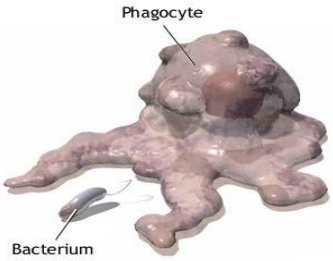
St.Ninian's High School
S2 Biology



Micro-organisms
Homework booklet
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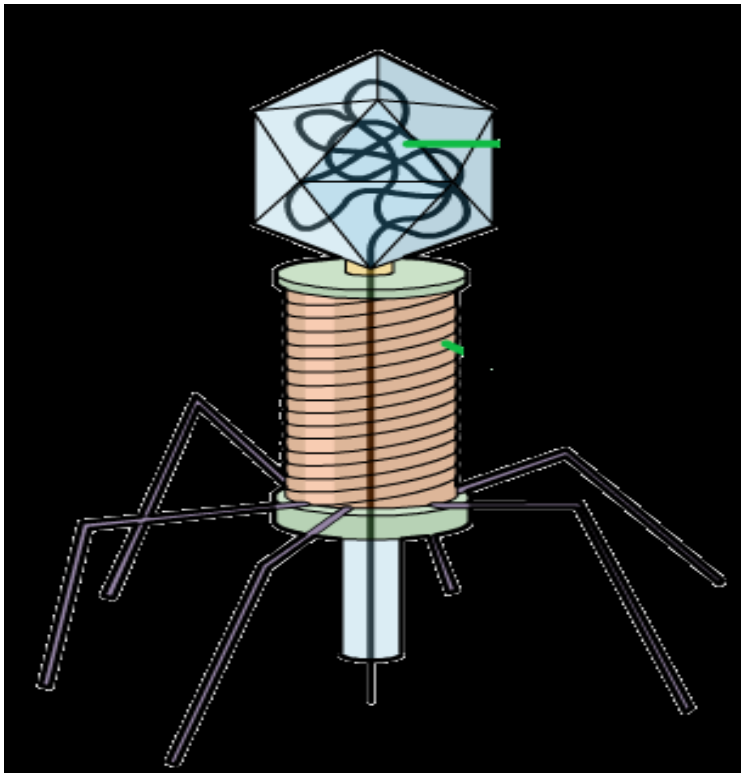


S2 Micro-organisms Homework 1

Answer the following questions in full sentences in your homework jotter.

1 Name 3 types of micro-organism. **1 mark**

2 Copy the table below into your homework jotter. **3 marks**
Fill in the correct type of micro-organism to match the correct size.

Micro-organism	Size
	0.001 mm
	0.000001 mm
	Can be seen by naked eye

3 What type of micro-organism are each of the following: **3 marks**
a) Flu
b) Yeast
c) Salmonella

4 What substance do scientists need if they want to grow micro-organisms in a laboratory? **1 mark**

5 What temperature do most micro-organisms grow best at? **1 mark**

6 The division time for a bacterial population is 30 minutes. Calculate how many bacteria will be present after 5 hours, when starting with 4 bacteria. **1 mark**

10 marks

S2 Micro-organisms Homework 2

1. What ingredients are used to make bread? **1 mark**

2. What type of micro-organism is used to make bread? **1 mark**

3. What does this micro-organism produce that causes the bread to rise? **1 mark**

4. What type of micro-organism is used to make yoghurt? **1 mark**

5. What does this micro-organism do to the milk? **1 mark**

6. What type of micro-organism is the mould that grows on bread? **1 mark**

7. **Read the following passage about Life in the compost heap and use it to answer the questions that follow in full sentences.**

Life in the compost heap. Adapted from *Biological Sciences Review*, September 1998.

Far from merely being a pile of rotting rubbish, a compost heap in the garden is an ecosystem with a community of billions of organisms. In a good compost heap, waste materials rot away rapidly to produce a fertile soil improver. This involves providing the right conditions for the decomposer organisms. They require food, water, air and warmth. The food is provided by the material you add to the heap, which can be anything organic- from grass clippings and weeds to kitchen waste and even paper.

Fungi and bacteria start the process of decay by consuming the organic material. There can be as many as one billion in a single teaspoonful of compost. Their respiration produces heat and the heap can increase in temperature by 10ºC every 5 days. The ideal temperature is 45ºC.

Bacteria are excellent food for various creatures such as protozoans and nematodes. Nematodes are tiny threadlike worms which are eaten by large creatures called mites. Centipedes patrol the heap feeding on both mites and the protozoans, and they themselves are excellent prey for birds such as the robin which visit the heap.

Compost is spread on garden soil to improve the soil structure. In addition, it contains 5% of useful plant nutrients released from the original material.

a) Name the **four** conditions required by decomposer organisms. **1 mark**

b) Which **two** organisms start the process of decay? **2 marks**

c) Select a phrase from the passage which suggests that the compost heap recycles valuable materials for plant growth. **1 mark**

d) From the information in the passage, give **two** benefits to a gardener of having a good compost heap. **2 marks**

e) Use information from the passage to calculate the mass of useful plant nutrients which could be contained in 5kg of compost. **1 mark**

13 marks

S2 Micro-organisms
Homework 3
Reading for information

Look at the following information table showing about diseases.

Disease example	What causes it	Symptoms (how it feels)	How it's spread	How it can be prevented
Athlete's foot	Fungus	Skin between toes is painful	Walking barefoot on wet floors or sharing towels	Dry feet well. Don't share towels
Cholera	Bacterium	Sickness, thirst, Diarrhea & stomach pains	Infected water	Clean water before drinking
Common cold	Virus	Sneezing, runny nose	Droplets in air	Sneeze into tissue & wash hands
Rabies	Virus	Twitches, fever, fits	Being bitten by an animal with rabies	Vaccine
Measles	Virus	High temperature, rash, runny eyes or nose	Droplets in air	Vaccine
Salmonella	Bacterium	Nausea, sickness, Stomach pain	Eating infected/ undercooked food	Cook food thoroughly
Tuberculosis (TB)	Bacterium	Persistent cough and fever	Droplets in air	Vaccine
Rubella (German measles)	Virus	Slight temperature, slight rash	Droplets from nose	Vaccine

science

S2 Micro-organisms Homework 3 (cont)

1. Draw the following table into your homework jotter using PENCIL & RULER. Then use the information in the previous table to fill it in.

Point of entry	Example of disease spread this way	Prevention
Air		
Food		
Water		
Touch		
Animals		

10 marks

science

S2 Micro-organisms Homework 4

Answer the questions in full sentences in your homework jotter.

Questions

1a What type of white blood cell is involved in non-specific immune responses? **1 mark**

1b How do these cells combat invading pathogens like bacteria? **1 mark**

1c What general name is given to this process? **1 mark**

2a What type of white blood cell is involved in specific immune responses? **1 mark**

2b What molecules, also involved in immunity, are produced by these cells? **1 mark**

2c How do these molecules bind to their particular antigen? **1 mark**

3a Why do we seldom get ill due to the same pathogen twice? **1 mark**

3b What are the three differences between the primary and secondary immune responses? **3 marks**

10 marks

S2 Micro-organisms Homework 5

Read the following passage about swine flu and use it to answer the questions that follow in full sentences in your homework jotter.

What is swine flu?

Swine flu is a type of influenza caused by a virus. There are many types of flu virus and these are constantly changing, which makes it hard for the human immune system to deal with it. The particular type of virus that causes Swine flu is known as H1N1.

Although the first cases of Swine flu appeared in Mexico, there have since been a growing number of cases reported round the world, including the UK. Initially, all the confirmed cases of Swine flu in the UK were people who had visited Mexico, but these were followed by many more cases as the virus was transmitted from person to person when they returned to the UK.

The number of cases rose in the summer of 2009 (which is very unusual for that time of year as it is not typically flu season). Since the schools returned in September 2009 there has been widespread transmission with a steadily rising number of cases. In the last week of September there were 14,000 new cases, which represented an increase of 45% over the previous week. This second wave of Swine flu has mostly affected schoolchildren.

Symptoms

Swine flu symptoms begin within 2 days of exposure, at which points the person is most infectious. It is highly contagious and once infected; a person soon develops symptoms which include:

High fever (above 38 ^0C)	Headache	Exhaustion/ fatigue
Cough	Sore throat	Upset stomach
Aching muscles	Chills & shivers	

It can be difficult to tell mild flu from a cold, but the symptoms of a cold tend to be limited to the head while flu causes symptoms all over.

Passage continues over the page

S2 Micro-organisms Homework 5 (cont)

Treatment and prevention

If you think you have developed flu-like symptoms, you should stay at home to avoid contact with other people. Contact your Doctor or the National Pandemic Flu Service who will give you advice.

The treatments are not a cure for swine flu, but an anti-viral drug such as Tamiflu or Relenza may shorten the symptoms.

As with any type of flu virus, it is important to avoid the spread by covering the nose and mouth when sneezing or coughing and by disposing of tissues carefully. Hands should be washed.

Finally, a Swine flu vaccine has been developed for groups of people most at risk form complications such as those with serious heart or breathing diseases, diabetes or weakened immune systems.

bbc.co.uk/health

Questions

1. What type of organism causes Swine flu? **1 mark**

2. Where did the first cases of Swine flu appear? **1 mark**

3. How did Swine flu come to the UK? **1 mark**

4. Why was it unusual that the number of cases of Swine flu increased over the Summer of 2009? **1 mark**

5. Which group of people is most affected by Swine flu? **1 mark**

6. Which 3 symptoms of Swine flu would show it is not a cold? **3 marks**

7. What 2 pieces of advice are given for someone who suspects that they might have Swine flu? **2 marks**

10 marks

Extension Problem Solving Exercises

Drawing Line Graphs

When drawing graphs always

- Draw Axes
- Add a scale (include zero)
- Label both the X and Y axis
- Remember units
- Use a Ruler
- Plot in pencil

Note: Make sure that your graph covers over half of the available graph paper

Question 1

The table shows the volume of air breathed per minute by an athlete at rest, during exercise and during the recovery time.

Draw a line graph using the information from the table.

Time (minutes)	*Volume of air breathed per minute (litres)*
0	6
2	6
4	56
6	60
8	60
10	60
12	34
14	31
16	6
18	6

(3)

Question 2

In an investigation, the diameter of arm muscles were compared to the mass they could lift.

The results are shown in the table below.

Diameter of Muscle (cm)	Mass Lifted (kg)
3	2.0
4	2.4
5	3.0
6	3.8
7	5.0
8	7.0
9	10.0

i. Show these results in a line graph (3)

ii. What conclusion can be drawn from these results? (1)
(*What does the graph tell you?)*

Drawing a Bar chart and getting information from different graphs

Question 3

ORGANISM	NUMBERS OF PAIRS OF CHROMOSOMES
Kangaroo	6
Chicken	18
Rhesus monkey	21
Gorilla	24
Dog	27
Cow	30

i. Use the information to plot a bar chart. (3)

ii. Which animal has the most numbers of pairs of chromosomes? (1)

iii. Which animal has the least numbers of pairs of chromosomes? (1)

Now for some calculations

iv. Calculate the total number of pairs of chromosomes in all the different animals. (1)

v. Calculate the average number of pairs of chromosomes found in the organisms? (1)

vi. What is the difference in the number of pairs of chromosomes between a gorilla and a monkey? (1)

Pie chart and Percentage calculations

Question 4 – using information from a table to complete a pie chart

Here are data about nutritional values found on some food packaging:

Food group	protein	fat	fibre	carbohydrate
content g/100g	10	2.5	5	2.5

percentage = $\frac{\text{part}}{\text{total}} \times 100$

i. Put this data on a pie-chart. (1)

ii. Calculate the percentage of fat in the food sample (1)

iii. Calculate the percentage of carbohydrate in the food sample (1)

iv. Calculate the ratio of fat to that of fibre. (1)

v. How many times greater is the protein content in comparison to the fat content? (1)

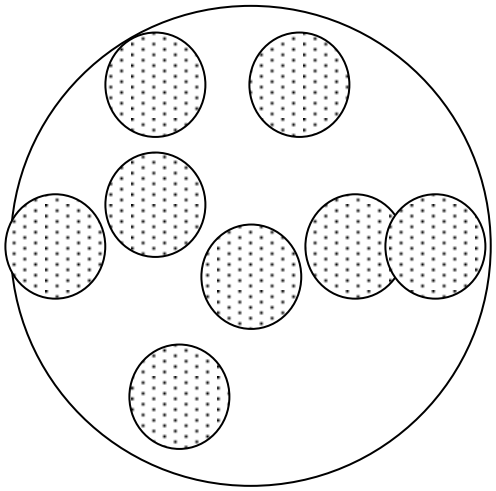
vi. Which food group contains twice as many grams per 100g as carbohydrates? (1)

Calculations involving cell size and converting between millimetre and micrometres

Remember your FIELD of VIEW is the area that you can see when you look down the microscope slide

Question 5

In order to look at red blood cells you need to use a very high magnification.
The Field of View shown below is **50 micrometres** in diameter.



i. Estimate the average length of one cell (1)
(*show your working*)

ii. Now convert the average length of one cell into millimetres. (1)

iii. What would the diameter of the Field of View be in millimetres? (1)

Extracting information from a written passage

Question 6

The following results were collected during a class experiment.

Starting length of our cress seedlings was measured.
Seedlings were left on the window sill for one week.
The length of the seedlings was measured the next lesson.
Mary's seedlings started at 4.2cm and grew to 5.0cm
John's measured 3.1cm at first and grew 2.6cm
Tom's went from 2.9cm to 4.3cm
Joanna's seedling had grown 1.2cm after one week and were now 4.0cm long

i. Use the information to copy and complete the following table

Pupil's name	Length at Start (cm)	Length at Finish (cm)	Increase in Length (cm)
Mary	4.2		
			2.6
Tom			
Joanna			

(4)

ii. What is the average increase in length for the four seedlings? (1)

iii. If there were 20 pupils in the class, what percentage of the class would these four pupils represent? (1)

Extracting information from a written passage

- **Answering questions**

Question 7

Read the passage below and answer the following questions:

Ecosystems are made up of living things like plants, animals and tiny bacterium (microorganisms) and non-living things like rocks, water, air and sunlight. An ecosystem needs a balance of living and non-living things.

Plants are called producers because they produce the energy in an ecosystem with sunlight through a process called photosynthesis. Then they pass their energy on to the animals that eat them. The animals are eaten by other animals and pass the energy on once again. Energy flows through an ecosystem as one animal eats another animal or plant.

Plants make (produce) their own food using water, sunlight and carbon dioxide (photosynthesis). The animals (insects, mice, chipmunks, squirrels, rabbits, deer) that mostly eat plants are called the herbivores. Herbivores feed directly on the producers. Animals (fox, coyotes, eagles, owls) who eat herbivores are carnivores (meat eaters).

Last but not least, the Decomposers (fungi and bacteria) feed on dead animals and plants releasing or recycling their nutrients back into the soil.

i. What are the two things all ecosystems are made up of? (2)

ii. Give 3 examples of non-living things found in an ecosystem. (3)

iii. What three things are required for the process of photosynthesis? (3)

iv. From the passage, give an example of a carnivore. (1)

v. State two reasons why decomposers are important in an ecosystem. (2)