Teacher: Mr. A. Goodison

1st Year Science, Christmas 2019
Time allowed: 1 ½ hours

Mr. A. Goodison

Student Name _____

Answer all questions in the spaces provided.

Good luck!

A photo of the planet Saturn, taken by the Cassini space probe. The tiny bright dot at the arrow is Earth.

Question	Marks	Awarded
1	15	
2	21	
3	45	
4	42	
5	18	
6	15	
7	21	
8	30	
Total	**207**	
Grade descriptor		

Junior Cycle	
Percentage	**Grade Descriptor**
≥ 90 to 100	Distinction
≥ 75 and < 90	Higher Merit
≥ 55 and < 75	Merit
≥ 40 and < 55	Achieved
≥ 20 and < 40	Partially Achieved
≥ 0 and < 20	Not Graded (NG)

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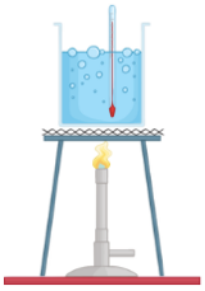
Question 1. (15 marks)

Lab safety
In science we often need to heat water.



Name two safety precautions which you would normally carry out while doing this. (6)

1.
Tie back long hair OR tidy work area of books and bags OR place stools under desks OR wear safety goggles OR any similar precaution

_____

2.
_____

_____

_____

Name a piece of lab equipment which could be used to heat the water (3)

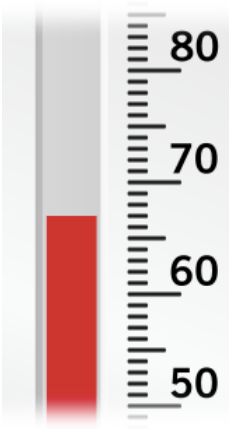
Name: hot plate OR Bunsen burner

Name a piece of lab equipment which could be used to measure the temperature. (3)

Name: Thermometer

During the experiment you measured the temperature. What is the temperature reading shown on this measuring instrument (the unit is ^{o}C)

Temperature _____67^{o}C_____ (3)



Question 2 (21 marks)

Some students measured the area of their school journal. The results are shown in the table below.

Name	Area of Journal (cm^2)
John	408
Isabelle	419
Weronika	402
Benjamin	1209
Janet	397

From the table above, which student do you think might have made a mistake and why?

Name of student Benjamin_____**(3)**

Explain why you picked this student: **(3)**

His answer was far above the average/other students_____

Do not accept his answer was the highest _____

_____

None of the students got the same answer for the area of their journals. Suggest a reasons why this might have happened. **(3)**

The journals may not have been the exact same length. OR Students may have measured incorrectly (eg ruler at an angle, not starting at 0, used the wrong units etc.)

Separating Mixtures

Identify which separating method should be used for the mixtures listed below (12)

Separating methods; **Distillation, Evaporation, Filtration, Chromatography**

To separate sand and water use Filtration (3)

To separate salt and water so that you have a sample of salt use Evaporation (3)

To get pure drinking water from salt water use Distillation (3)

To separate pen ink into its different colours use Chromatography (3)

Question 3 (45 marks)

Complete the table below for the instruments shown. **(9 x 2 marks)**

In each case, state what physical quantity the instrument measures. Also state the unit used for that measurement. (Some parts of the table are already completed for you)

Metre stick

Stopwatch

Graduated cylinder

Thermometer

Trundle Wheel

Mass balance

Instrument	**Quantity measured**	**Unit**
Metre stick	Length OR distance	m OR cm OR mm etc.
Stopwatch	Time	S OR min OR hours etc.
Graduated cylinder	Volume	cm^3 or mL
Thermometer	Temperature	^oC
Trundle wheel	Length OR distance	m OR km etc.
Mass balance	Mass	Kilograms (kg)

The average mass of a baby is 3.5 kg at birth and 8 kg at 1 year of age. Calculate how much mass a baby usually gains over the year.

8 kg – 3.5 kg = 4.5 kg

Answer __4.5____ (6)
Unit____kg___ (3)

Calculate the area of a rectangle of length 9 cm and width 4 cm.

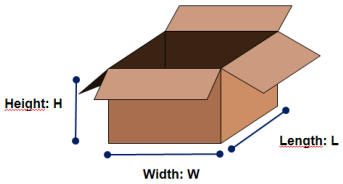
Area = length x width
Area = (9 cm) x (4 cm)
Area = 36 cm^2

Answer 36 cm^2 (6)
Unit_____cm^2___ (3)

Calculate the volume of a box of length 2 m, width 4 m and height 2 m.

Volume = length x width x height
Volume = (2 m) x (4 m) x (2 m)
Volume = 16 m^3

Answer ____16____ (6)
Unit_____m^3___ (3)



Question 4 (42 marks)

Your science teacher has asked you to find the **volume** of a metal bolt using one of two methods.
Method 1 uses a graduated cylinder and water to find the volume
Method 2 uses the same equipment as method A, but also uses an overflow can (sometimes called a displacement can) to find the volume.
Describe, with a labelled diagram, one of the methods used to find the volume of the bolt:

Method (1 or 2)? ……
Describe the procedure (more writing space on next page) (9)
Method 1.

- Fill the graduated cylinder with water so that it will completely cover the bolt.
- Read the volume
- Using a string carefully place the bolt into the graduated cylinder
- Read the volume again
- Find the difference in volumes by subtracting the first volume from the second. This is the volume of the bolt.

Method 2.

- Fill the overflow can up to the spout with water.
- Place the graduated cylinder under the spout.
- Using string lower the bolt into the overflow can
- The volume of water that flows into the graduated cylinder is equal to the volume of the bolt.
- Read the graduated cylinder at eye level

Labelled diagram of the arrangement of the equipment (9)

All equipment labelled (6)
Correct arrangement (set up) (3)

You find the **volume** of the bolt to be **41 cm^3.**
Your science teacher then asks you to figure out **what type of metal** the bolt is made from by determining its **density**.
You measure the **mass** of the bolt to be: **321.85 g**

Q. What could you have measured the mass of the bolt with?
Answer Mass balance_____(3)

Use the formula below to calculate the density of the bolt

$$Density = \frac{Mass}{Volume}$$

$$= \frac{321.85\,g}{41\,cm^3}$$

Density of the bolt_____7.85 g/cm^3_____ (6) Unit _____g/cm^3_____ (3)

Use the density of the bolt and the table below to identify which type of metal the bolt is made from.

Metal	**Density (g/cm^3)**
Aluminium	2.712
Brass	8.52
Cast iron	7.3
Copper	8.94
Gold	19.32
Iron	7.85
Lead	11.34
Lithium	0.534
Mercury	13.593
Nickel	8.908
Platinum	21.4
Silver	10.49
Sodium	0.971
Steel	7.85
Tin	7.28
Titanium	4.5
Tungsten	19.6
Zinc	7.135

Type of metal the bolt is made from Iron or steel_____ (3)

The density of water is 1 g/cm^3. Name one metal in the table that will float on water?

Lithium or Sodium_____ (3)

Explain why this metal will float on water.

This metal has a density less than water._____

_____(6)

Question 5 (18)

A car entering the motorway increased its speed from 17 m/s to 35 m/s in 9 seconds. Use the space below and the equation to calculate its acceleration.

$$Accleration = \frac{Change\ in\ speed}{Time}$$

$$= \frac{35\ m/s - 17 m/s}{9s}$$

$$= \frac{18\ m/s}{9\ s}$$

Answer___2 m/s/s_____(6) Unit____m/s/s OR m/s^2_____ (3)

At the 2015 Tennis Open, Serena Williams hit a serve, which was faster than the fastest serve from the men's champion Novak Djokovic.

If the **distance** to her opponent was **24 meters (m)** and the ball took a **time** of 0**.42 seconds (s)** to reach her opponent what was the **speed** of the ball?

$$Speed = \frac{Distance}{Time}$$

$$= \frac{24\ m}{0.42\ s}$$

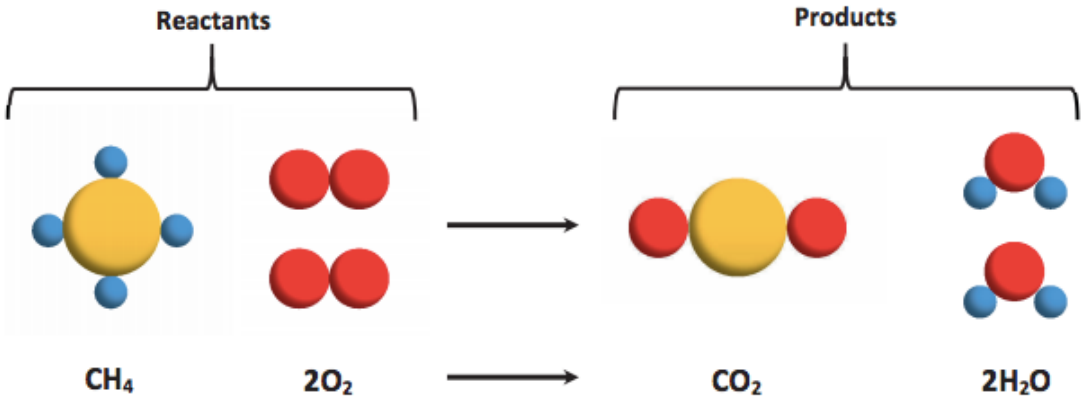
Answer____57.14 m/s_____(6) Unit_____m/s_____ (3)

Question 6 (15 marks)

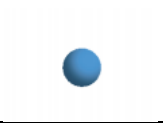
Natural gas contains methane (CH_4). Methane is a fuel.

Methane burns in oxygen to produce carbon dioxide and water.

The diagram below represents the reaction.



(a) Count the number of each type of atom in the products to complete the table below. (3)

Element	Type of atom	Number of atoms in reactants	Number of atoms in products
Carbon		1	1
Hydrogen		4	4
Oxygen		4	4

(b) Mass is conserved (the same) during this reaction. What evidence is there for this? (6)

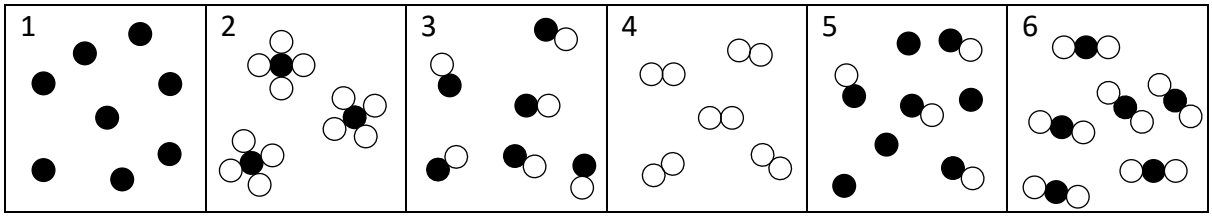
The number of atoms before the reaction (in the reactants) is the same after the reaction (in the products. It the number of atoms is the same then the mass must also be the same (conserved) _____

(c) The burning of methane is an example of a chemical change. Describe one difference between a physical change and a chemical change. (6)

During a chemical change a new substance (compound) is formed. No new substance is formed during a physical change. (OR) During a chemical change the bonds between atoms are broken and reformed, so the atoms are rearranged to form new compounds (substances). This does not happen for a physical change.

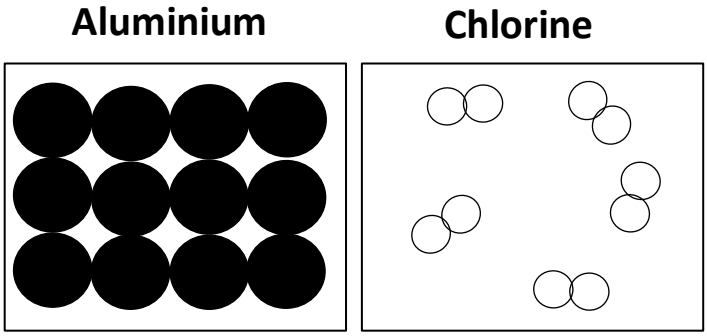
Question 7 (21 marks)

Look at the diagrams below and decide whether each one represents the particles in **an element, compound or mixture**. (12)



1 Element	4 Element
2 Compound	5 Mixture
3 Compound	6 Compound

The diagrams on the right show the arrangement of particles in the elements aluminium and chlorine at room temperature.



What evidence is there in the diagrams to support the classification of these substances as elements? (3)

There is only type of *atom* OR *particle* OR *colour* present. OR The substance cannot be broken down into a simpler substance. _____

Which of these elements (aluminium or chlorine) is a solid at room temperature? Justify your answer. (6)

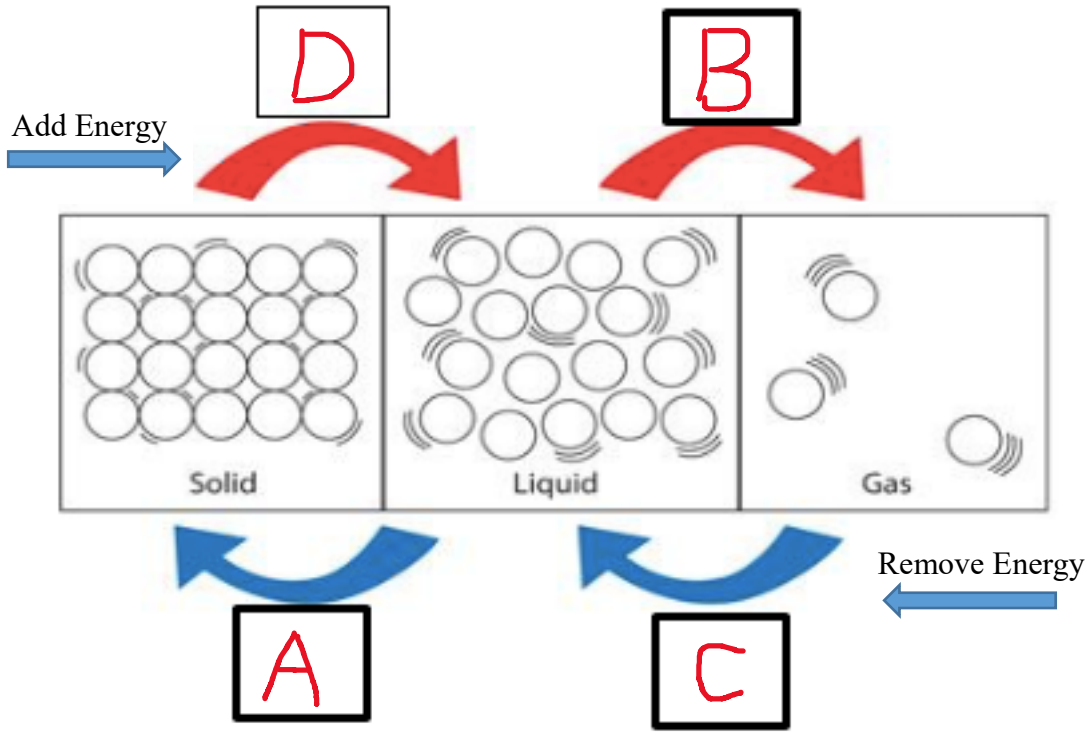
Aluminium (3) as the atoms / particles are packed very close together in a fixed position.

_____

Question 8 (30 marks)

There are three states of matter; solid (e.g. ice), liquid (e.g. water) and gas (e.g. steam). For each state of matter the particles are arranged differently as shown in the diagram below.

Fill in the correct letter into each box for the changing of one state of matter to another. (12)
A = Freezing B = Boiling C = Condensation D = Melting



What **state or states** of matter (eg. **Solid, liquid or gas**) does each statement describe (6 x 3)

This state has no definite volume. _____Gas_____

These states have no definite shape _____Liquid_____ and _____Gas_____

This state is easily squashed (compressed) _____Gas_____

In this state the particles are far apart _____Gas_____

In this state the particles can vibrate but not move past each other_____Solid_____

If you are finished early and have checked all of your answers, colour in the picture below.