Teachers Resource Book
Section III: Tests by chapter
Solutions Enter
# CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
<th>(pdf page)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td></td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td><strong>BIOLOGY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAPTER 1</td>
<td>Biology - Living Things</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td>CHAPTER 2</td>
<td>Animal and Plant Cells</td>
<td>34</td>
<td>7</td>
</tr>
<tr>
<td>CHAPTER 3</td>
<td>Food</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td>CHAPTER 4</td>
<td>The Digestive System</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>CHAPTER 5</td>
<td>Respiration and Breathing</td>
<td>40</td>
<td>13</td>
</tr>
<tr>
<td>CHAPTER 6</td>
<td>The Circulation System</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td>CHAPTER 7</td>
<td>Excretion</td>
<td>44</td>
<td>17</td>
</tr>
<tr>
<td>CHAPTER 8</td>
<td>The Skeleton and Movement</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>CHAPTER 9</td>
<td>The Senses and Nervous System</td>
<td>47</td>
<td>20</td>
</tr>
<tr>
<td>CHAPTER 10</td>
<td>Human Reproduction</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>CHAPTER 11</td>
<td>Genetics</td>
<td>52</td>
<td>25</td>
</tr>
<tr>
<td>CHAPTER 12</td>
<td>Plant Structure</td>
<td>53</td>
<td>26</td>
</tr>
<tr>
<td>CHAPTER 13</td>
<td>Photosynthesis</td>
<td>54</td>
<td>27</td>
</tr>
<tr>
<td>CHAPTER 14</td>
<td>Transport in Plants</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>CHAPTER 15</td>
<td>Sensitivity in Plants</td>
<td>59</td>
<td>32</td>
</tr>
<tr>
<td>CHAPTER 16</td>
<td>Plant Reproduction</td>
<td>60</td>
<td>33</td>
</tr>
<tr>
<td>CHAPTER 17</td>
<td>Ecology</td>
<td>63</td>
<td>36</td>
</tr>
<tr>
<td>CHAPTER 18</td>
<td>Habitat Study</td>
<td>65</td>
<td>38</td>
</tr>
<tr>
<td>CHAPTER 19</td>
<td>Conservation and Pollution</td>
<td>69</td>
<td>42</td>
</tr>
<tr>
<td>CHAPTER 20</td>
<td>Micro-organisms</td>
<td>71</td>
<td>44</td>
</tr>
<tr>
<td><strong>CHEMISTRY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAPTER 21</td>
<td>States of Matter</td>
<td>73</td>
<td>46</td>
</tr>
<tr>
<td>CHAPTER 22</td>
<td>Elements, Compounds and Mixtures</td>
<td>74</td>
<td>47</td>
</tr>
<tr>
<td>CHAPTER 23</td>
<td>Solutions</td>
<td>76</td>
<td>49</td>
</tr>
<tr>
<td>CHAPTER 24</td>
<td>Separating Mixtures</td>
<td>78</td>
<td>51</td>
</tr>
<tr>
<td>CHAPTER 25</td>
<td>The Atom - A Closer Look</td>
<td>80</td>
<td>53</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>Title</td>
<td>Page</td>
<td>(pdf page)</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------</td>
<td>------</td>
<td>------------</td>
</tr>
<tr>
<td>CHAPTER 26</td>
<td>The Periodic Table</td>
<td>82</td>
<td>55</td>
</tr>
<tr>
<td>CHAPTER 27</td>
<td>Chemical Bonding I - Ionic Bonding</td>
<td>84</td>
<td>57</td>
</tr>
<tr>
<td>CHAPTER 28</td>
<td>Chemical Bonding II - Covalent Bonding</td>
<td>88</td>
<td>61</td>
</tr>
<tr>
<td>CHAPTER 29</td>
<td>Ionic and Covalent Compounds</td>
<td>90</td>
<td>63</td>
</tr>
<tr>
<td>CHAPTER 30</td>
<td>Acids and Bases</td>
<td>91</td>
<td>64</td>
</tr>
<tr>
<td>CHAPTER 31</td>
<td>Air</td>
<td>94</td>
<td>67</td>
</tr>
<tr>
<td>CHAPTER 32</td>
<td>Water</td>
<td>98</td>
<td>71</td>
</tr>
<tr>
<td>CHAPTER 33</td>
<td>Groups of Elements</td>
<td>101</td>
<td>74</td>
</tr>
<tr>
<td>CHAPTER 34</td>
<td>Metals</td>
<td>103</td>
<td>76</td>
</tr>
<tr>
<td>CHAPTER 35</td>
<td>Chemistry in Everyday Life</td>
<td>106</td>
<td>79</td>
</tr>
<tr>
<td><strong>PHYSICS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAPTER 36</td>
<td>Measurements and Units</td>
<td>108</td>
<td>81</td>
</tr>
<tr>
<td>CHAPTER 37</td>
<td>Energy</td>
<td>109</td>
<td>82</td>
</tr>
<tr>
<td>CHAPTER 38</td>
<td>Speed, Velocity and Acceleration</td>
<td>112</td>
<td>85</td>
</tr>
<tr>
<td>CHAPTER 39</td>
<td>Mass, Density and Flotation</td>
<td>114</td>
<td>87</td>
</tr>
<tr>
<td>CHAPTER 40</td>
<td>Force, Work and Power</td>
<td>116</td>
<td>89</td>
</tr>
<tr>
<td>CHAPTER 41</td>
<td>Weight</td>
<td>118</td>
<td>91</td>
</tr>
<tr>
<td>CHAPTER 42</td>
<td>Turning Forces and Centre of Gravity</td>
<td>119</td>
<td>92</td>
</tr>
<tr>
<td>CHAPTER 43</td>
<td>Pressure</td>
<td>123</td>
<td>96</td>
</tr>
<tr>
<td>CHAPTER 44</td>
<td>Heat</td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td>CHAPTER 45</td>
<td>Temperature</td>
<td>130</td>
<td>103</td>
</tr>
<tr>
<td>CHAPTER 46</td>
<td>Light</td>
<td>132</td>
<td>105</td>
</tr>
<tr>
<td>CHAPTER 47</td>
<td>Sound</td>
<td>134</td>
<td>107</td>
</tr>
<tr>
<td>CHAPTER 48</td>
<td>Magnetism</td>
<td>137</td>
<td>110</td>
</tr>
<tr>
<td>CHAPTER 49</td>
<td>Static Electricity</td>
<td>139</td>
<td>112</td>
</tr>
<tr>
<td>CHAPTER 50</td>
<td>Current Electricity</td>
<td>141</td>
<td>114</td>
</tr>
<tr>
<td>CHAPTER 51</td>
<td>Electricity in the Home</td>
<td>145</td>
<td>118</td>
</tr>
<tr>
<td>CHAPTER 52</td>
<td>Electronics</td>
<td>148</td>
<td>121</td>
</tr>
</tbody>
</table>
Q.1 (a) Science is divided into three parts; they are: __physics__, __chemistry__ and __biology__.  
(b) The study of life and living things is called __biology__.  
(c) The study of energy, how things work and their properties such as volume, shape and weight is called __physics__.  
(d) The study of substances and how they might combine to form new substances is called __chemistry__.  
(e) An experiment is carefully planned so that it is a __fair__ test with a single, clear result.  
(f) To ensure a fair comparison, a __control__ experiment is carried out at the same time.  
(g) To be sure of the results, an experiment is often __repeated__.  
(h) All experiments are written up under the headings: Title and Date; Apparatus used; __Method__; Results; __Conclusions___.  
(i) The heading that describes exactly what you did and how you did it is called the __Method__.  
(j) What you observed happening is described under the heading __Results___.  
(k) Your explanation of what you observed happening is given under the heading __Conclusions___.  
(l) Science diagrams should always be drawn using a __pencil__, and everything in the diagram should be __labelled__.  

Q.2 What do the hazard symbols shown mean?  

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>flammable</strong></td>
<td><strong>explosive</strong></td>
<td><strong>oxidising</strong></td>
<td>___</td>
<td><strong>corrosive</strong></td>
<td><strong>harmful</strong></td>
<td><strong>irritant</strong></td>
</tr>
</tbody>
</table>

D = __toxic__.
Q.3 Name the following laboratory items:

**GLASSWARE**

A = ___ test tube ___ ; B = ___ beaker ___ ; C = ___ round bottomed flask ___ ;
D = ___ conical flask ___ ; E = ___ flat bottomed flask ___ ; F = ___ clock glass ___ ;
G = ___ evaporating basin ___ ; H = ___ pipette ___ ; I = ___ burette ___ ;
J = ___ graduated cylinder ___ .

Q.4 Name the following laboratory items:

**METAL OBJECTS**

A = ___ tripod ___ ; B = ___ gauze ___ ; C = ___ Bunsen burner ___ ; D = ___ retort stand ___ .
Q.1  
(a) Biology is the study of living things, which are also called __organisms__.

(b) The seven characteristics of living things are: 1. __movement__, 2. __respiration__, 3. __sensitivity__, 4. __feeding__, 5. __excretion__, 6. __reproduction__, and 7. __growth__.

(c) The release of energy from __food__ is called __respiration__.

(d) Getting rid of wastes is called __excretion__.

(e) The characteristic that allows animals and plants to detect and react to outside stimuli is called __sensitivity__.

(f) By growing towards the light, plants are showing the characteristics of __movement__, __growth__ and __sensitivity__.

Q.2  
(a) The animal kingdom is divided into two main groups - the __invertebrates__, made up of animals such as worms, insects and jellyfish, which have no __backbone__; and the __vertebrates__ which are animals with a __backbone__.

(b) The second group is further divided into five groups - these are the __fish__ (with scales and gills); the __amphibians__ (which live on land and in water); the __reptiles__ (which have dry, scaly skin and lay eggs on land); the __birds__ (which have feathers and toothless beaks); and the __mammals__ (which have hair or fur and feed their young with milk).

(c) Plants are __fixed__ in one position and use the chemical __chlorophyll__ to make their own __food__ in the process of __photosynthesis__.

(d) A set of simple questions used to identify an animal or plant is called a __key__.
**Chapter 2**

**Animal and Plant Cells**

**Biology**

*Your Name: ________________________________*

**Q.1**

(a) The diagram shows a typical animal cell.

\[
\begin{align*}
A &= \_\_\_\_\_\_\text{cell membrane}\_\_\_\_\_\_\_ \\
B &= \_\_\_\_\_\_\text{nucleus}\_\_\_\_\_\_\_ \\
C &= \_\_\_\_\_\_\text{cytoplasm}\_\_\_\_\_\_\_ \\
\end{align*}
\]

(b) The \_\_\_\_\_\_\_\text{cell membrane}\_\_\_\_\_\_\_ controls what enters and leaves the cell. It is present in \_\_\_\_\_\_\_\text{animal}\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\text{plant}\_\_\_\_\_\_\_ cells.

(c) The watery fluid in which the cell structures are suspended is the \_\_\_\_\_\_\_\text{cytoplasm}\_\_\_\_\_\_\_.

(d) The \_\_\_\_\_\_\text{nucleus}\_\_\_\_\_\_\_ controls the cell's activities.

(e) The \_\_\_\_\_\_\text{vacuoles}\_\_\_\_\_\_\_ are used for storage of food and wastes.

**Q.2**

(a) The diagram shows a typical plant cell.

\[
\begin{align*}
A &= \_\_\_\_\_\_\text{cell wall}\_\_\_\_\_\_\_ \\
B &= \_\_\_\_\_\_\text{large vacuole}\_\_\_\_\_\_\_ \\
C &= \_\_\_\_\_\_\text{nucleus}\_\_\_\_\_\_\_ \\
D &= \_\_\_\_\_\_\text{cytoplasm}\_\_\_\_\_\_\_ \\
E &= \_\_\_\_\_\_\text{chloroplasts}\_\_\_\_\_\_\_ \\
\end{align*}
\]

(b) The large \_\_\_\_\_\_\text{vacuole}\_\_\_\_\_\_\_ stores \_\_\_\_\_\_\text{water}\_\_\_\_\_\_\_ , \_\_\_\_\_\_\text{sugar}\_\_\_\_\_\_\_ , and \_\_\_\_\_\_\text{wastes}\_\_\_\_\_\_\_.

(c) The tough \_\_\_\_\_\_\text{cell}\_\_\_\_\_\_\_ \_\_\_\_\_\_\text{wall}\_\_\_\_\_\_\_ is present in plant, but not animal cells.

(d) The \_\_\_\_\_\_\_\text{chloroplasts}\_\_\_\_\_\_\_ contain the green chemical called \_\_\_\_\_\_\text{chlorophyll}\_\_\_\_\_\_\_.

(e) Plant cells differ from animal cells in that they have a \_\_\_\_\_\_\_\text{cell}\_\_\_\_\_\_\_ \_\_\_\_\_\_\text{wall}\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\text{chloroplasts}\_\_\_\_\_\_\_ , and a large \_\_\_\_\_\_\text{vacuole}\_\_\_\_\_\_\_.

(f) Plants do not need a skeleton because each cell has a \_\_\_\_\_\_\_\text{cell}\_\_\_\_\_\_\_ \_\_\_\_\_\_\text{wall}\_\_\_\_\_\_\_ which gives it support.

---

34
Q.3  (a) Name the parts of the microscope.

A = ____ eyepiece ________
B = ____ focus knobs ________
C = ___ objective lens ________
D = _____ stage _____________

(b) The ___ slide ___ is placed on the stage.

(c) The lens just above the stage is called the ___ objective ___ lens ___.

(d) The __ focus ___ knob ___ moves the ___ objective ___ lens ___ up and down.

(e) Total magnification is the ___ objective ___ lens power multiplied by the ___ eyepiece ___ lens power. Total maximum magnification is by ___ 600 ___ times.

(f) The ___ mirror ___ is first adjusted so that light is seen through the ___ eyepiece ___ lens.

(g) The ___ low ___ power ___ objective lens is lowered close to the slide.

(h) Looking through the ___ eyepiece ___, the coarse ___ focus ___ knob ___ is used to raise the ___ objective ___ lens ___.

(i) When using the ___ medium ___ power ___ objective ___ lens, or the ___ high ___ power ___ objective ___ lens, the coarse focus knob is never used.

Q.4  (a) Plant cells are stained with ___ iodine ___ which stains the cells an orange/yellow colour.

(b) The stain ___ methylene ___ blue ___ is used to stain animal cells.

(c) A ___ tissue ___ is a group of similar cells with a special function.

(d) An ___ organ ___ is a group of different ___ tissues ___ that work together to carry out a special function, (e.g. the ___ heart ___, the ___ stomach ___, and the ___ liver ___).

(e) A group of ___ organs ___ working together is called a ___ system ___, (e.g. the digestive ___ system ___, or the respiratory ___ system ___).
Q.1  (a) Food is needed to give us **energy**, for **growth**, and for **protection** against disease.

(b) Complete the following Table:

<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>SOURCES</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carbohydrates</td>
<td>Sugar <em>jam, honey, table sugar</em></td>
<td>provides energy</td>
</tr>
<tr>
<td></td>
<td>Starch <em>potatoes, bread, rice, pasta</em></td>
<td>provides energy</td>
</tr>
<tr>
<td></td>
<td>Fibre <em>bran, vegetables</em></td>
<td>prevents constipation</td>
</tr>
<tr>
<td></td>
<td>2. _____ Fats _____</td>
<td>butter, fat meat, cheese</td>
</tr>
<tr>
<td></td>
<td>3. _____ Proteins _____</td>
<td>lean meat, fish, eggs, nuts</td>
</tr>
<tr>
<td>4. Vitamins</td>
<td>Vitamin C <em>citrus fruits (e.g. oranges)</em></td>
<td>for healthy skin and gums</td>
</tr>
<tr>
<td></td>
<td>Vitamin D <em>milk, cheese, yoghurt</em></td>
<td>for strong bones</td>
</tr>
<tr>
<td>5. Minerals</td>
<td><em>Calcium</em></td>
<td>milk, cheese, tinned salmon</td>
</tr>
<tr>
<td></td>
<td>Iron <em>liver, cabbage, spinach</em></td>
<td>to make <em>red blood</em> cells</td>
</tr>
</tbody>
</table>

(c) Water is an essential part of body fluids such as __blood__, __urine__, and __sweat__. Water is used to ___dissolve___ substances, such as digested food __molecules___, and to ___transport___ them around the body.

(d) A ____ balanced ____ diet is one that contains the right amounts of all the food types needed for us to stay ____ healthy ____.
Q.2 (a) An athlete would need more ___energy___ from their food than would an office worker. Therefore an athlete would need to eat more ___carbohydrates___ and ___fats___ to have a ___balanced___ diet.

(b) Food packets usually give nutritional information and the ___energy___ content that a ___100___ g sample of the food would have.

(c) ___Fatty___ foods provide us with over twice as much energy by weight than either ___carbohydrate___-rich or ___protein___-rich foods.

(d) The food we take in each day should be enough to provide the ___energy___ for the ___work___ we do that day. Otherwise, we become ___tired___.

(e) A food ___pyramid___ shows the amounts of each common food types needed per day for the average child or adult for a healthy, balanced diet.

Q.3 (a) Starch is tested for by adding a few drops of ___iodine___ solution to the food. A __blue__-_black__ colour indicates the presence of starch.

(b) To test for a reducing sugar, such as glucose, an equal amount of ___Benedict's___ solution is added and the mixture is then ___heated___ for about three minutes.

If glucose is present, a ___brick red___ colour is seen.

(c) To test for protein, ___sodium___ ___hydroxide___ solution and a few drops of ___copper___ ___sulfate___ solution are added to the sample.

If protein is present, a ___purple___ colour is seen.

(d) The ___brown___ ___paper___ test tests for the presence of fats.

(e) When food is burned, the ___chemical___ energy it contains is converted into ___heat___ energy, which can be detected by using a ___thermometer__.
Q.1  (a) The digestive system is a group of ___ organs ___ , working together to break down our food into tiny ___ molecules ____.

(b) Fill in the labels on the diagram below, and answer the questions that follow:

A = ____ mouth _______
B = ____ oesophagus ______
C = _____ liver _________
D = _____ stomach ________
E = _____ pancreas ________
F = ____ large intestine ______
G = ___ small intestine _________

(c) Give the functions of the parts labelled C, D, F, and G:

C: .... produces bile which helps to break down fats ..............................................
D: .... stores the food, mixes it with digestive juices and makes acid to kill bacteria ..... 
F: .... passes water back into the blood, leaving solid wastes ...................................... 
G: .... digested foods (now molecules) are absorbed into the blood from here .............

(d) The 5 stages of nutrition are: 1. ____ ingestion ____ ; 2. _____ digestion _____ ; 3. _____ absorption ____ ; 4. ______ assimilation ______ ; 5. ______ egestion ______.

(e) What happens in stage 3 and 4?

Stage 3: ___ food molecules pass through the wall of the small intestine, into the blood ___.

Stage 4: ___ the body cells take in food molecules from the blood for growth, energy and repair ___.
Q.2  (a) The two types of digestion are ___physical___ and ___chemical___ digestion.

(b) The four types of teeth are:
   A = ___incisors___ used to ___cut___ the food.
   B = ___canines___ used to ___tear___ the food.
   C = ___premolars___ used to ___grind___ the food.
   D = ___molars___ used to ___grind___ the food.

(c) An adult has a full set of ___32___ teeth.

Q.3  (a) The second stage in digestion involves the use of chemicals, called ___enzymes___.

(b) Digestive enzymes are made in the ___mouth___, ___stomach___, ___pancreas___ and ___small intestine___.

(c) Enzymes are ___catalysts___ because they are substances that change the ___rate___ of a chemical reaction, but are not ___broken down___ in the reaction.

(d) The substance acted on by an enzyme is called the ___substrate___, which is broken down into the ___product___.

(e) In the diagram, the enzyme A is ___amylase___, which is found in the ___mouth___.
   It acts on the ___substrate___, starch, to give maltose.

(f) Maltose is acted on by the enzyme ___maltase___, which breaks it down into single glucose molecules.

(g) The final breakdown ___products___ of starch are single ___glucose___ molecules.
Q.1 (a) Complete the following word equation:

\[ \text{Glucose} + \_ \text{oxygen} \_ \rightarrow \_ \text{energy} \_ + \_ \text{carbon dioxide} \_ + \_ \text{water vapour} \_ \]

(b) Respiration is the ___ release ___ of ____ energy ____ from our food.

(c) Name the parts A - F

- A = ______ voicebox _______
- B = ______ trachea _______
- C = ______ bronchus _______
- D = ______ bronchioles _______
- E = ______ alveoli _______
- F = ______ diaphragm _______

(d) The function of F is to

\[ \text{To pull air into, and push air out of the lungs by relaxing and contracting} \]

(e) The function of A is ________ To allow us to make sounds __________________

(f) What happens at the tiny structures labelled E?

\[ \text{Gas exchange takes place - carbon dioxide is exchanged for oxygen} \]

(g) The experiment on the right shows that

\[ \text{Respiration produces the gas carbon dioxide} \]

(h) Why is the test tube stoppered?

\[ \text{So that the carbon dioxide does not escape} \]
Q.2 (a) The experiment shown demonstrates that
____ exhaled ____ air contains more
____ carbon ____ dioxide ____ than
____ inhaled ____ air.

(b) Each test tube contains ___ limewater ___,
which turns ___ milky ___ in the presence of ___ carbon ____ dioxide ____.

(c) A person breathes out through tube __ A __, and breathes in through tube __ B __.

(d) The ___ limewater ___ in tube _ B _ stays clear; and in tube _ A _ turns ___ milky ___.

Q.3 (a) The experiment shown demonstrates one of
the harmful effects of ____ smoking ____.

(b) A is connected to a ___ filter ___ pump ___.

(c) A build-up of ___ tar ___ is seen trapped on
the ___ glass ___ wool ___ in the test tube.

(d) Smoking can cause the diseases _ cancer _, _ bronchitis _, and _ emphysema _.

(e) Smokers need to breath faster than non-smokers because their blood carries the gas
carbon ___ monoxide ___, as well as oxygen.

Q.4 (a) The experiment shown demonstrates that
___ respiration ___ produces ___ energy ___.

(b) Thermos flask A contains ___ live ___ peas ___.

(c) Thermos flask B contains ___ dead ___ peas ___,
and acts as a ___ control ___ for the experiment.

(d) The temperature in flask _ A _ increases, showing
that the process of ___ respiration ___ produces
___ energy ___ in the form of ___ heat ___.

41
Q.1  (a) The watery part of the blood is called __**plasma**__ and has _____ **glucose** _____ ,
______ **wastes** ______ , and ______ **hormones** ______ dissolved in it.

(b) The 3 cell types found in blood are the ___ **red** ___ **blood** ___ cells , the __ **white** ___ 
___ **blood** ___ cells , and the ___ **platelets** ___ .

(c) Oxygen is carried in the blood by the chemical called ____ **haemoglobin** ____ which
is found in the ___ **red** ___ ____ **blood** ___ cells .

(d) White blood cells kill bacteria by ____ **eating** ____ them, or by making chemicals
called ____ **antibodies** ____ to poison them.

(e) The _____ **platelets** ______ in the blood help the blood to clot.

(f) Blood vessels called ____ **arteries** ____ carry blood away from the heart, while the
_____ **veins** ______ carry blood to the heart.

(g) The smallest blood vessels in the body are called ____ **capillaries** ____ .

(h) Give 2 differences between arteries and veins:

1. ____ **Arteries have a thicker wall than veins** ____________________________
2. ____ **Arteries do not have valves, veins do** _____________________________

Q.2  (a) The heart is a pump made of ____ **cardiac** _____ muscle.

It normally beats __ **72** ____ times per minute.

(b) The diagram shows, A = ___ **vena cava** ____ ,
B = __ **right atrium** __ , C = __ **right ventricle** __ ,
D = ____ **pulmonary artery** ____ , E = __ **aorta** ____ ,
F = __ **pulmonary vein** ____ , G = __ **left atrium** ____ ,
H = ____ **left ventricle** ____ .
(c) The main vein of the body, the ___ vena ____ cava ___ delivers blood to the right ___ atrium ___ of the heart.

(d) The blood then passes through a valve into the ___ right ____ ventricle ____ of the heart.

(e) It is then pushed out to the lungs in the ___ pulmonary ____ artery _____.

(f) Blood from the lungs (now rich in ___ oxygen ___ ) arrives in the ___ pulmonary ____ vein to the left ___ atrium ____ of the heart.

(g) From here the blood is passed through a valve into the ___ left ____ ventricle ____ of the heart.

(h) The blood is pumped from the heart into the main artery of the body, called the ____ aorta ____ .

Q.3  (a) Heart disease is caused by clogging up of the ___ arteries ___ that carry blood to the heart.

(b) Heart disease can be prevented by:

1. ___ Regular exercise _____________________________

2. ___ A healthy diet ______________________________

3. ___ Not smoking ________________________________

(c) The normal heartbeat rate (pulse rate) in humans is ___ 72 ___ beats per minute.

(d) The heart beats faster during exercise because the body cells need more ___ oxygen ___ to release more energy and, therefore, more ___ blood ___ needs to be pumped to them.

(e) During exercise, the ___ breathing ___ rate also increases in an effort to get more ______ oxygen _____ to the cells.

(f) The normal body temperature of the human body is ___ 37 ___ °C.

(g) In times of illness, the body temperature may ___ rise ___ and the person has a ___fever___ .
Chapter 7  Excretion  Biology

Your Name: ______________________________

Q.1  (a) Name each of the excretory organs A, B, and C in the diagram.

A = __ skin __ ; B = __ lung __ ; C = __ kidney __ .

(b) State the excretory products A, B, and C excrete.

A = __ sweat __ ; B = __ water __ and __ carbon __ dioxide __ ;
C = __ urine __ .

(c) Apart from excretion, can you think of any other function of each?

A = __ defence __ ; B = __ breathing __ ; C = __ control water in blood __ .

(d) How would you test the two products of excretion of B?

1. ______ blue cobalt chloride paper _______ ; 2. ________ limewater ________ .

(e) Where does the main excretory product of A come from? ______ the blood ________ .

(f) What is meant by excretion? ____________________________________________

__ Excretion is the removal of wastes that are made in the body ___ .

Q.2  (a) Name the parts labelled A, B, C, D, E and F in the diagram opposite.

A = __ renal artery __ ; B = __ renal vein __
C = __ kidney __ ;  D = __ ureter __
E = __ bladder __ ;  F = ___ urethra ___

(b) How is urine formed in part C?

__ By filtration of the blood __________

(c) What is the function of part E? __ To store urine ___

(d) Where do wastes enter the kidney? ______ In the renal artery (part A) ________ .

(e) In which part do wastes leave the kidney? __ In the ureters (part D) ___________ .
Chapter 8  The Skeleton and Movement Biology

Your Name: ______________________________

Q.1  (a) The three functions of the skeleton are ___ Support ___ , ___ Protection ___ , and _____ Movement ______ .

(b) Bone is made of ____ living ___ ___ cells ____ , which release substances containing ___ calcium ____ , which forms a hard rigid framework.

(c) All ___ vertebrates ___ have a spine made of bones called ___ vertebrae ___ .

(d) Plants do not need a skeleton because each of their cells has a ___ cell ___ ___ wall ___ which gives support to the plant.

(e) Where bones meet, a ____ joint ____ is formed.

Q.2  (a) The diagram shows the human hip.
Name the parts A, B, C, and D.

A = ___ ligament ____ ; B = ___ cartilage ___ ;

C = __ synovial ___ fluid ; D = ___ femur ___ .

(b) What is the common function of B and C? ___ Absorb shocks and reduce friction ____ .

(c) How do the joints found in the skull differ from the joint shown here? ___ They are fused and so do not allow movement ___

(d) The joint above is called a ___ ball ___ and ___ socket ___ joint.

(e) A joint like this is also found in the ___ shoulder ___ of the human.

(f) The _____ cartilage / synovial fluid ______ in the joint helps to absorb shocks.

(g) Bones are joined to bones by _____ ligaments ______ .

(h) Bones are joined to muscles by _____ tendons ______ .
Q.3  (a) What is a synovial joint?

_ A moveable joint containing synovial fluid _

(b) The diagram shows the human arm.
Name the types of synovial joints at A and B.

A = _ ball _ and __ socket _ ;
B = ___ hinge ____.

(c) Name another place in the body where (i) the joint type at A occurs, (ii) the joint type at B occurs.

(i) ______________ hip ___________ ; (ii) ______________ knee ______________.

(d) Describe two ways friction is reduced in a synovial joint.

1._ Presence of cartilage ___  2._ Presence of synovial fluid ___

(e) Immoveable, ____ fused ____ joints are found in the bones of the _____ skull _____.

(f) Explain how the muscles work to move the arm.

_ The biceps contracts and the triceps relaxes to raise the arm _________.

(g) Such pairs of muscles are called

___ antagonistic ____ muscle pairs.

Q.4  In the diagram of the human skeleton, name the bones labelled A to G:

A _______ ribs _____________
B ____ humerus ______
C _______ radius __________
D _______ ulna ___________
E _______ femur ___________
F _______ tibia ___________
G _______ fibula ___________
Q.1  
(a) Our five senses are: _____ sight _____; _____ hearing _____; _____ smell _____; _____ taste _____; and _____ touch ______.

(b) The sense organs for these senses are the: _____ eyes _____; _____ ears _____; _____ nose _____; _____ tongue _____; and _____ skin _____.

(c) The _____ nervous _____ system allows us to receive information from these organs.

(d) The central nervous system consists of the __ brain __ and the __ spinal __ cord __.

(e) Nerves run out from the __ central __ nervous __ system to all parts of the body.

(f) Large nerves are made up of bundles of nerve cells called _____ neurons ____.

(g) A message from a sense organ is sent along a ____ sensory ____ nerve to the __ brain __, where a decision is made.

(h) A message is then sent to a muscle along a ____ motor ____ nerve.

(i) Messages are sent along nerves in the form of pulses of ____ electricity ____.

Q.2  
A person sees a pencil on the desk. He decides to pick it up. Complete the following sequence of events to show how the nervous system works to carry out the action.

The sense organ, the eye receives a _____ stimulus _____ (the image of the pencil).

A message is sent along _____ sensory _____ nerves to the _____ brain _____, where a decision is made. Another message is then sent along a _____ motor _____ nerve, which passes down the _____ spinal _____ cord to a _____ muscle ______ in the arm.

This triggers the person to lift the pencil.
Q.3 (a) Identify the parts labeled A - G in the diagram of the human eye.

A = _____ lens ______ ; B = _______ iris _____ ; C = ______ cornea ______
D = ______ pupil ______ ; E = ___ ciliary muscle ___ ; F = _____ retina _____
G = ____ optic nerve ____ .

(b) The function of A is to: _____focus the image on the retina___________________.

(c) The function of B is to: _____control the amount of light that enters the eye__________.

(d) The function of E is to: _____change the shape of the lens_______________________.

(e) The function of F is to: _____hold the light sensitive cells and form the image_______.

(f) The function of G is to: _____ sends messages back to the brain____________________.

(g) Light rays entering the eye are first bent inwards by the _____ cornea _____.

(h) The light rays pass through the _____ pupil ____ and are focused by the ___ lens ___
so that a sharp image is formed on the ___ retina ___ at the back of the eye.

(i) In dim light, the ___ iris ___ opens to make the ___ pupil ____ bigger.

(j) The ___ ciliary ___ ___ muscle ___ pulls on the lens to make it change its
shape as needed.

(k) The lens changes shape so that it can _____focus ____ images on the _____ retina _____.

(l) The image formed on the ___ retina ____ is upside down, but the ___ brain ____
interprets it right way up.
Q.1  (a) Identify the parts labeled A - H in the diagrams below:

A = ____ gland _____ ;  B = ____ sperm duct ____ ;  C = ____ testis ______
D = ____ penis ____ ;  E = ____ fallopian tube ____ ;  F = ____ ovary ____
G = ____ uterus ____ ;  H = _____ vagina _____.

(b) The function of A is to: ___ to make seminal fluid _________________.

(c) The function of C is to: ___ to make sperm _________________________.

(d) The function of F is to: ___ to make the egg _________________________.

(e) The function of G is to: ___ to carry the embryo during pregnancy _________.

Q.2  Name the structures labeled A, B and C in the diagram of the female reproductive system, and for each part, state what happens to the egg in that part.

A = ____ ovary _______________________.
What happens: __ the egg is produced here ___.

B = ____ fallopian tube ___________________.
What happens: __ the egg is fertilised here ___.

C = __ uterus _________________________.
What happens: __ the egg divides to become the embryo here _____.

Your Name: ______________________________
Q.3  The diagram shows the 28 day menstrual cycle.

(a) What event occurs at A? **menstruation**.

(b) What happens during B? **the lining of the uterus builds up**.

(c) Name the process and state what happens at C. **ovulation**; **an egg is released**.

(d) During the time D, the **lining** of the **uterus** remains built up.

(e) The time E is known as the **fertile period**.

Q.4  (a) Fertilisation occurs in the **fallopian tube** and the fertilised egg then divides and moves to the lining of the **uterus**, where it embeds itself and continues to divide.

(b) The ball of cells continues to divide to form an **embryo**.

(c) The developing **embryo** is protected in a bag of fluid called **amniotic fluid**.

(d) A tube called the **umbilical cord** attaches the **placenta** to the wall of the **uterus** which is rich in blood vessels.

(e) The onset of muscle contractions, leading to birth is called **labour**.

(f) The average length of human pregnancy is **40** weeks.

(g) Identify the parts labeled A - D in the diagram:

A = **placenta**.

B = **umbilical cord**.

C = **amniotic fluid**.

D = **cervix**.

(h) The **placenta** connects the **blood supply** of the mother with that of the baby.
Q.5 (a) A human life begins when a _sperm_ cell (called the male _gamete_) meets and fuses
with an _egg_ cell (called the female _gamete_).

(b) Fertilisation is the _fusion_ of a male and female _gamete_.

(c) The sperm is made in the _testes_ and travels to the penis in the _sperm duct_.

(d) Semen is a mixture of _sperm_ and _seminal fluid_ which is produced by a _gland_.

(e) The eggs are made in the _ovaries_, and travel along the _fallopian tube_ towards the _uterus_.

(f) The release of an egg is called _ovulation_ and occurs around Day _14_ of the _menstrual cycle_.

(g) The uterus lining is shed if _fertilisation_ does not occur. This is called _menstruation_ and occurs during Days _1_ to _5_ of the _menstrual cycle_.

(h) The days of the _menstrual cycle_ when a woman is most likely to conceive is called the _fertile period_.

(i) Fertilisation usually occurs in the _fallopian tube_.

(j) The fertilised egg begins to _divide_ and then becomes lodged in the _lining_ of the _uterus_.

(k) A human pregnancy lasts for _40_ weeks, during which time the _embryo_ develops in the _uterus_.

(l) A tube called the _umbilical cord_ connects the developing embryo to the _placenta_.

(m) The embryo is protected and cushioned by a bag containing _amniotic fluid_.

(n) Any method which prevents fertilisation is called _contraception_.
Chapter 11  Genetics  Biology

Your Name: ______________________________

Q.1  (a) Genetics is the study of the ___ inheritance ___ of ___ characteristics ___.
(b) Characteristics you are born with are called ___ inherited ___ characteristics.
(c) The ___ nucleus ___ of a cell contains thread-like structures called ___ chromosomes ___.
(d) Genes are ___ chemicals ___ found on ___ chromosomes ___ that pass on ___ information ___ from ___ parents ___ to their ___ children ___.
(e) A human gamete has a total of ___ 23 ___ chromosomes.
(f) After fertilisation takes place, a new individual with ___ 46 ___ chromosomes in each cell is produced.
(g) Characteristics which are gained by a person during their lifetime are called ___ non-inherited ___ characteristics.
(h) DNA is found in the ___ nucleus ___ of a cell, and is the chemical from which ___ genes ___ are made.

Q.2  (a) Two examples of inheritable characteristics are
1. ___ shape of earlobes ___ 2. ___ ability to roll the tongue ___.
(b) Two examples of non-inheritable characteristics are:
1. ___ ability to speak French ___ 2. ___ muscles gained by weightlifting ___.
(c) A chromosome is a ___ thread ___-like structure found in the ___ nucleus ___ of a cell.
(d) A gene is a ___ chemical ___ which controls our ___ characteristics ___ and which is found on a ___ chromosome ___.
(e) Name two characteristics that you have inherited from your parents.
1. ___ blue eyes ___
2. ___ free ear lobes ___
(f) Name a characteristic that you have not inherited from your parents.
___ being able to ride a bicycle ___
Chapter 12

Plant Structure

Your Name: ______________________________

Q.1 (a) Name the parts labelled A-E below:

A = ______ flower _______
B = _______ fruit ________
C = _______ bud __________
D = _______ leaf __________
E = _______ root __________

(b) Part A is used for __ reproduction __

It contains the __ male __ and __ female __ sex organs. Its function is to make the __ seeds __.

(c) Part D has 3 functions, they are to:

1. ___ make food for the plant during photosynthesis ________________________.
2. ___ allow the plant to lose water vapour ________________________________.
3. ___ allow the plant to exchange oxygen and carbon dioxide with the air __.

(d) Part E has 3 functions, they are:

1. ___ to anchor the plant in the soil _________________________________.
2. ___ to take in water and minerals from the soil _________________________.
3. ___ to store food _________________________________________________.

(e) The stem allows for the transport of ___ water ___ and ___ minerals ___ from the soil,

and for the transport of ___ food ___ from the leaves to the rest of the plant.
Chapter 13

Photosynthesis

Your Name: __________________________________________

Q.1 (a) The process by which green plants make their own food is called ___photosynthesis___.

(b) Plants need a green chemical called ___chlorophyll___ to do this.

(c) Tiny pores called ___stomata___ on the leaf allow ___carbon___ ___dioxide___ to enter the leaf and ___oxygen___ and ___water___ ___vapour___ to leave the leaf.

(d) The green chemical called ___chlorophyll___ is contained in structures called ___chloroplasts___.

(e) What 2 features about the leaf make it suitable for photosynthesis?

1. ___they are flat and thin_________

2. ___they contain air spaces________

(f) The chemical ___chlorophyll___ traps the energy of ___sunlight___ and uses it to combine ___carbon___ ___dioxide___ and ___water___ ___vapour___ together to form the sugar called ___glucose___ and the gas ___oxygen___.

(g) Complete the following:

___carbon___ ___dioxide___ + Water \[\overset{\text{Chlorophyll}}{\rightarrow}\] ___glucose___ + ___oxygen___

(h) The sugar called ___glucose___ is carried around the plant in special cells called ___phloem___ cells. The sugar is stored in the plant as ___starch___.

(i) Living plant cells ___respire___ during the day and night, but only ___photosynthesise___ during the day when there is light.

(j) The equation for ___photosynthesis___ is the exact opposite to the equation for ___respiration___.

(k) A leaf has been photosynthesising if ___starch___ is found in its leaves.

(l) Plants need minerals such as ___nitrogen___ which they get from the ___soil___.
Q.2 (a) The following 4 stages are involved in testing a leaf for starch. Give the reason for each stage.

Stage 1: ___ to kill the leaf and soften it __________

Stage 2: ___ to remove the chlorophyll from it ___

Stage 3: ___ to soften the leaf so it is not brittle __

Stage 4: ___ to test the leaf for starch __________

(b) Why is a Bunsen burner not used?
___ because the methylated spirit is flammable ___

(c) What is the result if the leaf had been photosynthesising?
___ the leaf would turn blue/black, showing it contained starch __________________

Q.3 (a) The experiment on the right is used to show that carbon dioxide (in set-up A) is needed for photosynthesis to take place. What might be the purpose of the soda lime in set-up B?
___ to remove carbon dioxide from the air ___

If a leaf from plant A and a leaf from plant B were tested for the presence of starch, what would the results be? A ___ starch present ___ ; B ___ starch absent ___.

(b) The experiment on the right is used to show that light is needed for photosynthesis to occur. What is the tinfoil for? ____________
___ to block light from part of the leaf ____________.

The leaf is then tested for the presence of ___ starch ___.

The result of this test is: __ the leaf turns blue/black under the area that had light ____. 
Q.4  (a) The experiment on the right is set up to show that the gas ___ oxygen ___ is produced during ___ photosynthesis ___. 
This can then be tested for by using a __ glowing ___ splint __. 

Why is this plant often placed in fish tanks? 
___ to release oxygen for the fish to breath ________________

(b) If a bright lamp were shone on the apparatus, the rate of bubbles produced would _____ increase _____.

(c) If some sodium bicarbonate (which produces carbon dioxide) were added to the water in the beaker, the rate of bubbles produced would ____ increase ____ , because the plant would then have more ___ carbon ___ dioxide ___ available to it.

Q.5  (a) During the day, a plant takes in the gases ___ carbon ___ dioxide ___ and ___ water ___ vapour ___, and gives out the gas ___ oxygen ___ in the process of ___ photosynthesis ___.

(b) At night, a plant takes in the gas ___ oxygen ___, and gives out the gases ___ carbon ___ dioxide ___ and ___ water ___ vapour ___, in the process of ___ respiration ___.

(c) During the night, a plant uses up much of the ___ food ___ it has made during the day.

(d) Give 2 reasons why photosynthesis is so important for animals and humans:
1. ___ It produces oxygen for animals to breathe _________________.
2. ___ It produces plant material for animals to eat and so get their energy __.

(e) Give 2 reasons why photosynthesis is considered to be the opposite of respiration:
1. ___ photosynthesis uses up carbon dioxide, respiration produces it _________.
2. ___ glucose is made during photosynthesis, and is used up in respiration _____. 
Q.1 (a) What is meant by transpiration in plants?

Transpiration is the loss of water vapour from the leaves of a plant.

(b) List the three plant structures through which water from the soil passes.

1. _____ roots _______ 2. _____ stem _____ 3. _____ leaves _______.

(c) Describe briefly an experiment to demonstrate transpiration in plants.

Cover the leafy part of a potted plant with a plastic bag, tied at the base. Leave the plant on the window sill for a few days. Droplets of water form on the inside of the bag due to transpiration from the leaves of the plant.

(d) Give three reasons why transpiration is necessary in plants.

1. ___ to provide water for photosynthesis
2. ___ to carry minerals from the soil to all parts of the plant
3. ___ to cool the plant

Q.2 (a) The experiment below is used to show the absorption of ____ water ____ by the ____ roots ____ of a plant. It also shows that ____ water ____

is lost through the ____ leaves ____ by

the process of ____ transpiration ____.

(b) What is the function of B?

B acts as a control.

(c) What is the function of the oil layer?

The oil layer prevents water from evaporating from the test tube.
Q.3  (a) What is the purpose of the experiment shown below?

___ to demonstrate transpiration, using a control ________________________________ .

(b) Why are plastic bags placed around each pot?

___ to prevent water from the pots from condensing on the sides of the bell jar _____ .

(c) How would you test the drops of liquid formed in A?

___ blue cobalt chloride paper would turn pink if the liquid was water ____________ .

(d) What is the purpose of B in the experiment?

___ B is the control and shows that the water seen did not evaporate from the soil ____ .

Q.4  (a) The transport system in plants is used to carry ___ water ___ and ___ minerals ___ from the roots to the leaves, and ___ food ___ from the leaves to the rest of the plant.

(b) The flow of water from the roots to the leaves is called the ___ transpiration ___ stream ___ .

(c) Water and ___ minerals ___ are absorbed from the ___ soil ___ by the ___ roots ___ of a plant.

(d) Water travels up the plant in tiny tubes called ___ xylem ___ vessels ___ .

Food travels around the plant in tubes called ___ phloem ___ tubes ___ .

(e) The loss of water from the leaves of a plant is called ______ transpiration ______ .

(f) In the leaf, water is lost through tiny pores called ___ stomata ___ which can open and close.
**Chapter 15**

**Sensitivity in Plants**

*Your Name: ______________________________*

**Q.1**  
(a) State the term used to describe a plant’s response to (i) light, (ii) gravity.

(i) _______ phototropism _______ ; (ii) _______ geotropism _______.

(b) Describe, using a labelled diagram, an experiment to show a plant’s response to gravity.

(c) This experiment shows a plant’s response to gravity because no matter what position the _seed_ is in, the ___roots___ always grow _____ downwards _____.

(d) How does a plant benefit from its response to (i) light, (ii) gravity?

(i) ___ the leaves are held up to the light so the plant gets more light for photosynthesis ___

(ii) ___ the roots grow down into the soil to get water and minerals for the plant ______

(e) The diagram shows two petri dishes containing green cress plants. Suggest a reason why the plants in A are not upright as in B.

___ in A, the light is coming from the side ___

**Q.2**  
(a) Plants have no sense organs, but they can still respond to an outside ___stimulus___.

(b) A ___ tropism ___ is the growth of a plant in response to a ___stimulus___.

(c) A growth response to light is called ___phototropism___, and can be shown using ___cress___ seeds, placed on moist ___cotton___ ___wool___, and put in a box with a ______ window ______ at the top or side.

(d) A growth response to gravity is called _____ geotropism ____ , and is shown using ___broad___ ___bean___ seeds, placed in a beaker with moist ___blotting___ ___paper___ and ___compost___. The ___roots___ always grow ___downwards___.

59
Chapter 16

Plant Reproduction

Biology

Your Name: ______________________________

Q.1 (a) Plants reproduce sexually by means of _____flowers_____.

(b) The plant produces male cells called ___pollen___ and female cells called ___eggs___.

(c) The ___sepal___ protects the flower before it blooms.

(d) The ___nectary___ produces a sugary solution called ___nectar___ to attract insects.

(e) The female part, called the ___carpel___ consists of the ___stigma___,

   the ___style___, and the ___ovary_____.

(f) The male part, called the ___stamen___ consists of the ___anther___ and ___filament___.

Q.2 (a) Name the parts A - J in the spaces provided:

A = _______carpel__________
B = _______stamen__________
C = _______petal___________
D = _______nectary__________
E = _______sepal___________
F = _______anther___________
G = _______filament__________
H = _______stigma___________
I = _______style___________
J = _______ovary___________

(b) Reproduction in plants involves the 5 stages:

1. Pollination.  2. _______Fertilisation_______,  3. _______Seed and fruit formation_______,

4. _______Seed dispersal_______,  5. Germination.
Q.3  (a) Pollination is the ______ transfer of pollen from the stamen (anther) of one plant to the carpel (stigma) of another ____________________________.

(b) Complete the following Table:

<table>
<thead>
<tr>
<th>Part of</th>
<th>Insect pollinated</th>
<th>Wind pollinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petals</td>
<td>Large, coloured, scented</td>
<td>Small, often green</td>
</tr>
<tr>
<td>Stamens</td>
<td>Are inside the flower</td>
<td>Hang outside the flower</td>
</tr>
<tr>
<td>Pollen Grains</td>
<td>Large, fewer in number</td>
<td>Small, huge numbers</td>
</tr>
<tr>
<td>Stigmas</td>
<td>Small, inside the flower</td>
<td>Feathery, hang outside</td>
</tr>
<tr>
<td>Nectaries</td>
<td>Present, produce nectar</td>
<td>Absent, not needed</td>
</tr>
</tbody>
</table>

(c) After pollination, the pollen grain grows a _____ pollen _____ tube _____ which is used to carry the __ male __ __ gamete __ to the __ female __ __ gamete __ which fuse together to form a __ zygote __. This process is called _____ fertilisation _____.

(d) The fertilised egg will grow into the __ seed ___.

(e) The ___ ovary ___ will develop into the fruit which is used to ___ disperse ____ the seeds.

(f) 2 examples of fleshy fruits are 1. ___ apples ____ and 2. _____ cherries _____.

(g) 2 examples of ‘dry’ fruits are 1. ____ dandelion ____ and 2. ___ sycamore _____.

(h) Label the fruit (A) and the seed (B) in each of the examples below:
Q.4 (a) The growth of a seed into a new plant is called ______ germination ______.

(b) The experiment set up below is used to show that 3 things are needed for seeds to grow. The 3 factors needed are ___ water ___ , ___ oxygen ___ and ___ heat ___.

(c) The seeds in tube A have all the 3 factors needed. Describe fully the set-up in each of the test tubes B, C, and D:

B: __ has oxygen and heat but no water - the cotton wool is dry ________________

C: __ has water and heat but no oxygen - the water was boiled and cooled to remove it __

D: __ has water and oxygen but no heat - it was left in a fridge ________________

(d) Tube B shows that ___ water ___ is needed for germination.

(e) Tube C shows that ___ oxygen ___ is needed for germination.

(f) Tube E shows that ___ heat ___ is needed for germination.

(g) Place the diagrams A, B, C and D in the correct order, starting with Spring.

1. __ C __ ; 2. __ B __ ; 3. __ D __ ; 4. __ A __.

(h) Only one parent is involved in ___ asexual ___ reproduction.

(i) Plant cuttings, tulip ___ bulbs ___ and strawberry ___ runners ___ , are examples of ___ asexual ___ reproduction as ___ seeds ___ are not involved.
Chapter 17 Ecology

Your Name: ______________________________

Q.1 Explain each of the following terms:

(a) Ecology: _is the study of the relationships between living things and their environment_

(c) Habitat: _is the place where an animal or plant lives_ ________________________________

(d) Producers: _are green plants that make their own food_ __________________________________

(e) Consumers: _are all organisms other than green plants_ __________________________________

(f) Herbivore: _is an animal that eats both plants and animals_ __________________________

(g) Carnivore: _is an animal or plant that eats meat only_ ______________________________

(h) Food Chain: _shows how animals are linked by what they eat_ _______________________

(i) Food web: _a number of food chains linked together_ ______________________________

Q.2 The diagram shows a food web in a woodland habitat.

(a) Name the producers in the food web. _grass, plant seeds_ __________________________

(b) Name the herbivores. ___________________ _rabbit, caterpillar, grasshopper, aphid, finch_ __________________________

(c) Name the carnivores. ____________ _hawk, fox, warbler, ladybird_ __________________________

(d) Write the food chain that has five feeding levels. __ Grass → aphid → ladybird → warbler → hawk_.

Back to Contents
Q.3  (a) Name 2 different habitats: 1. ___ woodland ___; 2. ______ pond ______.

(b) Everything that surrounds an organism is called its _____ environment ______.

(c) Each habitat has its own _____ community ______ of animals and plants.

(d) Name 3 organisms found in a woodland habitat: 1. ___ primrose ___ 2. ___ hedgehog ___

3. ______ snail ______.

(e) Animals and plants in a habitat depend on each other for food, ___ shelter ___,

and ___ pollination ______.

(f) Give an example of plants depending on other plants: ___ ivy depends on trees to climb ___.

(g) A food chain must start with a ___ green ___ ___ plant ___.

(h) All the other organisms in the food chain are called ___ consumers ___.

(i) Organisms occupy different _____ feeding _____ levels in a food chain.

(j) The energy for any food chain comes from the ___ sun ___.

(k) A pyramid of numbers shows how the numbers of organisms ___ decreases ___ as we
go up the food chain.

(l) Name 2 organisms that could be placed in

X and Y on the pyramid of numbers shown
on the right.

X = ______ rabbit _______

Y = ______ fox _______

(m) A group of interconnected food chains is called a ___ food ___ ___ web ___.

(n) Give an example of a producer: _______ dandelion (any green plant) _______.

(o) Animals that are well adapted to their environment survive better than those that are not.

Name an animal and give 2 ways that it is adapted to its environment:

Animal: _____ hedgehog ______.

Adaption 1. ___ spines to keep it from being eaten ____________________________.

Adaption 2. ___ an excellent sense of smell to find its food ______________________.
Q.1 Name each of the following pieces of equipment and describe how it is used.

(a) Name: ______ *pooter* ______
   How used: __*to suck up small insects into the jar*__________

(b) Name: ______ *sweeping net* ______
   How used: __*swept through long grass to collect insects*__________

(c) Name: ______ *funnel* ______
   How used: __*used to collect insects moving away from the heat*__________

(d) Name: ______ *pitfall trap* ______
   How used: __*collects insects that crawl under the rock*__________

Q.2 The following numbers of plants were recorded at different distances from the base of a hedge:

<table>
<thead>
<tr>
<th>Distance from hedge (m’s)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of plants (per square metre)</td>
<td>0</td>
<td>12</td>
<td>23</td>
<td>42</td>
<td>82</td>
<td>105</td>
</tr>
</tbody>
</table>

(a) Name the apparatus used to get these results: ______ *quadrat* ______.

(b) Explain how you would use this apparatus ________________________________
   ___*place it randomly on the ground and check what plants are present in it. Repeat this*
   ___*a number of times and then work out the percentage of times each plant is present*_____

(c) How many plants would you expect to find at:
   (i) 7 metres from the hedge? ___*about 62*_____.
   (ii) 9 metres from the hedge? ___*about 94*_____.

(d) Why do the plant numbers vary with distance from the hedge?
   ___*maybe the hedge is blocking the light or absorbing a lot of the soil water*_______.
Q.3  The diagram shows the results of a habitat survey:

(a) How many thistles are in the habitat? _____ 5 _____.
(b) What is the total number of plants in the habitat? _____ 90 _____.
(c) Name the apparatus you would use to carry out this study _______ a quadrat _______.
(d) Name 3 animals that might be found in this habitat:
   1. _____ beetle _____ 2. _____ rabbit _______ 3. _____ ladybird _______.

Q.4  (a) Draw a simple map of your studied habitat in the space provided.
(b) Name 3 plants found in this habitat.
   1. _____ primrose _____
   2. _____ nettle ______
   3. _____ buttercup _____
(c) Name 3 animals found in this habitat.
   1. _____ hedgehog _____; 2. _____ earwig ______; 3. _____ squirrel _____.
(d) Name 3 things that plants compete for:
   1. _____ light ______; 2. _____ water _____; 3. _____ minerals ______.
(e) Name 3 things that animals compete for:
   1. _____ food _____; 2. _____ territory _____; 3. _____ mates _____.

Legend

- wall
- stream
- meadow
- hedge
- wood
(f) Give 2 examples of how plants compete with other plants:

1. **dandelions** have a long tap root to compete with grass for soil water
2. **ivy** competes with other plants for light by climbing up trees

(g) Give 2 examples of how animals compete with each other:

1. **blackbirds** compete with other blackbirds for territory by singing
2. **cheetahs** compete with lions for prey by being able to run very fast

(h) Name 2 animals from your studied habitat and for each animal, give 2 ways it is adapted to survive in its environment.

Animal: **thrush**
- Adaption 1: sharp pointed beak to catch snails
- Adaption 2: excellent eyesight to see its prey

Animal: **spider**
- Adaption 1: spins a web to catch flies
- Adaption 2: brown colour so it is not easily seen

Q.5 (a) Make two food chains using some of the following organisms: oak tree, grass, caterpillar, spider, hawk, ladybird, greenfly (aphids), thrush.

Food chain 1: **Oak tree → Greenfly → Ladybird → Thrush**
Food chain 2: **Grass → Caterpillar → Thrush → Hawk**

(b) Name the organism at the second feeding level in each of the food chains above:

1. **greenfly**; 2. **caterpillar**.

(c) Construct a food web in the space provided using all the organisms listed above in (a).
Q.6 (a) The apparatus (method) used on the right is called a:

___ line ___ transect ___

(b) Where in the woodland might this method be used?

___ across a boundary, for example, from a well lit area into a shaded area ________

Q.7 (a) A habitat study involves making a simple ___ map ___ of the habitat; measuring and recording the ___ environmental ___ factors; collecting ___ samples ___ of the organisms present; and estimating the _____ numbers _____ of organisms present.

(b) A map should include the direction ___ north ___; a ___ scale ___; and a ___ legend ___ of the different features.

(c) Air, water and soil temperatures are taken using a _____ thermometer ______

(d) Light intensity can be recorded using a ___ light _____ meter ___.

(e) A _____ quadrat _____ is used to estimate the numbers of plants - it is placed at _____ random _____ in the habitat.

(f) The changes in plant numbers ___ across a boundary ___ are best recorded using a ___ line _____ transect _____.

(g) When two or more organisms seek a resource that is in limited supply, ______ competition ______ occurs.

Q.8 How organisms depend on other organisms is called interdependence. Give an example of:

(a) Plants depending on animals: ___ buttercups depend on bees for pollination ________

(b) Animals depending on plants (other than for food): ______________________________

_____ robins depend on trees to build their nests in ______________________________

(c) Plants depending on other plants: ______________________________

_____ the primrose depends on trees in a woodland for shelter ____________________
Chapter 19  Conservation and Pollution  Biology

Your Name: ____________________________________________

Q.1  (a) Conservation means protecting our natural ___resources___ for future generations.

(b) Pollution is adding unwanted ___wastes___ to the ___environment___, causing damage to it.

(c) Air pollution is caused by ___smoke___, ___dust___ and harmful ___gases___.

(d) When a fossil fuel is burned, it releases the gases ___carbon___ ___dioxide___ and ___sulfur___ ___dioxide___, which can dissolve in rainwater to form ___carbonic___ acid and ___sulfuric___ acid, which altogether form the harmful rain known as ___acid___ ___rain___.

(e) This type of rain damages and kills ___plants___ and corrodes ___limestone___.

(f) The 'Greenhouse Effect' is caused mainly by the gas ___carbon___ ___dioxide___. This causes the Earth to ___heat___ up, causing ___floods___ and other ___weather___ changes. The gas is produced by burning ___fossil___ fuels.

Q.2  (a) Soil pollution is caused by ___pesticides___, artificial ___fertilisers___, and ___acid___ ___rain__.

(b) Chemicals used to kill weeds and unwanted pests are called ___pesticides___; they can be passed up the ___food___ ___chain___, eventually causing damage to animals, including humans.

(c) Artificial ___fertilisers___ can soak into ___rivers___ and ___lakes___, where they cause the rapid growth of scum-like green ___algae___. Bacteria feeding on these use up the ___oxygen___ in the water, causing the ___fish___ to die.

(d) Nutrient-containing ___sewage___ and ___detergents___ have the same effect as described in 2.(c) above.

(e) Large tankers at sea often release ___oil___ which clogs and sticks to the ___feathers___ of ___sea-birds___, and destroys our ___beaches___.

69
Q.3  (a) The two main methods of waste disposal on land are ____ incineration ____ (burning), and burial at designated sites called ____ landfills ____.

(b) However, burning can cause ____ air ____ pollution, and burial can lead to ____ water ____ pollution, if ____ seepage ____ from the waste occurs.

(c) Nuclear waste is often dumped in the ____ sea ____.

(d) Wastes such as ____ paper ____ , ____ glass ____ , some ____ metals ____ and ____ plastics ____ can all be recycled.

(e) Central collections points for materials to be recycled are called ____ bottle ____ banks ____ , but such schemes, at the moment, are only carried out on a ____ voluntary ____ basis.

Q.4  (a) Two ways in which humans have a harmful effect on the environment are:

1. ____ burning fossil fuels ____

2. ____ allowing seepage into rivers from silage and slurry pits ____

(b) Two ways in which humans have a beneficial effect on the environment are:

1. ____ using unleaded petrol instead of leaded petrol ____

2. ____ cleaning up of rivers and canals ____

Q.5  (a) Describe two ways in which you and your classmates could benefit your local environment:

1. ____ by not throwing litter on the ground ____

2. ____ by not burning rubbish in the back garden ____

(b) For any one of the two you have chosen, describe briefly how you might go about carrying it out.

 ____ by putting up posters around the school to remind people not to drop litter on the ground, and to make sure that there are plenty of bins available ____.
Q.1 (a) Micro-organisms are so small that a ____ microscope ____ is needed to see them.

(b) The study of micro-organisms is called ____ microbiology ____.

(c) A virus consists of a chemical that can ____ reproduce ____ itself surrounded by a ____ protein ____ ____ coat ____.

(d) A virus can only reproduce inside a ____ living ____ ____ cell ____ and therefore, all viruses cause ____ disease ____ in animals and plants.

(e) Human diseases caused by viruses include ____ colds ____ , ____ 'flu ____ , ____ measles ____ and ____ rabies ____.

(f) Drugs called ____ antibiotics ____ do not work against viruses.

(g) Our white blood cells produce ____ antibodies ____ to kill viruses and ____ bacteria ____.

(h) Tooth decay is caused by ____ bacteria ____ feeding on ____ sugars ____ on the teeth.

Q.2 (a) Bacteria are living ____ cells ____ therefore, they feed, move and respire.

(b) Soil bacteria and fungi break down ( ____ decompose ____ ) the remains of dead animals and plants in the soil. In ecology, therefore, bacteria and fungi are called ____ decomposers ____.

(c) Bacteria are used commercially to produce ____ cheese ____ and ____ yogurt ____ , and to break down grass to form ____ silage ____.

(d) Human diseases caused by bacteria include ____ pneumonia ____ , ____ meningitis ____ , and ____ appendicitis ____.

(e) Bacteria cause milk to go ____ sour ____ , and food to ____ spoil ____.

(f) The use of living things, such as micro-organisms, to make substances useful to humans is called ____ biotechnology ____ . Examples of its uses include using ____ yeast ____ to make alcohol and using ____ bacteria ____ to produce cheese.
Q.3 (a) Fungi can occur as single cells (e.g. _____ yeast _____); as long, fine threads (e.g. ___ bread mould ___); or as larger structures (e.g. ___ mushrooms ___).

(b) Fungi are used in the ___ brewing ____ and ____ baking ____ industries to produce ______ alcohol ____ and to make the ____ dough ____ rise.

(c) The fungus ___ Penicillium ___ is used to make a medicine called an ____ antibiotic ____.

(d) Fungi cause the human diseases ___ ringworm ____ and ___ athletes ___ ___ foot ____.

(e) Both bacteria and fungi break down dead animals and plants in the soil, and turn them into ___ humus ____ which enriches the soil.

Q.4 The diagram below shows the stages of an experiment to determine the presence of micro-organisms in the air.

(a) Describe how the nutrient agar is inoculated with micro-organisms.

___ the lid of the agar plate is left open in the laboratory for fifteen minutes _______.

(b) Why was one agar dish (called the __ control __) left unopened?

___ to show that any micro-organisms that grew came from the air only ___________.

(c) Why are the inoculated agar plates placed in an oven at 20 °C?

___ the micro-organisms grow (divide) rapidly at this temperature _________________.

(d) Why are the dishes turned upside down in the incubator? (hint: condensation).

___ any condensation that forms falls onto the lid and not onto the micro-organisms ____.
Q.1  
(a) Matter is anything that takes up _____ space _____ and has _____ mass _____.

(b) The amount of matter in an object is its ______ mass ______.

(c) The three states of matter are _____ solid _____, _____ liquid _____, and _____ gas _____.

(d) The diagram shows molecules in a solid, a liquid and a gas.

(i) In the solid, the molecules are in a ____ fixed ____ position. Each has enough 
____ energy _____ to _____ vibrate _____ slightly.

(ii) In a liquid, the molecules have enough _____ energy _____ to _____ slide _____ 
and _____ roll ____ over and around each other.

(iii) In a gas, the molecules have enough _____ energy _____ to ___ separate ___ completely from each other.

(e) The state of matter depends on the amount of ____ energy ____ its molecules have.

(f) When a substance is heated, its molecules are given ____ energy ____ which can be 
used to change the _____ state _____ of the substance.

(g) The temperature at which both the solid and liquid states of a substance occur 
together is called the _____ melting _____ point ____ of the substance.

(h) The boiling point of a liquid is the temperature at which _____ evaporation _____ begins 
to occur _______ throughout _______ the liquid.
Q.1  (a) An ______ atom ______ is the smallest part of an element that still is that element.
(b) An element consists of only one kind of ______ atom ______.
(c) Four examples of elements which are metals are ______ iron _____, ____ copper _____, 
______ silver _____, and ______ gold _______.
(d) Four examples of elements which are non-metals are ______ carbon ______, 
________ sulfur ______, ______ oxygen ______, and _____ nitrogen _____.
(e) The element ______ carbon _____ occurs in two forms, one being a soft, grey-black 
substance known as graphite, which is used as pencil 'lead'.
(f) The element ______ copper _____ is a reddish-brown metal used for wiring.
(g) The element _____ sulfur _____ is a solid, yellow, non-metal used to make matches.

Q.2  (a) A substance consisting of two or more types of atoms bonded together is called 
______ compound ______. Examples include ___ water _____, and ___ sugar _____.
(b) The smallest possible part of a compound is a ___ molecule ____ of that compound.
(c) Each ___ molecule ____ of carbon dioxide consists of one ___ atom ____ of carbon 
and two ___ atoms ____ of oxygen chemically bonded together.
(d) A ___ molecule ___ of water consists of two ___ atoms ___ of hydrogen and one ___ atom__
of oxygen chemically bonded together. Its chemical formula is therefore ___ H₂O ____.
(e) A compound is a completely _____ new _____ substance.

Q.3  (a) A mixture consists of two or more different ______ substances ______, which are 
_____ mingled ____ together, but are not ______ chemically _____ combined ____.
(b) When a mixture is made, nothing _____ new _____ has been formed.
(c) Air is a mixture which includes the elements: ______ oxygen _____,
and_____ nitrogen _____, and the compound _____ carbon _____ dioxide _____.

(d) Seawater is a mixture of the compounds _____ salt _____ and _____ water _____.

(e) A mixture of iron and carbon gives _____ steel _____.

(f) A mixture of iron and sulfur is easy to separate using a ______ magnet _______.

(g) When a mixture of iron filings and sulfur is heated, a new _____ compound _____
called ___ iron ___ sulfide ____ is formed by a ______ chemical ______ reaction.

(h) In a physical change, nothing ____ new ____ is formed.

(i) Changing the state of a substance by heating or cooling is a _____ physical _____ change.

(j) When something new is formed, a _____ chemical _____ change has taken place.

Q.4 (a) State which of the following is an element (E), a compound (C), or a mixture (M).

seawater ( M ); air ( M ); water ( C ); sulfur ( E ); iron ( E ); glass ( C );
sodium chloride ( C ); coke ( M ); sugar ( M ); oxygen ( E ); perspex ( C );
carbon dioxide ( C ); copper ( E ); gold ( E ); iron sulfide ( C ); soap ( C );
candle wax ( C ); zinc ( E ); nitrogen ( E ); steel ( M ); ink ( M ); ice ( C ).

(b) State whether each of the following is a physical (P) or a chemical (C) change.

ice melting ( P ); burning paper ( C ); dissolving sugar in water ( P );
iron rusting ( C ); melting lead ( P ); cutting bread ( P ); making toast ( P );
brewing alcohol ( C ); boiling water in a kettle ( P ); chewing food ( P ).
Q.1 (a) A solution is a mixture of a _____ solute _____ in a _____ solvent ______.

(b) When copper sulfate is added to water, it ___ dissolves ___ to form a ___ solution ___.

(c) The copper sulfate is the ____ solute _____ and the water is the ______ solvent ______.

(d) A dilute solution is one with a small amount of _____ solute _____ and a large amount of _____ solvent ______.

(e) A concentrated solution is one with a small amount of _____ solvent _____ and a large amount of _____ solute ______.

(f) A _____ saturated _____ solution is one that cannot _____ dissolve _____ any more of the _____ solute _____, without raising the _____ temperature ______.

(g) If ____ crystals _____ of solute appear at the bottom of the test tube, we know that the solution is a _____ saturated _____ solution.

(h) Large _____ crystals _____ of copper sulfate can be grown using a ___ hot ___, very _____ concentrated _____ solution of copper sulfate and allowing it to ___ cool ____ over a _____ long ____ period of time.

(i) In general, the hotter a solution is, the ___ more ____ solute it can dissolve.

(j) A solubility _____ curve _____ is a graph used to show how the solubility of a substance increases with increasing ______ temperature ______.

(k) The formation of crystals from a hot, very concentrated solution which is left to cool is called ______ crystallisation ______.

(l) The solubility of copper sulfate increases with increase in _____ temperature ______.

(m) To make a solubility curve for copper sulfate, the amount (mass) of copper sulfate that will dissolve in 100 g of _____ water _____ at 20°C is found. Then the amount that will dissolve at three higher _____ temperatures _____ is also found.
Q.2 An investigation on the solubility of copper sulfate was carried out and the data is given in the table shown below.

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Solubility (g / 100 g of water)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>29</td>
</tr>
<tr>
<td>50</td>
<td>34</td>
</tr>
<tr>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>70</td>
<td>48</td>
</tr>
<tr>
<td>80</td>
<td>56</td>
</tr>
<tr>
<td>90</td>
<td>68</td>
</tr>
</tbody>
</table>

(a) Plot the graph of the solubility curve for copper sulfate.

(b) From the graph, the solubility of copper sulfate at 25 °C is ____22____ g / 100 g water.

(c) From the graph, the solubility of copper sulfate at 75 °C is ____52____ g / 100 g water.

(d) 45 g of copper sulfate dissolves in 100 g of water at a temperature of ___67___ °C.

(e) From the graph, what can you conclude about the solubility of copper sulfate at different temperatures?

___the higher the temperature, the more copper sulfate will dissolve___________

(f) Describe two ways that a dilute solution could be made more concentrated.

1. ___add more solute____________________________

2. ___remove some of the solvent by evaporating it____________________________
Q.1 (a) Substances in a mixture may be separated if there is some physical ___difference___ between them.

(b) Method A is called _____filtration_____ and can be used to separate small, ___insoluble___ solids, such as ___sand___, from a liquid. However, any _____soluble_____ solids would just pass straight through the _____filter_____ paper.

(c) Method B is called _____evaporation_____ and can be used to separate _____soluble_____ solids from a liquid. The liquid soon ___evaporates___ from the dish, leaving ___crystals___ of the solid behind.

(d) A mixture of sand, salt and water could be separated by first using the method of _____filtration_____ to remove the ___sand___, followed by the method of _____evaporation_____, to separate the ___salt___ and _____water_____.

(e) Method C is called _____distillation_____ and can be used to separate two liquids, such as, ___alcohol___ and ___water___, which have different _____boiling_____ points.

On heating, the ___alcohol___ vapour enters the _____Liebig_____ condenser first, condenses and is then collected in the _____beaker_____.

(f) Two changes of state that occur in the apparatus are: 1. _____evaporation_____ and, 2. _____condensation_____.

Your Name: ______________________________
Q.2  (a) Method D is called paper ____ chromatography ____ and is used to separate small amounts of substances that are ____ dissolved ____ in a liquid. The ____ chromatography ____ paper is placed in a ____ graduated ____ ____ cylinder ____ with a small amount of ____ solvent ____ at the bottom. The dyes present in black ____ ink ____ can be separated out in this way.

(b) The dyes that are most ____ soluble ____ in the solvent are carried furthest up the chromatography paper.

(c) The method of ____ evaporation ____ may be used to separate a solution of salt in water (seawater), to give a pure sample of each component.

(d) Two different liquids with boiling points of 78 °C and 100 °C could be separated by the method of ____ distillation ____ .

Q.3 Name the method/s which could best be used to separate each of the following mixtures to give a pure sample of each component.

(a) Sand and iron filings: ____ magnet ________________________________.

(b) Sand and salt: ____ filtration, followed by evaporation ____________________.

(c) Sand and water: ____ filtration ________________________________.

(d) Copper sulfate and water: ____ evaporation ________________________________.

(e) Alcohol and water: ____ distillation ________________________________.

(f) Alcohol, water and sand: ____ filtration, followed by distillation ________________.

(g) The dyes in black ink: ____ chromatography ________________________________.

(h) Minerals dissolved in mineral water: ____ evaporation ________________________________.

(i) Salt and water (seawater): ____ evaporation ________________________________.
Q.1  (a) The smallest possible piece of an element is an _____ atom _____ of that element.

(b) The ___ atom ___ is made up of three sub-atomic particles; these are the ___ proton ___ , the ___ neutron ___ , and the ___ electron ___ .

(c) Answer the questions on the diagram of the atom given below.

Particles A are called ___ electrons ___ , they orbit the _____ nucleus _____ , have a charge of ___ –1 ___ , and a mass of ___ 1 ___ a.m.u.

B and C are ______ shells ______ or orbits which hold the ______ electrons ______ .

D is the core or __ nucleus __ of the atom; it contains __ protons __ and __ neutrons __ .

E is a positively charged particle called a _____ proton _____ ; its mass is ___ 1 ___ a.m.u.

F is a ___ neutron ___ with a charge of ___ 0 ___ , and a mass of ___ 1 ___ a.m.u.

(d) An atom is electrically neutral because it has equal numbers of ___ protons ___ and ___ electrons __ . Each ___ positive ___ charge cancels out each ___ negative ___ charge.

(e) The number written over the symbol of an element in the Periodic Table tells us the number of ___ protons ___ in the nucleus of an atom of that element.

This number is called the ___ atomic ___ number of the atom.

(f) The larger number written below the symbol of an element in the Periodic Table tells us the number of ___ protons ___ plus ___ neutrons ___ in the nucleus of the atom.

This number is called the ___ mass ___ number of the atom.
Q.2
(a) The atom of carbon has 6 protons in its nucleus; it must have \(6\) electrons orbiting its nucleus; and its \(\text{atomic number}\) is 6.
(b) The first shell can hold a maximum of \(2\) electrons.
(c) The second shell can hold a maximum of \(8\) electrons.
(d) An atom of sodium (atomic number 11) has \(11\) protons in its nucleus and \(11\) electrons in orbit around the nucleus. The first shell contains \(2\) electrons; the second shell contains \(8\) electrons; and the third shell contains \(1\) electron.
(e) The arrangement of electrons in the sodium atom, called its \(\text{electronic configuration}\), is therefore given as \(2\) \(8\) \(1\).
(f) Four atoms, A, B, C and D are shown below.

Atom A has atomic number \(8\); it is an atom of \(\text{oxygen}\).

Atom B has atomic number \(1\); it is an atom of \(\text{hydrogen}\).

Atom C has atomic number \(12\); it is an atom of \(\text{magnesium}\).

Atom D has atomic number \(17\); it is an atom of \(\text{chlorine}\).

(g) Atom E and atom F have the same \(\text{atomic number}\), therefore they are atoms of the same \(\text{element}\) which is \(\text{carbon}\).

However, they have different numbers of \(\text{neutrons}\) and are therefore \(\text{isotopes}\) of the element \(\text{carbon}\).

The two forms are known as \(\text{carbon} - \_\_12\) and \(\text{carbon} - \_\_14\).
Q.1  (a) The Periodic Table arranges the elements in order of increasing _atomic__ number _. 

(b) Each atom has an equal number of _____protons_____ and _____neutrons_____. 

(c) Sodium has __11__ (number) protons in its nucleus, and __11__ electrons in orbit around the nucleus. 

(d) For any element, the number over the symbol is the __atomic__ number ___and gives the number of _____protons_____ in the nucleus of an atom of that element. 

(e) Vertical columns of elements are called _____groups_____. 

(f) All the elements in a particular _____group_____ or column have the same number of _____electrons_____ in their _____outermost_____ shells ___.

---

**Chapter 26**

**The Periodic Table**

**Chemistry**

---

**Your Name:** ______________________________

---

**Q.1**

(a) The Periodic Table arranges the elements in order of increasing _atomic _ number _. 

(b) Each atom has an equal number of _____protons_____ and _____neutrons_____. 

(c) Sodium has __11__ (number) protons in its nucleus, and __11__ electrons in orbit around the nucleus. 

(d) For any element, the number over the symbol is the __atomic__ number ___and gives the number of _____protons_____ in the nucleus of an atom of that element. 

(e) Vertical columns of elements are called _____groups_____. 

(f) All the elements in a particular _____group_____ or column have the same number of _____electrons_____ in their _____outermost_____ shells ___.

---

**Back to Contents**
(g) Another thing that the elements in a particular vertical column have in common is that they __*behave in the same way chemically*__________________________.

(h) Group I elements are called the ___alkali_____ metals_____, they all have __1___ __*electron*____ in their ____outermost_____ shells. Examples of Group I elements are ________ lithium ______ , ________ sodium ______, and ________ potassium ______.

(i) Group II elements are called the ___alkaline_____ earth______ metals____, they all have __2___ __*electrons*____ in their ______outermost_____ shells.

(j) Group VII elements are called the _____halogens_____. Two things all these elements have in common are: 1. __*they all have 7 electrons in their outermost shells*________; and 2. __*they all behave in the same way chemically*__________________________.

(k) Group __8__ elements, called the ___noble_____ gases____ are very unreactive because they all have __a full outermost shell______________________________.

(l) The electronic configuration of sodium is : 2, 8, __1___.

(m) The electronic configuration of neon is : __2__ , __8___.

(n) The electronic configuration of chlorine is __2__ , __8__ , ___7___.

(o) The horizontal rows of elements are called ______*periods*______.

(p) The first row or __*period___ only has two elements, they are _hydrogen_ and _helium_.

(q) The third row, or __*period___ goes from the element _____sodium_____ to the element _____argon_____, and is numbered n = __3___.

(r) All the elements in row 3 have ______3 shells of electrons______________.

(s) The Periodic Table may also be divided into the _____metals______ on the left and middle, and the ___non_____ _____metals_____ on the right hand side.

(t) Include the symbols for each of the following elements:

Copper (_Cu_); zinc (_Zn_); aluminium (_Al_); lead (_Pb_); iron (_Fe_); silver (_Ag_); gold (_Au_); carbon (_C_); oxygen (_O_); sulfur (_S_); hydrogen (_H_) and nitrogen (_N_).
Use the Periodic Table of Elements in your textbook to answer the following:

**Q.1**

(a) Elements combine with each other chemically to form ______ compounds ______.

(b) An atom of sodium (symbol __Na__) will combine with an atom of chlorine (__Cl__) to form ___sodium_____ ___chloride_____ (formula ____NaCl____).

(c) Elements that have __8__ electrons in their outer shells are very stable. These elements are in Group __8__ and are called the ___noble___ ___gases___.

(d) All other elements would like to have this stable state and thereby satisfy the ______ Octet ______ Rule.

(e) Atoms of other elements can only achieve this stable state by either ____giving____ or ______ taking _____ or _______ sharing ______ outer electrons.

(f) An ionic bond is formed when atoms either ____give___ or ___take___ electrons in order to satisfy the ______ Octet ______ Rule.

(g) In an ionic bond, both atoms end up with a ___full___ ___outer___ shell of electrons.

(h) Sodium, in Group _1_, has _1_ outer electron which it ___gives___ ___away___ when it forms an ionic bond with another atom or atoms. The sodium atom is then called a sodium ____ion____, - it now has a total of __10__ electrons and __11__ protons, and therefore it now has an overall electrical charge of __+__ __1__.  

(i) Chlorine, in Group __7__, has __7__ outer electrons, it will therefore need to ___gain___ an electron when it bonds. It will then have __18__ electrons and __17__ protons, and therefore it will have an electrical charge of __−__ __1__.  

(j) After bonding, the chlorine atom is called a chloride ____ion____.

(k) An ____ion____ is a charged atom or group of atoms.
(l) An **ionic** bond is formed by the force of attraction between a **positive** and a **negative** ion.

(m) The electronic configuration of the sodium atom is: \( _{1}^{2} \, _{2}^{8} \, _{3}^{1} \).

(n) The electronic configuration of the sodium ion is: \( _{2}^{2} \, _{2}^{8} \).

(o) The electronic configuration of the chlorine atom is: \( _{17}^{2} \, _{18}^{7} \).

(p) The electronic configuration of the chloride ion is: \( _{17}^{2} \, _{18}^{8} \).

**Q.2** Complete the electronic configuration diagrams below by adding in the electrons to show how sodium and chlorine bond together to form sodium chloride:

![Sodium atom](image1)

![Chlorine atom](image2)

charge = +1

![Sodium ion](image3)

![Chloride ion](image4)

charge = –1

Sodium chloride, NaCl
Q.3 Complete the electronic configuration diagrams below by adding in the electrons to show how magnesium and oxygen bond together to form magnesium oxide:

Magnesium atom

Oxygen atom

charge = _ + 2 _

Magnesium ion

Oxygen ion

charge = _ -2 _

Magnesium oxide, MgO

Q.4 (a) Sodium atoms form ions with a charge of __ +1 __ when they react; oxygen atoms form ions with a charge of __ –2 __. Therefore when sodium oxide is formed, 2 atoms of _____ sodium _____ are needed for every 1 atom of _____ oxygen ______.

The chemical formula for sodium oxide is therefore _____ Na₂O ______.

(b) All the ions formed by elements in Group I have a charge of ____ +1 ____.

(c) All the ions formed by elements in Group VI have a charge of __ –2 __.

(d) Use the Periodic table to fill in the ions in the Table overleaf (include the charge present on each ion). Fill all blank spaces as shown for hydrogen and magnesium.
(e) When a compound is formed, the overall charge on it must be __ 0 __, therefore, the __ positive ___ charges and the ___ negative ___ charges must add up to give __ 0 __.

(f) Use the Table above to write the chemical formulas for the following compounds:

- Lithium fluoride ______ LiF ______ ; Sodium sulphide _______ Na₂S ______ ;
- Potassium oxide ______ K₂O ______ ; Calcium chloride _____ CaCl₂ _____ ;
- Lithium oxide ______ Li₂O ______ ; Aluminium chloride _____ Al₂O₃ _____ .

(g) An ionic bond is formed by the force of attraction between a _____ positive _____ and a _____ negative _____ ion.
Q.1 (a) A covalent bond is formed when atoms ______ share _____ electrons, so that each atom has a _____ full _____ outer shell.

(b) A __ single __ covalent bond is formed when atoms combine by __ sharing __ one pair of electrons. Examples of this are found in molecules of ____ hydrogen ____ , ______ water ______ , and ______ methane ________.

(c) A ___ double ___ covalent bond is formed when atoms combine by ___ sharing ___ two pairs of electrons. An example of this is found in the _____ oxygen ____ molecule.

(d) A hydrogen atom has one _____ electron ______ in its outer shell, it needs to have ___ two ___ _____ electrons ____ to have a _____ stable _____ , full outer shell.

(e) In the hydrogen molecule, two hydrogen atoms ______ share _____ their outer ___ electrons ___.

88
Q.2  (a) Use the Periodic Table to complete the electronic configurations for the atoms shown:

Hydrogen atom  
Oxygen atom  
Carbon atom

(b) In the spaces provided, draw similar diagrams to show the molecules named:

Hydrogen molecule (H₂)  
Water molecule (H₂O)  
Methane molecule (CH₄)  
Oxygen molecule (O₂)

(c) Each hydrogen atom drawn in 2(b) is in a _______ stable _______ state because it has a _______ full _______ outer shell, containing _____ 2 _____ electrons.

(d) Each oxygen atom is now _______ stable _______ because it also has a ___full___ outer shell.

89
Chapter 29  Ionic and Covalent Compounds

Your Name: ______________________________

Q.1 (a) The kind of bonding in a compound has a large effect on its ______ properties ______.

(b) An _____ ionic _____ bond is formed when a metal reacts with a non-metal.

(c) Positive and negative _____ ions _____ are strongly _____ attracted _____ to each other and also to other positive and negative _____ ions _____ nearby.

(d) This leads to the formation of a giant _____ lattice _____ structure, called a ____ crystal ____ _____ lattice ____ , in which all the _____ ions _____ are strongly held together.

Q.2 (a) Ionic compounds form a giant _____ crystal _____ _____ lattice _____.

(b) At room temperature, ionic compounds are normally in the _____ solid _____ state.

(c) Ionic compounds have _____ high _____ melting and boiling points because a _____ large ____ amount of heat energy is needed to break their bonds.

(d) Ionic compounds are usually _____ soluble _____ in water.

(e) When melted or _____ dissolved _____ in water, ionic compounds can ___ conduct ___ ___ electricity ____ , because moving ____ ions ____ can carry a ___ current ___.

(f) In the diagram, the bulb lights, showing that the beaker contains a dissolved _____ ionic _____ compound.

Q.3 (a) A _____ covalent _____ compound is made up of separate, individual ____ molecules ____.

(b) In such a compound, the attraction between the molecules is very _____ small _____, therefore most ____ covalent ____ compounds occur as either ____ liquids ____ or ____ gases ____.

(c) Such compounds usually have ____ low ____ melting and boiling points, are ____ insoluble ____ in water and do not conduct ____ electricity _____.

90
Q.1 (a) Strong acids such as ___ hydrochloric ___ acid, formula ___ HCl ___ ; and ___ sulfuric ___ acid are very ___ corrosive ___ which means they will eat into substances.

(b) Weak acids such as ___ carbonic ___ acid in fizzy drinks and ___ citric ___ acid in oranges and lemons, like all acids, have a ___ sharp ___ , ___ sour ___ taste.

(c) Bases that are dissolved in water are called ____ alkalis ____.

(d) Bases (or ____ alkalis ____ ) are the ____ opposite ____ to acids.

(e) The base, ___ sodium ___ hydroxide ___, formula ___ NaOH ___, is known as caustic soda because it is so ___ corrosive ___.

(f) The base ___ calcium ___ hydroxide ___ forms limewater when dissolved in water.

(g) Commonly used substances in the home that contain bases include, ___ toothpaste ___, ___ soap _____ , and _____ window _____ cleaner _____.

(h) Bases dissolved in water ( ____ alkalis ____ ) have a ____ soapy ____ feel.

(i) When they mix, an acid and an alkali ____ neutralise ____ each other to form a harmless, non-corrosive substance called a ____ salt ____.

(j) An ____ indicator ____ is a chemical which shows, by means of a colour change, whether a substance is an ____ acid ____ or an ____ alkali ____.

(k) An example of such a chemical is ____ litmus ____ - it turns ____ red ____ in an acid and ____ blue ____ in an ____ alkali ____.

(l) The pH scale shows how ____ strong ____ or ____ weak ____ an acid or alkali is; the scale goes from ___ 0 ___ for a strong ___ acid ___ to ___ 14 ___ for a strong ___ base ____.

(m) To find the pH of a substance, ____ universal ____ indicator ____ paper is used.

(n) A neutral substance, such as ___ sodium ___ chloride ___ has a pH of ___ 7 ____.

(o) The stronger the acid the ____ lower ____ its pH will be.
Q.2 (a) An acid and a base **neutralise** each other in a **neutralisation** reaction.

(b) **Hydrochloric** acid, formula **HCl** and **sodium** hydroxide, formula **NaOH**, react together to form the **salt** called sodium chloride, formula **NaCl**, and **water**.

(c) The chemical equation for this reaction is:

\[ \text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O} \]

(d) The experiment shown below is used to find out exactly how much acid is needed to **neutralise** a certain amount of alkali; it is called a **titration**.

(e) The apparatus, A and B, used are: A = ** burette **; B = ** pipette **.

(f) The chemical C used is **hydrochloric** acid ; and chemical D is **sodium** hydroxide, to which a few drops of **litmus** are added.

(g) The white tile allows **the colour change to be easily seen**.

(h) The experiment is repeated a third time with no **litmus** in the conical flask.

(i) At the end of the experiment, the conical flask contains a **salt** called **sodium chloride** and **water**.
Q.3  
(a) The method shown on the right is used to _____ separate _____ the water from the mixture formed in Q.2. This leaves the ___ sodium ___ chloride ___ which appears as ____ crystals ____ on the evaporating dish.

(b) A salt is a compound formed when the _____ hydrogen ____ in an acid gets replaced by a ______ metal _____ _____ ion _____.

(c) An acid and a base always react to give a _____ salt _____ and _____ water _____.

(d) An acid and a carbonate react to give a _____ salt _____ and _____ water _____ and _____ carbon _____ dioxide _____.

(e) The (i) word and (ii) chemical equations for the reaction between hydrochloric acid and calcium carbonate are as follows:

(i) Hydrochloric acid + calcium carbonate → calcium chloride + water + carbon dioxide

(ii) ___ 2HCL + CaCO3 ___ CaCl2 + H2O + CO2

Q.4  
The substances A, B, C, D and E, whose pH was tested for as shown in the diagram, include: rainwater, lemon juice, window cleaner, sulfuric acid and sodium hydroxide solution.

The substances are:

A = ___ sulfuric acid ______;
B = ___ lemon juice ______;
C = ___ rainwater ______;
D = ___ window cleaner ____;
E = ___ sodium hydroxide ____.
Q.1 (a) Air is a ___mixture___ of separate gases, consisting mainly of ___nitrogen___ (78%) and ___oxygen___ (21%).

(b) The compounds present in air are ___carbon___ dioxide and ___water___ vapour.

(c) To test for water, ___cobalt___ chloride and ___paper___ is used.

(d) Carbon dioxide is tested for by using ___limewater___ which turns a ___milky___ colour.

(e) To show the percentage of oxygen in the air, the metal ___copper___ is burned in air to form the compound ___copper___ oxide.

(f) Oxygen is prepared in the laboratory by the breakdown of ___hydrogen___ peroxide in the presence of the catalyst ___manganese___ dioxide.

(g) Oxygen is a colourless, ___odourless___ , ___tasteless___ , gas, which is slightly ___soluble___ in water.

(h) Oxygen is a neutral gas - it has no effect on moist ___litmus___ paper.

(i) Oxygen ___relights___ a glowing splint. This is the ___test___ for oxygen.

(j) Oxygen reacts with many elements to form ___oxides___ of that element.

(k) Oxygen is used for ___breathing___ , ___welding___ , and ___burning___.

(l) Carbon dioxide is prepared in the laboratory by the action of dilute ___hydrochloric___ acid on ___marble___ chips.

(m) Carbon dioxide can be ‘poured’ because it is ___denser___ than air.

(n) Moist, ___blue___ litmus paper turns ___red___ in colour in the presence of carbon dioxide. This shows that carbon dioxide is an ___acidic___ gas.

(o) Moist, ___red___ litmus paper turns ___blue___ in colour in the presence of magnesium oxide. This shows that magnesium oxide is a ___basic___ oxide.

(p) From (n) and (o) above, non-metal oxides are ___acidic___ and metal oxides are ___basic__.
Q.2 (a) We know that air is a mixture and not a compound because:

1. Its __composition____ can vary, depending on where it is.
2. When it is cooled, its ___gases become liquids at different temperatures_____
3. Air can be made by ___mixing together the gases that make it up________

(b) The apparatus below is used to show that: ___21% of air is oxygen________

![Diagram of experiment](image)

At the start, __100__ cm³ of air is held in one of the syringes. The metal in the tube is ___copper____ which, when heated, reacts with ___oxygen___ in the air to form black ___copper____ ____ oxide ____.

At the end of the experiment, there is ___79___ cm³ of air in the syringe.

This shows that air contains about ___21___ % of ___oxygen____.

Q.3 (a) The experiment below is used to show that air contains ___carbon____ ___dioxide____ and ___water____ ____ vapour____.

![Diagram of experiment](image)
(b) In the diagram: 

\[ \text{A} = \underline{\text{cobalt}} \underline{\text{chloride}} \underline{\text{paper}} \]. 
\[ \text{B} = \underline{\text{limewater}} \].

c) Ice in the beaker is used to cause \underline{\text{the water vapour to condense to liquid water}}.

d) Substance A is coloured \underline{\text{blue}} at the start of the experiment, and turns to the colour \underline{\text{pink}} due to the presence of \underline{\text{water}}.

e) Substance B is \underline{\text{clear}} at the start of the experiment and turns \underline{\text{milky}} due to the presence of \underline{\text{carbon dioxide}}.

Q.4 (a) Oxygen is prepared in the laboratory by the breakdown of \underline{\text{hydrogen peroxide}} (formula \underline{\text{H}_2\text{O}_2}), into \underline{\text{water}} and \underline{\text{oxygen}}.

The black powder called \underline{\text{manganese dioxide}} (formula \underline{\text{MnO}_2}) acts as a \underline{\text{catalyst}} to make the reaction go faster.

(b) In the space below, draw a fully labelled diagram (as given in your textbook) to show how oxygen is prepared in the laboratory.
(c) The test for oxygen is that it will ___ relight a glowing splint ____________.

(d) Oxygen is a __ colour __-less, __ odour __-less, __ tasteless __-less gas.

It is slightly ___ denser ___ than air and is slightly ___ soluble ___ in water. This is important as it allows ___ fish ___ to breath.

Oxygen is very reactive and will react with other elements to form ____ oxides ____.

For example it reacts with magnesium to form ___ magnesium ___ oxide ___ which is a white powder. It reacts with carbon to form ___ carbon ___ dioxide ___ which can be tested for using ___ limewater ___.

(e) Three uses of oxygen are:

1. ___ breathing ____________________________
2. ___ welding ______________________________
3. ___ burning _______________________________

Q.5 (a) Carbon dioxide is prepared in the lab. by the reaction between dilute ___ hydrochloric ___ ___ acid ___ (formula ___ HCl ___); and ___ marble ___ chips ___ (formula ___ CaCO3 __). These react together to form the solid ___ calcium ___ chloride ____, the liquid ___ water ____, and the gas ___ carbon ___ dioxide ___.

(b) Carbon dioxide is a ___ colour ___-less, ___ odour ___-less, ___ taste ___-less gas. It is ___ denser ___ than air and does not support ___ burning ___.

(c) What will happen in the experiment on the right?

___ the candle will go out ________________

What 2 properties of carbon dioxide are shown in this experiment?

1. ___ it is denser than air as it can be poured __
2. ___ it does not support burning __________

(d) 2 uses of carbon dioxide are:

1. ___ fire extinguishers _________________
2. ___ fizzy drinks _____________________
Q.1  (a) Water is a _____ covalently _____ bonded compound consisting of the elements _____ hydrogen _____ and _____ oxygen ____. The formula for water is ___ H₂O ___.
(b) The test for water is ___ cobalt ___ ___ chloride ___ paper, which turns colour from _____ blue _____ to _____ pink _____ if water is present.
(c) Pure water freezes at _0_ °C and boils at _100_ °C at normal atmospheric pressure.
(d) Water _____ expands _____ when it freezes; therefore the ____ density ____ of ice is less than that of water. Ice therefore _____ floats _____ in water.
(e) Many substances can _____ dissolve _____ in water because it is an excellent solvent.
(f) What two scientific processes are occurring at A and B?
   A: ___ evaporation ____________
   B: ___ condensation ____________
(g) Where in the cycle are the ions that cause water hardness picked up?
   ___ as it runs over land __________
(h) The purest form of water is _____ distilled _____ water.
(i) Water to our homes needs to be _____ treated _____ before we can drink it safely.
(j) The five stages of water treatment are: 1. ___ screening ____, 2. ___ settling ____,
    3. ___ filtration ____ , 4. ___ chlorination ____ , and 5. ___ fluoridation ____ .
(k) At the ____ screening ____ stage, water is passed through a wire mesh.
(l) At the _____ settling _____ stage, water is stored in large tanks or reservoirs.
(m) Water is then passed through ____ filtration ____ beds to remove tiny particles of dirt.
(n) At the __ chlorination __ stage, small amounts of __ chlorine __ is added to kill bacteria.
(o) Small amounts of ____ fluoride ____ compounds are added to prevent tooth decay.
Q.2 (a) Because water is such a good solvent, it is hardly ever pure.

(b) Hard water is water that does not easily form a lather with soap.

(c) Hardness in water is caused by calcium ions dissolved in the water.

(d) Hard water is found in limestone areas where the rocks are mainly limestone. These rocks react with slightly acidic rain-water to release the calcium ions into the water.

(e) The process shown is called ion exchange, and it involves exchanging the calcium ions in the water for hydrogen ions in the resin (part B).

A is hard water, and C is soft water.

(f) Two advantages of hard water are:

1. it provides calcium for healthy teeth and bones.
2. it tastes better.

(g) Two disadvantages of hard water are:

1. it blocks pipes and leaves a scale on kettles and boilers.
2. it wastes soap.

Q.3 (a) The experiment shown is used to demonstrate that various water samples contain dissolved solids.

(b) Water leaves the clock glass by the process of evaporation.

(c) Of the samples, seawater, rainwater, mineral water and river water, rainwater contains the least amount of dissolved solids; while seawater contains the most.
Q.4  (a) The apparatus shown is called a __Hoffman____ voltameter____, and is used to pass a ___current____ through water, causing it to break down into ____hydrogen____ and ____oxygen____.

(b) The production of a chemical reaction by electricity is called _______electrolysis_____.

(c) A is the gas _____hydrogen_____.

(d) C is the gas ______oxygen_____.

(e) The water (B) has a small amount of ____sulfuric____ acid____ added to it to allow a ____current____ to flow.

(f) D and E are called _____electrodes____, and are made of ______platinum_____.

(g) The experiment shows the composition of water and also shows that water is made up of two parts _____hydrogen____ to one part _____oxygen____, by volume.

Q.5  A student tested four different water samples for hardness using soap solution. Equal amounts of each water sample were tested. The samples A, B, C, and D each had 6 drops of soap solution added to them and were then shaken. The results were as shown with various amounts of lather being produced.

(a) Why was it important to use equal volumes of water samples?
   _____to make it a fair test_____________________.

(b) Which sample is most likely to be:
   (i) distilled water _____D_____.
   (ii) water from a limestone area ______B_____.
Chapter 33 Groups of Elements Chemistry

Your Name: _______________________________________

Q.1 (a) Groups of elements are arranged into ___ vertical ____ ____ columns ____ in the Periodic Table.

(b) All the elements in a particular Group have the same number of ___ electrons ___ in their ___ outer ____ ____ shells ____ ; and they all ___ behave ___ in a similar way chemically.

(c) Alkali Metals, such as ___ lithium __ , ___ sodium __ , and ___ potassium __ will ___ float ___ in water because they all have very low ___ density ____ .

(d) The Alkali Metals must be stored in ___ oil ____ because they react readily with elements in the air such as ___ oxygen ____ .

(e) Alkali Metals react with oxygen to form ___ oxides ____ .

(f) Sodium reacts with water to form ___ sodium ____ ____ hydroxide ___ (formula ___ NaOH ___ ) and ___ hydrogen __ . The solution is then ___ alkaline ___ and turns ___ red ___ litmus ___ blue ___.

(g) In the Alkali Metals, reactivity increases as we go ___ down ____ the Group.

(h) The Alkali Metal ___ sodium ____ is used in street lighting.

(i) The Alkali Metal ___ lithium ____ is used to manufacture camera and watch batteries.

Q.2 (a) The diagram shows sodium being burned in oxygen. The substance formed is:

____ sodium ____ oxide ____ .

(b) The same substance is formed by exposing a ___ cut ____ ____ surface of sodium metal to the ___ air ____ .

(c) Write the word equation for this reaction:

___ sodium ___ + oxygen __ → sodium oxide ___________________ .
Q.3 (a) The diagram shows potassium reacting with water.

The gas given off is ___ hydrogen ___

The product ______ potassium ______

________ hydroxide ______ is also formed.

(b) This product forms an _____ alkaline _____ solution in the water which turns __ red ___ litmus ___ paper __ blue __ in colour.

(c) Write a word equation for the reaction:

___ potassium + water _____ potassium hydroxide + hydrogen ___.

Q.4 (a) With reference to the diagram, explain why potassium is more reactive than sodium.

___ The outer electron in potassium is further away from the positive nucleus and is therefore easier to remove. ___

This means that potassium will react faster ________

(b) Of the three elements shown, ______ lithium ______ is the least reactive.

Q.5 (a) The experiment shown is used to demonstrate how an alkali metal reacts with ___ oxygen ___.

(b) When first cut, a _____ shiny _____ surface of the metal is exposed.

c) This surface quickly becomes _____ dull _____ due to a coating of the metal ___ oxide ___ being formed.

(d) Of the alkali metals lithium, potassium and sodium, the change occurs most quickly with the ___ potassium ___ , because it is the most _____ reactive _____ of the three.
Chapter 34  
Metals Chemistry

Your Name: ________________________

Q.1 (a) Metals are found on the ___ left ___ and in the ___ middle ___ of the Periodic Table.
(b) When cut with a knife, metals have a ___ shiny ___ , ___ metallic ___ appearance.
(c) All metals are solids except for ___ mercury ___ which is a liquid at room temperature.
(d) Metals can be hammered out into thin sheets - i.e. they are ___ malleable ___.
(e) Metals can be stretched out into thin wires - i.e. they are ___ ductile ___.
(f) Metals usually have very high ___ melting ___ point ___.
(g) Metals are good ___ conductors ___ of heat and ___ electricity ___.
(h) Metals react with elements in the air, such as ___ oxygen ___ , to form ___ oxides ___.
(i) Iron, in the presence of ___ water ___ , slowly reacts with ___ oxygen ___ in the air to form ___ rust ___ , the chemical name for which is ___ iron ___ ___ oxide ___.
(j) Corrosion returns metals to their ___ ore ___ state (i.e. as they were in the ground).

Q.2 (a) The apparatus shown below was set up to investigate the: ___ conditions necessary for rusting ___.
(b) X = ___ calcium ___ chloride ___
Y = ___ oil layer ___
Z = ___ boiled ___ water ___
(c) X removes ___ water ___ from the test tube.
(d) Z has been ___ boiled ___ in order to remove any ___ oxygen ___ from it.
(e) Y ensures that no further ___ oxygen ___ can get at the nail.
(f) The nail in tube ___ A ___ has both ___ water ___ and ___ oxygen ___; so it will ___ rust ___.
Q.3 (a) Four methods used to prevent the corrosion of steel are: 1. _____ painting ____ ; 2. ___ greasing ___ ; 3. __ galvanising ___ ; 4. ___ chrome ___ plating ___ .
(b) Coating iron with a layer of zinc is called ___ galvanising ___ the iron.
(c) When metals are melted and mixed together, an _____ alloy _____ is formed.
(d) An example of the above is ___ bronze ___ which is a mixture of ___ copper ___ and ___ tin ___ ; and ___ brass ___ which is a mixture of ___ copper ___ and ___ zinc ___ .
(e) Stainless steel is a mixture of ___ iron ___ , ___ carbon ___ , and ___ chromium ___ .
(f) An alloy of ___ tin ___ and ___ lead ___ , ___ solder ___ , is used in the electrical industry to join copper wires.

Q.4 (a) A list of metals placed in order of how reactive they are is called the ___ activity ___ _____ series ____ of metals.
(b) The metals are arranged on the basis of how quickly they react with ___ oxygen ___ , ___ water ___ , and dilute ___ hydrochloric ___ acid ___ .
(c) Only the least reactive metals are found free in Nature, because the more reactive ones would ___ react ___ with other elements to form ___ compounds ___ of the metal.
(d) The diagram shows samples of metals placed in four test tubes, containing cold water.
A = magnesium; B = calcium; C = zinc and D = copper.

Only the metal in test tube ___ B ___ will react vigorously, giving off a large amount of ___ hydrogen ___ gas. On close inspection, a few bubbles of ___ hydrogen ___ gas are seen on the surface of the metal in test tube ___ A ___ .

From this experiment, it is concluded that ___ calcium ___ is the most reactive metal, and ___ magnesium ___ is the next most reactive.
(e) The diagram shows samples of three metals placed in test tubes, containing dilute hydrochloric acid. 
\[ A = \text{magnesium}; \ B = \text{zinc}; \text{ and } C = \text{copper}. \]

Only the metal in test tube \( C \) will show no reaction with the hydrochloric acid.

Of the other two metals, the metal in test tube \( A \) will show the greatest reaction by forming large amounts of \( \text{hydrogen} \) gas.

The metal \( \text{calcium} \) was not used in this test, as, from the previous test, we already know that it is the most reactive metal in the list.

(f) The order of reactivity, from most to least reactive of the metals calcium, copper, magnesium and zinc is: 1. \( \text{calcium} \), 2. \( \text{magnesium} \), 3. \( \text{zinc} \) and 4. \( \text{copper} \).

Q.5  
(a) When metals react with hydrochloric acid, \( \text{hydrogen} \) gas is given off, and the \( \text{chloride} \) of the metal is formed.

(b) The diagram shows the preparation of \( \text{hydrogen} \) by reacting zinc with dilute \( \text{hydrochloric acid} \).

(c) The (i) word and (ii) chemical equations for the reaction are:

(i) \( \text{zinc} + \text{hydrochloric acid} \rightarrow \text{zinc chloride} + \text{hydrogen} \).

(ii) \( \text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2 \).

(d) The gas collected is tested for by placing a \( \text{lit} \) \( \text{taper} \) over the mouth of the test tube. The gas \( \text{hydrogen} \) is present if \( \text{it goes 'pop'} \).

(e) The gas collected forms an \( \text{explosive} \) mixture with air.
Q.1 (a) Most of the energy we need comes from the burning of ____ fossil ____ fuels, such as ____ coal ____ , ____ oil ____ , and ____ gas ____.

(b) All of these fuels contain the elements ____ carbon ____ and ____ hydrogen ____ , and when they burn, the waste products ____ carbon ____ ____ dioxide ____ and ____ water ____ are formed.

(c) Natural gas is mainly ____ methane ____ , which has the formula ____ CH₄ ____.

(d) When coal or oil is burned, the gas ____ sulfur ____ ____ dioxide ____ is released. This gas combines with rainwater to form ____ acid ____ ____ rain ____ which damages plants.

(e) The diagram shows that the burning of natural gas forms the waste products ____ carbon ____ ____ dioxide ____ and ____ water ____.

(f) A, in the diagram is a piece of ____ cobalt ____ ____ chloride ____ ____ paper ____ , which is used to detect the presence of ____ water ____.

(g) B, in the diagram is the chemical ____ limewater ____ which turns ____ milky ____ in the presence of ____ carbon ____ ____ dioxide ____.

Q.2 (a) Plastics are made from simple chemicals called ____ monomers ____ which are manufactured from ____ crude ____ ____ oil ____.

(b) Three useful properties of plastics are: 1. ____ lightweight ____ ; 2. ____ durable ____ ; and 3. ____ waterproof ____.

(c) Plastics are non- ____ biodegradable ____ as they are not easily broken down in Nature.

(d) Three examples of plastics are: 1. ____ polythene ____ ; 2. ____ nylon ____ ; and 3. ____ PVC ____.
Q.3
(a) Normal rainwater is slightly ___acetic___ because ___carbon___ ___dioxide___ in the air dissolves in it to form the weak acid called ___carbonic___ acid.

(b) When fossil fuels are burned, the gas ___sulfur___ ___dioxide___ is formed which dissolves in rainwater to form ___sulfuric___ acid.

(c) The combination of these two acids in rainwater causes rain known as ___acid___ rain.

(d) In an investigation of the effect of acid rain on plants, two dishes of cress seedlings were set up as in the apparatus shown below.

In A, the cotton wool in the beaker is soaked in sodium metabisulfite, which releases the 'acid rain gas' ___sulfur___ ___dioxide___ into the bell jar.

The plants in A will eventually ___die___.

In B, the cotton wool is soaked in water.

B acts as a ___control___ for the experiment.

(e) Acid rain corrodes buildings made of ___limestone___.

(f) A piece of ___limestone___ treated with ___sulfuric___ acid as shown will be seen to fizz as bubbles of the gas ___sulfur___ ___dioxide___ are released.

This acid is found in ___acid___ rain.
Chapter 36  Measurements and Units  Physics

Your Name: ____________________________

Q.1 (a) The S.I unit for length is the ____ metre ____; for mass is the ____ kilogram ____;
for time is the ____ second ____; and for volume is the ____ cubic ____ metre ____.
(b) The apparatus on the right is called an ____ opisometer ____.
It is used to measure ____ curved ____ lines such as ____ roads ____ or ____ rivers ____ on a map.
(c) The apparatus on the right is called a ____ Vernier ____ callipers ____.
It is used to measure the ____ diameter ____ of a pipe or a ____ marble ____.
(d) The area of a rectangle or square is calculated by multiplying the ____ length ____ by the
____ breadth ____. The unit of area is the ____ m² ____ , or the ____ cm² ____ , or the ____ km² ____.

Q.2 In the diagram, the level of the water in the graduated cylinder rises from 170 cm³ (A) to 220 cm³ (B) when the stone is inserted.

The volume of the water displaced is ____ 50 ____ cm³ ____.
The volume of the stone is ____ 50 ____ cm³ ____.
In each case, the reading is taken from the bottom of the ____ meniscus ____.

Q.3 If the stone is too big to fit into the graduated cylinder, an ____ overflow ____
____ can ____ as shown in the diagram must be used. If the volume of
water that overflows is 78 cm³, the volume of the stone is ____ 78 cm³ ____.

Describe how the volume of an object which floats in water could be measured using this method.

____ it would have to be pushed under the water fully ____________ .

What additional piece of apparatus would be needed?
____ a long needle ____.
Chapter 37

Energy

Your Name: ______________________________

Q.1  (a) Energy is the ___ ability ___ to do ___ work ____ . It is measured in ___ joules ____ .
(b) A brick held at a height, or a coiled spring has ______ potential ______ energy.
(c) Anything which is moving has ____ kinetic ____ energy.
(d) The energy stored in our food is ____ chemical ____ energy. This type of energy is also
    present in fuels and is converted to ___ heat ___ energy when they are burned.
(e) The energy stored in the nuclei of atoms is called ____ nuclear ____ energy.
(f) Both ____ light ____ and ____ heat ____ energy come to us from the sun.

Q.2  (a) Energy can neither be ___ created ___ nor ___ destroyed ___ but can only ___ change ___
    from one form to another. This is the Law of ___ conservation ___ of ___ energy ___ .
(b) List the energy conversions that take place in each of the following energy converters:

    bulb  chainsaw  toaster  radio  leaf  dam  torch

    The bulb converts ____ electrical ____ energy to ___ light ___ and ___ heat ___ energy.
    The petrol chainsaw converts _____ chemical _____ energy to _____ kinetic _____ energy.
    The toaster converts ___ electrical ___ energy to ___ heat ___ energy, and its spring
        converts ____ potential ____ energy to ______ kinetic ______ energy.
    The battery radio converts _ chemical _ energy to _ electrical _ energy to _ sound _ energy.
    The leaf converts ___ light ___ energy from the ___ sun ___ into ___ chemical ___ energy.
    The dam converts ____ potential ____ energy of the water to ____ kinetic ____ energy.
    The torch converts __ chemical __ energy to __ electrical __ energy to __ light __ energy.

    In all cases the energy is neither _____ created _____ nor _____ destroyed _____ ; it only
        ______ changes ______ from one form to another.
Q.3  
(a) Three ways to prevent energy loss from our homes are:

1. ___ glass fibre in the attic ____________________________ .

2. ___ double glaze windows ________________________________ .

3. ___ lagging on the hot water tank ____________________________ .

(b) Examples of non-renewable sources of energy are __ coal __ , __ oil __ , and __ gas __ .

(c) Renewable sources of energy are constantly being ___ replaced ___ by Nature.

(d) Four examples of renewable sources of energy are: __ wind __ , __ wave __ ,

____ solar ____ , and ____ geothermal ____ .

(e) The energy sources of the future will have to be _____ renewable _____ sources because they cause little or no ___ pollution ___ and will never ___ run ___ ___ out ___ .

(f) Plants used to produce oils and certain fuels are an example of ___ biomass ___ energy.

(g) Water heated below the earth's surface is an example of ____ geothermal ____ energy.

(h) The diagram on the right is an example of the use of ___ wind ___ energy. In this structure,

___ wind ___ energy is converted into ___ electrical ___ energy which we can use.

Where in Ireland would these be best located?

____ near the coasts ____________________________ .

Why? ___ most wind there _____________ .

Q.4  
(a) Almost all the energy we use comes originally from the ____ sun ____ .

(b) Green plants trap ___ light ___ energy and convert it into ___ chemical ___ energy in a process known as ___ photosynthesis ____ . This energy is then shared between all living things by means of ___ food ___ - ___ chains ___ .

(c) The remains of dead animals and plants, buried in the ground over millions of years, give rise to ____ fossil ____ fuels such as ___ coal ___ , ___ oil ___ , and ___ gas ____ .
Q.5  (a) Nuclear energy is released by the splitting of the ______ nuclei ______ of large atoms.

(b) Nuclear power stations use ____ nuclear ____ energy to produce _____ electrical _____ energy for our homes.

(c) In medicine, nuclear radiation is used to kill _____ cancer _____ cells _____.

(d) Unfortunately, the __ waste __ products of nuclear power stations are __ radioactive __ and can kill living things; they also remain for a ___ long ___ time in the environment.

Q.6  (a) Rubbing your hands together briskly demonstrates the conversion of ___ kinetic ___ energy into _____ heat _____ energy.

(b) Sounding a tuning fork or twanging a ruler over the side of a bench demonstrates the conversion of _____ kinetic _____ energy into _____ sound _____ energy.

(c) When a Bunsen burner is lit, ___ chemical ___ energy is converted to __ heat __ energy.

(d) Figure 1 shows a circuit used to demonstrate the conversion of _____ chemical _____ energy into _____ electrical _____ energy into _____ heat _____ energy.

(e) Figure 2 shows a circuit used to demonstrate the conversion of ______ light _____ energy into _____ electrical __ energy into ______ kinetic _____ energy.

(f) Figure 3 shows a circuit used to demonstrate the conversion of _____ electrical _____ energy into _____ magnetic _____ energy into _____ kinetic _____ energy.
**Chapter 38  Speed, Velocity and Acceleration  Physics**

**Your Name: ______________________________**

**Q.1**

(a) The speed of an object is the ___ distance ___ it travels per ___ unit ___ time ___.

(b) Speed is found by dividing the _____ distance _____ by the ____ time ____ taken.

(c) Velocity is ____ speed ____ in a given _____ direction _____.

(d) The proper unit for speed or velocity is ___ metres ___ per ___ second ___ and its symbol is written as ___ m/s ___ or ___ ms⁻¹ ___.

(e) A man walks 200 m in 50 s. His average speed is ___ 4 ___ ms⁻¹ ___.

(f) A car travels 1 km in 40 s. Its average speed is ___ 25 ___ ms⁻¹ ___.

(g) The graph shows the distances travelled at different times by a girl walking.

- It took the girl ___ 4.5 ___ s to walk 18 m.
- Her average speed in this time was ___ 4 ___ ms⁻¹ ___.

- It took the girl ___ 7.5 ___ s to walk 30 m.
- Her average speed in this time was ___ 4 ___ ms⁻¹ ___.

A straight line distance/time graph always means that the speed (or velocity) is ___ constant ___.

**Q.2**

(a) Acceleration is the change in ____ velocity ____ per ____ unit ____ time ___.

(b) The unit of acceleration is ___ metres ___ per ____ second ____ per ____ second ___.

- Its symbol is written as ___ m/s² ___ , or ___ m/s² ___ , or ___ ms⁻² ___.

(c) The formula for acceleration is the ___ change ___ in ___ velocity ___ divided by the ___ time ___ taken.

(d) A car increases its velocity from 20 m/s to 35 m/s in 5 s. Its acceleration is ___ 3 ___ ms⁻² ___.

(e) The velocity of a train increases from 8 m/s to 24 m/s in 10 s. Its acceleration is ___ 1.6 ___ ms⁻² ___.

112
(f) A car travelling at 42 ms\(^{-1}\) slows down to 14 ms\(^{-1}\) in 4 s.
   Its deceleration (negative acceleration) is \(\frac{42 - 14}{4} = 7\) ms\(^{-2}\).

(g) A car travelling at 56 ms\(^{-1}\) takes 7 s to come to a stop. Its deceleration is \(\frac{56}{7} = 8\) ms\(^{-2}\).

(h) A train starting from rest accelerates at 3 m/s/s for 8 s.
   Its velocity at the end of this time is \(3 \times 8 = 24\) ms\(^{-1}\).

(i) The graph shows the velocity at different times of a stone dropped from a helicopter.
   After 3 s its velocity was \(30\) ms\(^{-1}\).
   Its acceleration in this time was \(10\) ms\(^{-2}\).
   After 8 s its velocity was \(80\) ms\(^{-1}\).
   Its acceleration in this time was \(10\) ms\(^{-2}\).
   A straight line velocity/time graph always means that the acceleration is constant.
   The acceleration due to the pull of gravity is approximately \(10\) ms\(^{-2}\).

Q.3 The graph shows a velocity/time graph for a sports car.

(a) What is the maximum velocity of the sports car? \(50\) ms\(^{-1}\).

(b) For how many seconds does the car stay at its maximum speed? \(50\) s.

(c) What is the acceleration of the car in the first 30 seconds? \(1.67\) ms\(^{-2}\).

(d) What is the retardation of the car in the last 20 seconds? \(2.5\) ms\(^{-2}\).

(e) Between \(30\) seconds and \(80\) seconds, the car has no acceleration.
Q.1 (a) The mass of an object is the amount of ______ matter ______ in it.
(b) The mass of an object cannot ___ change ___ provided you don't add to or take from it.
(c) Mass is measured in _ g's _ or _ kg's _ and is found using an _ electronic _ balance _.
(d) Lead is ____ denser ____ than wood because the matter in it is packed more tightly.
(e) The ____ density ____ of a substance is the mass of ___ 1 ___ cm³ ___ of it.
(f) If each of the cubes on the right have a volume of 1 cm³,
then the density of lead is ___ 11.2 ___ g/cm³ ___.
and the density of aluminium is ___ 2.7 ___ g/cm³ ___.
(g) The volume of a block of lead that has a mass of 33.6 g
would have to be ___ 3 ___ cm³ ___.
(h) The mass of a block of aluminium of volume 5 cm³ would be ___ 13.5 ___ g ____.
(i) The density of a substance is the ___ mass ___ of 1 cm³ of it; therefore if 10 cm³ of glass
has a mass of 25 g, the density of glass is ___ 2.5 ___ g/cm³ ___.
(j) The mass of 12 cm³ of copper is 106.8 g. The density of copper is ___ 8.9 ___ g/cm³ ____.
(k) The density of a substance is found by dividing the ___ mass ___ by the ___ volume ___ of it.
(l) The unit of density is written as ___ g/cm³ ____.
(m) The mass of an object can be found by multiplying its ___ density ___ by its ___ volume ___.
(n) The volume of an object can be found by dividing its ___ mass ___ by its ___ density ___.
(o) The block of wood has a volume of 70 cm³.
The density of the wood is ___ 0.6 ___ g/cm³ ___.
(p) A block of this wood of volume 10 cm³ would
have a mass of ___ 6 ___ g ____.
(q) A block of this wood, of mass 5.4 g would occupy a space of ___ 9 ___ cm³ ____.
Q.2
The mass of the stone is \(42\) g.

The mass is found using an electronic balance.

The volume of the stone is \(14\) cm\(^3\).

The volume is found using an overflow can and a graduated cylinder.

The volume of the stone is equal to the volume of the water displaced.

If the object floated, a needle would be needed in addition to the apparatus shown.

If the stone was very small, an overflow can would not be needed.

Q.3
The mass of the beaker on the right, when empty, was found to be 124 g. The mass of the liquid is \(112\) g.

The volume of the liquid, found using a graduated cylinder is 140 cm\(^3\). Its density is \(0.8\) g/cm\(^3\).

Q.4
(a) An object floats in a liquid if its density is less than that of the liquid.

(b) Ice floats in water because its density is less than that of water.

(c) An object with a density of greater than \(1\) g/cm\(^3\) will sink in water.

(d) The following substances have densities as given: cork (0.2 g/cm\(^3\)), glass (2.5 g/cm\(^3\)), ice (0.9 g/cm\(^3\)), water (1.0 g/cm\(^3\)), paraffin oil (0.8 g/cm\(^3\)), lead (11.2 g/cm\(^3\)), iron (7.9 g/cm\(^3\)), mercury (13.6 g/cm\(^3\)), and gold (19.3 g/cm\(^3\)).

Lead would float if placed in a beaker of mercury.

Ice would sink in a beaker of paraffin oil.

Gold would sink if placed in a beaker of mercury.

Of the substances given, cork, ice, and paraffin oil would float in water - all the others would sink.
Q.1  
(a) A force is a ____ push ____ or a ____ pull ____.
(b) Force is measured in units called _____ newtons _____.
(c) A force is anything which causes an object to __ move __ or change its __ velocity __.
(d) The force of ____ gravity ____ pulls objects towards the ground. This force, acting on an object, is known as the object's ______ weight ______.
(e) The force of _____ friction _____ slows down moving objects.
(f) Forces can be measured using a ____ spring ____ balance ____.
(g) A mass of 1 kg has a force of gravity of ___ 10 ____ newtons ____ pulling it to the ground. The weight of a mass of 1 kg is therefore ___ 10 ____ N ____.
(h) The force of ____ friction ____ is being measured in the diagram.
(i) This force would ___ increase ___ if sandpaper was placed under the block.

Q.2  
(a) If a weight of 2 N extends the spring by 1 cm, a weight of 6 N will extend the spring by __ 3 __ cm.
(b) The spring will be extended by __ 5 __ cm when a weight of 10 N is placed on the pan.
(c) The extension of the spring is in ____ direct ____ ____ proportion ____ to the size of the force applied to it.
(d) Complete the Table and sketch the Graph:

<table>
<thead>
<tr>
<th>Force (N)</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension (cm)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Q.3
(a) The force which prevents easy movement between two objects in contact is called _____ friction _____.
   Like all forces, it is measured in ____ newtons ____.
(b) Oil and grease are ____ lubricants ____ because they reduce ____ friction ____.
(c) Work is done when a _____ force _____ moves an _____ object _____.
(d) Energy is the ability to do ____ work _____. Energy is measured in ____ joules _____.
(e) Work = _____ force _____ ( ___ N ___ ) x _____ distance ____ ( ___ m ___ ).
(f) The maximum amount of work (measured in ____ joules ____) that an object can do is equal to the amount of ____ energy ____ (measured in ____ joules ____) it contains.
(g) A man exerts a force of 200 N as he pushes a trolley a distance of 15 m.
   The amount of work done is _____ 3000 _____ _____ joules _____.
(h) The amount of work done in lifting an object that weighs 200 N to a height of 4 m
   is _____ 800 _____ _____ joules _____.

Q.4
(a) Power is the _____ rate _____ at which _____ work _____ is done.
(b) In other words, power is the amount of ____ work ____ done in one ____ second ___.
(c) Power is measured in units called _____ watts _____.
(d) A man takes 10 seconds to do 800 joules of work; the work he averages per second is __ 80 ____ joules; and his power is ____ 80 ____ _____ watts _____.
(e) A 200 W bulb converts electrical energy to light and heat energy at the rate of __ 200 ____ joules ____ per ____ second ___. Its power is ____ 200 ____ _____ watts _____.
(f) Power is the ____ work ____ done (measured in ____ joules ____) divided by the ____ time ____ taken (measured in ____ watts ____).
(g) A man lifts a 250 N block from the ground to a shelf 2 m high in 5 s.
   The amount of work he does is _____ 500 ____ _____ joules _____.
   His average power is ____ 100 ____ _____ watts _____.

117
Chapter 41

Weight Physics

Your Name: ______________________________

Q.1  (a) The weight of an object is the ____force____ of ____gravity____ acting on it.
(b) The greater the ____mass____ of an object, the greater the force of ____gravity____ acting on it.
(c) Weight is a ____force____ and therefore is measured in ____joules_____.
(d) The earth pulls with a force of ____10____ newtons on every one ____kilogram____ of mass.
(e) An object of mass 50 kg has a weight of ____500____ newtons on earth.
(f) The mass of a man who weighs 750 N on earth is ____75____ kilograms.
(g) The moon, being only one-sixth the size of the earth, pulls things with a force of ____1.67____ newtons per kilogram. A man who weighs 750 N on earth would weigh ____125____ N on the moon. His mass would be ____75____ kg on the moon.
(h) An astronaut has a mass of 124 kg.
   His mass on the moon is ____124____ kg; and in outer space (no gravity) is ____124____ kg.
   His weight on earth is ____1240____ N; on the moon is ____206.67____ N; and in outer space is ____0____ N. His mass, unlike his weight never varies wherever he is.

Q.2  (a) The ____extension____ of the spring in the spring balance is in ____proportion____ to the ____weight____ of the mass on the pan.
(b) A mass of 3 kg gives a reading of ____30____ newtons on the balance.
(c) A mass of 250 g gives a reading of ____2.5____ newtons.
(d) An object of mass ____400____ g gives a reading of 4 N.
(e) If the balance was moved to the moon, a mass of 3 kg would give a reading of ____5____ N.
Chapter 42  Turning Forces and Centre of Gravity

Your Name: ________________________________

Q.1  
(a) A lever is a ___ rigid ___ ___ body ___ which is free to turn about a fixed point called the ___ fulcrum ___ . A lever applies a ___ turning ___ force.

(b) The turning effect of a force is called the ___ moment ___ of the force. It depends on the ___ size ___ of the force and the ___ distance ___ from the ___ fulcrum ___ to where the force is applied.

(c) Moment of a force = ( ___ force ___ ) x (Perpendicular distance from the ___ force ___ to the ___ fulcrum ___ ). The distance is always measured in ___ metres ___.

(d) A metre stick suspended at its centre acts as a ___ lever ___ as it is a ___ rigid ___ body and is free to turn about its ___ fulcrum ___ (point of support).

Q.2

In diagram A, the metre stick is not ___ balanced ___ as there are more ___ moments ___ (turning forces) on the ___ left ___ hand side than on the ___ right ___ hand side.

This lever will turn in an ___ anticlockwise ___ direction.

In diagram B, the metre stick is ___ balanced ___ , because the ___ clockwise ___ moments are equal to the ___ anticlockwise ___ moments.

On each side, the moments are calculated as ( ___ force ___ ) x (perpendicular ___ distance ___ ) which is ( ___ 10 ___ N) x ( ___ 0.3 ___ m) to give a total of ___ 3 ___ moments on each side.
Q.3  
(a) The Law of the ___ **Lever** ___ states that: "When a ___ **lever** ___ is balanced, the ____ **clockwise** ____ and ____ **anticlockwise** ____ moments are ____ **equal** ____ ."

(b)  
\[
\text{Anticlockwise moments} = (\_15\_ \text{N}) \times (\_0.4\_ \text{m}) = \_6\_ \text{moments.}
\]

and \[
\text{Clockwise moments} = (\_20\_ \text{N}) \times (\_0.3\_ \text{m}) = \_6\_ \text{moments.}
\]

Therefore the lever is ___ **balanced** ____ .

(e)  
\[
\text{Anticlockwise moments} = (\_12\_ \text{N}) \times (\_0.1\_ \text{m}) = \_1.2\_ \text{moments.}
\]

and \[
\text{Clockwise moments} = (\_3\_ \text{N}) \times (\_0.4\_ \text{m}) = \_1.2\_ \text{moments.}
\]

Therefore the lever is ____ **balanced** ____ .

(d)  
\[
\text{Anticlockwise moments} = (\_6\_ \text{N}) \times (\_0.2\_ \text{m}) = \_1.2\_ \text{moments.}
\]

and \[
\text{Clockwise moments} = (\_5\_ \text{N}) \times (\_0.3\_ \text{m}) = \_1.5\_ \text{moments.}
\]

A further ___ **0.3** ____ moments are needed on the ___ **left** ____ hand side to ___ **balance** ____ the metre stick.

(e)  
\[
\text{Anticlockwise moments} = (\_6\_ \text{N}) \times (\_0.2\_ \text{m}) = \_1.2\_ \text{moments.}
\]

and \[
\text{Clockwise moments} = (\_5\_ \text{N}) \times (\_0.3\_ \text{m}) = \_1.5\_ \text{moments.}
\]

Is the metre stick balanced and, if not, how could it be balanced?
Anticlockwise moments = \(( _6 \quad N \quad _) \times \(_0.4 \quad m \quad _) = \_2.4 \_ \text{ moments.}\)

and Clockwise moments = \(( _8 \quad N \quad _) \times \(_0.3 \quad m \quad _) = \_2.4 \_ \text{ moments.}\)

A further \_0 \_ moments are needed on the \text{right} hand side to \text{balance} the metre stick.

(f)

Anticlockwise moments = \(( _10 \quad N \quad _) \times \(_0.2 \quad m \quad _) = \_2 \_ \text{ moments.}\)

and Clockwise moments = \(( _4 \quad N \quad _) \times \(_0.4 \quad m \quad _) = \_1.6 \_ \text{ moments.}\)

A further \_0.4 \_ moments are needed on the \text{right} hand side to \text{balance} the metre stick.

(g)

Anticlockwise moments = \(( _50 \quad N \quad _) \times \(_0.3 \quad m \quad _) = \_15 \_ \text{ moments.}\)

Therefore \_15 \_ clockwise moments are needed on the right to \text{balance} the stick.

Therefore:  \((\text{the weight } Y) \times \_0.2 \_ \text{ m} = \_15 \_ \text{ moments.}\)

Therefore, \( Y = \_75 \_ \text{ N} \)

(h)

When a force \(F\) is applied to the spanner, the moment of the force is 8.4 Nm.

The value of \(F\) is \_42 \_ \text{ N} \_.
Q. 4 (a) Common, everyday examples of levers include:

1. _______ door _______ ; 2. _______ wheelbarrow _______ ; 3. _____ pliers _____.

(b) In all cases of levers, the _____ effort _____ is where the force is applied, and the _____ load ____ is where the force takes effect.

c) The weight of any object appears to act through a single point.

This point is known as the object’s _____ centre ____ of _____ gravity _____.

(d) An object supported at this point is always ______ balanced ______.

(e) An object that is ___ balanced ___ and not ___ moving ___ is said to be in equilibrium.

(f) The three states of equilibrium are _ stable _, _ unstable _ and _ neutral _ equilibrium.

(g) The Bunsen burner in A is in ___ stable ___ equilibrium.

(h) The Bunsen burner in B is in ___ unstable ___ equilibrium.

(i) The ball in C is in _____ neutral _____ equilibrium.

(j) When the Bunsen burner in A is moved slightly, its centre of gravity is ______ raised ______.

(k) When the Bunsen burner in B is moved slightly, its centre of gravity is ___ lowered ___.

(l) When the ball is moved, its centre of gravity is neither __ raised __ nor __ lowered ___.

(m) Objects in stable equilibrium have a __ wide ___ base and a __ low ___ centre of gravity.

(n)

What is the weight of the rock if the metre stick is balanced?

Anticlockwise moments = ___ 2 ___ N x ___ 0.2 ___ m = ___ 0.4 ___ moments.

Clockwise moments needed to balance the metre stick = ___ 0.4 ___ moments.

Therefore: (the weight the rock) x ___ 0.4 ___ m = ___ 0.4 ___ moments.

Therefore, weight of rock = ___ 1 ___ N
**Chapter 43**

**Pressure**

Your Name: __________________________

**Q.1**

(a) Pressure is the _____ **force per unit area** ________________.

(b) The formula for pressure is \[ P = \frac{\text{force}}{\text{area}} \]

(c) Pressure is measured in units called ____ pascals ____.

(d) The cube weighs 200 N. What pressure does it exert?
   \[ P = \frac{200}{4} = 50 \text{ Pa} \]

(e) Block A weighs 1,200 N, calculate the pressure it exerts when placed on each of its 3 different sides.
   - Largest side: \[ P = \frac{1200}{2} = 600 \text{ Pa} \]
   - Middle side: \[ P = \frac{1200}{2.5} = 480 \text{ Pa} \]
   - Smallest side: \[ P = \frac{1200}{3} = 400 \text{ Pa} \]

(f) Complete: 'The ___ smaller ___ the area, the ___ greater ___ the pressure'.

**Q.2**

(a) The plastic bottle shown is being used to demonstrate pressure in a liquid. What are the two features of pressure in a liquid shown in the diagram?

1: ____ pressure in a liquid increases with depth ___

2: ____ pressure in a liquid acts equally in all directions ___

(b) The pressure exerted by the weight of air is called ____ atmospheric ____ pressure ____. 
(c) The apparatus below is used to measure atmospheric pressure, it is called a barometer.

Name the parts A - D.

(d) The apparatus below is used to demonstrate atmospheric pressure. Describe how it is set up and how it works.

---

A small amount of water is boiled for three minutes in a tin can, with the cap removed.

The steam drives out all the air in the can. The burner is then removed and the cap replaced.

The steam condenses, leaving a vacuum in the can. Atmospheric pressure crushes the can.

Q.3 The weather map shows lines called isobars joining areas of equal atmospheric pressure.

Winds will rush in from high pressure areas to low pressure areas to try to make the pressures equal. These winds will raise air and water vapour from the ground and seas in the low pressure area.

This causes unsettled weather in the low pressure area.
Q.4 Fill in the blanks to complete the following:

(a) Pressure is the ____force____ per unit ____area____.

(b) The formula for pressure is ____force____ divided by ____area____.

(c) Pressure is measured in ____N/m²____, also called _____pascals_____.

(d) The smaller the area, the ______greater_____ the pressure exerted.

(e) In a liquid, pressure increases with _____depth_____.

(f) In a liquid, the pressure is _____equal____ in all directions.

(g) Water stored in a reservoir is held at a ___higher___ level than the water in our homes.

(h) The ___higher___ the reservoir, the ___greater___ will be the water pressure in our homes.

(i) The pressure exerted by the weight of the air is called __atmospheric__ pressure__.

(j) A _____barometer_____ is used to measure atmospheric pressure.

(k) Normal atmospheric pressure is given as __76__ cm of ______mercury______.

(l) Changes in ___atmospheric___ pressure___ can be used to forecast the weather.

(m) Atmospheric pressure ______decreases_______ the higher you go above sea level.

(n) Normal atmospheric pressure is __76__ cm of __mercury__, or __1013__ hectopascals.

(o) An altimeter is a ____barometer____ used to measure ____altitude____.

(p) Conditions of _____high_____ atmospheric pressure give good, settled weather.

(q) Conditions of _____low_____ atmospheric pressure give wet, windy weather.

Q.5 (a) A barometer used to measure height above sea level is called an _____altimeter_____.

(b) The units used by weathermen in measuring atmospheric pressure are __hectopascals__. 

(c) The pressure at sea level is ____greater____ than the pressure at the top of a mountain.

(d) Normal atmospheric pressure can hold up a column of mercury a height of __76__ cm.

(e) Why is water not used in a barometer instead of mercury?

_____ a very long glass tube would be needed as much more water could be held up _____.

125
Q.6 On the weather map, lines called

isobars join areas of equal atmospheric pressure.

What kind of weather had Ireland on this particular day? How do you know?

fine, settled weather. Ireland is under an area of high atmospheric pressure.

Q.7 The apparatus shown is used to show that

air occupies space.

The paper remains dry because the water is unable to enter the test tube due to the presence of air.

Q.8 The apparatus shown is used to show that

air has mass.

With the clip open, the water in the flask is boiled for 5 minutes. The steam produced drives the air out of the flask.

With the Bunsen burner removed, the clip is then closed, and the mass of the flask, without air is recorded. The clip is then replaced, allowing air to re-enter the flask. The mass of the air is then recorded. The mass of the air in the flask is then calculated by subtraction.
Chapter 44  Heat

Your Name: ______________________________

Q.1 (a) Heat is a form of ___ energy ___ because it can do ___ work ___ and make things move.

(b) 3 examples of heat making something move are:

1. ___ a steam engine _______________________________
2. ___ a hot air balloon _______________________________
3. ___ the mercury in a thermometer _______________________

(c) Like all forms of ___ energy ___ , heat is measured in units called ___ joules ___.

Q.2 Heat can travel in 3 ways; they are by ___ conduction ___ , ___ convection ___ , and ___ radiation ___.

The diagram below shows heat moving by ___ conduction ___.

What is the purpose of this experiment?
___ used to see which solid rod is the best conductor of heat
__________________________________________________________

Explain briefly how the experiment works ______________________________
___ heat travels by conduction along the rods and melts the wax on the best conductor first ___.

Q.3 The diagram below shows heat moving by ______ convection ______.

A ______ convection ______ current _____ is set up in the liquid.

What is the purpose of the crystals?
___ so that the movement of the water can be seen ___
__________________________________________________________

Explain how this method of heat transfer differs from the method in Q.2.
___ in Q.2, (conduction), the atoms are passing heat by vibrating faster - they do not move out of their positions. In Q.3, (convection), moving water molecules carry the heat ________

127
Q.4 (a) Heat moves out in all directions from a hot object by the method of **radiation**.
It does not need a **solid**, **liquid**, or **gas** to travel by this method.
(b) Heat from the sun must reach us by **radiation**.
(c) A dull, black surface is a better **radiator** of heat than a bright, shiny one.
(d) A dull, black surface is also a better **radiator** of heat than a bright, shiny one.

Q.5 (a) Solids, liquids and gases all **expand** when heated and **contract** when cooled.

The apparatus on the right is used to show that:

**solids expand when heated**

(b) The bar above the flame in the diagram is called a **bimetallic strip**.

Explain how the apparatus might work as a simple fire alarm.

**heat causes the metal on the bottom of the strip to expand more than the top metal.**

_This bends the strip upwards, closing the electrical circuit to ring the bell._

(c) The experiments on the right show that both **liquids** and **gases** will

**expand** when heated, and **contract** when cooled.

Result for A: **when heated, the liquid expands and goes up the tube**

Result for B: **when heated, the gas expands and moves out as bubbles in the water**
Q.6 (a) When a hot object is near a cold object, heat will always travel from the **hot** object to the **cold** object until both are at the **same** temperature.

(b) Heat is a form of **energy** and therefore is measured in **joules**.

(c) The three methods by which heat moves from a hot place to a cooler place are **conduction**, **convection**, and **radiation**.

(d) Heat travels through solids by means of **conduction**.

(e) Very poor conductors of heat are called **insulators**.

(f) The handle of a saucepan could be made of **wood**, **plastic**, or, **porcelain**, because these are all good **insulators** of heat.

(g) The experiment on the right shows that water is a poor **conductor** of heat. The ice will not be heated by the method of **convection** either, because, heat, carried by this method, travels in an **upwards** direction.

(h) Heat is carried in a liquid or gas by the method of **convection**.

(i) A dull, black surface will both **radiate** out and **absorb** heat better than a bright, shiny surface.

(j) Solids, liquids and gases all **expand** when heated and **contract** when cooled.

(k) Gaps are left between long lengths of railway track to allow for **expansion**.

(l) A can of beans placed in an oven with no holes in the lid will explode due to the **air** in the can **expanding** due to the heat.

(m) A **bimetallic strip** consists of two metals riveted together; in an electric iron it is used as a switch called a **thermostat**, which can control the **temperature**.

(n) Water is most dense at a temperature of **4°C**, and least dense when it turns to **ice** at a temperature of **0°C**.
Q1. (a) Temperature is ___ a measure of how hot an object is _________________.

(b) A ____ thermometer ____ is used to measure temperature; it works on the principle that liquids ____ expand ____ when heated and ____ contract ____ when cooled.

(c) Water freezes at __ 0 __ °C and boils at __ 100 __ °C at normal atmospheric pressure.

(d) Beaker __ B ___ on the right (A or B) contains the most heat.

(e) Beaker __ C ___ on the right (C or D) contains the most heat.

(f) The amount of heat in a substance depends on

1. ___ its temperature _____________
2. ___ its mass _________________
3. ___ what the substance is ____________

(g) The graph shows how the temperature changes as a beaker full of ice is heated for 10 minutes. Why is there no increase in temperature between the 2nd - 4th and also the 8th - 10th minutes?

___ the heat is being used to change
the state of the substance, and not to raise the temperature of it __________
________________________________________

This heat is called ___ latent ___ ___ heat ___.

(h) Hidden, or ___ latent ___ heat is the heat used by a substance to ___ change ___ its ___ state ____; it does not ___ raise ___ the temperature.
Q.2  (a) The apparatus shown is used to plot the **cooling** curve for the chemical **naphthalene**.

(b) When the heat is removed, the temperature will **drop** steadily until the chemical begins to turn to a **solid**.

(c) The temperature then remains constant until all of the **liquid** has turned to a **solid**.

Q.3  (a) The apparatus shown is used to determine the **melting** point of water which is **100** °C at normal atmospheric pressure.

(b) The thermometer bulb is held above the water because, at this point, both **liquid** and **gas** states occur together.

Q.4  (a) The apparatus shown is used to determine the **melting** point of ice which is **0** °C at normal atmospheric pressure.

(b) The temperature of the melting ice will remain at **0** °C until **all the ice has melted**.

Q.5  (a) The apparatus shown is used to show the effect of **pressure** on the **boiling** point of water. The water is first heated to create steam which drives the **steam** out of the flask.

(b) When the flask is sealed and cooled, the pressure inside it is very **low**, due to the absence of **air**. This allows the water to **boil** again.
Your Name: ____________________________

Q.1  
(a) The apparatus A on the right is called a ____ Crooke's ___ radiometer ___.  
It is used to show that  
_____ light is a form of energy ________________

(b) Experiment B on the right shows that  
_____ light travels in straight lines ___

(c) When light bounces back off a surface,  
this is called ____ reflection ___.

(d) The area X is lit by ____ some ___ of the bulb.  
The area Y is lit by ____ none ___ of the bulb.

(e) Light rays bend as they enter another  
substance of different density,  
this is called ____ refraction ___.

(f) In the diagrams below, draw in the path of the light rays as they enter and leave the block of glass.

(g) Lens A below is called a ____ convex ___ lens. It ____ converges ___ the light rays.  
Lens B below is called a ____ concave ___ lens. It ____ diverges ___ the light rays.

(h) A glass ____ prism ____ is used to split up white light into its 7 colours. This is called  
_____ dispersion ___. The 7 colours are called the _____ spectrum ____ of white light.
Q.2 (a) Light is a form of __ energy __. This can be shown using a __ Crooke's __ radiometer __.

(b) An object that gives out light is a ___ luminous ___ object;

all other objects are ___ non ___-___ luminous ___ - they just ___ reflect ___ light.

(c) The existence of shadows is proof that light travels in ___ straight ___ lines ___.

(d) The bouncing of light off an object (e.g. a plane ___ mirror ___) is called ___ reflection ___.

(e) The bending of light is called ___ refraction ___; it occurs when light passes from one

substance into another substance of different ___ density ___.

The light rays get pulled ___ towards ___ the denser substance.

(f) The breaking up of white light into its 7 colours is called ___ dispersion ___.

It is shown by using a ___ prism ___.

(g) The seven colours of white light are: ___ red __, ___ orange __, ___ yellow __,

___ green __, ___ blue __, ___ indigo __, and ___ violet __.

Q.3 Suggest a reason for each of the following:

(a) Light can be used to power calculators.

____ light is a form of energy and can be converted into other forms ________

(b) We can hear around corners, but we cannot see around corners.

____ light travels in straight lines, whereas sound can bend around corners ______

(c) A converging lens can be used to set paper on fire.

____ light rays can be brought to a very concentrated point with a convex lens ___

(d) A swimming pool always appears to be shallower than it actually is.

____ light rays leaving the water are refracted before they reach the eye ______

(e) A rainbow is often seen during light rain or drizzle on a summer's day.

____ the small rain droplets act as prisms and cause dispersion of the light ______

(f) A periscope can be used to see over a high wall.

____ light rays entering the periscope are reflected twice in the periscope ______
Chapter 47  Sound  Physics

Your Name: ______________________________

Q.1  (a) The instrument on the right is called

a sound ___ level ___ meter ___.

It measures the ___ decibel ___ level of sounds.

(b) Sound is caused by ___ vibrations ___.

(c) Sound cannot travel through a ___ vacuum ___.

(d) Echoes are caused by the ___ reflection ___ of sound.

(e) The speed of sound in a solid is ___ faster ___ than the speed of sound in air or water.

(f) Sounds cause the ___ eardrum ___ in our ear to vibrate, and the ___ brain ___ detects this as sound.

(g) State 2 differences between light and sound:

1. ___ light travels much faster than sound ______________________

2. ___ light does not need a medium to pass through, sound does ______

(h) Which of the following are the units used to measure the loudness of sounds?

newtons [ ] moments [ ] grams [ ] decibels [x] pascals [ ]

Q.2  Taking the speed of sound in air as 340 m/s, answer the following:

(a) How far will a sound travel in 5 seconds? ___ 1700 ___ ___ m ____.

(b) The clap of thunder is heard 6 seconds after the flash of lightning is seen.

How far away is the lightning? ___ 2040 ___ ___ m ____.

(c) A boy, standing in front of a cliff face shouts, and 4 seconds later he hears the echo of his voice. How far is he from the cliff? ___ 680 ___ ___ m ____.

(d) A person fires a starting pistol. How long does it take for him to hear the echo from a wall that is 680 m away? ___ 4 ___ ___ seconds ____.
Q.3  (a) The experiment on the right shows that sound needs a ___ medium ___ to pass through, it cannot pass through a ___ vacuum ___.

(b) The ___ air ___ is removed from the bell jar using a ___ vacuum ___ pump ___.

(c) If the phone was held in a waterproof container, and the bell jar filled with water, would a sound be heard? Yes __ X __; No ____.

(d) Sound is always caused by something being made to ____ vibrate ____.

(e) Sound, like light, is a form of ___ energy ___, it can cause things to move.

(f) Sound is _____ reflected _____ off hard surfaces, causing ___ echoes ___ to be heard.

(g) The experiment below demonstrates the _____ reflection _____ of sound.

(h) When is the sound heard most clearly above in relation to the angles A and B? 

_____ when the angle A is equal to the angle B ________________

(i) Give one common example which shows that light travels faster than sound: 

_____ we see lightning before we hear the thunder ________________

Q.4 Answer true or false to each of the following:

(a) Sound does not transmit energy. T/F? _____ F _____.

(b) Sound can be reflected. T/F? _____ T ______.

(c) An echo is an example of the refraction of sound. T/F _____ F ______.

(d) A note of a very low pitch (frequency) is called ultrasound. T/F? _____ F ______.

(e) Sound can only travel through air. T/F? _____ F ______.
Q.5
(a) A ___ sound ___ is made by something being caused to vibrate.
(b) These vibrations are then passed through a ___ medium ___ such as air.
(c) The vibrations then cause the ___ eardrum ___ in the ear to vibrate.
(d) The message is then sent to the ___ brain ___ which interprets it as sound.
(e) A sound which bounces back to you is called an ___ echo ___.
(f) High frequency sounds, which cannot be heard by humans are called ___ ultrasound ___.
(g) Three uses for these high frequency sounds and their echoes are:
   1. ___ ships use ultrasound to determine the depth to the seabed ________.
   2. ___ in medicine, ultrasound is used to see inside the body ________.
   3. ___ ultrasound can be used to shatter gallstones or kidney stones ________.
(h) The fact that you see lightning before you hear the thunder is proof that: ___ light travels faster than sound ________.
(i) If the speed of sound in air is 340 m/s, how far away is lightning from a man who hears the thunder clap 6 seconds after he sees the lightning? ___ 2.04 ___ ___ km ___.
(j) A ship sends an ultrasonic sound wave to a submarine below it. If the speed of sound in water is 1,500 m/s, and the ship received the echo back from the submarine 2 seconds later, the submarine is at a depth of ___ 1,500 ___ ___ m. ___
(k) The loudness of sounds is measured in units called ____ decibels _____.
(l) Regular exposure to sounds louder than __ 85 ____ decibels ____ can lead to partial ___ deafness ___ unless proper hearing protection is worn.
Q.1 (a) A natural magnetic ore is ______ magnetite ______ or ______ lodestone ______.

(b) Substances which can be magnetised are the elements ______ iron ______, ______ nickel ______, ______ cobalt ______, and the metal alloy ______ steel ______.

(c) The magnetic pull of a bar magnet is strongest at two points at each end called the ______ poles ______ of the magnet.

(d) If a bar magnet is freely suspended, its ______ north ______ pole ______ points north.

(e) Like poles ______ repel ______ each other, unlike poles ______ attract ______ each other.

(f) A magnetic ______ compass ______ contains a small, needle-like magnet balanced on a thin spindle.

(g) A magnetic ______ field ______ is the space around a magnet where a magnetic ______ force ______ can be seen.

(h) Small ______ plotting ______ compasses are used to show the magnetic ______ field ______ around a magnet.

(i) These compasses also show the ______ direction ______ of the magnetic field lines.

(j) Magnetic field lines of a bar magnet always run from the ______ N ______ pole to the ______ S ______ pole.

(k) The ______ south ______ pole of the earth’s imaginary magnet is in the northern hemisphere, whereas the ______ north ______ pole is in the southern hemisphere.

Because of this, the north pole of a freely suspended bar magnet always points ______ north ______.

(l) Magnets are used in everyday devices such as ______ loudspeakers ______, and ______ motors ______.

(m) The apparatus shown is used to determine the ______ north ______ pole ______ of a magnet.

A ______ compass ______ is also needed for this experiment.
Q.2  (a) The diagram on the right shows a bar magnet with plotting compasses placed around it. Draw in the pointers on each of the plotting compasses.

(b) The plotting compasses are being used to show the ___ direction ___ of the magnetic ___ field ___ lines.

Q.3  (a) Explain how a magnetic compass works to show us which way is North?

___ the pointer end of the compass needle is a north pole and it is attracted to the Earth's magnetic south pole, which is at the Earth's North pole

(b) In the space, draw a diagram to show the magnetic field around the bar magnet.

Use arrows to show the direction of the magnetic field lines.

Q.4  (a) The diagram shows the north pole of a magnet being moved towards the north pole of a suspended magnet. What is seen to happen?

___ the two north poles repel each other ___

(b) What is the law of attraction and repulsion for magnets?

___ like poles repel, unlike poles attract ___

(c) 3 metals which can be magnetised are __ iron __, __ nickel __, and __ cobalt ___.
Q.1 (a) Electricity is a form of _____ energy _____ and it can be converted into other forms such as _____ heat _____, or _____ light _____.

(b) Electricity that does not flow is called ____static ____ electricity. It builds up on good _____ insulators _____ such as _____ polythene ___ and ____ perspex ____.

(c) When a polythene rod is rubbed with a woollen cloth, ____ electrons ____ move from the cloth onto the ___ polythene ___ rod ____ giving the rod a ___ negative ____ charge.

(d) When a perspex rod is rubbed, ___ electrons ___ move from the ___ rod ____ to the ___ cloth ____, giving the perspex rod a ___ positive ___ charge.

(e) Oppositely charged objects ____ attract ____ each other, while objects with the same charge ____ repel ____ each other.

(f) Static electricity builds up on good ____ insulators ____ such as ____ polythene ____ or ____ perspex ____; it cannot build up on good ____ conductors ____ such as ____ metals ____ because it would just flow to ____ Earth ____.

(g) A common example of static electricity is ____ lightning ____.

Q.2 In each diagram A - D, place possible charges on each rod and ball
Q.3 Two balloons are hung from a thread as shown. Each balloon is then rubbed briskly with a wool cloth.

(a) What would be observed to happen?
   _____ the balloons would repel each other
   __________________________________________

(b) Explain this observation in terms of static charges gained.
   _____ each balloon would gain the same charge, and, as like charges repel, the balloons would push each other apart ________________________________________

Q.4 Explain the following observations:

(a) Nylon clothing crackles as you undress. _______________________________________
    _____ friction occurs between the layers of clothing causing static electricity ______

(b) In dry weather, people walking on nylon carpets may get a shock if they touch a radiator or a metal door knob. ____ friction between the soles of a person's shoes and the carpet builds up static electricity on the person, which is then earthed ______

(c) Because some anaesthetics are explosive, the floor tiles in an operating theatre are made of metal. ____ so that any static electricity, building up on a person, which could cause a spark if they touched something metal, is immediately earthed ______

(d) Tall buildings should always have a lightning conductor. ____ so that static electricity (lightning) can pass safely to earth, and not through the stonework of the building ___

(e) Before an aeroplane is refuelled from a truck, a chain from the plane is touched to the ground. ____ an aeroplane could gain static electricity by friction with the air. This charge might be earthed, causing a spark, when the metal fuel hose is touched to the plane, causing an explosion. Earthing the plane with the chain prevents this ___

(f) The more you wipe a CD, the more the dust seems to appear on it.
    ____ friction between the CD and the cloth causes static electricity to build up on the CD. The CD then attracts particles of dust in the air ______________________
Q.1 (a) An electric _____ current _____ is a flow of electric _____ charge _____.

(b) Substances which allow electricity to flow through them easily are called _____ conductors ______.

(c) A battery or power pack pumps electrons from a region of ___ high ___ electrical pressure to a region of ___ low ___ electrical pressure.

(d) The difference in electrical pressure needed to make a current flow is called the _____ potential _____ difference, or the _____ voltage _____.

       It is measured in ___ volts ___ using a _____ voltmeter ______.

(e) The flow of electric charge is called the ___ current ___, it is measured in ___ amps ___ using an _____ ammeter _____.

(f) Some materials slow down the flow of electrons through them; they offer a ___ resistance ___ to the current. This is measured in units called ___ ohms ___.

(g) An electric heating coil in a kettle, or the filament in a bulb are _____ resistors ______ in an electrical circuit because they offer a _____ resistance _____ to the current.

(h) The larger the voltage, the ____ larger ____ the current that can flow.

(i) The larger the resistance, the ____ smaller ____ the current in the circuit.

(j) At constant temperature, the ____ voltage ____ is always proportional to the ____ current ____ in a circuit. This is known as ____ Ohm's ____ Law.

(k) Resistors, such as bulbs, connected in ___ series ___ are connected one after the other.

(l) The three effects of an electrical current are a ___ heating ___ effect, a ___ magnetic ___ effect and a ___ chemical ___ effect.
Q.2  
(a) Ohm’s Law states that at constant _____ temperature ____ , the _____ voltage ____ is in proportion to the _____ current ____ in a circuit.

(b) The diagram shows a circuit with two resistors and a 12 V battery.

The resistors are arranged in ____ series ____.

The total resistance is _____ 10 ohms _____.

Calculate the value of the current in the circuit. Show your calculation.

___ I = V/R; I = 12/10; I = 1.2 amps ______

(c) What term is used to describe materials which will not allow current to flow through them? Name one such material. ____ insulators ____; ____ plastic ____.

Q.3  
(a) The diagrams show two arrangements of resistors. Calculate the resistance of the arrangement of resistors in A.

___ 9 Ω ________________

(b) In A the resistors are wired in ____ series ________________.

(c) In B the resistors are wired in ____ parallel ________________.

(d) How would you show:

(i) the heating effect of an electric current.

_____ use an electric kettle to heat water ____________________________.

(ii) the magnetic effect of an electric current.

_____ coil an insulated wire around an iron nail, connect the circuit ________.

(iii) the chemical effect of an electrical current.

_____ use a Hoffman voltameter to split water into hydrogen and oxygen _____.

142
Q.4  (a) Diagram A shows three lamps connected to a 24V power pack in a circuit. Calculate:

(i) the total resistance of the three lamps. ______________ 6 Ω __________

(ii) the current flowing in the circuit. ______________ 4 A __________

(b) Calculate the current flowing in the circuit in diagram B. ____ 6 A ______

(c) You are given four rods of different materials. Describe how you would find out which were electrical conductors and which were electrical insulators.

_____ set up a circuit with a battery and a lamp, but with a gap in the circuit.

Place the material to be tested in the gap - if the lamp lights, it is a conductor ______

Q.5  (a) The circuit shown was used in an experiment to verify Ohm’s Law.

(i) Name the meters X and Y.

X = _ voltmeter _ ; Y = _ ammeter _

(ii) What measurements are taken during the experiment?

__ voltage __ ; __ current __

(iii) What would you expect the reading on meter Y to be when the reading on meter X is 12? Show calculations.

__ I = V/R; I = 12/8; I = 1.5 A __

(iv) If the voltage of the power pack could not be changed, the part Z, called a variable resistor, could be used to change the:

_____ voltage __________

of the circuit.

(b) Sketch the graph you would expect to obtain from this experiment.
**Q.6** The diagrams below show two circuits, X and Y. The circles represent identical lamps.

![Circuits X and Y](image)

(a) What do the symbols A and B represent?

\[ A = \underline{\text{battery or power pack}} \] ; \[ B = \underline{\text{switch}} \]

(b) Which circuit, X or Y shows lamps connected in parallel? \[ \underline{Y} \]

(c) The lamps will shine brighter in circuit \[ \underline{Y} \]

(d) In which circuit can one lamp be switched off while the other stays on? \[ \underline{Y} \]

(e) Give one advantage circuit X might have for wiring Christmas tree lights.

\[ \underline{it uses less wiring and therefore is cheaper to make} \]

(f) Give 2 reasons for wiring your house lights in parallel:

(i) \[ \underline{if one bulb blows, the others will stay lighting} \]

(ii) \[ \underline{the current in the circuit is higher, therefore the bulbs are brighter} \]

**Q.7** The following table shows the voltage, resistance and current for several different electrical items. Fill in the blanks for the missing values:

<table>
<thead>
<tr>
<th>Item</th>
<th>Voltage (Volts)</th>
<th>Resistance (Ohms)</th>
<th>Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>240</td>
<td>48</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>54</td>
<td>18</td>
<td>3</td>
</tr>
</tbody>
</table>
Chapter 51  
Electricity in the Home  
Physics

Your Name: ______________________________

1. (a) A fuse is a safety device which contains a thin piece of wire that melts when the current gets too high. In modern houses they are largely replaced by devices known as circuit breakers.

(b) Any electrical appliance with a metal case should have an earth wire to safely carry the current away in the event of the live wire dislodging and touching the case.

(c) Two cables enter your home from the ESB supply, the live at 230 V, and the neutral at 0 V. Each circuit from the fuse board is protected by a fuse or circuit breaker which is always placed on the live wire.

(d) The unit of electrical power is called the watt. It measures how quickly an appliance converts electrical energy into other forms of energy.

(e) The ESB’s unit of electricity is the kilowatt hour or the symbol (kWh).

(f) The number of ESB units used by an appliance is found by multiplying the power rating of the appliance by the number of hours that the appliance is used for.

(g) To calculate the cost of running an appliance, multiply the number of kWh's used by the cost per unit.

(h) Alternating current can be changed into direct current using a rectifier.

(i) The normal ESB voltage supply to our houses is 230 volts.

(j) The metal tungsten is used to make lamp filaments because of its very high melting point.

(k) Circuit breakers, unlike fuses, do not have to be replaced when they trip.

(l) An appliance with a metal case must be fitted with an earth wire.
Q.2 (a) An immersion heater has a power rating of 3,000 W. Its rating in kW is __ 3 kW ____.

(b) If switched on for 8 hours, it uses ____ 24 ____ units of electricity.

(c) If electricity costs 15c per unit, it costs _____ € 3.60 ____ to run the immersion heater for 8 hours.

(d) The cost of heating a room for 6 hours with a 2,000 W fire is _____ € 1.80 _____.

(e) The cost of leaving a 100 W bulb lighting for 40 hours is _____ € 0.60 _____.

The diagram shows part of an ESB bill for electricity used in a home:

<table>
<thead>
<tr>
<th>Meter readings Present</th>
<th>Units and Rate (cent)</th>
<th>Description</th>
<th>Amount (CR = Credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>52757</td>
<td>N X 15</td>
<td>General Domestic Charge</td>
<td>49.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standing Charge</td>
<td>6.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special Discount</td>
<td>3.05 CR</td>
</tr>
<tr>
<td></td>
<td>VAT @ 12.5% on</td>
<td>€ 56.10</td>
<td>7.01</td>
</tr>
<tr>
<td></td>
<td>ELECTRICITY</td>
<td>THIS PERIOD</td>
<td>€ 60.06</td>
</tr>
</tbody>
</table>

(f) The scientific term for the unit used by the ESB in its bills is the _____ kilowatt hour _____.

(g) From the ESB bill above the number of units, N, of electricity used is _____ 330 _____.

Q.3 Complete the table below by calculating (i) the number of ESB units (kWh's) used by each of the following appliances, running for three hours; and (ii) the cost of running each appliance for three hours, when the ESB charges 15 cent per unit used.

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Power rating</th>
<th>kWh's used in 3 hours</th>
<th>Cost for 3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ceiling fan</td>
<td>2.4 kW</td>
<td>7.2</td>
<td>€ 1.08</td>
</tr>
<tr>
<td>electric blanket</td>
<td>720 W</td>
<td>2.16</td>
<td>€ 0.32</td>
</tr>
<tr>
<td>table lamp</td>
<td>100 W</td>
<td>0.3</td>
<td>€ 0.05</td>
</tr>
<tr>
<td>T.V.</td>
<td>110 W</td>
<td>0.33</td>
<td>€ 0.05</td>
</tr>
<tr>
<td>electric fire</td>
<td>2 kW</td>
<td>6</td>
<td>€ 0.90</td>
</tr>
<tr>
<td>electric oven</td>
<td>3 kW</td>
<td>9</td>
<td>€ 1.35</td>
</tr>
<tr>
<td>immersion heater</td>
<td>3.5 kW</td>
<td>10.5</td>
<td>€ 1.58</td>
</tr>
<tr>
<td>computer</td>
<td>150 W</td>
<td>0.45</td>
<td>€ 0.07</td>
</tr>
<tr>
<td>fan heater</td>
<td>1.2 kW</td>
<td>3.6</td>
<td>€ 0.54</td>
</tr>
<tr>
<td>video recorder</td>
<td>40 W</td>
<td>0.12</td>
<td>€ 0.02</td>
</tr>
</tbody>
</table>
Q.4 (a) A 3-bar electric fire has a total power rating of 3 kW when all three bars are on. The fire is used for four hours each day, with all the bars on. How many units of electricity would the fire use in a week?

\[ 3 \times 4 \times 7 = 84 \text{ units} \]

At a cost of 15 cent per unit, what would it cost to run the fire for a week at this usage?

\[ 84 \times 0.15 = \€ 12.60 \]

(b) A person switches on a 3 kW immersion heater for 2 hours to heat enough water to take a bath. How many units of electricity are used? What is the cost at 15 cent per unit?

Units used: \[ 6 \text{ units} \] Cost: \[ \€ 0.90 \]

Another person takes a 15 minute shower, using a 5 kW electric shower. How many units of electricity does this person use? What is the cost at 15 cent per unit?

Units used: \[ 1.25 \text{ units} \] Cost: \[ \€ 0.19 \]

(c) On which wire should a fuse be placed? Explain why.

\[ \text{live - to cut off any current to the appliance} \]

(d) Identify the terminals A, B, and C in the diagram of a 3-pin plug. Indicate the colour of the insulation of the wire leading to each terminal.

A = \[ \text{earth} \] Colour = \[ \text{yellow/green} \]
B = \[ \text{neutral} \] Colour = \[ \text{blue} \]
C = \[ \text{live} \] Colour = \[ \text{brown} \]

(e) The meter shown in diagram X is used by the ESB to determine the number of kilowatt hours of electricity used by a household. The previous reading is subtracted from the present reading to give the number of units used.

(f) The situation shown in diagram Y is dangerous, and could easily cause a fire in the house. Too much electric current is being drawn from the socket and this could cause a fuse to blow, or, worse, the wires in the circuit to overheat.
Chapter 52  
Electronics  
Physics

Your Name: ________________________________

Q.1  
(a) Electronics is the careful and ___ exact ___ control of very small ___ small ___ currents ___.

(b) Many modern devices such as ____ televisions ____ , _____ computers _____ ,  
_____ calculators _____ , and _____ recorders _____ , work by means of electronics.

(c) A diode is a component that will allow ___ current ___ to flow in one direction only.

(d) When the positive terminal of a battery is connected to the positive end of a diode,  
the diode is said to be ____ forward _____ biased ____.

(e) When the positive terminal of a battery is connected to  
the negative end of a diode,  
the diode is said to be __ reverse ___ biased ___.

(f) In A the diode is in ___ forward ____ bias ___ and  
the bulb will ___________ light ________________.

(g) In B the diode is in __ reverse ____ bias ____ and  
the bulb will ___________ not light ________________.

(h) A diode can be used to change ___ alternating ____ current into ___ direct _____ current.

(i) Many electronic devices can only use ______ direct ______ current and not the  
_________ alternating ____________ current that comes from the mains supply.

(j) A diode that gives out light when a current passes through it is called a ___ light ____  
___ emitting ____ diode, or ___ LED ___ for short.

(k) Such a diode uses a very ____ small ____ amount of electricity and therefore a ____ resistor ____  
must be connected in ___ series ___ with it in order to ____ reduce ____ the current (see diagram).

Back to Contents
Q.2 (a) The LED is often used as an **indicator** on an electronic device.

(b) LED's use far **less** current than a bulb and are used because they are **cheap** and **reliable**.

(c) When light falls on an LDR, its **resistance** decreases.

(d) In the diagram, device X is a **light dependent resistor**. Device Y is an **ammeter**.

(e) What change occurs in device Y when a light is shone on device X?

   ___ the reading increases as current increases with the lower resistance of the LDR ___

(f) The ___ resistance ___ of device X decreases when a light shines on it, and therefore the ____ current ____ in the circuit increases enough to cause the __________________ lamp to light __________________.

(g) LDR is short for **light dependent resistor**.

(h) The diagrams and symbols for a diode, an LED and an LDR are shown.

   A = _____ LDR _______.
   B = _____ diode _______.
   C = _____ LED _______.

Back to Contents