Ashby School

AAQ BTEC National Level 3 in Applied Science

Summer transition homework

Name: _____

General science

Task 1- Complete the table below with the SI units.

Physical Quantity	Symbol	Unit	Abbreviation
Mass	m	Kilograms	Kg
Distance			
Time			
Electrical current			
Temperature			

Task 2- Convert the units

20mm	_____µm
140000g	_____Kg
0.8Km	_____m
48 mins	_____s
14mA	_____A
78mm	_____nm

Task 3- Match the keyword or Phrase to the definition

1. Accuracy
2. Precision
3. Reliability
4. Validity
5. Systematic error
6. Random error
7. Resolution
8. Uncertainty
9. Control variable
10. Independent variable
11. Dependent variable
12. Anomaly

- **A value that deviates significantly from the general pattern of results.**
- The degree to which repeated measurements show the same result.
- **The variable that is deliberately changed in an experiment.**
- The closeness of a measured value to the true or accepted value.
- **The smallest change in a measurement that can be detected by an instrument.**
- Measurements that are close together but not necessarily close to the true value.
- **Errors that arise from unpredictable variations in measurement.**
- The confidence in a measurement, often expressed as a range.
- **Errors that shift all measurements in the same direction (e.g. faulty calibration).**
- A variable that is kept constant to ensure a fair test.
- **How well an experiment measures what it is intended to measure.**
- The variable that is measured or observed in an experiment.

Biology

Task 4- Solve these Magnification equations

1. A cell has an actual size of 0.02 mm. The image size is 4 mm.
   Calculate the magnification.

2. A specimen is viewed at a magnification of ×200. The image size is 50 mm.
   Calculate the actual size of the specimen..

3. A cell is magnified ×1000. The image size is 2 mm.
   Calculate the actual size?

4. An object has an actual size of 0.05 mm and is magnified ×150.
   Calculate the image size.

5. The image of a specimen measures 8 mm and the magnification is ×400.
   Calculate the actual size.

6. A cell has an image size of 5 mm and an actual size of 50 µm.
   Calculate the magnification.

7. A specimen is magnified ×250 and has an image size of 10 mm.
   Calculate the actual size in micrometres (µm).

8. An object has an actual size of 200 µm and is viewed at ×400 magnification.
   Calculate the image size in millimetres (mm).

1. **Cell Structure:**
   Name the organelle responsible for controlling the activities of the cell.

2. **Cell Structure:**
   What is the function of the **mitochondria**?
3. **Cell Structure (plant vs animal):**
   Name one structure found in plant cells but not in animal cells and give its function.

4. **Membrane Transport:**
   Define **diffusion**.
5. **Membrane Transport:**
   What is the difference between **active transport** and diffusion?

6. **Blood & Blood Vessels:**
   Name the three main types of blood vessels.

7. **Blood:**
   What is the function of **red blood cells**?

8. **Plant Tissue:**
   What is the function of **xylem tissue** in plants?

9. **Plant Tissue:**
   What is the role of **phloem tissue**?

10. **Homeostasis:**
    Define **homeostasis**.

11. **Homeostasis:**

    Explain how insulin helps regulate blood glucose levels."

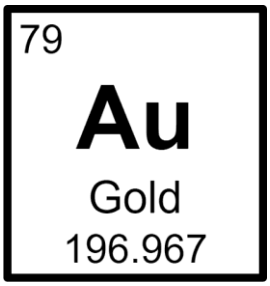
Chemistry

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4		Key: relative atomic mass; atomic symbol; name; atomic (proton) number									11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	[285] Cn copernicium 112	[286] Uut ununtrium 113	[289] Fl flerovium 114	[289] Uup ununpentium 115	[293] Lv livermorium 116	[294] Uus ununseptium 117	[294] Uuo ununoctium 118

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

Task 1: Periodic Table & Atomic Structure (Recall + Understanding)



1. Label the information on the element to the right.
2. What does the atomic number tell you about an element?
3. What is the relative atomic mass (Ar)?
4. Where are protons, neutrons and electrons located in the atom?
5. What is the charge and relative mass of:
    - a) Proton
    - b) Neutron
    - c) Electron

6. How many protons, neutrons and electrons are in an atom of magnesium-24? (atomic number = 12)
7. What is meant by the term isotope?
8. Why do isotopes of the same element have the same chemical properties?
9. Explain why atomic mass values in the periodic table are often not whole numbers.

Task 2: Using the Periodic Table (Application)

10. An element has atomic number 16.

- a) Identify the element
- b) State its group and period
- c) Predict the number of electrons in its outer shell

11. An element is in Group 1, Period 3.

- a) Name the element
- b) Describe its likely reactivity compared to lithium

12. Why do elements in the same group have similar chemical properties?

13. An atom has the electron configuration 2,8,7.

- a) Identify the element
- b) What group is it in?
- c) Predict what ion it is likely to form

14. Explain why noble gases are unreactive.

15. Compare the properties of metals and non-metals (give two differences).

16. An element forms a 2+ ion.

- a) Is it more likely to be a metal or non-metal?
- b) Explain your reasoning

Task 3: Isotopes & Relative Atomic Mass Calculations

17. Calculate the number of neutrons in:

- a) Carbon-12
- b) Chlorine-35
- c) Uranium-238 (atomic number = 92)

18. Chlorine exists as two isotopes:

- Cl-35 (75%)
- Cl-37 (25%)

Calculate the relative atomic mass of chlorine.

19. An element has two isotopes:

- X-20 (40%)
- X-22 (60%)

Calculate the relative atomic mass.

20. A sample contains:

- Isotope A (mass 24, abundance 80%)
- Isotope B (mass 25, abundance 20%)

Calculate the relative atomic mass.

21. The relative atomic mass of bromine is 79.9.
    It has two isotopes: Br-79 and Br-81.

Explain what this tells you about their relative abundances.

22. An element has three isotopes:

- 10 (20%)
- 11 (50%)
- 12 (30%)

Calculate the relative atomic mass.

23. A student calculates a relative atomic mass and gets a value slightly different from the periodic table.
    Give two reasons why this might happen.

Physics.

You may use the Physics GCSE equation list to aid you in this section.

Task 1: Core Concepts & Recall (Forces, Energy, Waves)

1. Define velocity.
2. Define acceleration.
3. State the equation linking force, mass and acceleration.
4. What is meant by resultant force?
5. Define work done.
6. State the equation for kinetic energy.
7. State the equation for gravitational potential energy.
8. What is meant by the conservation of energy?
9. Define frequency of a wave.
10. State the wave equation linking wave speed, frequency and wavelength.

Task 2: Application of Knowledge (Mechanics & Electricity)

11. A car increases its speed from 10 m/s to 20 m/s in 5 s.

- a) Calculate the acceleration
- b) State the equation you used

12. A force of 60 N acts on a mass of 12 kg.

- a) Calculate the acceleration
- b) Describe what happens if the mass is doubled

13. An object of mass 2 kg is lifted 5 m.
    (g = 9.8 N/kg)
    Calculate the gravitational potential energy gained.

14. A wave has a wavelength of 2 m and a frequency of 5 Hz.
    Calculate the wave speed.

15. Describe the difference between transverse and longitudinal waves.

16. A circuit has a current of 3 A and a resistance of 4 Ω.

- a) Calculate the potential difference
- b) Name the law used

17. Explain why resistance increases when a wire gets hotter.

18. A student connects two resistors in series.

- a) What happens to total resistance?
- b) What happens to current?

Task 3: Problem Solving & Calculations (Higher GCSE / KS5 Ready)

19. A car travels 150 m in 10 s.

- a) Calculate its speed
- b) Convert your answer to km/h

20. A force of 20 N acts on a 4 kg object.

- a) Calculate acceleration
- b) Determine the velocity after 3 s (starting from rest)

21. A 1000 kg car is travelling at 15 m/s.
    Calculate its kinetic energy.

22. A wave has a frequency of 50 Hz and a speed of 300 m/s.
    Calculate the wavelength.

23. A 12 V battery supplies a current of 2 A.

- a) Calculate the resistance
- b) Calculate the power

24. A device transfers 1200 J of energy in 60 s.

- a) Calculate the power
- b) Explain what this value represents

25. A student measures a current of 0.25 A.
    Convert this to milliamps (mA) and explain the conversion.