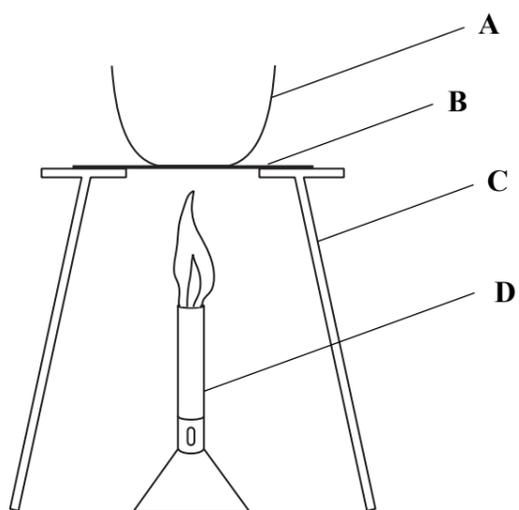


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Answer ALL the questions. Write your answers in the spaces provided.

1. Students were asked to measure the amount of dead plant material in the soil found in different places (woodland, grass lawn and sandy beach). They obtained six soil samples from each place and dried the soil in an oven. The soil samples were then burnt using the apparatus shown in the diagram.



- (a) (i) Use the label letters from the diagram to complete the table below.

Name of apparatus	Letter of apparatus
Bunsen burner	
Tripod	
Crucible	
Gauze	

(4)

- (ii) Suggest why the students put goggles on when burning the soil samples.

.....

(1)



Leave
blank

- (b) Suggest how the students could have made sure the soil was completely dry before they burnt it.

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

(2)

- (c) The students calculated the percentage of dead plant material in the dry soil. They used the formula below.

$$\text{percentage of dead plant material} = \frac{\text{mass of dry soil} - \text{mass of burnt soil}}{\text{mass of dry soil}} \times 100$$

Calculate the percentage of dead plant material in a soil sample that weighed 2.0 g when dry and 1.9 g after being burnt. Show your working.

Answer =%
(2)



Leave blank

(d) The results obtained by the students are shown in the table.

Soil sample	Percentage of dead plant material in dry soil in each place		
	woodland	grass lawn	sandy beach
1	5.9	3.4	0.4
2	6.6	3.6	0.2
3	6.4	4.1	0.6
4	5.8	3.2	0.2
5	5.9	4.0	2.4
6	6.0	4.0	0.3

(i) **One** result in the table is anomalous. Put a circle around this result. (1)

(ii) Suggest **one** possible cause for this anomalous result.
.....
.....
(1)

(iii) Suggest why soil from the woodland had the highest percentage of dead plant material.
.....
.....
(1)

Q1

(Total 12 marks)



2. Peter wanted to find out how his heart rate changed when he did some exercise. First he measured his heart rate at rest by counting his pulse for one minute.

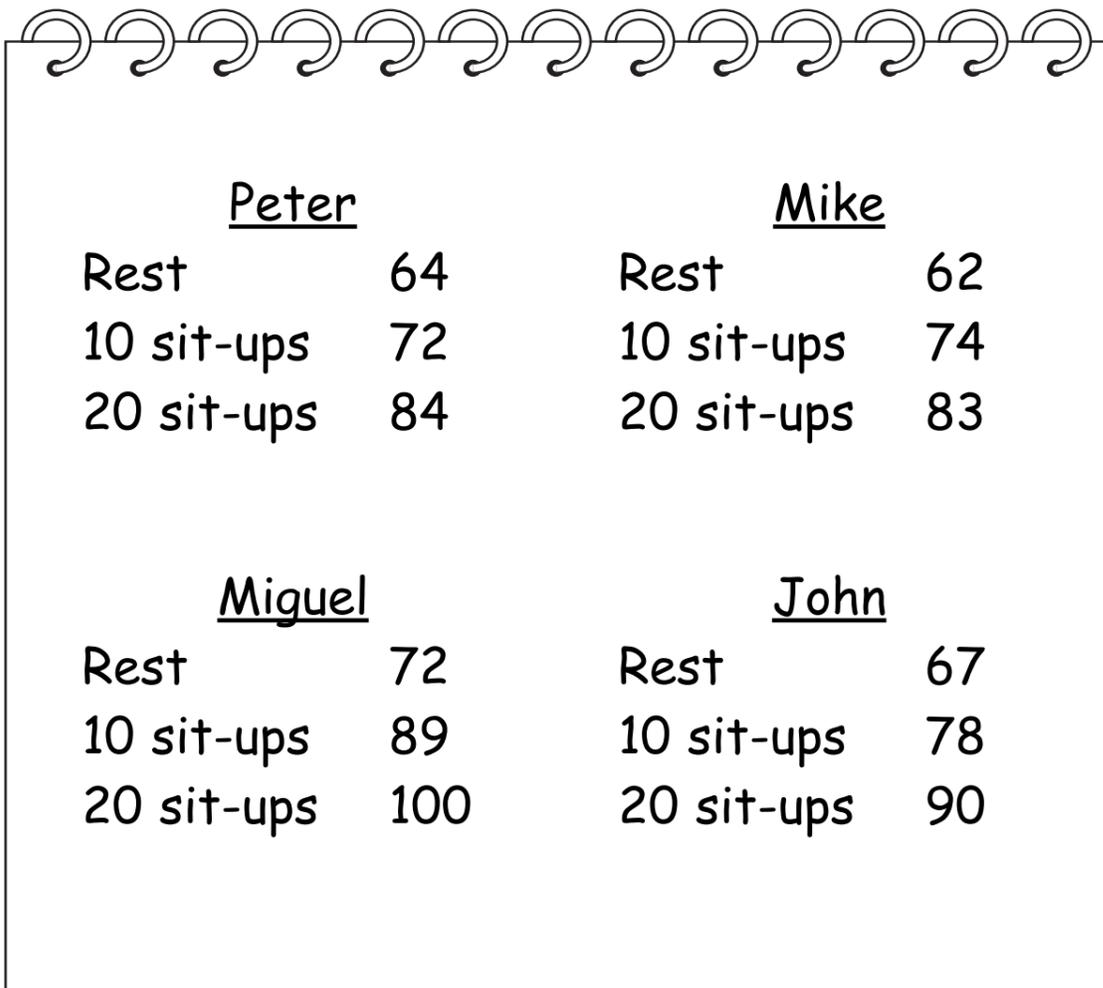
(a) Describe how Peter would count his pulse for one minute.

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

(2)

(b) For his exercise, Peter chose to do some 'sit-ups'. This involved lying on the floor and then sitting up. He did 10 sit-ups and then counted his pulse. After a brief rest he did 20 sit-ups and then counted his pulse. Peter then asked three of his friends to do the same experiment.

He wrote all the results in rough in his notebook as shown below.



<u>Peter</u>		<u>Mike</u>	
Rest	64	Rest	62
10 sit-ups	72	10 sit-ups	74
20 sit-ups	84	20 sit-ups	83

<u>Miguel</u>		<u>John</u>	
Rest	72	Rest	67
10 sit-ups	89	10 sit-ups	78
20 sit-ups	100	20 sit-ups	90



Leave
blank

(i) In the space below, draw a table to show Peter's results and those of his friends.

(4)

(ii) From his results, Peter came to the conclusion that heart rate increases with increasing exercise. Use your scientific knowledge to explain this conclusion.

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

(3)

(c) Peter's teacher said that counting the pulse for one minute after the exercise had finished would give a result for the heart rate that is too low. It might be better to count for only 15 seconds after exercise and multiply by 4.

Suggest an explanation for this.

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

(2)

(Total 11 marks)

Q2

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7

Turn over



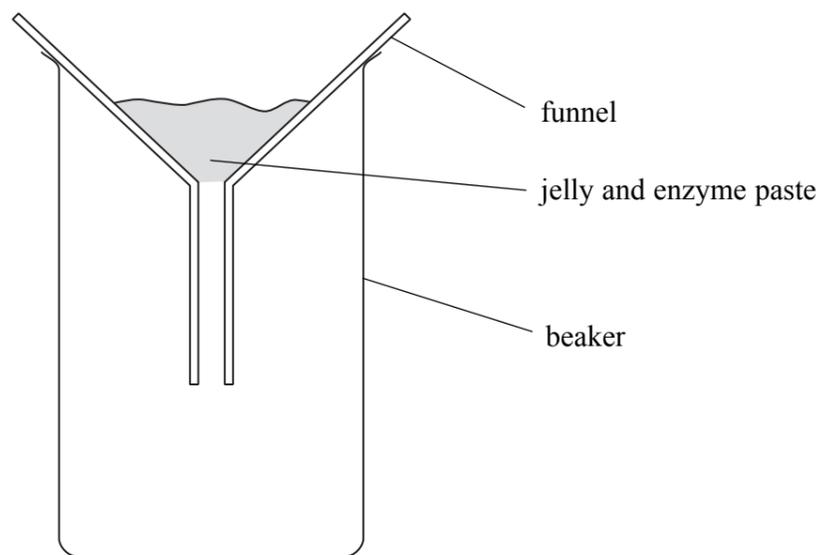
N 3 3 9 6 9 A 0 7 1 6

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3. Mary wanted to find out if the concentration of a protease enzyme affected the time taken to digest protein. She used a protein jelly and, as the enzyme digested the protein, the jelly became liquid.

She put the same mass of protein jelly into five different beakers, **A**, **B**, **C**, **D** and **E**. She poured a different concentration of enzyme solution into each beaker. She then mixed the jelly and enzyme solution together to make a paste. After a time, she poured the paste into a funnel as shown.



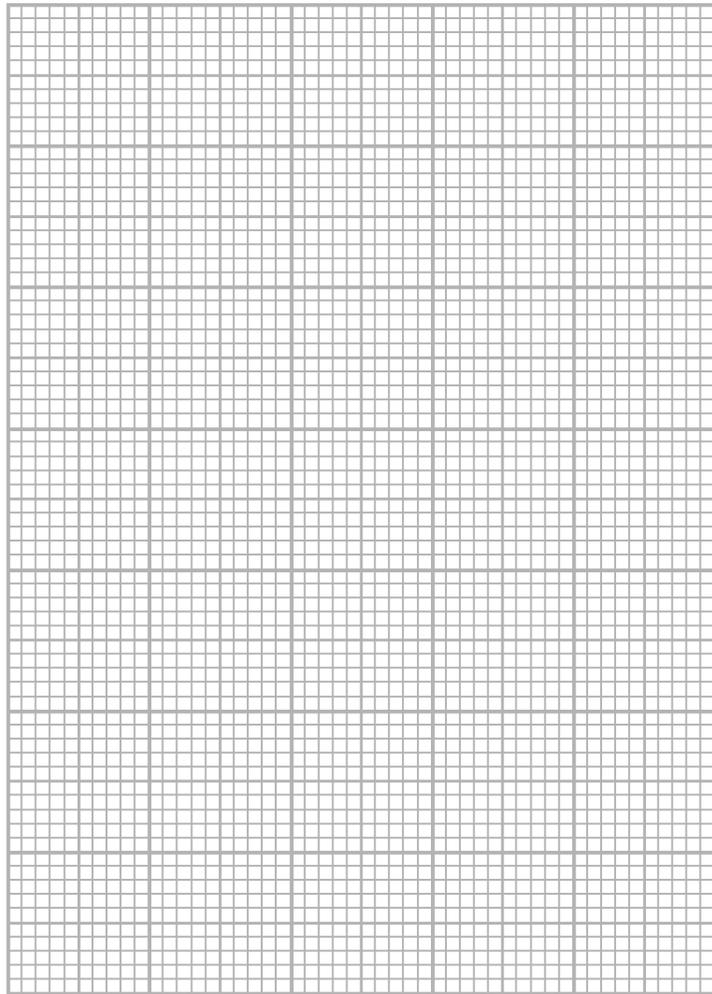
Mary measured the time taken for the jelly and enzyme paste to flow out of the funnel. The results are shown in the table.

Beaker	Concentration of enzyme solution (%)	Time for paste to flow out in seconds
A	0.00	32
B	0.25	29
C	0.50	25
D	0.75	19
E	1.00	16



Leave
blank

- (a) Plot a line graph on the grid below to show the time taken for the paste to flow out at each enzyme concentration. Use a ruler to join the points.



(5)

- (b) (i) Describe the pattern shown by these results.

.....

.....

(1)



Leave
blank

(ii) Explain why the time taken for the paste to flow out is affected by enzyme concentration.

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

(2)

(c) Name **two** factors that need to be kept the same for each beaker for the results to be valid.

1

2

(2)

(d) Mary was given the enzyme as a powder. To make the 1.00% concentration of enzyme solution she dissolved 1g of powder in 100 cm³ of water. Suggest how she would make the 0.50% concentration of enzyme solution.

.....
.....

(1)

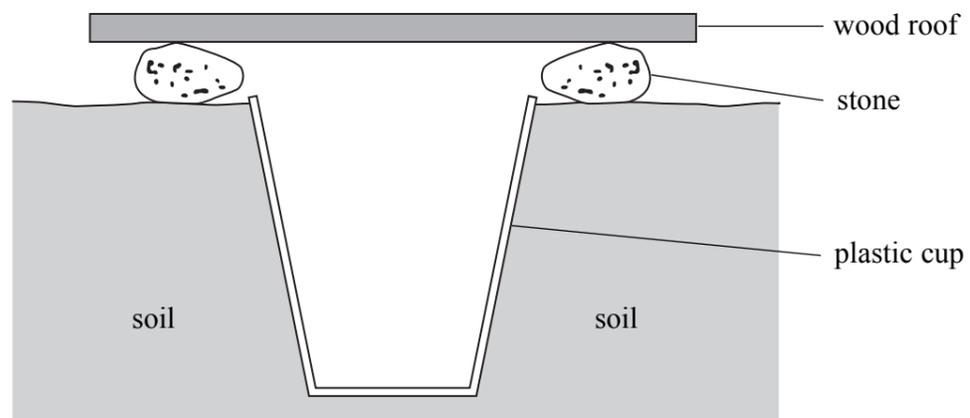
Q3

(Total 11 marks)



4. A student wanted to find out about the numbers and types of small animals moving around in a field during the day and during the night.

The student used a pitfall trap to catch the small animals. The diagram shows a pitfall trap.



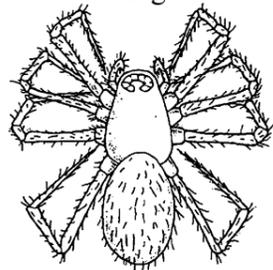
The key shows the different types of animal caught.



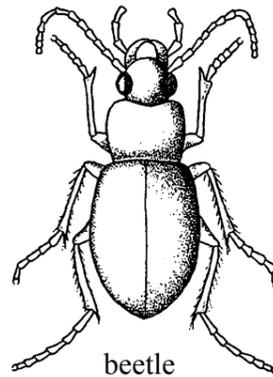
ant



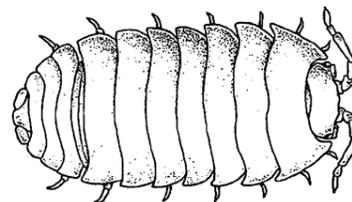
slug



spider



beetle

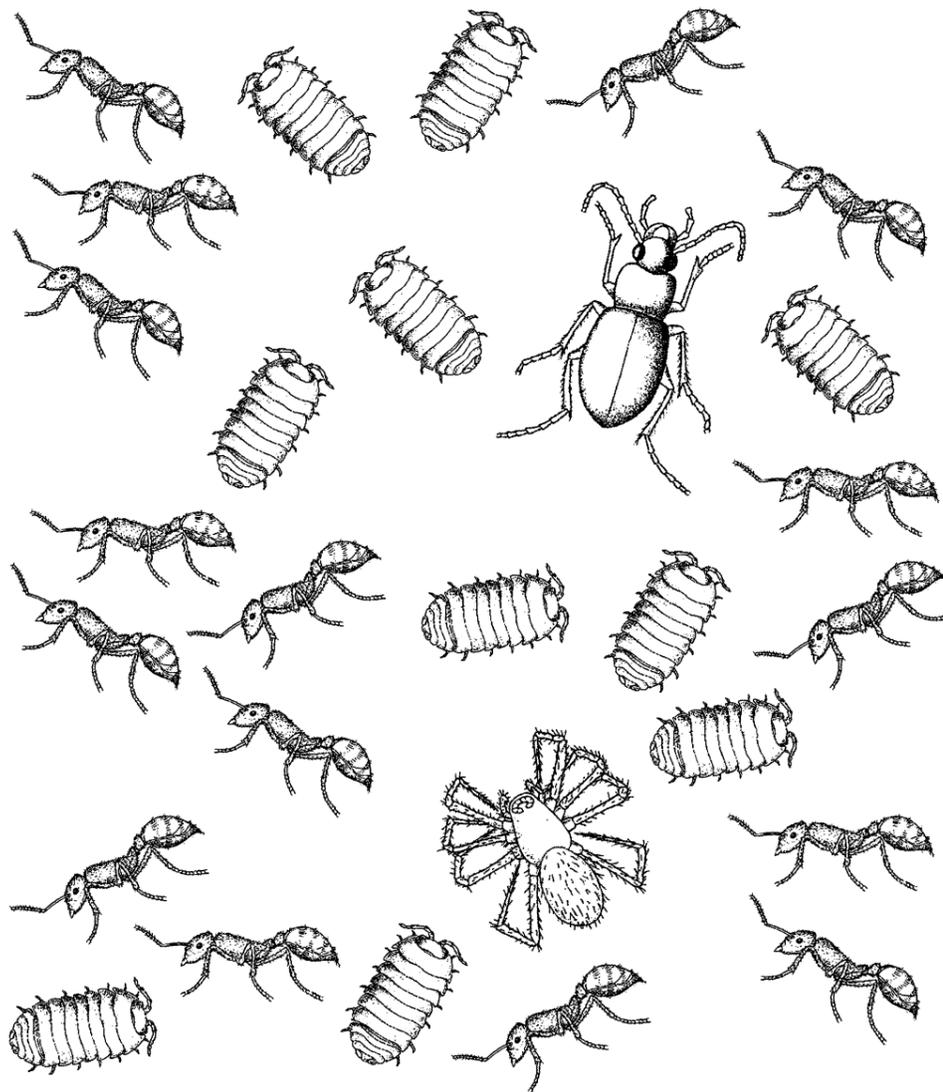


woodlouse

(not to scale)



The diagram shows the total number of the different types of animal caught in ten traps during the day.



(not to scale)

The student produced a table of the results for the catch during the day.

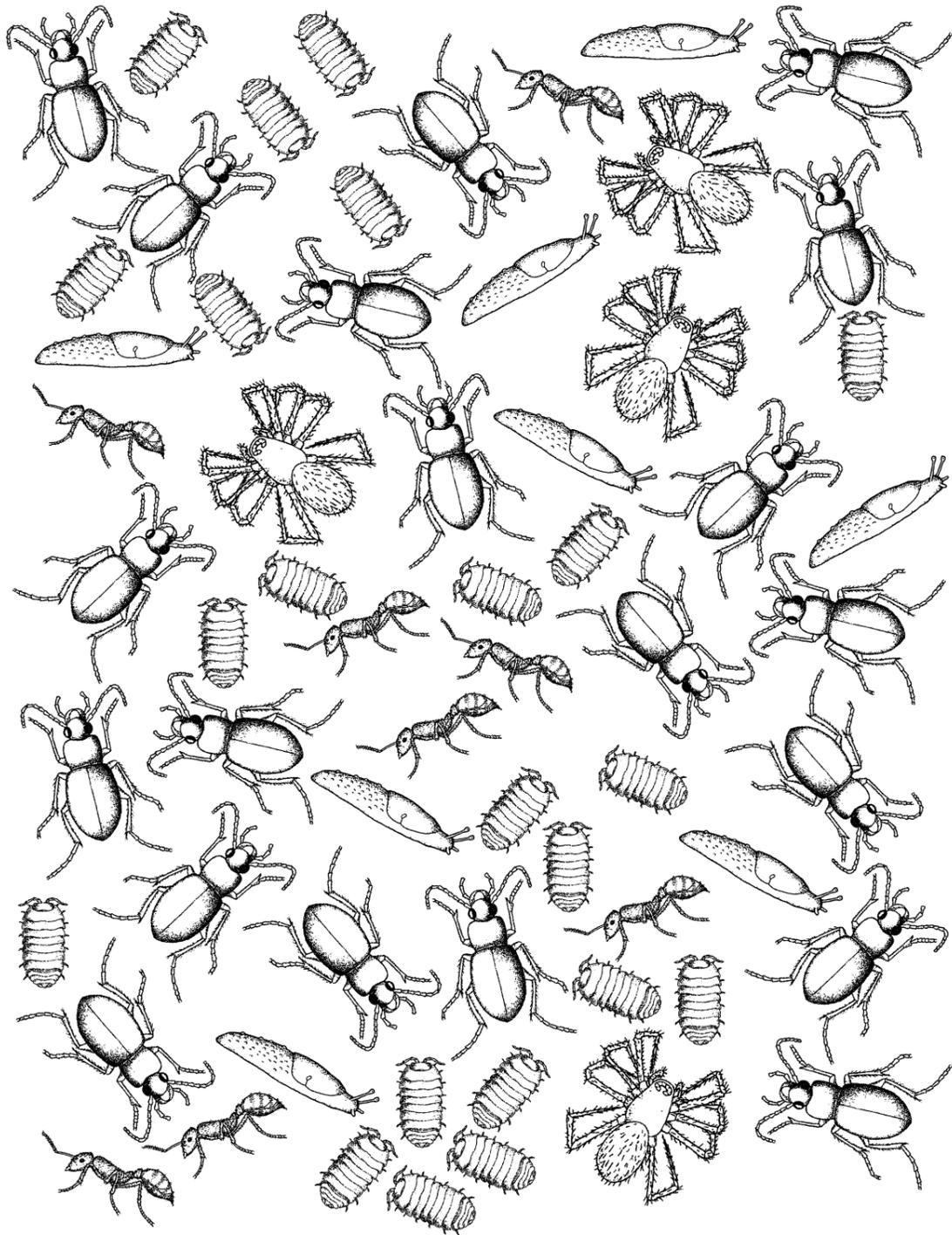
Catch during the day

Type of animal	Tally	Total number caught
ant	III III III I	16
beetle	I	1
slug		0
spider	I	1
woodlouse	III III	10



Leave
blank

The diagram shows the total number of the different types of animal caught in ten traps during the night.



(not to scale)



Leave blank

(a) (i) Complete the table to show the results for the catch during the night.

Catch during the night

Type of animal	Tally	Total number caught
ant		
beetle		
slug		
spider		
woodlouse		

(6)

(ii) What did the student do to make the investigation reliable?

.....
(1)

(iii) Suggest **two** reasons for the difference in the total number of beetles caught during the day and the total number of beetles caught during the night.

1

2

(2)

(b) Another student suggested repeating the investigation using liquid detergent placed at the bottom of the plastic cup. Liquid detergent kills animals. The student said that this would be a better way of doing the experiment.

Do you agree with this suggestion? Give a reason for your answer.

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

(1)

Q4

(Total 10 marks)



