

SEVENOAKS SCHOOL



YEAR 9 (13+) SCHOLARSHIP

May 2025
for entry in September 2025

SCIENCE

Your Name: _____

Your School: _____

Time allowed: 1 hour

Equipment needed: Pen, pencil, and ruler.
You may use an eraser and a calculator if needed.

Information for candidates:

1. Write your name and school on this page.
2. Write all of your answers on the question papers in the space provided.
If you need additional paper then please ask the invigilator. Please put your name on the sheets of paper you use.
3. The marks for each question or part question are shown in square brackets [] after the question.
4. Answer **ALL QUESTIONS**.
5. The total mark for this paper is 60.

BIOLOGY

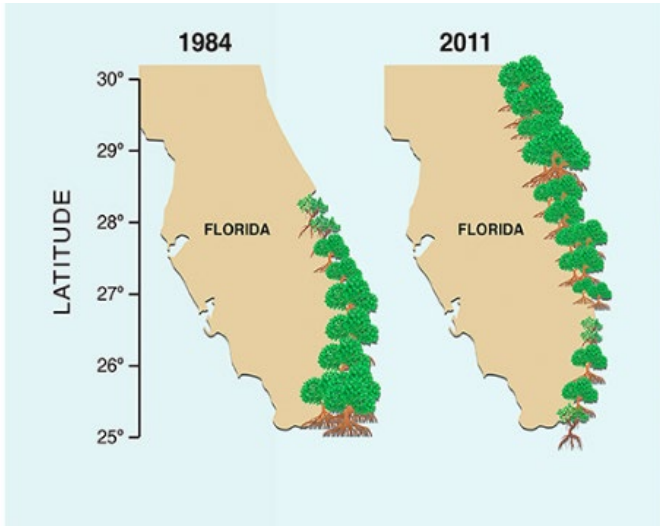


Figure 1 – mangrove distribution in Florida



Figure 2 – Florida manatee

The diagram in Figure 1 shows the distribution of mangrove trees in Florida. The latitude value increases as you move further north from the equator.

The mangroves trees provide an important habitat for a wide range of species including the Florida manatee (figure 2).

1. Suggest why the distribution of mangrove trees has changed from 1984 to 2011. [2]

2. Manatees are large marine mammals.

- a) Describe 2 ways in which they are adapted to their habitat. [2]

- b) How do young manatees gain nutrition –

- (i) While they are developing in the uterus? [2]

(ii) In the first few months after they are born? [1]

3. All living organism are comprised of cells. Give two differences between the cells that make up the mangrove leaves and the manatee cells. [2]

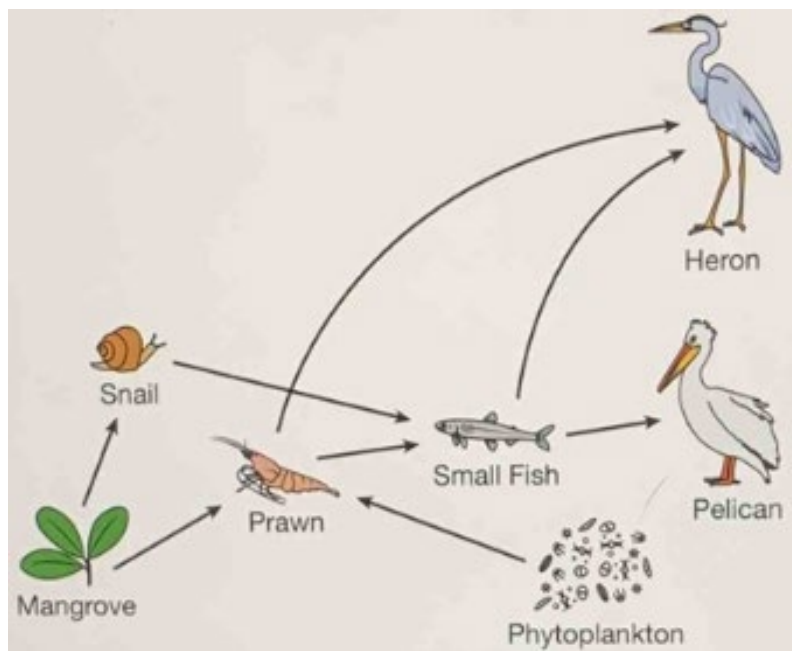


Figure 3 – mangrove food web

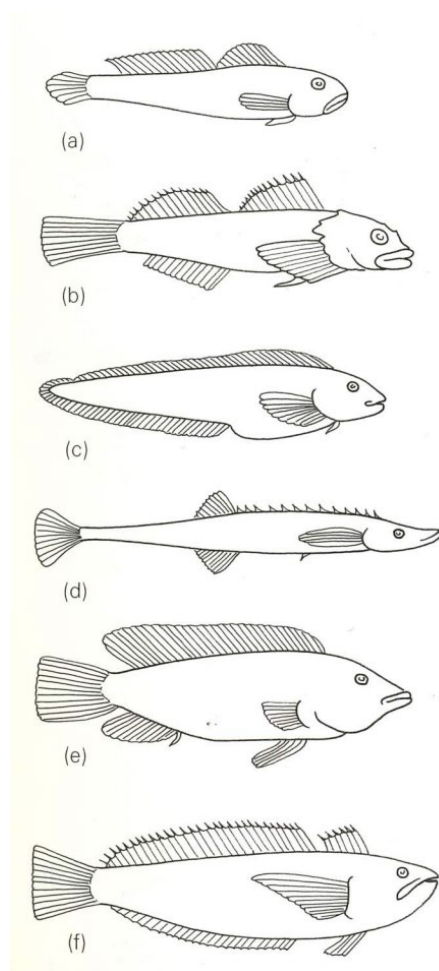
Figure 3 shows a simplified food web from a mangrove in Florida.

4. From the web identify

a) Two producers [1]

b) Two primary consumers [1]

c) One organism that is both a secondary and a tertiary consumer. [1]



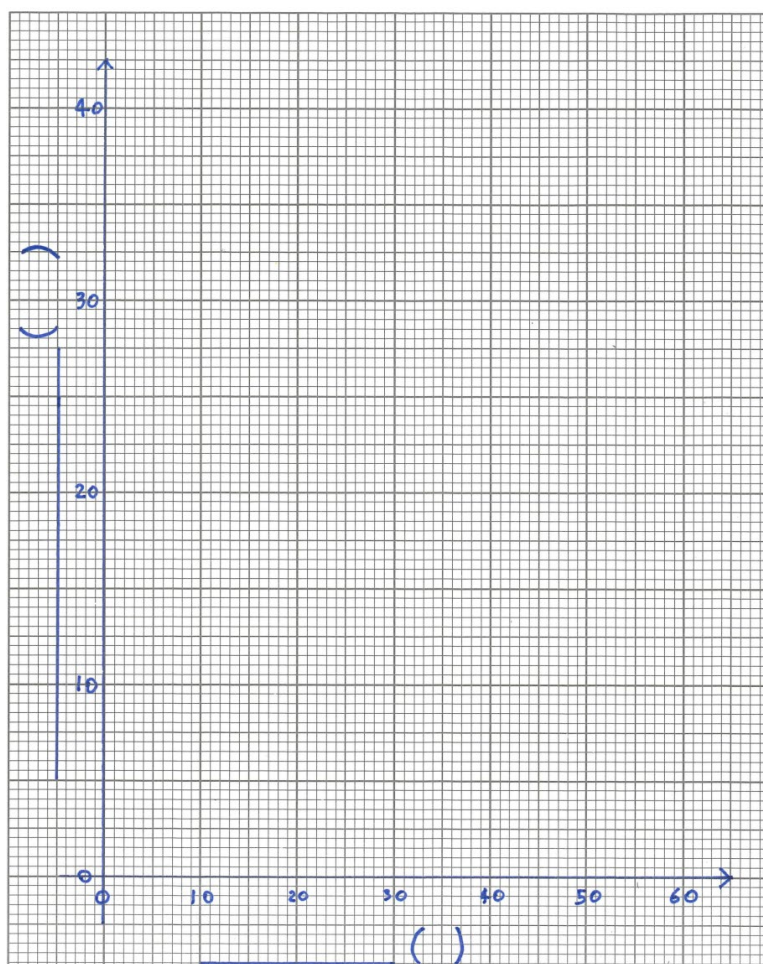
- | | | |
|----------|---|---------------------|
| 1 | The fins or body have spines along the top (dorsal) surface | 2 |
| | No obvious dorsal spines | 3 |
| 2 | Spines on the fins | 4 |
| | Separate spines on the body but not on the fins | 5 |
| 3 | Single dorsal fin | 6 |
| | Two dorsal fins | Gobius |
| 4 | Dorsal fins similar in size | Cottus |
| | The front dorsal fin much smaller than the rear one | Trachinus |
| 5 | Snout upturned, body slender | Spinachia |
| | Snout not upturned, body not slender | Gasterosteus |
| 6 | Distinct tail fin | 7 |
| | Dorsal fin merged with the tail fin | Zoarces |
| 7 | Elongated body; tail fin with central notch | Ammodytes |
| | Body not noticeably elongated; tail fin smooth | Labrus |

CHEMISTRY

1. An experiment was carried out to investigate the effect of marble chip size on the rate of CO_2 production when marble reacts with hydrochloric acid. Small, medium, and large marble chips were placed in conical flasks of hydrochloric acid and the volume of CO_2 gas produced was recorded every 5 seconds for 30 seconds. The data from the experiment with small marble chips is shown below.

| Time (s) | Volume of CO_2 (cm^3) |
|----------|---|
| 0 | 0 |
| 5 | 17 |
| 10 | 27 |
| 15 | 31 |
| 20 | 33 |
| 25 | 34 |
| 30 | 34 |

- a) (i) Complete the axes and plot a graph of the results below. [4]
(ii) Draw a suitable line of best fit on your graph. [1]



b) Based on your graph, state and explain when the reaction had finished. [2]

(ii) Explain how the time at which the reaction finished could be determined more accurately. [2]

c) The average rate of reaction can be calculated by the following equation:

$$\text{average rate of reaction} = \frac{\text{total volume of gas collected}}{\text{time taken for reaction to finish}}$$

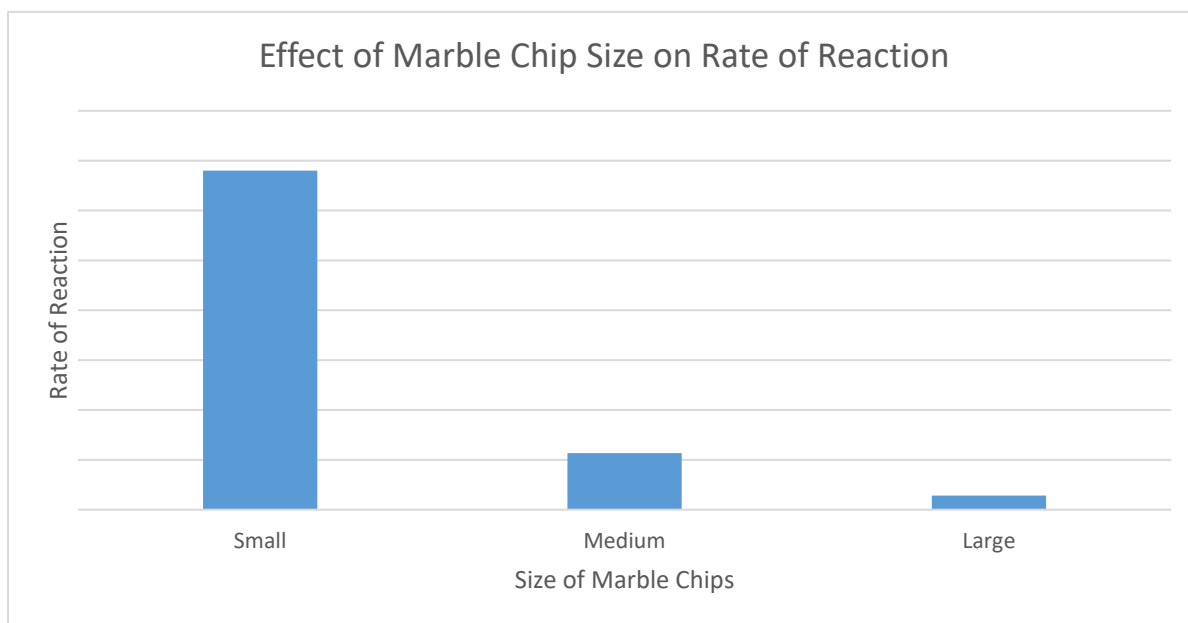
Calculate the average rate of reaction for the experiment using the equation, giving your answer to one decimal place and suggest units for the rate of reaction. [2]

d) (i) The initial rate of reaction can be determined by finding the gradient of a tangent at time = 0 s. Draw a tangent to your line of best fit from the origin and determine its gradient to obtain the initial rate of reaction. [2]

(ii) Compare the gradient of your tangent to the average rate and state how the initial rate is different to the average rate. What does this tell you about how the rate must change as a reaction progresses? [2]

(iii) Suggest two variables that must be controlled in this experiment to ensure the tests are fair. [2]

e) Bar chart with rate of reaction compared to size of chips.



Using the bar chart, state the relationship between the size of the chips and the rate of reaction. [1]

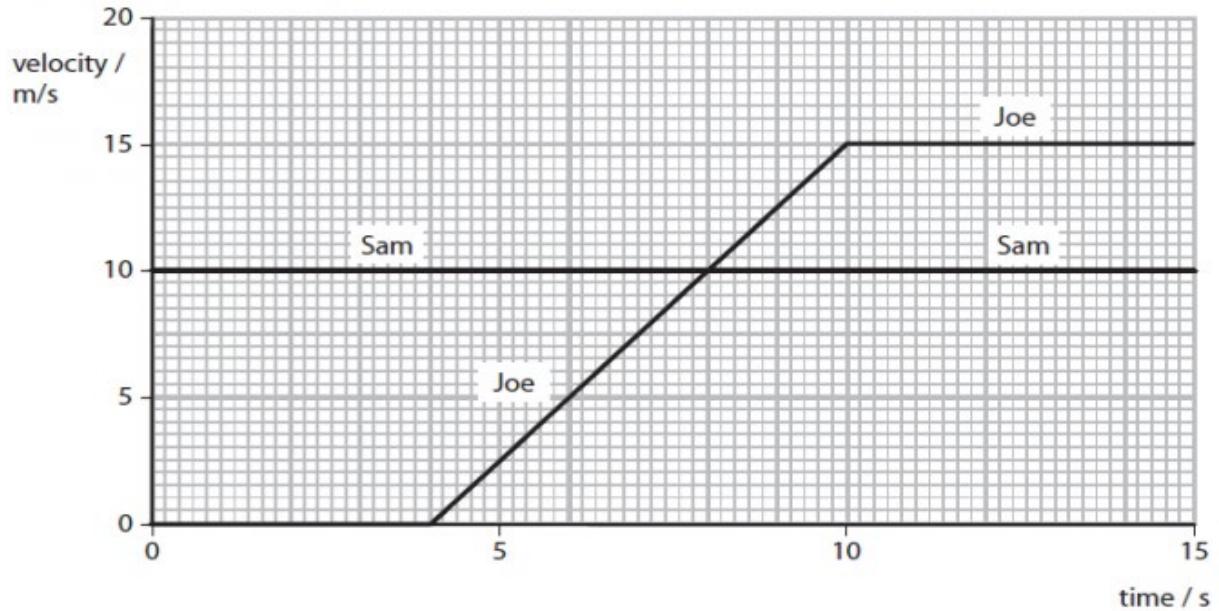
f) Suggest a reason for the observed trend. [2]

PHYSICS

1. Sam and Joe are on their bikes. They are on a flat, straight road.

a) Joe is stationary when Sam rides past at a constant velocity of 10 m/s.

Joe waits for 4 s and then follows Sam. This is a velocity/time graph of their motion.



(i) How far did Sam travel during these 15 s? [1]

- A 1.5 m
- B 10 m
- C 100 m
- D 150 m

(ii) At which of these times is the resultant force on Joe bigger than the resultant force on Sam? [1]

- A at 3 s
- B at 6 s
- C at 11 s
- D at 15 s

(iii) Calculate Joe's acceleration between 4 and 10 seconds. [2]

Joe's acceleration = _____ m/s²

- b) The diagram shows the horizontal forces acting on Joe at one point while he is accelerating.



- (i) Calculate the size and direction of the resultant horizontal force acting on Joe and his bike. [2]

resultant force = _____ N to the _____

- (ii) The total mass of Joe, his heavy bag, and his bike is 55 kg. Calculate the total weight. [1]

Gravitational field strength, $g = 10 \text{ N/kg}$

total weight = _____ N

- c) On another day, Joe is riding the same bike on the same piece of road. This time he does not have the heavy bag on his back. He finds that it is easier to accelerate.

Explain in detail why Joe finds it easier to accelerate. [2]

2. Complete the sentence by putting a cross (☒) in the box next to your answer. [1]

A student correctly estimated the length of a bee.

The length of a bee is about 2.0

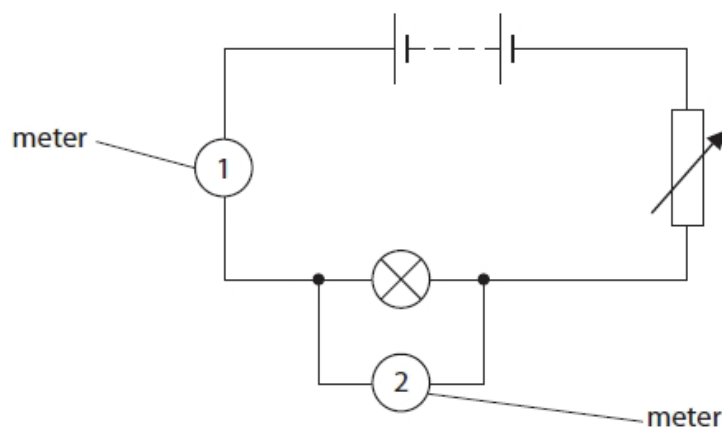
- A mm
- B cm
- C m
- D km

3. A student is investigating a filament lamp. [1]

a) (i) The current in the filament lamp is a flow of

- A protons
- B neutrons
- C electrons
- D atoms

(ii) The student uses this circuit in his investigation.



State what is measured by the meters. [2]

Meter 1 measures _____

Meter 2 measures _____

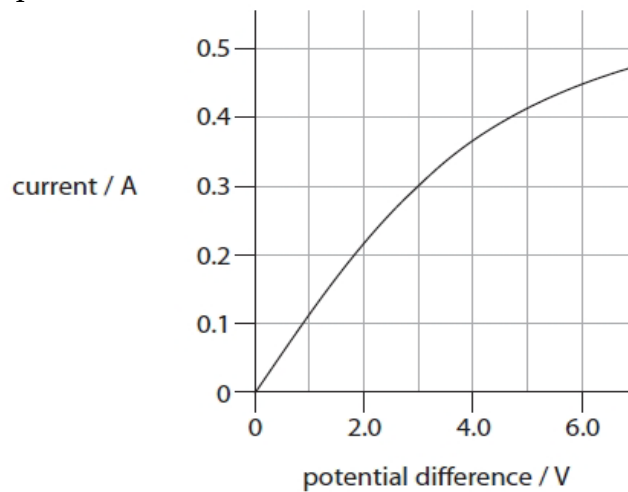
b) The normal operating voltage and current of the filament lamp is 6 V, 0.4 A.

48 Joules of energy is supplied to the lamp. How long is it turned on for? [2]

$$(E = V \times I \times t)$$

time = _____

c) The graph shows how current varies with potential difference (voltage) for another filament lamp.



Calculate the resistance of the lamp when the current in the lamp is 0.45 A. [2]

$$\text{resistance} = \text{potential difference} \div \text{current} (R = V / I)$$

resistance = _____ Ω

d) Using the graph in part (c), describe in detail how the voltage across a filament lamp affects the current flowing through the filament lamp. [3]
