

Homework task 1 – 9B1 Cells and body processes

Section 1: Review of prior knowledge

1. What is produced when magnesium burns with oxygen?
2. How can we know the number of protons in an atom?
3. Recall the equation for pressure
4. How are forces represented on diagrams?
5. Where does respiration occur in a cell?
6. What is ventilation (breathing?)

Section 2: Refreshing current knowledge

1. What is the name of the process by which nutrients pass from the lumen into the blood?
2. Name three ways that the small intestine is adapted for its function

Section 3: Application of knowledge

Q1. The photograph shows a model of the small intestine.

Bread, saliva and water were mixed together.

This bread mixture was placed inside a tube made from one leg of a pair of tights.



The person squeezed the tube behind the mixture to move the mixture along the tube.

Liquid came through the sides of the tube during the demonstration.

This liquid was collected and the concentration of sugar was measured at the start and after every 30 seconds.

The results are shown in the table.

time / s	concentration of sugar in liquid / mg per cm ³
0	9
30	15
60	22
90	28
120	32
150	32
180	32

(i) Describe how the concentration of sugar in the liquid changes between 0 and 180 seconds.

(2)

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

(ii) Explain how the sugar was produced in the bread mixture.

(2)

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

(iii) Suggest **one** way that the tube is not a good model of the small intestine.

(1)

.....
.....

Homework task 2 – 9B2 Respiration

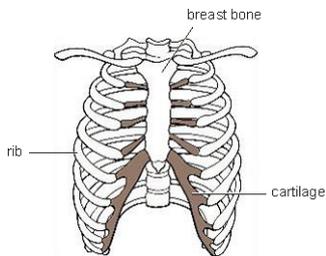
Section 1: Review of prior knowledge

1. What are the characteristic processes of life?
2. What are all living and previously living organisms made of?
3. What is respiration?
4. How do molecules move through cytoplasm?
5. Place the following in size order- molecule, cell and atom
6. How can we describe the cell membrane?

Section 2: Refreshing current knowledge

Q2.

The drawing below shows the human rib cage.



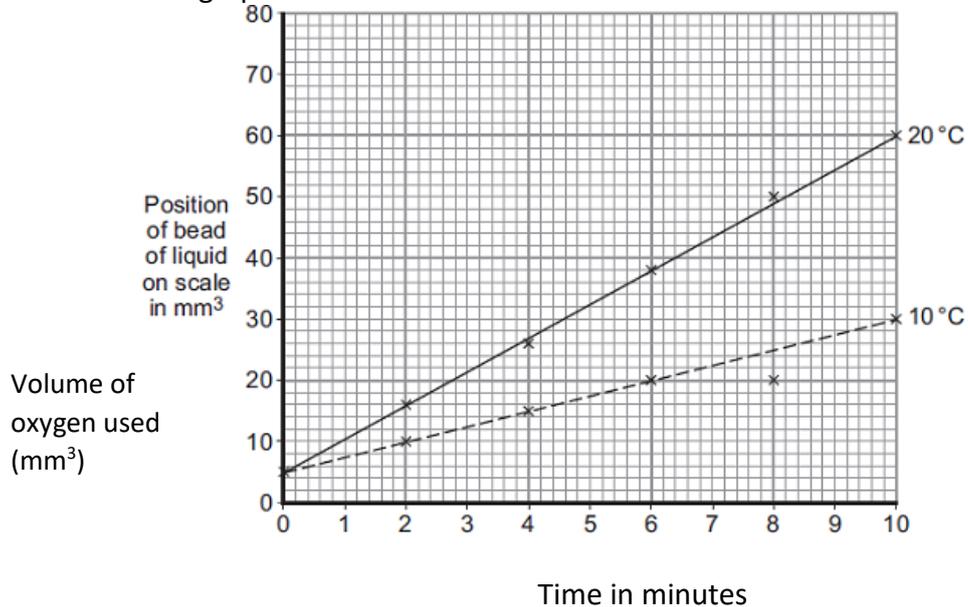
- (a) The rib cage protects organs in the chest. Give the names of **two** organs in the chest.
- (b) The ribs are attached to the breast bone by cartilage which bends easily. This lets the space in the chest get bigger. Why is it important that the space can get bigger?

Section 3: Application of knowledge

Q1.

- (b) Some students investigated the effect of temperature on the rate of aerobic respiration in earthworms.

The graph shows the students' results.



- (i) How much oxygen did the earthworms take in during the 10 minutes at 20°C?

- (ii) The earthworms took in this volume of oxygen in 10 minutes.

Use your answer from part (c)(i) to calculate how much oxygen the earthworms took in each minute.

- (iii) The earthworms took in less oxygen each minute at 10°C than they took in at 20°C. Explain why.

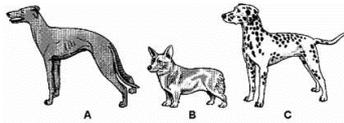
Homework task 3 – 9B3 Genetics

Section 1: Review of prior knowledge

1. What is the process trees use to make their food?
 1. When plants and animals die and are buried for millions of years, what is formed?
 2. Give the formulae for oxygen, carbon dioxide and water
 3. Why are group 1 metals so reactive?
 4. What is the name given to a turning force?
 5. What is a pivot?

Section 2: Refreshing current knowledge

The drawings below show three dogs. They all look different.



- (i) Which word describes the differences between these dogs? Tick the correct box.

adaptation	<input type="checkbox"/>	reproduction	<input type="checkbox"/>
vaccination	<input type="checkbox"/>	variation	<input type="checkbox"/>

1 mark

- (ii) The drawing below shows a puppy. Dog C is the puppy's mother.



Why does the puppy look like his mother? Tick the correct box.

- | | |
|--|--------------------------|
| Information passed from the mother in an egg. | <input type="checkbox"/> |
| Information passed from the mother in a sperm. | <input type="checkbox"/> |
| Information passed from the mother in milk. | <input type="checkbox"/> |
| Information passed from the mother in blood. | <input type="checkbox"/> |

1 mark

Section 3: Application of knowledge

The drawings show identical twins, Sara and Helen, and their parents.



- (a) (i) Sara and Helen have blue eyes like their mother. Describe how genetic information is passed on from a parent to a child.

.....

2 marks

- (ii) Sara and Helen have brown hair like their father and blue eyes like their mother. Why do children have characteristics of both parents?

.....

1 mark

- b) Sara and Helen are identical twins. Why do they have identical characteristics?

.....

1 mark

(c) Sara now spends a lot of her time working outdoors in a hot country. Helen now works in an office in England. The table shows information about three human characteristics.

characteristic	Is it identical for Sara and Helen?
eye colour	yes
skin colour	no
weight	no

Explain why their eye colour is identical but their weight and skin colour are **not** identical.

.....

Homework task 4 – 9B4 Ecology

Section 1: Review of prior knowledge

1. Name the four scientists that discovered the structure of DNA.
2. Name two reasons for variation within a species.
3. What effect does increasing concentration have on the rate of reaction?
4. What effect does increasing pressure have on the rate of reaction?
5. State Hooke's law
6. What is meant by elastic deformation?

Section 2: Refreshing current knowledge

Fill in the blanks using the words below:

Conservation

The future of our species on Earth depends on maintaining _____. Activities that create air and water pollution, are _____ biodiversity in many ecosystems. Conservation of species and habitats by charities, governments and individuals helps to maintain the _____ of biodiversity

Humans can interact both positively and negatively with ecosystems.

A list of human interactions is given below:

- Creating _____
- _____ habitats
- Introducing _____ to habitats
- _____ programmes
- Developing _____
- Managing _____

Reducing vaccines High biodiversity land nature reserves range removing new species breeding

Section 3: Application of knowledge

A student was investigating the populations of organisms in a garden.

Figure 15 shows the estimates of the number and biomass of some of the organisms in the garden.

organism	number	mean biomass of each organism in grams	biomass of population in grams
cabbages (plants)	80	70	5600
earthworms	620	3.4	?
slugs	30	4.1	123
hedgehogs	1	620	620
squirrels	2	600	1200

Figure 15

(i) Calculate the biomass of the population of earthworms in the garden.

(1)

.....

(ii) Hedgehogs eat slugs and earthworms.

Slug pellets were used to kill the slugs.

Explain how killing the slugs would affect the population of earthworms in this garden.

(2)

(iii) Describe a method that could be used to estimate the population of slugs in the garden.

(3)

(Total for question = 6 marks)

Homework task 5 – 9C1 Atoms and the Periodic Table

Section 1: Review of prior knowledge

1. What is biomass?

2. What chemical is used to test for starch?

3. Which greenhouse gas is responsible for recent climate change?

4. Which gas is responsible for Acid Rain?

5. Why do objects cool down?

6. In which states of matter can convection take place?

Section 2: Refreshing current knowledge

1) Draw and label an atom:

2) State what is meant by atomic number (1)

.....

.....

.....

3) Explain what is meant by relative atomic mass (2)

.....

.....

.....

.....

4) Explain why an atom is neutrally charged overall (2)

.....

.....

.....

.....

Section 3: Application of Knowledge

a) Complete the table to show the relative mass of a neutron and of an electron.

Particle	Mass
Neutron	1
Proton	
Electron	

(2)

(b) Complete the sentence by putting a cross next to your answer.

(1)

An atom has no overall charge because it contains

- A more protons than electrons
- B the same number of electrons and protons
- C the same number of electrons and neutrons
- D more neutrons than electrons

(c) The atomic number of lithium is 3.

The mass number of an atom of lithium is 7.

State the name and number of each of the particles in the nucleus of this atom.

(2)

.....

.....

.....

.....

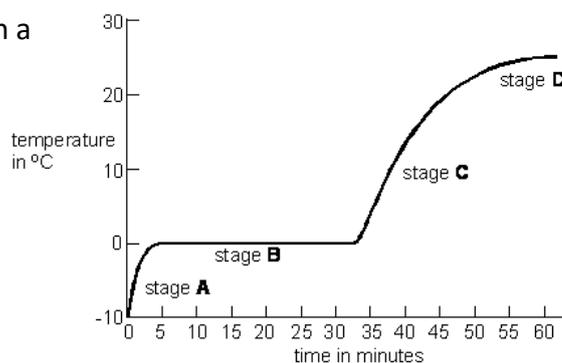
Homework task 6 – 9C2 Particles

Section 1: Review of prior knowledge

1. What do we call diseases that cannot be passed from person to person e.g. are caused by genes or lifestyle?
2. Give two ways that we can easily represent really big measurements or really small measurements.
3. What is a molecule?
4. Give the formulae for oxygen, carbon dioxide and water.
5. What effects does an unbalanced force have on motion of an object?
6. How can the motion of an object be described if the forces acting upon it are balanced?

Section 2: Refreshing current knowledge

A test tube of crushed ice is taken out of a freezer and left in a warm room. The graph shows how the temperature in the test tube changes.



(a) What is happening to the ice at stage B? (1)

.....

(b) Why does the temperature of the water stop rising at 23°C (stage D)? (1)

.....

(c) Four descriptions of the ways molecules could move are given below.

1. They vibrate around fixed points.
2. They move past each other and are close together.
3. They move in straight lines, colliding occasionally.
4. They all move in the same direction at the same speed.

(i) How do the molecules move at stage A? **Write A in the correct box above.** (1)

(ii) How do the molecules move at stage C? **Write C in the correct box above.** (1)

(d) Ice from a freezer is put in a glass of water at room temperature. The ice floats in the water.

(i) What does this show about the density of the ice compared to that of water? **Tick the correct box.** (1)

1. Ice is more dense than water.
2. Ice and water have the same density.
3. Ice is less dense than water.
4. Ice has a density of zero.

(ii) The fact that ice floats in water tells us something about the distances between the molecules.

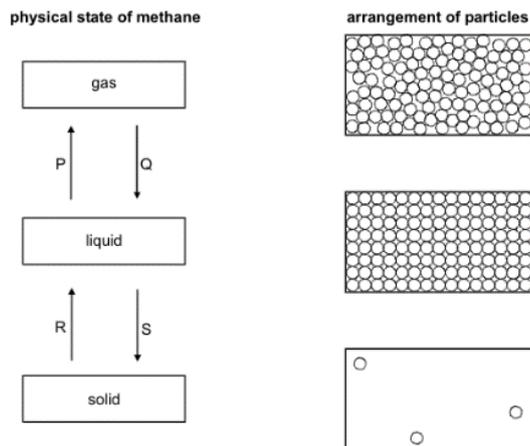
Tick the box by the correct statement. (1)

1. The molecules are further apart in ice than in water.
2. The molecules are the same distance apart in ice and in water.
3. The molecules are closer together in ice than in water.

Section 3: Application of knowledge

(a) Methane can be a gas, a liquid or a solid. In the diagram below, arrows P, Q, R and S represent changes of state.

The boxes on the right show the arrangement of particles of methane in the three different physical states. Each circle represents a particle of methane.



(i) Draw a line from each physical state of methane to the arrangement of particles in that physical state.

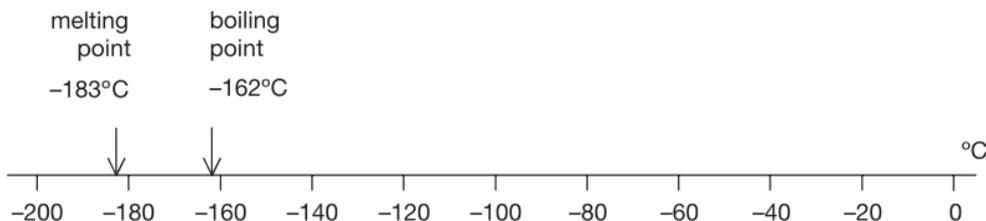
Draw only three lines. (1)

(ii) Arrows P, Q, R and S represent changes of state. Which arrow represents: (2)

evaporation?

melting?

(b) Methane is the main compound in natural gas. The scale below shows the melting point and the boiling point of methane. Methane has three physical states: solid, liquid and gas.



(i) What is the physical state of methane at -170°C ? (1)

Homework Task 7 – 9C3 Chemical Reactions

Section 1: Review of prior knowledge

1. What is Newton's first law of motion?	
2. What do we call diseases that cannot be passed from person to person?	
3. Which body system responds to infection and fights disease?	
4. Why does an atom have neutral charge?	
5. How can the motion of an object be described if the forces acting upon it are balanced?	
6. How are group numbers and electrons related?	

Section 2: Refreshing current knowledge

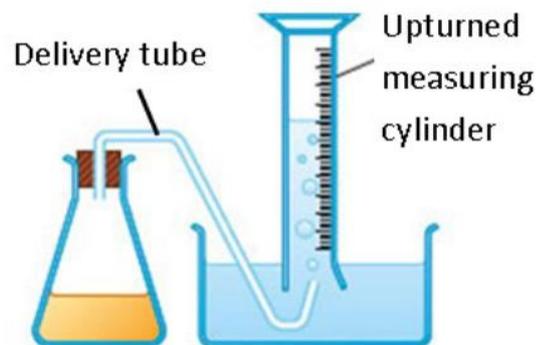
- 1) What name is given to a substance that can increase the rate of a chemical reaction without being altered itself?
- A Bunsen burner
 B Volumiser
 C Dehumidifier
 D Catalyst
- 2) What happens to the size of the particles in a chemical reaction?
- A they get bigger
 B they get smaller
 C they stay the same
 D impossible to tell
- 3) Which of the following must happen for a reaction to occur?
- A substances must change state
 B particles must collide
 C particles must get hotter
 D particles must increase in size
- 4) What name is given to the amount of energy particles need to have for a reaction to occur?
- A activation energy
 B gravitational potential energy
 C catalytic energy
 D optimum energy

Section 3: Application of knowledge

A student investigates how the concentration of an acid affects the rate of reaction between hydrochloric acid and chalk.

This is the method that they followed

- Set up the equipment shown to the right. →
- Add acid into the conical flask.
- Add large pieces of chalk.
- Place a bung on the top of the conical flask with a delivery tube attached so that the gas produced is collected.
- Measure the volume of gas that is released in the first **thirty seconds** of the reaction.
- Repeat the previous steps using different concentrations of acid.



They repeated the experiment twice more for each concentration of acid.

Their results are shown in the table below.

concentration of acid (mol/dm ³)	volume of gas collected in thirty seconds (cm ³)			Average volume of gas collected in 30 seconds (cm ³)	Rate of reaction (cm ³ /s)
	repeat 1	repeat 2	repeat 3		
0.10	10	13	13	12	0.4
0.40	36	41	37	38	1.3
1.00	92	89	89		

a) Calculate the values missing from the table and write them in. Use the space below to show your working:

b) What is the trend shown in the results?

c) Suggest at least two other changes apart from using higher concentrations of acid that could increase the rate of reaction.

d) The symbol equation below shows the reaction that took place in the experiment. Balance this equation.



Homework task 8 – 9C4 Earth Science

Section 1: Review of prior knowledge

1. What is the organelle in which respiration occurs?

2. What is the difference between ventilation and respiration?

3. What is kinetic energy?

4. What happens to the number of particles during a state change?

5. How do you use a distance-time graph to find the speed of an object?

6. What does a curved line on a distance-time graph mean?

Section 2: Refreshing current knowledge

1. Describe how an intrusive igneous rock forms.

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

2. Describe how an extrusive igneous rock forms.

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

Section 3: Application of knowledge

Q1. (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Earth's earliest atmosphere is thought to have been formed by

(1)

- A animals breathing
- B photosynthesis in plants
- C the oceans cooling
- D gases from volcanoes

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Earth's earliest atmosphere contained large amounts of carbon dioxide.

The percentage of carbon dioxide in the Earth's atmosphere today is

(1)

- A less than 1%
- B 5%
- C 21%
- D 78%

(ii) Write the formula of a molecule of carbon dioxide.

(1)

(iii) The percentage of carbon dioxide in the atmosphere has decreased since the Earth's earliest atmosphere.

Explain what has caused the amount of carbon dioxide in the atmosphere to decrease.

(2)

.....
.....

(iv) State one human activity that increases the amount of carbon dioxide in the atmosphere today.

(1)

.....

(v) Describe the test to show that a gas is carbon dioxide.

(2)

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

Homework task 9 – 9C5 Metals

Section 1: Review of prior knowledge

1. When is a species considered to be extinct?
2. State the sex chromosomes contained within a male and a female body cell.
3. Describe how metamorphic rocks are formed
4. Name two greenhouse gasses other than carbon dioxide
5. What does sound travel fastest in? Solid, Liquid or Gas?
6. What is the angle of reflection?

Section 2: Refreshing current knowledge

1. Fill in the blanks using the words below:

Combustion is an example of a type of reaction called _____.
In an oxidation reaction, a substance _____.
Metals and _____ can take part in oxidation reactions.

Gains non-metals oxidation oxygen reduction lose

2. Complete the word equation, then write as a balanced symbol equation :

magnesium + oxygen → _____

Section 3: Application of knowledge

Q1. Calcium nitrate solution can be made by adding solid calcium carbonate to dilute nitric acid in a beaker.

The solid calcium carbonate is added until some remains at the bottom of the beaker.

(i) After this reaction the liquid in the beaker is (1)

- A acidic
- B alkaline
- C neutral
- D pure water

(ii) Explain why the calcium carbonate is added until some solid remains at the bottom of the beaker. (2)

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

(iii) Write the balanced equation for the reaction between calcium carbonate and nitric acid to form calcium nitrate, $\text{Ca}(\text{NO}_3)_2$. (3)

.....

Q2. Magnesium carbonate, MgCO_3 , can be reacted with dilute sulfuric acid, H_2SO_4 , to form magnesium sulfate, water and carbon dioxide. Write the balanced equation for this reaction. (2)

.....

Q3. When dilute hydrochloric acid is added to copper carbonate, a gas is produced. Describe a test to show that this gas is carbon dioxide. (2)

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

Q4. Unreactive metals are found as uncombined metals in the Earth's crust. When iron oxide is heated with carbon, iron is produced.

(i) Complete the word equation for the reaction. (2)

iron oxide + carbon \rightarrow +

Homework task 10 – 9P1 Forces and Motion

Section 1: Review of prior knowledge

1. Give two reasons why cells need food.

2. Name the unicellular organisms that live in the human digestive system and keep it healthy.

1. Where on the periodic table are the halogens found?

2. What is the maximum number of electrons found in the first energy level?

3. Define friction

4. Recall the equation for pressure

Section 2: Refreshing current knowledge

Fill in the gaps in these sentences using words below. You do not need to use all of the words:

When a car is travelling at a constant speed, the forces on it are _____. The forwards force from the _____ is exactly balanced by the forces of air _____ and _____.

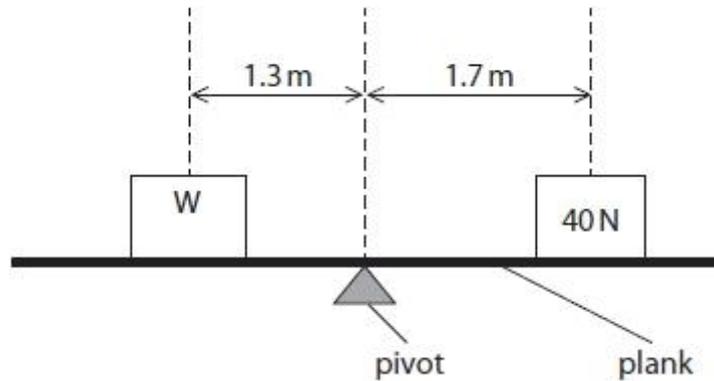
Balanced forces do not change the _____ of something. A car with balanced _____ on it will carry on moving at the same speed.
_____ forces make objects _____ or slow down.

Moving objects do not need _____ to keep moving. A space probe orbiting the Sun has no forces of _____ to slow it down. It will carry on _____ the Sun.

balanced balanced do do not engine forces forces friction friction
orbiting resistance speed speed up unbalanced unbalanced

Section 3: Application of knowledge

Figure 7 shows two boxes on a plank.
The plank is balanced on a pivot.



One box has a weight of 40 N.

- (i) Calculate the moment of the 40 N weight about the pivot.

State the unit.

Use the equation

moment = force \times perpendicular distance

(3)

moment =

unit

- (ii) Calculate the weight, W, needed to balance the plank in Figure 7.

(3)

W = N

(Total for question = 6 marks)

Homework task 11 – 9P2 Energy

Section 1: Review of prior knowledge

1. Whereabouts in the digestive system does absorption happen?
2. What do we call diseases that cannot be passed from person to person e.g. are caused by genes or lifestyle?
3. What is the maximum number of electrons in the second energy level?
4. How are group numbers and electrons related?
5. What is the name given to a turning force?
6. How are moments calculated?

Section 2: Refreshing current knowledge

Fill in the blanks using the terms below:

There are three states of matter _____, _____ and _____.

One form of heat transfer is known as _____. This is the primary form of the transfer of heat through _____ materials. The process of conduction works through the _____ of particles with their neighbouring particles. When they collide they transfer energy. The more energy a particle has the more it _____. Therefore when it collides with another particle it will transfer a _____ amount of energy.

Gas, liquid, conduction, moves, larger, conduction, collisions, solid, solid

Section 3: Application of knowledge

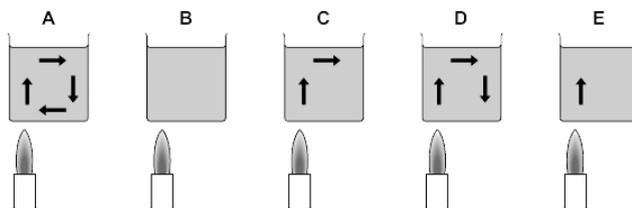
Convection is an important energy transfer.

a) Complete the following sentence.

Convection only happens in and
because the particles in these states are free to move around. (2)

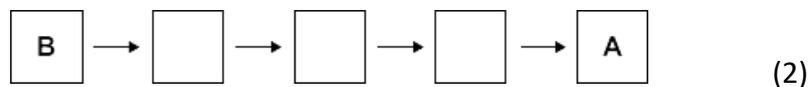
b) A Bunsen burner is used to heat a beaker of water. The energy is transferred through the water by a convection current.

The arrows on the diagrams show the movement of water as it is heated. The diagrams are **not** in order.



Complete the sequence below to put the diagrams in the correct order.

The first and last boxes have been completed for you.



A student investigates the infrared radiation being emitted by different coloured surfaces to the surroundings.

a Draw a ring around each correct answer to complete the sentences.

(i) All objects **absorb / conduct / insulate** infrared radiation (1)

(i) Compared with cooler objects, hotter objects **emit less / the same amount of / more** infrared radiation (1)

3

a The student pours 300 cm³ of hot water into each of 3 metal cubes and seals the top of each cube.

(i) Draw a ring around the correct answer to complete the sentence.

Energy is transferred through the sides of the metal cubes by
conduction / convection / radiation (1)

Homework task 12 – 9P3 Electricity

Section 1: Review of prior knowledge

1. What is a dominant allele?
2. What causes genetic variation?
3. What is a catalyst?
4. How do catalysts increase the rate of reaction?
5. What is radiation?
6. Which surfaces are the best absorbers/emitters of infrared radiation?

Section 2: Refreshing current knowledge

Use the words underneath to fill in the blanks:

An electric current is the _____ of _____ through a conductor. In an electric circuit the charge is carried by _____. The electrons can transfer _____ to components such as a _____. In a circuit we measure this as the _____. It is this easy to use transfer of energy that makes electric circuits so _____.

Flow, energy, voltage, useful, electrons, charge, bulb

Section 3: Application of knowledge

The box on the right shows three different versions of the formula relating voltage, current and resistance.

$$\begin{aligned} \text{voltage} &= \text{current} \times \text{resistance} \\ \text{current} &= \frac{\text{voltage}}{\text{resistance}} \\ \text{resistance} &= \frac{\text{voltage}}{\text{current}} \end{aligned}$$

1. A 2 metre long piece of wire has a resistance of 2Ω . What would its resistance be if it was 4 metres long? Explain your answer.
2. Another wire is the same length and made of the same material, but it is thicker. Suggest what its resistance might be and explain your answer.
3. Complete this table by filling in the missing values.

	Voltage (V)	Current (A)	Resistance (Ω)
a	12		6
b		10	5
c	6		3

4. The results in the table above are part of an investigation into the resistances of different metals. Samala says that the material tested in part c has the lowest resistance.
What information about the investigation would you need to know to say whether or not Samala is correct?
5. A current of 0.1 A flows through a material when the voltage across it is 5000 V.
 - a. Calculate the resistance of the material.
 - b. Is this material a metal? Explain your answer.

Homework task 13 – 9P4 Waves

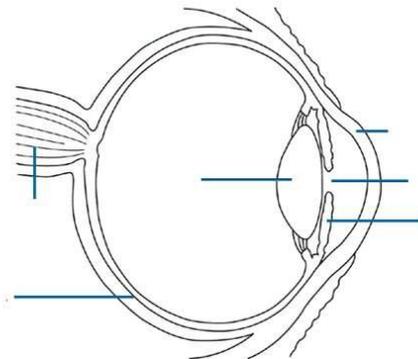
Section 1: Review of prior knowledge

1. Why is the muscle of the heart thicker on the left side?
2. Why does heart rate increase during exercise?
3. How is energy stored in substances when they get hotter?
4. What does a substances boiling point represent?
5. What is a free body diagram?
6. What is Newton's first law of motion?

Section 2: Refreshing current knowledge

1. Name the individual colours of light that make up the spectrum.

2. Label the diagram of the eye.



Section 3: Application of knowledge

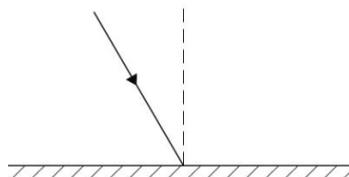
1. These sentences explain why you have a shadow on a sunny day. Complete the sentences using words from the box.

absorbed curved opaque straight translucent transmitted
transparent wavy

Light travels in _____ lines. Your body is _____ and so light that hits it is _____ or reflected, and is not _____ through it.

7. [2 marks]

2a The diagram below shows a plane mirror with a ray of light hitting it. Complete the diagram by drawing in the reflected ray.



8. [1 mark]

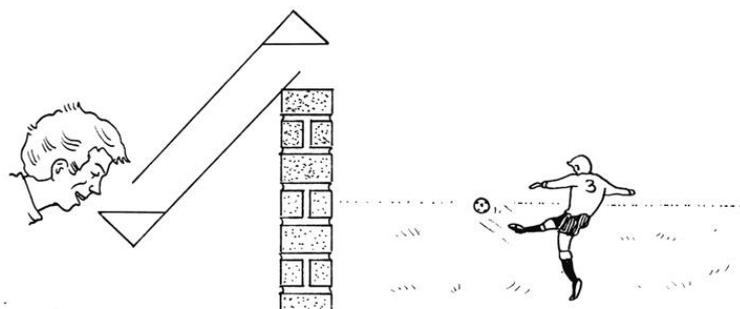
b Look at the diagram in part **a**. What is the name of the dashed line at right angles to the mirror?

[1 mark]

c A piece of paper does not reflect light in the same way as a mirror. Describe what happens to light when it hits a piece of paper.

9. [1 mark]

d Draw a ray of light on the diagram to show how the person can see the ball.



Homework task 14 – 9P6 Astronomy

Section 1: Review of prior knowledge

1. When extracting DNA from fruit, what is the role of the detergent solution?
2. What are gametes?
3. Which greenhouse gas is responsible for recent climate change?
4. Give an example of a metamorphic rock.
5. Name the colours in the visible spectrum in order (from the lowest frequency).
6. Which unit of measurement is used for the loudness of a sound?

Section 2: Refreshing current knowledge

Some sentences have more than one correct ending.

2 A galaxy is:

- a pattern of stars in the sky.
- millions of stars together.
- a very large star.

3 The Milky Way is:

- the name of our galaxy.
- the name for the way the stars seem to move during the night.
- the name for a bright band of stars in the sky.

2 A light year measures:

- distance.
- time.
- brightness.

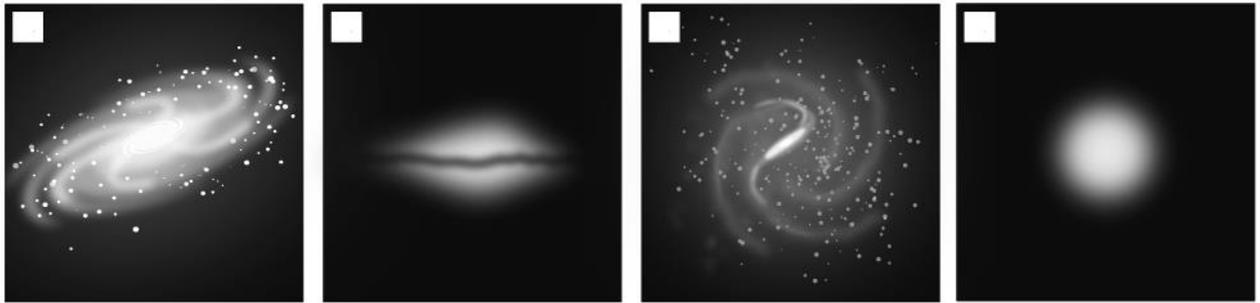
4 The Sun looks brighter than the other stars because:

- it *is* brighter.
- it is much closer.
- we can only see it during the day.

Section 3: Application of knowledge

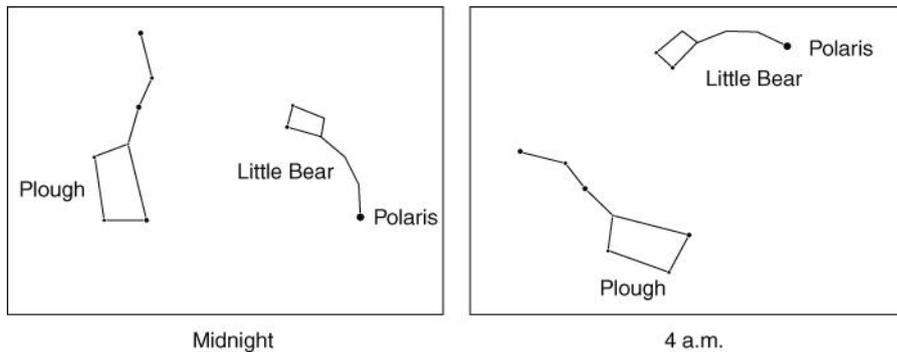
1. What is:
 - a. a constellation _____
 - b. a galaxy _____
 - c. the Universe? _____

2. Which of these is the shape of our galaxy? Tick (✓) *one* box.



3. What is our galaxy called? _____

4. Danny observed the sky at midnight and at 4 a.m. When he looked to the north, this is what he saw.



Explain why the constellations were in different places for his two observations.

5. Write these objects in order of size, start with the smallest: star, planet, Universe, galaxy.

6. Write down *two* differences between a star and a planet.

a.

b.

7. Tick (✓) *one* box to show the size of a light year.

ten thousand km

ten million km

ten million million km