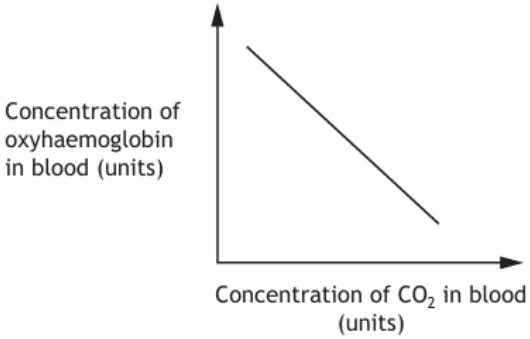
Relationships/conclusions

1. The graph below shows the relationship between the concentration of carbon dioxide and oxyhaemoglobin in the blood.



Which of the following statements describes this relationship?

A As the carbon dioxide concentration increases the concentration of oxyhaemoglobin decreases.

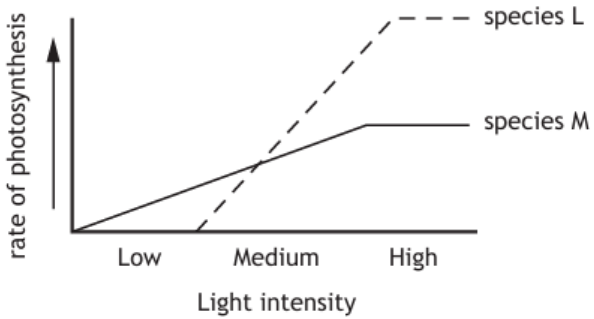
B As the carbon dioxide concentration decreases the concentration of oxyhaemoglobin decreases.

C As the carbon dioxide concentration increases the concentration of oxyhaemoglobin increases.

D Increasing carbon dioxide concentration has no effect upon the concentration of oxyhaemoglobin.

2. The effect of light intensity on the rate of photosynthesis was measured for two species of plants, L and M.

The results are shown in the graph below.



The rate of photosynthesis of species M is

A slower than L in low light intensities

B slower than L in high light intensities

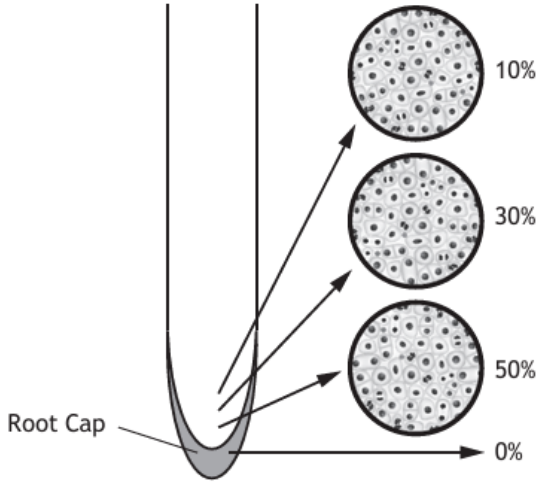
C faster than L in medium light intensities

D faster than L in high light intensities.

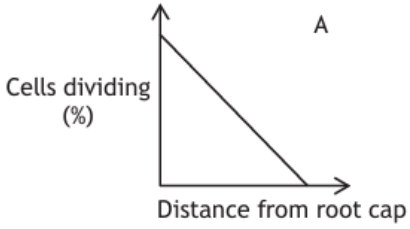
2.

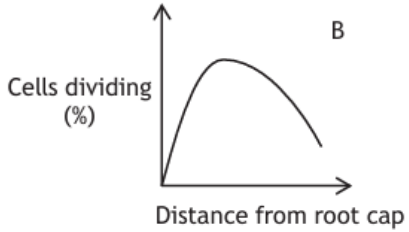
Relationships/conclusions

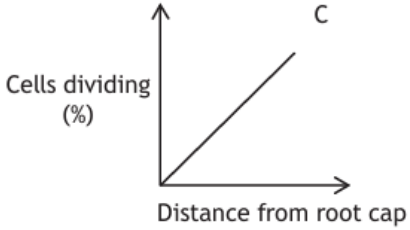
3. The diagram below shows the percentage of cells dividing in four areas of an onion root.

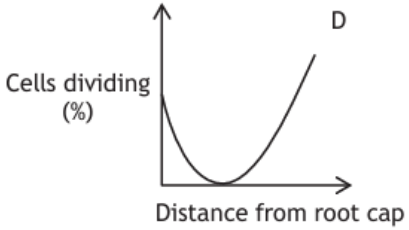


Which graph represents the number of cells dividing in this root?









4. The table shows the results of an investigation into the effect of temperature on egg laying mites.

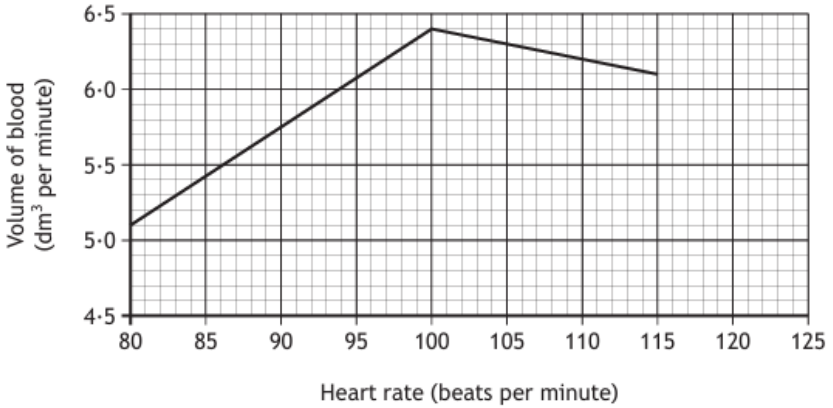
Feature	Temperature (°C)		
	20 °C	25 °C	30 °C
Average length of egg laying period (days)	36	27	18
Average number of eggs laid per female during egg laying period	108	108	108

As the temperature increases, the average number of eggs laid per female **per day**

A increases
B decreases
C stays the same
D halves.

Relationships/conclusions

5.



Describe the relationship between heart rate and volume of blood pumped by the left ventricle. **2**

6.

Site	*Oxygen levels* (Units)	*Number of bacteria per 100ml*
1	1·2	500
2	0·04	150 000
3	0·40	12 680
4	0·54	3 400
5	1·12	1 250

Using data from Table 1, describe the relationship between the number of bacteria and the oxygen level in the water. **1**

7.

Dish	*Number of seeds sown*	*Number of seedlings surviving after six days*	*Percentage of seedlings surviving after six days*
A	5	5	100
B	10	10	100
C	20		95
D	40	34	85
E	80	60	75

Describe the relationship between the number of seeds sown and the percentage of seedlings surviving after six days. **1**

8.

		Number of plants		
Sample site	*Soil moisture* (units)	*Species E*	*Species F*	*Species G*
1	20·2	11	15	12
2	23·4	13	14	11
3	22·1	12	16	10
4	24·5	15	17	15
5	26·6	18	13	12
6	28·4	19	15	14

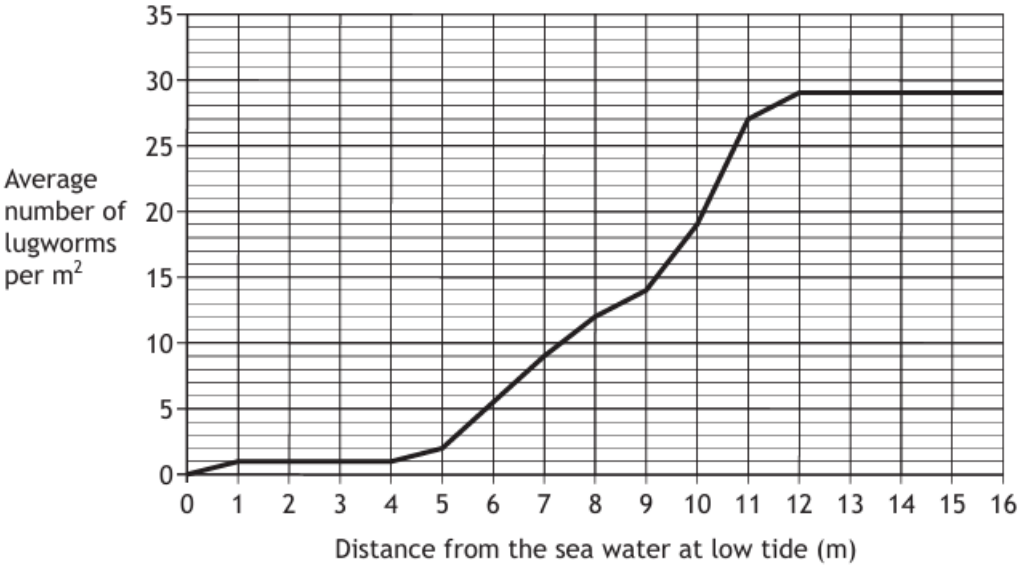
State which species has its distribution most affected by the soil moisture levels.

Species _____

Relationships/conclusions

9. Lugworms live on the seashore in dark moist burrows under the sand.

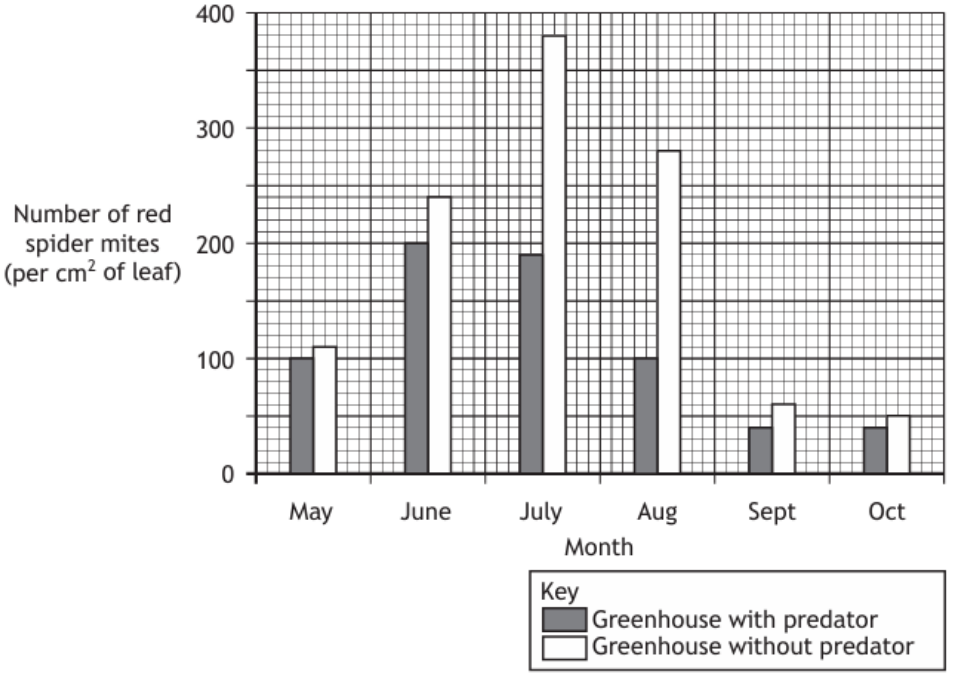
The graph below shows the average number of lugworms at different distances from the seawater at low tide.



(i) Describe the relationship between the distance from the seawater at low tide and the average number of lugworms per m^2. **2**

10 Tomato growers aimed to investigate whether a predator would reduce the spider mite numbers in their greenhouses. Two identical greenhouses were used and the predator was released into only one greenhouse.

The results are shown in the graph below.



With reference to the aim of this investigation, give the conclusion that the tomato growers would have drawn from these results. **1**

Relationships/conclusions

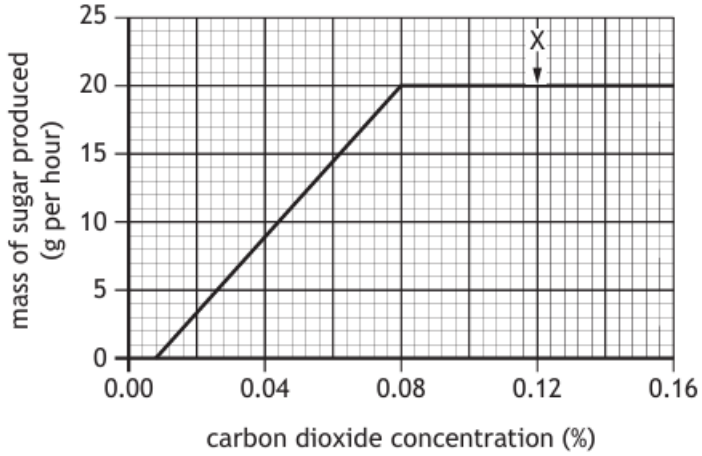
11.

Sample site	Average soil moisture (%)	Ground cover of moss (%)
1	18	86
2	14	70
3	15	80
4	11	58
5	13	65
6	12	60
7	22	98
8	30	99
9	35	100

Describe the relationship between average soil moisture and percentage ground cover of moss.

1

12 An experiment was carried out to investigate the effect of carbon dioxide concentration on the rate of photosynthesis. The rate of photosynthesis was measured by recording the mass of sugar produced per hour.



(a) (i) Describe the relationship shown between carbon dioxide concentration and the mass of sugar produced.

2

Relationships/conclusions

13. The table shows the effect of training at different altitudes on athletes' red blood cell count.

Altitude (km)	Average red blood cell count (million/ml of blood)
0	4.4
0.5	5.0
1.0	5.6
2.5	6.2
3.5	7.4
5.0	8.8
5.5	9.4

Describe the relationship between altitude and red blood cell count.

_____

_____

14. An investigation into the effect of water temperature on the breathing rate of fish was carried out. The results are shown in the table.

Water temperature (°C)	Average breathing rate (breaths/min)
4	4
10	26
14	56
20	79
26	100

Use these results to draw a conclusion for this investigation. **1**

_____

_____

Relationships/conclusions

15 **Measles in the UK**

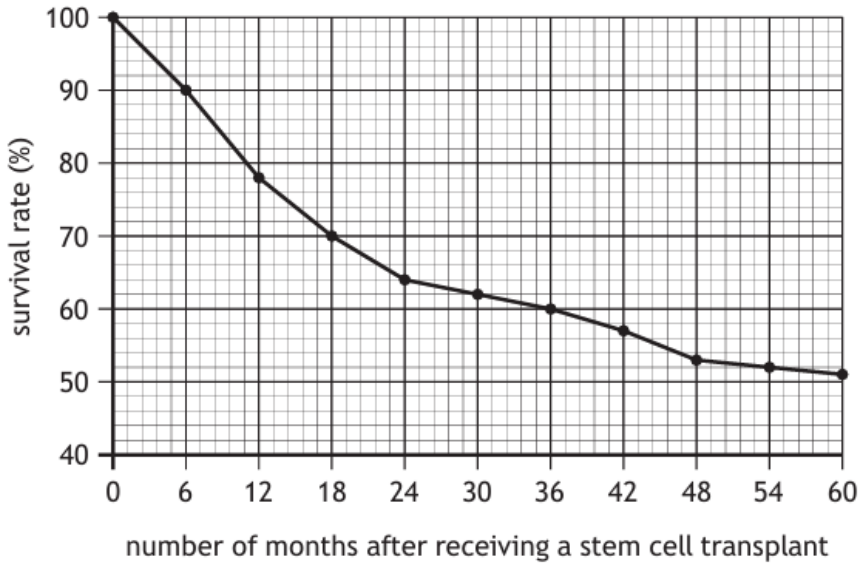
Measles is a disease that can be prevented through two doses of the MMR vaccine. The target set by health experts to achieve measles-free status is to have at least 95% of the population vaccinated. The World Health Organization declared the UK measles-free in 2016.

However, since 2016, cases of measles in the UK have been increasing, with too few people being vaccinated. It was suggested by experts that when measles cases became less common, some people believed that the threat of the disease was less. Another factor was the publication in the late 1990s of a controversial, and since discredited, piece of research wrongly linking the MMR vaccine with autism.

In 2018, there was a marked increase in reported cases, with 994 cases in England and Wales, compared with 284 cases in 2017. There were 307 cases across the UK during the first three months of 2019. In 2019, only 87% of the population in England received their second dose of MMR. In both Wales and Scotland it was 92%, and in Northern Ireland it was 91%.

Describe the relationship between the uptake of the vaccine and the number of cases of measles. **1**

16 The graph shows the survival rates of patients with a blood disorder who have received a stem cell transplant.



6.

Describe the relationship between the number of months after receiving a stem cell transplant and the survival rate. **1**

Relationships/conclusions

1. A
2. B
3. B
4. A
5. As the heart rate increases the volume of blood pumped **increases** until **<u>100 bpm</u>** and then **decreases.**
6. As the bacteria increases, the oxygen level in the water **decreases**
7. Up to **10 seeds** sown, the percentage of seedlings surviving **remains constant** then as the number of seeds increases the percentage of seedlings surviving **decreases.**
8. E
9. As distance from the sea water increases, the average number of lugworms **<u>increases</u>** until **<u>12m</u>** then **<u>remains constant</u>**
10. When predators are present the number of red spider mites decrease
11 As the soil moisture increases, the percentage ground cover increases
12. As carbon dioxide concentration increases the mass of sugar produced **<u>increases</u>** until **<u>0.08 %</u>** then **<u>remains constant</u>**.
13. As altitude increases, the red blood cell count also increase
14. As the temperature (of the water) increases breathing rate increases
15. As the vaccine uptake decreases, the number of cases increases
16. As number of months after a stem cell transplant increases, the survival rate decreases