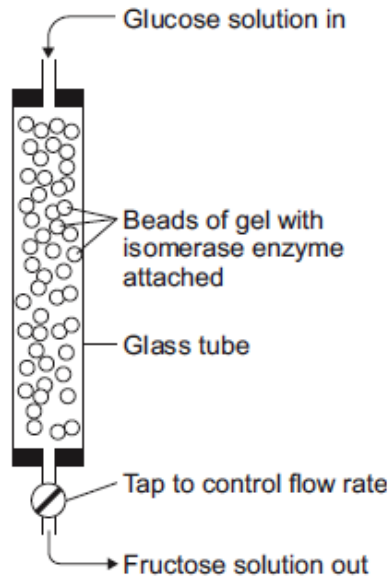
(1)

(iii) In industry, the enzyme carbohydrase is used to change starch into

amino
acids.
fatty
acids.
sugar.

(1)

- (b) The enzyme isomerase changes glucose into fructose. In industry, the enzyme isomerase is attached to beads of gel in a glass tube, as shown below.



Give **two** advantages of using an enzyme attached to beads of gel.

Tick (✓) **two** boxes.

The enzyme would be denatured.

The enzyme can easily be used again.

The fructose does not have any enzyme in it.

The enzyme can also be used to pre-digest baby foods.

(2)
(Total 5 marks)

- Q4.** (a) The air you breathe in and the air you breathe out are different.

Use the names of gases from this box to complete the **three** spaces.

argon carbon dioxide nitrogen oxygen water vapour

Compared to the air you breathe in, the air you breathe out contains:

- **more**
- **more**
- **less**

(3)

(b) The process of aerobic respiration takes place in your cells.

(i) Complete the space in the word equation for this process.

..... + oxygen → carbon dioxide + water

(1)

(ii) Complete the space to give the main energy transfer which takes place in this process.

chemical energy → energy

(1)

(iii) What is the name of the organ where oxygen from the air passes to your blood?

.....

(1)

(c) The athlete is taking part in vigorous exercise.



Complete the **two** spaces in the passage.

The cells in our muscles respire anaerobically during vigorous exercise. This results indebt and the production of acid.

(2)

(Total 8 marks)

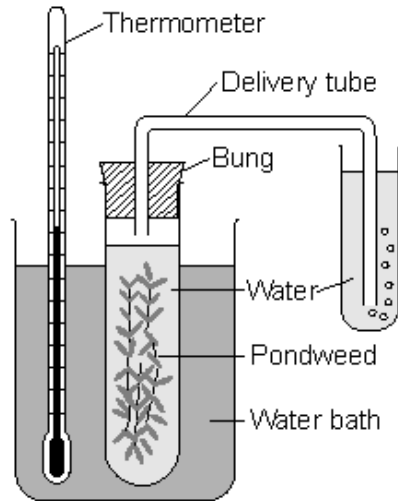
Q5. Plants produce food by photosynthesis.

(a) Complete the equation for photosynthesis.

carbon dioxide + (+ light energy) → glucose +

(2)

Some students investigated the effect of temperature on the rate of photosynthesis in pond weed. They set up the apparatus and altered the temperature using ice and hot water. They counted the number of bubbles given off in a minute at different temperatures.

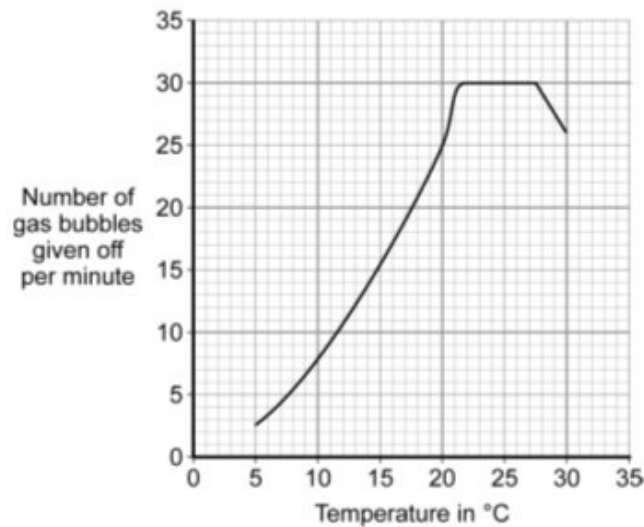


(b) Why did the students use a water bath?

.....

(1)

The graph shows the students' results.



(c) Explain the shape of the graph between 22 °C and 27 °C.

.....

(2)

(d) A farmer wants to grow lettuces as quickly and cheaply as possible in winter.

(i) At what temperature should he keep his greenhouse to grow the lettuces as quickly and cheaply as possible?

..... °C

(1)

(ii) Explain the reason for your answer.

.....
.....
.....
.....
.....
.....

(2)

(Total 8 marks)

Q6. Some students were asked to investigate the distribution of clover in a field of grass. They noticed that the clover grew in patches amongst the grass.

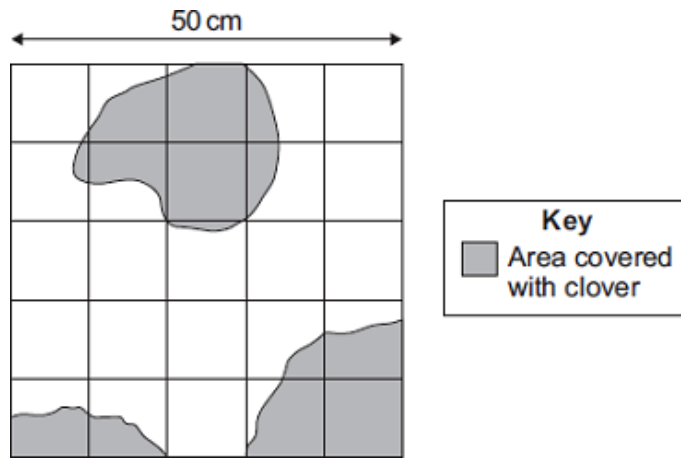
(a) The students decided to use quadrats.

Describe how the students should decide where to place the quadrats to investigate the distribution of the clover.

.....
.....
.....
.....

(2)

(b) The diagram shows one of the quadrats the students used.



(i) Estimate the number of squares of the quadrat covered with clover.

.....

Number of squares =

(1)

(ii) Describe how you worked out your answer to part (b)(i).

.....

(1)

(iii) Use your answer from part (b)(i) to calculate the percentage of the quadrat covered by the clover.

.....

Answer = %

(2)

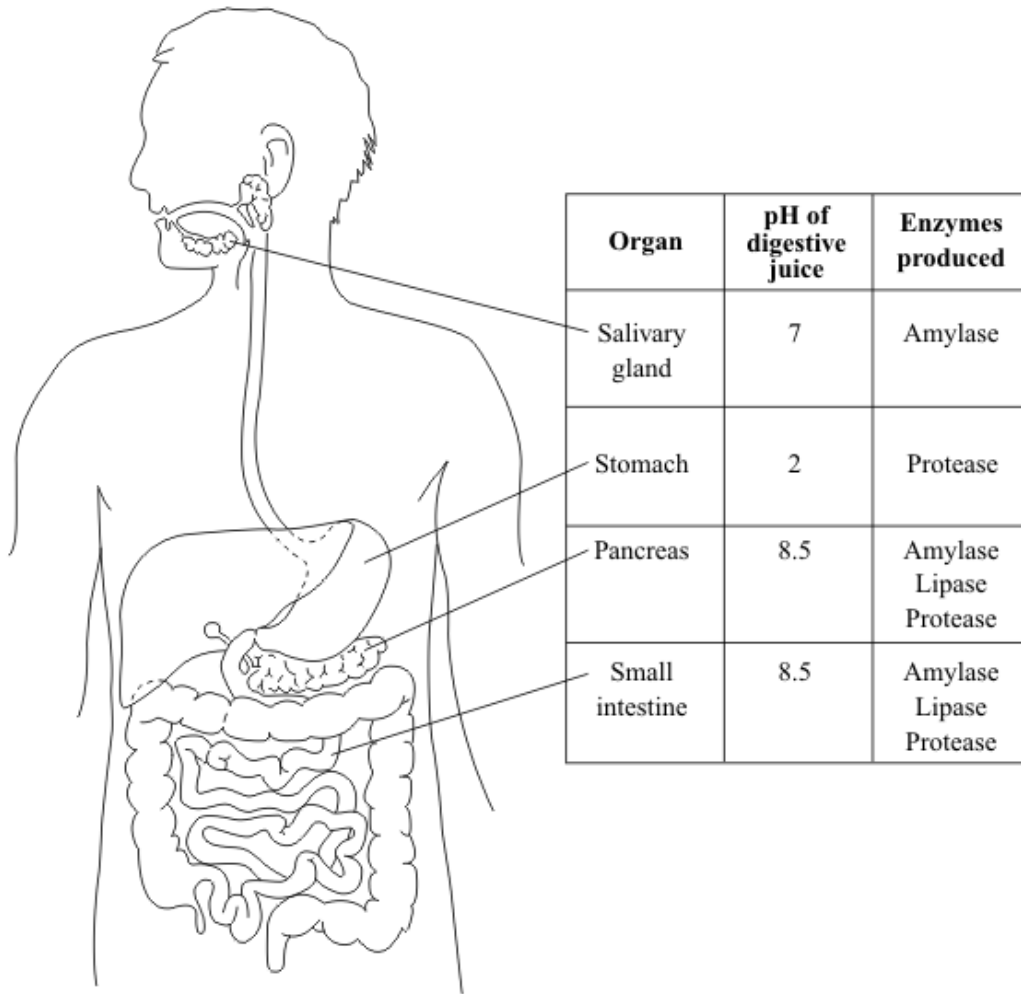
(c) Suggest **one** factor that could account for the distribution of the clover plants.

.....

(1)

(Total 7 marks)

Q7. The diagram gives information about some parts of the human digestive system.



(a) (i) Name the organ which **makes** bile.

.....

(1)

(ii) Label this organ with the letter **X** on the diagram.

(1)

Information in the table may help you to answer parts (b) and (c).

(b) Name **two** parts of the digestive system where protein is digested.

1

2

(2)

(c) Suggest **two** reasons why starch is not digested in the stomach.

- 1
-
- 2
-

(2)
(Total 6 marks)

Q8. Energy is obtained from both aerobic and anaerobic respiration during exercise.

(a) Give **three** differences between aerobic and anaerobic respiration.

- 1
-
- 2
-
- 3
-

(3)

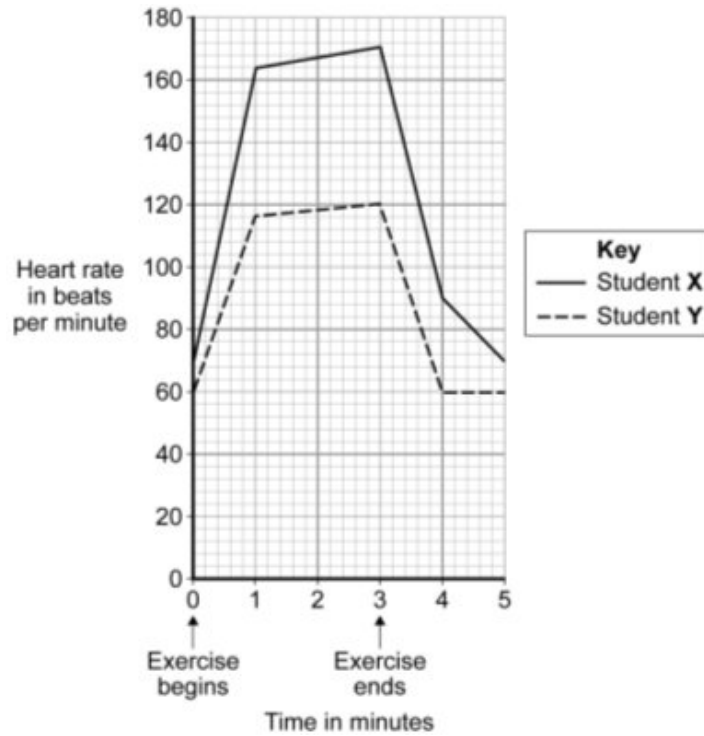
(b) Two students did the same step-up exercise for 3 minutes.



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One of the students was fit. The other student was unfit.

The graph shows how the students' heart rate changed during the exercise and after the exercise.



(b) Suggest which student was the fitter.

Draw a ring around your answer. **Student X / Student Y**

Give **three** reasons for your answer.

- 1
-
- 2
-
- 3
-

(3)

(c) Explain the advantage to the students of the change in heart rate during exercise.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)
(Total 10 marks)

- M1.** (a) photosynthesis 1
- (b) oxygen 1
- (c) chlorophyll 1
- (d) starch 1
- [4]**

- M2.** (a) place all the quadrats randomly in two different sample areas.
extra boxes ticked cancels the mark 1
- (b) 2.2
correct answer gains 2 marks
if answer incorrect, evidence of correct method gains 1 mark
allow only 1 mark for a rounded mean 2
- (c) 15 120
correct answer gains 2 marks
if answer incorrect, evidence of correct substitution gains 1 mark 2
- [5]**

- M3.** (a) (i) a catalyst 1
- (ii) lower temperatures 1
- (iii) sugar 1
- (b) The enzyme can easily be used again 1
- The fructose does not have any enzyme in it 1
- [5]**

| | | | | |
|------------|------|---|--|-----|
| (d) | (i) | 21/22 | 1 | |
| | (ii) | rate of photosynthesis is at maximum | 1 | |
| | | for the least heating cost | 1 | [8] |
| M6. | (a) | chose places <u>randomly</u> | 1 | |
| | | method of obtaining randomness, e.g. (grid and) random numbers | | |
| | | <i>allow thrown qualified e.g. over shoulder, eyes shut</i> | | |
| | | <i>allow max 1 for mention of a transect with sampling at regular or random intervals</i> | 1 | |
| | (b) | (i) | 7 or 8 | |
| | | | <i>allow fractions / decimals between 7 and 8</i> | 1 |
| | | (ii) | count number of whole squares and add estimate of area covered by part squares | |
| | | | <i>allow reference to counting squares with ½ cover or more</i> | |
| | | | <i>allow clear working on diagram and / or (b)(i)</i> | 1 |
| | | (iii) | 28 – 32 (in range) | |
| | | | <i>allow ecf</i> | |
| | | | <i>if answer incorrect allow 1 mark for reasonable reference to divided by 25 or multiplied by 4</i> | 2 |
| | (c) | nutrients / minerals / ions / fertiliser / water | | |
| | | <i>allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell</i> | | |
| | | <i>ignore pollution / soil / competition if unqualified</i> | | |
| | | <i>ignore temperature / wind</i> | 1 | [7] |
| M7. | (a) | (i) | liver | 1 |
| | | (ii) | <u>on diagram:</u> | |
| | | | 'X' on liver | |
| | | | <i>must be unambiguous (eg not overlapping gall bladder)</i> | |
| | | | <i>intersection of X in liver</i> | 1 |

(b) stomach 1

small intestine

*accept duodenum or ileum
extra wrong answers cancel the mark,
eg small intestine (colon) = no marks*

1

(c) amylase not produced by stomach

*accept no starch digesting enzymes in the stomach
accept correct enzyme not in stomach
accept only proteases in stomach
do **not** accept protease does not digest starch*

1

acid / low / wrong pH in stomach **or** enzyme would be denatured in stomach **or** amylase only works in neutral / alkaline conditions

*incorrect extra information cancels mark
do **not** accept amylase does not work in the stomach*

1

[6]

M8. (a) any **three** from:

- oxygen used in aerobic respiration
- more energy from aerobic respiration
- carbon dioxide and water are end products of aerobic respiration
- lactic acid is end product of anaerobic respiration

3

(b) (Student Y)

accept converse for student X

- the lower resting heart rate
- the lower heart rate increase and
- the quicker recovery time

1

1

1

(c) when exercising the rate of respiration (in the muscles) is higher

1

(the increased heart rate delivers)

- more oxygen to the (respiring) muscles
- more glucose to the (respiring) muscles
- and results in faster removal of carbon dioxide and lactic acid

1

1

1

[10]

