**Answers to last weeks’ questions**

**Starter Questions**
1. What is meant by a communicable disease? A disease that can be passed on from one person to another.
2. What is meant by a non-communicable disease? A disease that cannot be passed on from one person to another.
3. What is a pathogen? A pathogen is a microorganism that causes a disease.
4. What are the four pathogens? The four types of pathogen are bacteria, virus, protist and fungus.
5. Identify 3 common diseases? Measles, Salmonella, Alzheimer’s (plus others).
6. What can salmonella cause? Salmonella bacteria can cause food poisoning.

**Intermediate Questions**
1. Is the Corona Virus communicable or non-communicable? Explain why. Communicable – this is because it can be passed from person to person.
2. Look at the graph below. The UK Government records annual statistics about the numbers of sexually transmitted diseases. The instances of syphilis from 2006 to 2015 are shown in line graphs below. **Describe** what the graph shows using full sentences.

![Graph showing instances of syphilis from 2006 to 2015]

In all years the number of men infected is greater than women (1 mark). The number of women infected remains constant, well below 1000 per year (1 mark). Between 2006 and 2012 the number of men infected remained constant around 3000 (1 mark). Between 2012 and 2015 the number of men infected increased from around 3000 to over 5000 (1 mark)

**Challenge Question**
Infectious diseases such as malaria and ebola can be passed from person to person. Explain how this happens (6 marks).

A pathogen is a microorganism that causes a disease. The four types of pathogen are bacteria, virus, protist and fungus. Bacteria make us feel ill by reproducing rapidly inside the body and then releasing toxins into our organ systems. Viruses are different in that they can’t reproduce on their own. Instead, they infiltrate our cells and use them to reproduce. Eventually they burst out of the host cell killing it in the process. An example of a bacterial infection is salmonella. This is found in uncooked meat. It is passed to people by direct contact when they eat meat that has not been cooked properly. It can also stay on surfaces that have not been properly cleaned so it is vital that you wash your hands and your cooking utensils if they have come into contact with raw meat. The flu is caused by a virus that damages your cells. It is an airborne virus that is passed from person to person when they sneeze or cough. Droplets carried by the air contain the virus and can be breathed in by other humans. The virus can survive on surfaces for a couple of hours, so it can also be passed on after an infected person has touched a door handle for example. To prevent the spread of the flu, people should cover their nose and mouth with a tissue when they sneeze or cough to catch the virus and prevent it from being passed on. Further to this, good hygiene such as regularly washing your hands can prevent the spread of this type of disease.
Please complete the following questions as part of an informal assessment:

You have 60 minutes in total. Please attempt every question. You could either print off the slides and answer on the sheets, or you could write the answers on a separate piece of paper and send the answers to me on email.

If you are struggling to answer some of the questions then you may use your Q4K for support.

A mark scheme will be attached next week so that you can self-assess.

Good luck!
Scientists investigated the effect of different factors on health.

People who are not active may have health problems.

The graph shows the percentage of 16-year-olds in some countries who are not active.

**Figure 1**

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of 16-year-olds who are not active</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>30%</td>
</tr>
<tr>
<td>Germany</td>
<td>40%</td>
</tr>
<tr>
<td>Italy</td>
<td>60%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>50%</td>
</tr>
<tr>
<td>UK</td>
<td>35%</td>
</tr>
</tbody>
</table>

(a) What percentage of 16-year-olds in the UK are not active? _____________ %

(b) What percentage of 16-year-olds in the UK are active? _____________ %

A newspaper headline states:

People in the UK are the laziest in the world.

Information in Figure 1 does not support the newspaper headline.

(c) Suggest one reason why the newspaper headline may be wrong.

__________________________________________________________________________________
01.1 Doctors gave a percentage rating to the health of 16-year-olds.  
100% is perfect health.

The table shows the amount of exercise 16-year-olds do and their health rating.

<table>
<thead>
<tr>
<th>Amount of exercise done in minutes every week</th>
<th>Health rating as %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>72</td>
</tr>
<tr>
<td>90</td>
<td>76</td>
</tr>
<tr>
<td>180</td>
<td>82</td>
</tr>
<tr>
<td>300</td>
<td>92</td>
</tr>
</tbody>
</table>

What conclusion can be made about the effect of exercise on health?  
Use information from the table.

__________________________________________________________________________________
__________________________________________________________________________________

1 mark

01.2 Inherited factors can also affect health.

Give one health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

being malnourished having a high cholesterol level having a deficiency disease

1 mark
02. Figure 2 shows some muscle cells from the wall of the stomach, as seen through a light microscope.

Figure 2

02.1 Describe the function of the muscle cells in the wall of the stomach.

__________________________________________________________________________________

2 marks

02.2 Figure 2 is highly magnified. The scale bar in the figure above represents 0.1 mm. Use a ruler to measure the length of the scale bar and then calculate the magnification of the figure above.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

Magnification = ______________ times

2 marks

02.3 The muscle cells in Figure 2 contain many mitochondria. What is the function of the mitochondria?

__________________________________________________________________________________

2 marks

02.4 The muscles in Figure 2 also contain many ribosomes. The ribosomes cannot be seen in the figure. What is the function of the ribosomes?

__________________________________________________________________________________

1 mark

02.5 Suggest why ribosomes cannot be seen through a light microscope.

__________________________________________________________________________________

1 mark
03 The circulatory system contains arteries and veins.

03.1 Describe how the structure of an artery is different from the structure of a vein.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

2 marks

03.2 A comparison is made between blood taken from an artery in the leg and blood taken from a vein in the leg.
Give two differences in the composition of the blood.
1. _________________________________________________________
2. _________________________________________________________

2 marks

During operations patients can lose a lot of blood. Patients often need blood transfusions to keep them alive.
The text shows information about a new artificial blood product.

Sea worms give hope for people in need of blood transfusions
Scientists have carried out a five-year trial using a new artificial blood product. The scientists have used a protein from sea worms to create the new artificial blood and the results from the trial are very positive. Thousands of sea worms can be grown and collected. During the trial, mice were given blood transfusions of the artificial blood. The bodies of the mice tolerated the artificial blood and the artificial blood did not cause any side effects.

03.3 Suggest two possible advantages of using the new artificial blood, instead of using human blood for a transfusion in humans.
1. _________________________________________________________
2. _________________________________________________________

2 marks
04  This question is about diamond and graphite.

Figure 3 shows part of the structure of diamond.

Figure 3

04.1  Complete the sentence

Choose an answer from the box.

| calcium | carbon | chromium | cobalt |

Diamond is a form of _________________________________.

1 mark

04.2  Which two statements about diamond are correct?

Tick two boxes.

- Diamond has a giant structure.
- Diamond has ionic bonds.
- Diamond is made of layers.
- Diamond has weak bonds.
- Each atom is joined to four other atoms.

2 marks
Figure 4 shows part of the structure of graphite.

01.3 Explain why graphite is soft and slippery.
Use Figure 4 and your own knowledge.
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
3 marks

01.4 Graphite has covalent bonds between the atoms.
How many covalent bonds does each atom have?
Tick one box.

1 2 3 4

1 mark

01.5 Explain why graphite can conduct electricity.
You should include a reference to electrons in your answer.
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
2 marks
Elements are made up of atoms. 

Figure 5 shows the atoms of five elements.

\[ \begin{array}{c}
\text{R} & \text{S} & \text{T} & \text{U} & \text{V} \\
3 & 7 & 23 & 39 & 85 \\
\end{array} \]

The letters are not the symbols for the elements.

05.1 Which two atoms in Figure 5 are isotopes of the same element?

Explain your answer fully.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

3 marks

05.2 The halogens are in Group 7 of the periodic table.

Explain the trend in reactivity of the halogens.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

6 marks
The pH scale is a measure of the acidity or alkalinity of a solution.

06.1 Draw one line from each solution to the pH value for each solution.

<table>
<thead>
<tr>
<th>Acid</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Neutral</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

2 marks

06.2 When sulphuric acid is added to sodium hydroxide a reaction occurs to produce two products. The equation is:

\[ H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O \]

How many elements are in the formula H2SO4?

Tick one box.

3
4
6
7

1 mark

06.3 Describe how an indicator can be used to show when all the sodium hydroxide has reacted with sulphuric acid.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

3 marks
07 Figure 6 shows a model of the particles in a gas and in a liquid.

Figure 7

<table>
<thead>
<tr>
<th>Gas</th>
<th>Liquid</th>
<th>Solid</th>
</tr>
</thead>
</table>

07.1 Complete the diagram to show the arrangement of particles of the same substance as a solid.  
2 marks

07.2 What is the name of the process when a substance changes from a gas to a liquid?  
Tick one box.  
Condensing  
Evaporating  
Freezing  
Melting  
1 mark

07.3 The substance in the diagram has a:  
• melting point of 98 °C  
• boiling point of 883 °C  
What is the state of the substance at 20 °C?  
Tick one box.  
Gas  
Liquid  
Solid  
1 mark

07.4 What type of change is a change of state?  
Tick one box.  
Chemical  
Kinetic  
Permanent  
Physical  
1 mark
07.5 Which two statements are correct about the particles when a liquid turns into a gas?
Tick two boxes.
- Particles are bigger
- Particles are lighter
- Particles have more chemical energy
- Particles have more kinetic energy
- Particles move faster

2 marks

07.6 Which two quantities are needed to calculate the energy required to turn a liquid into a gas with no change in temperature?
Tick two boxes.
- Mass of the liquid
- Specific heat capacity of the gas
- Specific latent heat of vaporisation
- Time the liquid is heated

2 marks

07.7 A mass of 2.0 kg of water is heated.
The temperature increase of the water is 80 °C
The specific heat capacity of water is 4200 J/kg °C
Calculate the change in thermal energy when the water is heated.
Use the equation:
change in thermal energy = mass × specific heat capacity × temperature change

_________________________________________________________________________________
_________________________________________________________________________________
_________________________________________________________________________________

Change in thermal energy = ________________ J

2 marks
Figure 8 shows a solar thermal power station.

Energy from the sun is directed at the solar receiver by many mirrors.

08.1 Suggest one reason why a solar thermal power station is built in a hot desert.

__________________________________________________________________________________
__________________________________________________________________________________

1 mark

08.2 Heated water is used to generate electricity in the solar thermal power station.

Choose the correct answer from the box to complete each sentence.

boiler          motor          transformer          turbine

At the solar receiver, water is heated in a ____________________, which turns the water into steam.
The steam turns a ____________________, which is connected to a generator. The generator produces electricity. A ____________________ is used to change the voltage for transmission along power lines.

3 marks
A different method of generating electricity uses wind turbines.
A student researching a wind farm wrote the following.

Top Hill Wind Farm has 25 wind turbines. Last week, one of the wind turbines generated electricity for only 42 hours out of a possible 168 hours. My conclusion is that all wind turbines operate for only 25% of the time.

08.3 Give two reasons why the student is not correct in reaching his conclusion.
1. __________________________________________________________________________
   __________________________________________________________________________

2. __________________________________________________________________________
   __________________________________________________________________________

   2 marks

08.4 Give one reason why wind turbines do not generate electricity all the time.

   __________________________________________________________

   1 mark

08.5 Give one advantage of using wind turbines to generate electricity compared with using fossil fuel power stations.

   __________________________________________________________

   1 mark
A small community of people live in an area in the mountains. The houses are not connected to the National Grid. The people plan to buy an electricity generating system that uses either the wind or the flowing water in a nearby river. Figure 9 shows where these people live.

09.1 It would not be economical to connect the houses to the National Grid. Give one reason why.

______________________________________________________________________________

______________________________________________________________________________

1 mark
The wind turbine costs £50 000 to buy and install.

The hydroelectric generator costs £20 000 to buy and install.

The average power output from the wind turbine is 10 kW.

The hydroelectric generator will produce a constant power output of 8 kW.

Compare the advantages and disadvantages of the two methods of generating electricity.

Use your knowledge of energy sources as well as information from Figure 10.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

6 marks
*The lanthanides (atomic numbers 58–71) and the actinides (atomic numbers 90–103) have been omitted. The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.
**Bonus Task:**

Watch this video from Mr. Anderson with two more influential scientists that you may not have heard of before.

Can you find out any additional information about them to share with your Learning Consultants?

Who is the most impressive scientist in this series so far and why?