Questions are for separate science science students only

Q1.

A student investigated the effect of different factors on photosynthesis.

The student used three leaves growing on the same plant.

Each leaf was treated in a different way.

After 48 hours the student tested each leaf for starch.

Table 1 shows the results.

Table 1

Leaf tested	Treatment	Result after 48 hours
1	Upper and lower surfaces covered with black paper	No starch present
2	Upper and lower surfaces covered and sealed with transparent plastic	No starch present
3	**Not** covered	Starch present

(a) Explain the results for the three leaves.

(5)

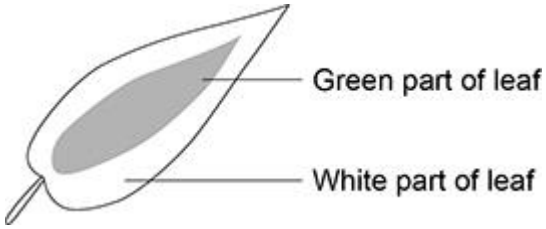
In another investigation the student used a different type of plant.

The plant was left uncovered in the light for 48 hours.

After 48 hours the student tested a leaf from the plant for starch.

Figure 1 shows the leaf before it was tested for starch.

Figure 1



(b) Complete **Table 2** to show the results you would expect for the starch test on the leaf in **Figure 1**.

Table 2

Part of leaf tested	Result after 48 hours
Green	
White	

(1)

(c) Explain the results you gave in part (b).

_____

_____

_____

_____

(2)

In some leaves, the green parts become yellow because of an ion deficiency.

(d) Which ion is deficient in a plant with yellow leaves? **(biology only) (HT only)**

_____

(1)

(e) Give the scientific term that describes the yellow colour of the leaves **(biology only) (HT only)**.

_____

(1)

(f) The rate of photosynthesis is affected by different factors.

How could the oxygen produced during photosynthesis be used to measure the **rate** of photosynthesis?

_____

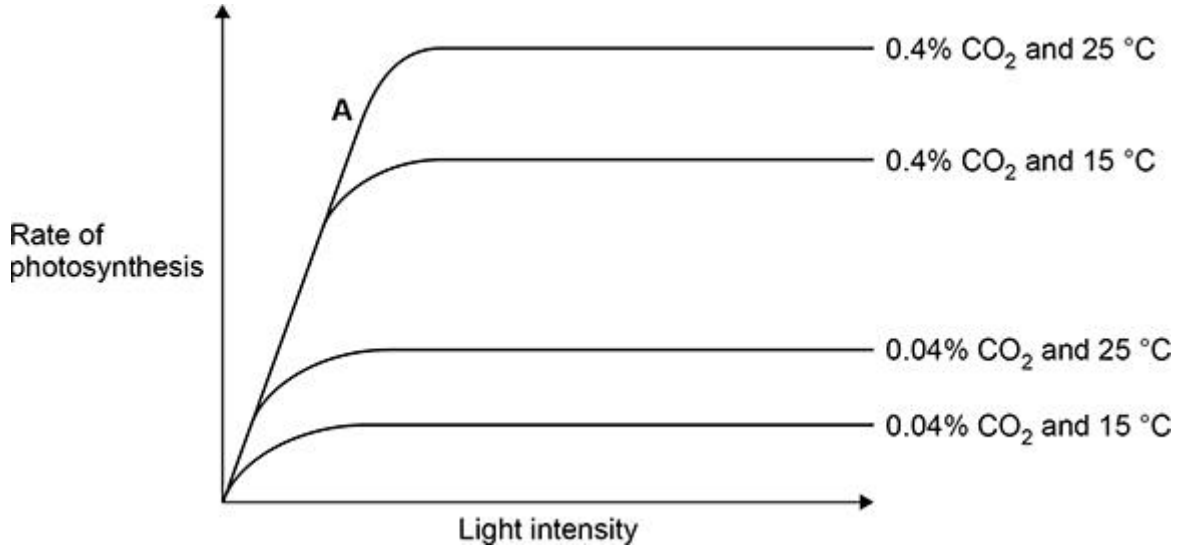
_____

(1)

Light, carbon dioxide and temperature are limiting factors of photosynthesis.

Figure 2 shows how the rate of photosynthesis is affected by light, carbon dioxide and temperature.

Figure 2



(g) At point **A** on **Figure 2**, light is a limiting factor.

What is meant by a 'limiting factor'? **(HT only)**

_____

_____

(1)

(h) Explain the effect of increasing temperature and increasing carbon dioxide concentration on the rate of photosynthesis shown in **Figure 2**. **(HT only)**

(4)

(i) Photosynthesis investigations often use a light source.

The spreading out of light from a source obeys the inverse square law.

The inverse square law links light intensity to distance from the light source.

Which of the following shows the inverse square law? **(HT only)**

Tick (✓) **one** box.

$\text{light intensity} \propto \frac{1}{\text{distance}^2}$ ☐

$\text{light intensity} \propto \text{distance}^2$ ☐

$\frac{1}{(\text{light intensity})^2} \propto \text{distance}^2$ ☐

$\frac{1}{(\text{light intensity})^2} \propto \frac{1}{\text{distance}^2}$ ☐

(1)

(Total 17 marks)

Q2.

Plants and animals have many defence responses.

(a) The table below shows some plant defences.

Identify whether each defence is a chemical response or a physical response.

Tick (✓) **one** box in each row. **(biology only)**

	Type of response	
Plant defence	**Chemical**	**Physical**
Thick, waxy layer on leaf surface		
Berries that are poisonous		
Bark on trees that falls off		

(2)

Mimicry is a mechanical adaptation seen in both plants and animals.

Figure 1 shows two insects.

Figure 1

Hornet Hornet Moth

(b) Hornets are insects that sting other animals and cause pain.

Hornet moths do **not** sting other animals.

Suggest how mimicry helps the **hornet moth** survive.

_____

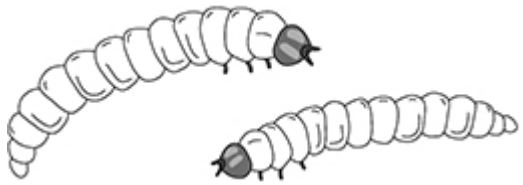
_____

(1)

Adult hornet moths lay eggs that hatch into larvae.

Figure 2 shows the larvae of a hornet moth.

Figure 2



(c) The larvae of the hornet moth:

- live inside the roots of trees
- use the tree roots as a source of food
- cause damage to the tree roots.

Explain why a tree might die if the roots of the tree are damaged.

(6)

(d) The larvae of the hornet moth form when fertilised eggs divide by mitosis.

Describe how mitosis produces two genetically identical cells.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(e) The cells which are first formed from the fertilised eggs of the hornet moth are stem cells.

Name the process by which these stem cells then form specialised cells.

_____

(1)

(Total 14 marks)