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ES1 Celestial Objects

1. What is a moon?

2. What is a galaxy?

3. Name our galaxy.

4. What is the solar system?

5. What is a planet?

6. Name the 8 planets that orbit our solar system.

7. Name the 4 terrestrial planets in our solar system.

8. Why is Pluto not considered a planet?

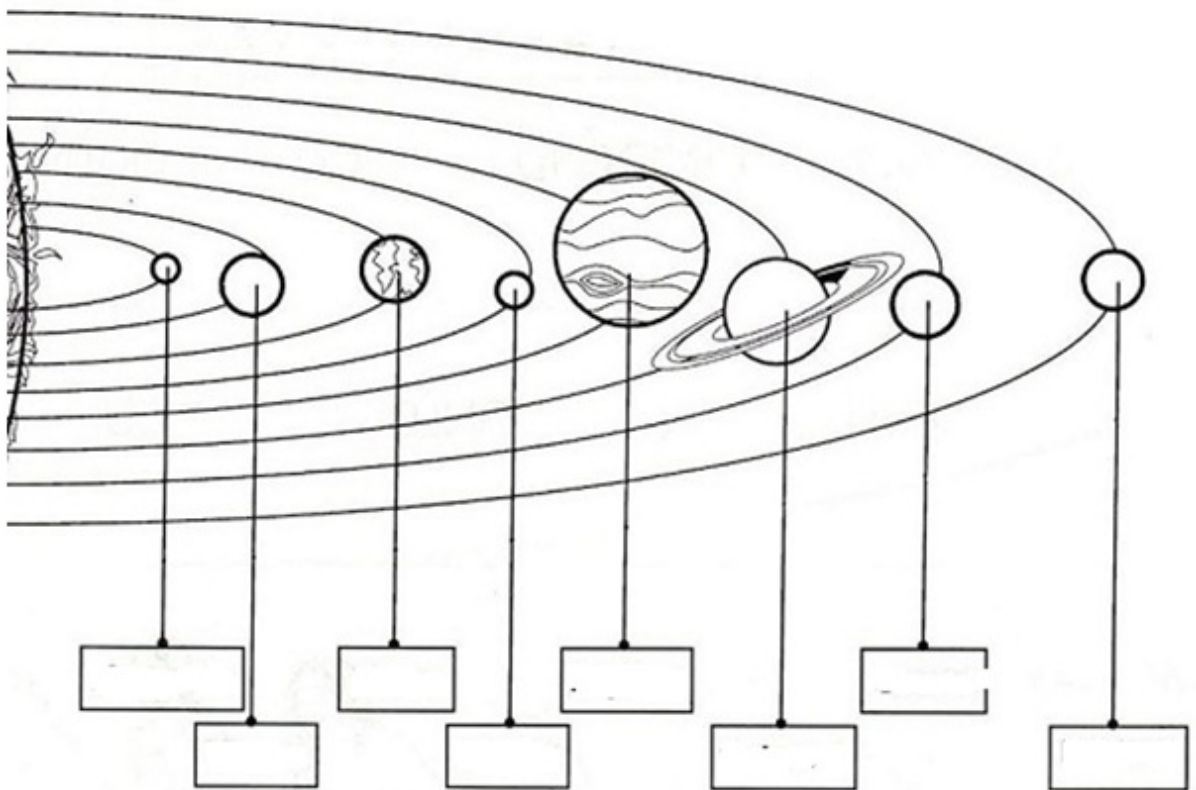
9. What is a comet?

10. Where do comets originate?

11. Name a comet. How often does this comet pass close to earth?

12. What is a meteorite?

Label the planets shown in the diagram of the solar system.



ES2 Origin of the universe

1. Name the theory that explains the origin of the universe.

2. Give 2 pieces of evidence that supports the theory of the origin of the universe

3. Name one scientist that provided evidence for the origin of the universe.

4. What is a nebula?

5. What force drew particles in a nebula together

6. What is the name given to the theoretical point that contained all the mass of the universe as it formed..

7. How do scientists estimate the relative speed of distant galaxies?

8. What is the estimated age of the universe?

ES3 Comparing earth and other planets and moons

1. The earth's Earth's diameter is 12,757 km and the Moon's diameter 3,474 km. How much bigger is the earth than the Moon?

2. If a model of the Earth was 10 cm in diameter, what should a scaled model of the Moon be?

3. If the distance between the Earth and the Moon is 384,400 km, then what distance should the Moon model be from the 10 cm earth model?

4. The weight of an object is its mass in kg multiplied by the acceleration due to gravity which on earth is often simplified as 10 m/s^2 (**weight = mass (kg) X 10**).

What is the **simplified** weight of a person of mass 70 kg on earth?

5. The acceleration due to gravity on the moon is 1.6 m/s^2 .

What is the **simplified** weight of a person of mass 70 kg on the moon?

6. The **actual** acceleration due to gravity on earth is 9.8 m/s^2 .

What is the **actual** weight of a person of mass 70 kg on earth and on the moon?

Examine the data table and answer the questions that follow each table

	<u>MERCURY</u>	<u>VENUS</u>	<u>EARTH</u>	<u>MARS</u>
<u>Mass</u> (10^{24}kg)	0.3	4.87	5.97	0.642
<u>Diameter</u> (km)	4879	12,104	12,756	6792
<u>Density</u> (kg/m³)	5427	5243	5514	3933
<u>Gravity</u> (m/s²)	3.70	8.9	9.8	3.71
<u>Distance from Sun</u> (10^6 km)	57.9	108.2	149.6	227.9
<u>Average Temperature</u> (C)	167	464	15	-65

7. List the 4 terrestrial planets in order of mass, smallest to largest.

8. List the 4 terrestrial planets in order of gravity smallest to largest.

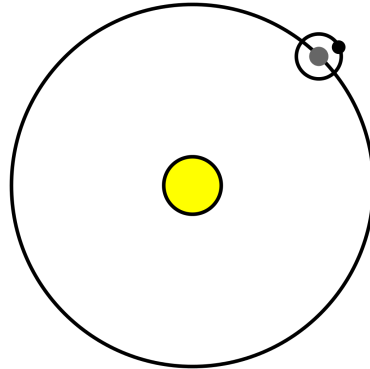
9. What is the relationship between the mass of a planet and its gravity?

10. Would an object of mass 100 kg have a greater weight on mercury compared to venus? Explain your answer in detail.

11. List the 4 terrestrial planets in increasing order of distance to the sun, closest to furthest.

ES4 Earth moon and sun system

1. Use labels and arrows to identify the Earth, Sun and moon in the following diagram.



2. What is meant by the earth's orbit?

3. How long does it take for the Earth to orbit the sun?

4. How long does it take for the Moon to orbit the Earth?

5. Complete the following sentences by using the words **revolve** and **rotate** as appropriate.

The earth _____ around its own axis and _____ around the sun.

The moon _____ around the earth.

6. How long does it take for the earth to turn around its own axis?

7. How long does it take the moon to turn around its own axis?

8. The Earth and Moon are **tidally locked** by gravity to each other. What effect does this have on our view of the moon?

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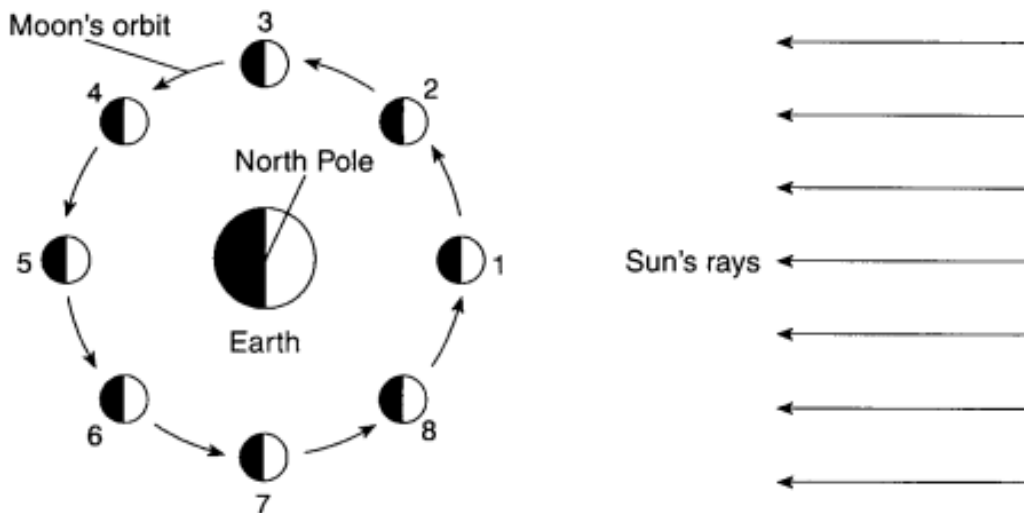
9. Why can we see the moon?

--

10. At different times, our view of the moon changes, these are called Lunar Phases. In the following boxes draw the appearance of the moon from earth for each phase indicated.

First Quarter	Waxing crescent	Waning Crescent	3rd Quarter

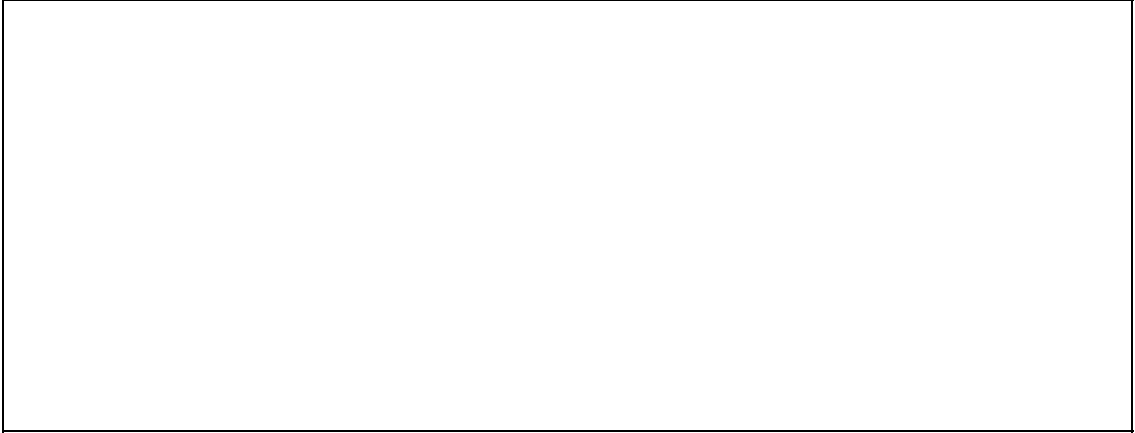
11. Examine the diagram of the Earth, Sun and Moon system and write down the names for the phases of the moon visible from earth in each box.



1	3	5	7

12. What is a lunar eclipse?

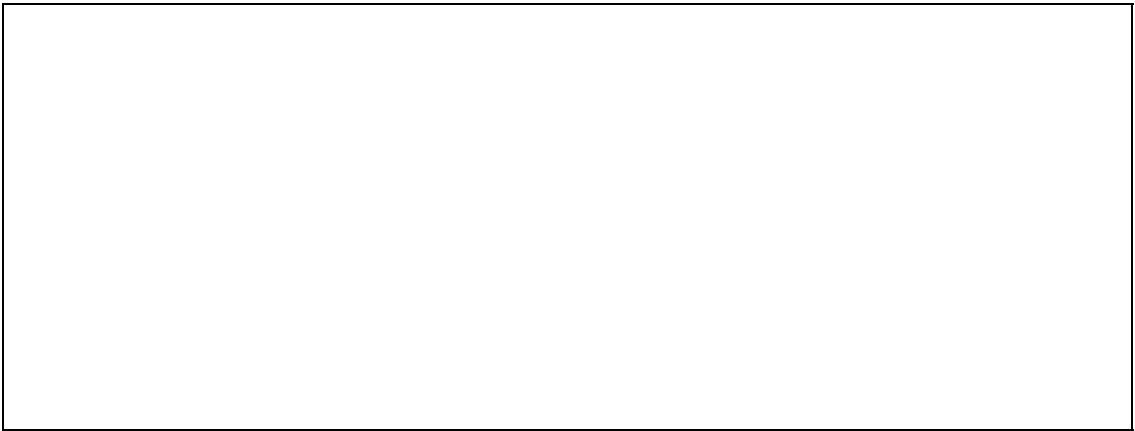
13. Draw a diagram to show the position of the earth moon and sun in a lunar eclipse.



14. In which lunar phase would a lunar eclipse occur?

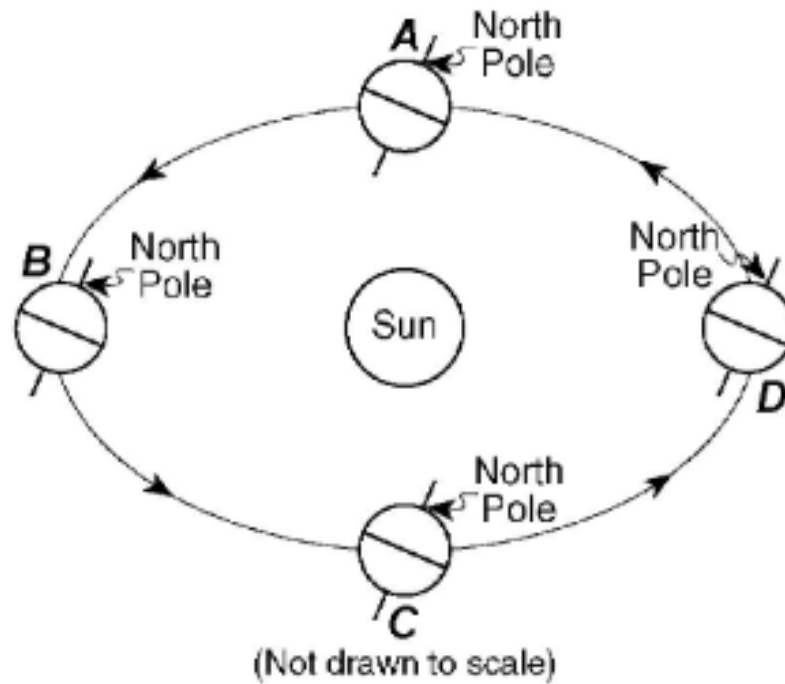
15. What is a solar eclipse?

16. Draw a diagram to show the position of the earth moon and sun in a solar eclipse.



17. In which lunar phase would a solar eclipse occur?

18. Identify the northern hemisphere seasons of the year in the boxes provided below the following diagram.



A	B	C	D
---	---	---	---

19. Complete the following sentence by using the appropriate words from the list.

Closer to further from

During winter, the sun is _____ the sun than in summer.

What is the angle of tilt of the Earth on its axis? _____

20. What season is experienced in Ireland when the northern hemisphere is tilted towards the Sun?

ES5 Water and carbon cycles

1. What is matter?

2. Name 2 compounds that contain carbon.

3. Earth has finite resources. Explain the term finite.

4. What process moves carbon from the atmosphere to plants?

5. What process moves carbon from plants to animals?

6. What process moves carbon from living organisms to the atmosphere?

7. What is combustion?

8. What are the products of the burning of methane?

9. Name 2 types of organic carbon stores.

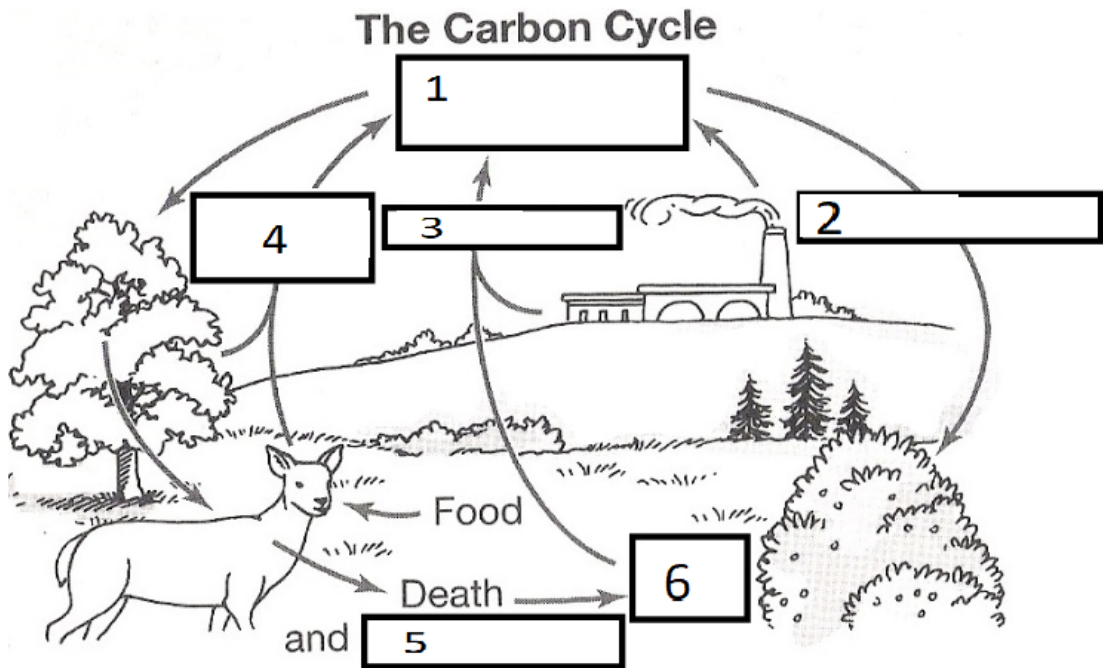
10. Name a carbon store formed from the remains of plants and animals.

--

11. Name 2 types of inorganic carbon stores.

--

12. Label the carbon stores and processes in the diagram of the carbon cycle.



1	
2	
3	
4	
5	
6	

13. What is transpiration?

14. What weather conditions lead to high rates of transpiration?

15. What is evaporation?

16. How are clouds formed?

17. Why does it rain?

18. Name the 2 forms of liquid water stores on earth.

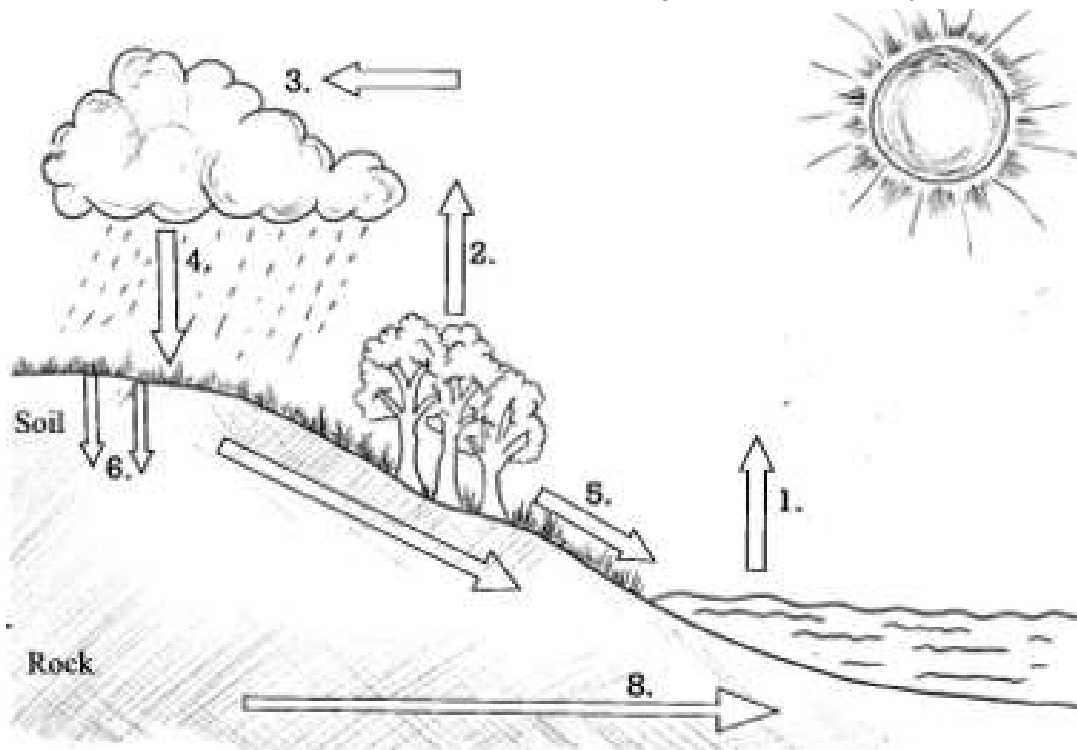
18. What is precipitation?

20. Name 3 types of precipitation?

21. How does fog form?

22. What does condensation mean?

23. Label the water stores and processes in the diagram of the water cycle.



1	
2	
3	
4	
5	
6	
7	
8	

ES6 Research different energy sources.

1. Give one essential use of electricity.

2. What is renewable energy?

3. Give 3 examples of renewable sources of energy.

4. What is non renewable energy?

5. Give 3 examples of non renewable sources of energy.

6. Give 1 disadvantage of non renewable sources of energy.

7. Give 1 disadvantage of renewable energy sources.

8. Name 3 different methods used to produce electricity in Ireland.

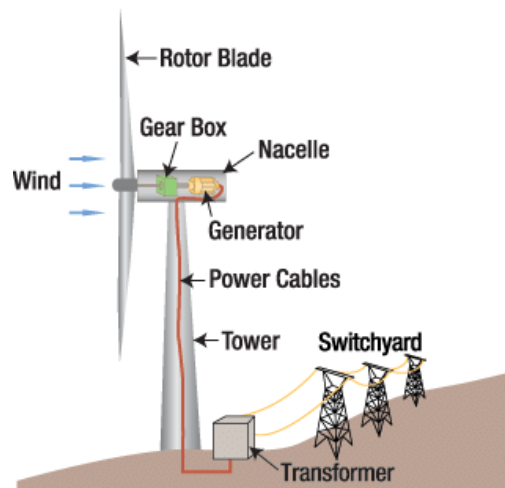
9. Give one reason why it is important to look for alternative ways of producing electricity.

Wind Energy

Wind turns the propeller-like blades of a turbine around a rotor, The rotor connects to the generator, either directly (if it's a direct drive turbine) or through a shaft and a series of gears (a gearbox) that speed up the rotation and spins a generator, which creates electricity.

A 2 megawatt wind turbine, operating at 40 percent capacity would generate 7,000 megawatt hours of electricity per year. The turbine would need less than 6 months to generate enough electricity to compensate for the energy used in its manufacture or an equivalent of 2,175 tonnes of carbon dioxide emissions.

Comparative life cycle assessment of 2.0 MW wind turbines (Prof Karl R. Haapala Oregon State University 2014)



10. What energy conversion occurs in a wind turbine?

11. Why do you think people object to wind turbines close to their house?

12. How long does it take for a 2 MW wind turbine to pay back its manufacturing carbon footprint?

13. How much energy is required to manufacture a 2 MW wind turbine.

14. How do we know if the information in the article is reliable?

ES7 Climate change

1 Explain the difference between weather and climate.

2 What is meant by climate change?

3 What evidence is there of climate change happening?

4 Describe how a naturally occurring process on earth could contribute to climate change.

5 How do humans contribute to climate change?

6 Name a greenhouse gas produced by human activities.

7 How do greenhouse gases cause global warming?

8 What would the effect of increased global temperature be on earth and society?

9 What would happen to Earth's temperature if the energy absorbed from the sun (solar radiation) was less than the emitted (thermal) energy leaving the Earth?

10 What effect do greenhouse gases have on the thermal energy leaving earth?

11 What is meant by a carbon footprint?

12 How can consumer choice of foods affect a person's carbon footprint?

13 What steps can individuals take to reduce their impact on global warming?

14 What steps can governments take to reduce or prevent climate change?

15 How can global warming result in increased rainfall in some areas?

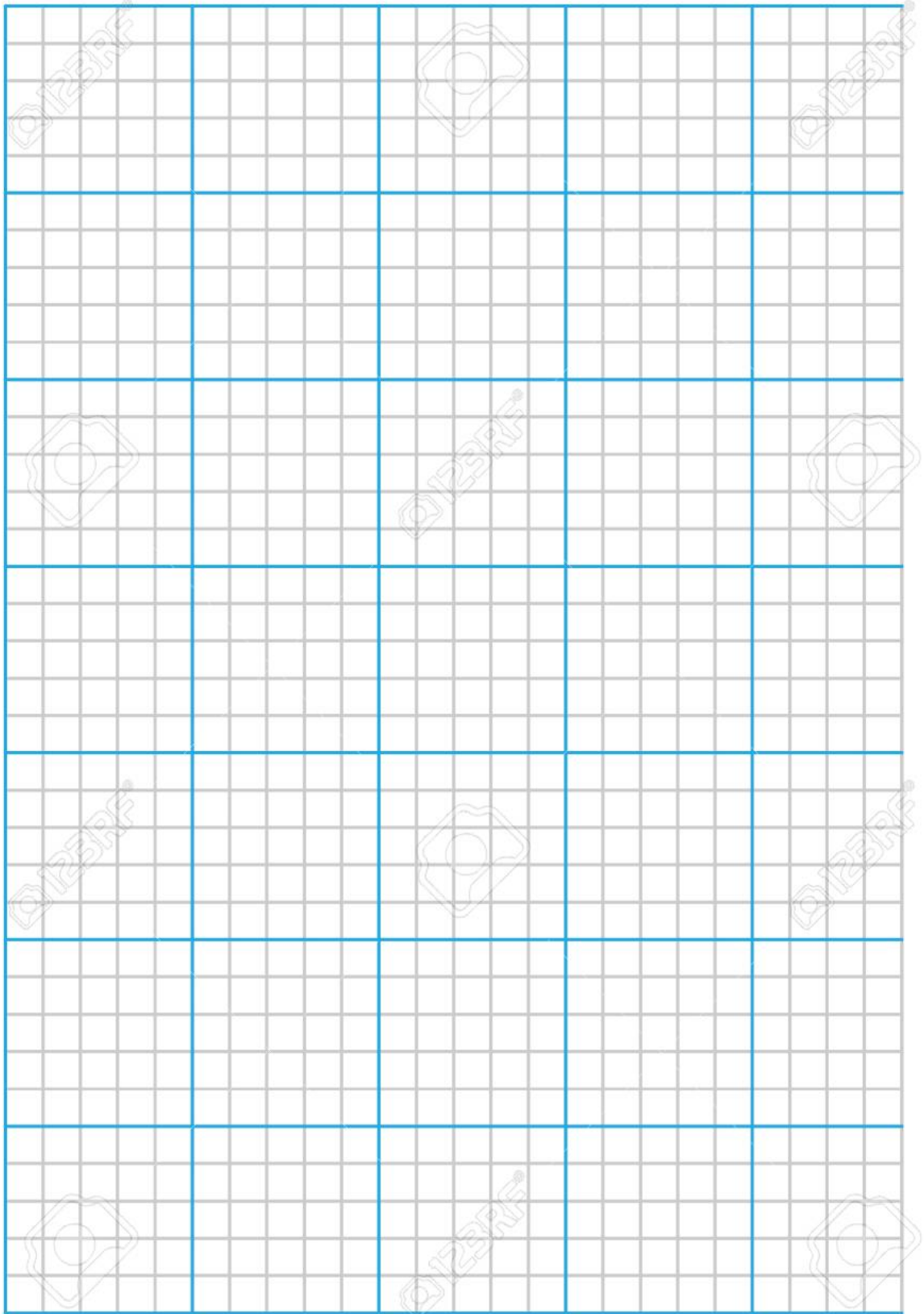
16 The table shows the average global temperatures between 1926 and 2016. Plot the data on the graph page provided. *Source NASA*

Year	1926	1936	1946	1956	1966	1976	1986	1996	2006	2016
Temp °C	13.8	13.8	13.9	13,7	13.9	13.8	14.1	14.2	14.5	14.8

17 What conclusion can be made after analysing the data

18 Suggest 1 explanation for the change in global temperatures.

Graph page for question 16



ES8 Space exploration hazards and benefits

Read the following article and answer the questions that follow.

Bone loss is an essential problem for astronauts to overcome during extended stays in space. Crew members engage in physical exercise for two and a half hours a day, six times a week (fifteen hours a week) while in orbit to avoid these issues. In a microgravity environment, because of reduced loading stimuli, there is increased bone resorption and no change in or possibly decreased bone formation, leading to bone mass loss at a rate of about ten times that of osteoporosis. The femur loses 1.5 percent of its mass per month in space, with the recovery after returning to Earth taking at least three or four years. Bisphosphonate is a therapeutic agent that has been used to treat osteoporosis patients for more than a decade, with a proven efficacy to increase bone mass and decrease the occurrence of bone fracture. ISS crew members are participating in a study by taking Bisphosphonate once a week while in space and early results suggest that astronauts can reduce the risk of bone loss and renal stones by proper intake of appropriate nutrients, such as calcium and vitamin D and an effective exercise program.

1. What health dangers to astronauts are outlined in this article?

2. Why do astronauts suffer from this disorder?

3. What steps can be taken to minimise these health risks?

4. Why are astronauts who return to earth not allowed to run or lift heavy weights for a number of weeks?

5. What is the name for naturally occurring bone loss?

Read the following article and answer the questions that follow.

Astronauts who visit the International Space Station (ISS) orbit the Earth at an altitude of around 400 km and so are not protected from the Sun's radiation by the Earth's atmosphere and magnetic field. At higher altitudes the Earth's magnetic field is weaker, so there is less protection against radiation. In just one week on the ISS, astronauts are exposed to the equivalent of one year's exposure on the ground. On the ISS astronauts wear dosimeters to keep a record of the amount of radiation to which they are exposed. The NASA limit for radiation exposure in low-Earth orbit is 50 mSv/year. In the SI system, a millisievert (mSv) is defined as "the average accumulated background radiation dose to an individual for 1 year". A 1000 mSv radiation dose could increase the likelihood of cancer in later life by 5%. Lin EC. Radiation risk from medical imaging. *Mayo Clin Proc.* 2010

6. What does the term "orbit" mean?

7. What are the main dangers to astronaut health discussed in the article.

8. What are the units used to measure radiation?

9. Why do you think younger astronauts 30-40 are not allowed on long missions on the ISS

10. What protects people on the surface of the earth from radiation?

11. A manned mission to Mars would expose astronauts to 1,200 mSv over 3 years. How could this affect the health of the astronauts?

12. Why do you think the radiation levels are higher on Mars than on Earth?

Read the following articles and answer the questions that follow.

Overcoming the challenges of working in space has led to many technological and scientific advances and technological benefits including improved solar panels, implantable heart monitors, cordless tools, light-weight high-temperature alloys used in jet engine turbines, cameras found in today's cell phones, compact water-purification systems, global search-and-rescue systems and biomedical technologies. Ongoing research in the space environment of the ISS – in areas such as human physiology, continues to yield insights that benefit society. For example, studies of the human body's response to extended periods in the microgravity environment of the ISS are improving our understanding of the aging process and robotic systems for manipulating satellites are being modified to help paraplegics walk.

13. Complete the following table using examples you have researched or from the above article.

Technological Advance	How it was used in space	How it is used in society

In 2016 Ireland committed €90 million in spending to the European Space Agency (ESA) over five years to assist the continued expansion of the space sector in Ireland. This sector is growing rapidly, with the number of companies set to grow to over 80 by the end of the decade, and 1,000 high value technology jobs expected to be created.

14. Write a short article, giving reasons, either for or against continued investment with the ESA.

Diet and Exercise Plan

Getting enough **calories**, vitamins and minerals is as important for **astronauts** as it is for people living on Earth. They have to eat at least 2000 **calories** per day. During the mission, crew members fill out a computer questionnaire to report what foods they have eaten

15. Research and design a healthy diet and exercise plan (two and a half hours a day) for an astronaut that would be living in microgravity for 1 week. Be sure that you list the amount of food the astronaut is supposed to eat as well as which exercises and for how long the astronaut must do them everyday. Include as much variety in your plan as you want to make sure the astronaut stays as healthy as possible.

Day	Food	Exercise

CW1 Conservation of mass in chemical and physical changes,

1.What is mass?

2.What are the units of mass? _____

3.How is mass measured?

4.What is a physical change?

5.Give an example of a physical change.

6.What is a chemical change?

7.Give an example of a chemical change.

8.State the law of conservation of mass.

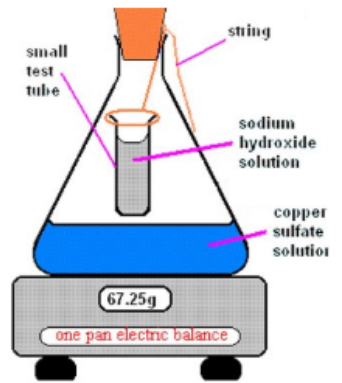
9.Antoine Lavoisier was one of the first scientists to state the law of conservation of mass. When he heated a sample of tin and air in an airtight flask, tin reacted with oxygen in the air to produce tin oxide. Did the mass of the flask and its contents increase, decrease, or stay the same because of this reaction?



10. A wet 43.2 g sample of copper sulfate is heated removing water. The mass of the water lost is 34.1 g. What is the mass of the copper sulfate?

11. Copper sulfate and sodium hydroxide are reacted in a closed container as shown. The total mass of reactants is 67.25g. What is the predicted mass of the products?

12. Why is it important to keep the stopper in the flask?



13. Describe an activity you carried out to show the law of conservation of mass in physical and chemical changes

CW2 Change of States, Physical and Chemical Changes, Mixtures

1.State the law of conservation of matter.

2.In which state of matter do the particles have the most energy? _____

3.Why can liquids not be compressed easily?

4.Why do solids have a fixed shape?

5.What is the name of the change when a liquid becomes a solid? _____

6.What eventually happens if energy is continually removed from a liquid?

7.In the boxes draw the arrangement of atoms in a solid, liquid and a gas.

--	--	--

8.How do solids differ from gases?

9.How do solids differ from liquids?

10. Which states of matter cannot be compressed? _____

11. What is an atom?

12. What is a molecule?

13. What is a mixture?

14. How is a mixture of salt and water separated?

15. Explain why salt and water can be separated by this method.

16. Draw a diagram of the apparatus you would use to separate salt and water.

17. How is a mixture of sand and water separated?

18.Explain why sand and water can be separated by this method.

19.Draw a diagram of the apparatus you would use to separate sand and water.

20.What is a physical change?

21.Give an example of a physical change.

22.What is a chemical change?

23.Give an example of a chemical change.

CW3 Structure of the atom

1.What is an atom?

--

2.What is an element?

--

3.What is a subatomic particle?

--

4.Name the 3 subatomic particles found in atoms.

--	--	--

5.What charge do each of the subatomic particles have?

--	--	--

6.Give the location of each subatomic particle.

--	--	--

7.Draw a clear labelled diagram to represent an atom with its sub atomic particles.

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CW4 Classification

1. What is an element?

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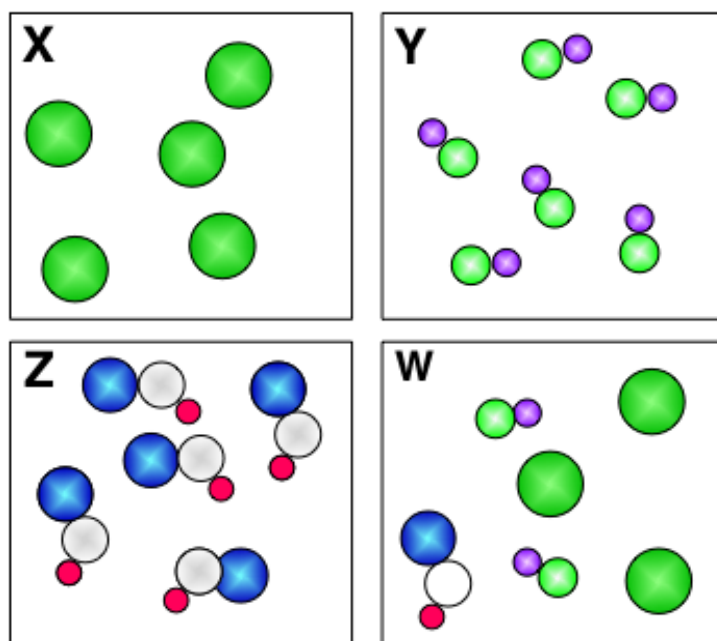
2. What is a compound?

--

3. What is a mixture?

--

4. Describe the diagrams below as elements, compounds or mixtures.



X	
Y	
Z	
W	

5. Give an example of a mixture.

6. Give an example of a compound.

7. Give 2 properties of solids.

8. Give 2 properties of liquids.

9. Give 2 properties of gases.

10. Name 4 metals.

11. What is an alloy?

12. Explain the term malleable.

13. Explain the term ductile.

14. Give 4 differences between metals and nonmetals.

15. Name the 2 parts of a solution

--

16. Give an example of a solution.

--

17. When salt is added to water, name the solute and the solvent.

--

18. Name a solvent often used to clean paint brushes.

--

19. Nail polish remover sometimes consists of acetone used to dissolve the nitrocellulose in nail polish. Name the solute and solvent mentioned above.

--

CW5 Periodic table/bonding, Ratio of compounds

Examine the simplified periodic table below and answer the questions that follow.

A								D
H								He
Li	Be	B	C	N	O	F		Ne
Na	Mg	Al	Si	P	S	Cl		Ar
K	Ca	Ga	Ge	As	Se	Br		Kr
Rb	Sr	In	Sn	Sb	Te	I		Xe
Cs	Ba							

1. Identify groups labelled A, B, C and D in the periodic table.

2. What do all the elements in group 1 have in common?

--

3.What do all the elements in group 2 have in common?

4.What do all the elements in group 6 have in common?

5.What do all the elements in group 7 have in common?

6.Which group of the periodic table are commonly known as the Noble Gases?

7.What is special about the Noble Gases?

8.What is the octet rule?

9.In terms of electron transfer, how can an element in group 1 become stable?

10.In terms of electron transfer, how can an element in group 7 become stable?

11.What is an ion?

12.What is meant by the valency of an element?

13.Explain the valency or combining power of elements in group 6 of the periodic table

14.Name 2 forms of chemical bonding.

15.Name the form of chemical bonding that involves oppositely charged ions.

16.Name the form of chemical bonding that involves shared electrons.

17.Draw a diagram to explain how sodium and chlorine combine to form sodium chloride.

18. Use the periodic table to calculate the formula of the compounds formed when the following elements react.

Potassium and oxygen	Potassium and chlorine
Calcium and chlorine	Calcium and oxygen

19. Use the periodic table to calculate the formula for the following compounds.

Sodium oxide	Sodium bromide
Lithium oxide	Aluminium oxide

CW6 properties of materials

1. Choose the correct word from the following list to complete the paragraph below.

Solute Solvent Solution Saturated.

When sugar is added to hot tea a _____ is formed. The solid sugar is the _____ and the hot tea is the _____. When no more sugar will dissolve the solution is _____.

2: Some pupils carried out an investigation to find out whether more sugar or more salt dissolved in water at 60°C. Here are some of the steps in their investigation. They are not in the correct order.

A: Add salt to one beaker and sugar to the other beaker of water both at 60°C

B: Count the number of spatulas added until no more will dissolve

C: Stir the mixtures

D: Record the results

E: Put 20cm³ of water into each beaker

F: Collect equipment needed

3. Put the letters in the correct order to show the correct order of steps

4. Name a piece of equipment a student would use to measure the volume of water.

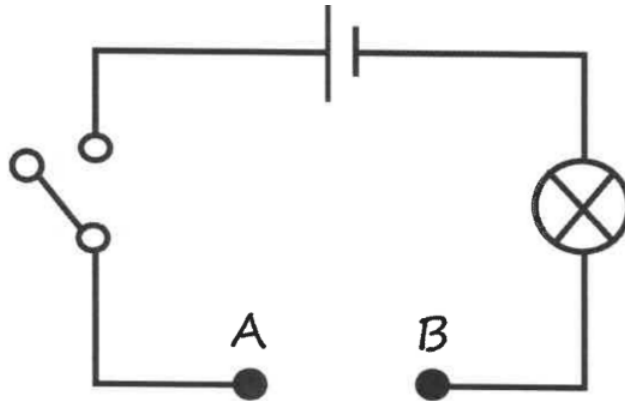
5. Counting the number of spatulas of sugar that dissolves is not a very accurate way of measuring mass. Suggest a better way of measuring the mass of sugar dissolved in the water.

6. Name a piece of equipment a student would use to warm the water.

7. Describe a safety precaution a student should take during this experiment.

8. Salt and sugar both dissolve in water. Name a substance that does not dissolve in water.

9. A student designed an experiment to measure the electrical conductivity of different materials. Label the switch battery and bulb in the diagram of the circuit she used.



10. The student tested 4 substances for electrical conductivity. Complete the table below based on your knowledge of electrical conductivity.

Substance	Light bulb on or off	Conductor or Insulator
Wooden stick		
Copper wire		
Plastic tube		
Iron nail		

11. Explain the term solubility

12. What is the effect of temperature on the solubility in water of a solid such as copper sulfate?

13. What is the effect of temperature on the solubility in water of a gas such as carbon dioxide?

14. What is the effect of adding a solute such as salt on the boiling point of water?

15. What is a concentrated solution?

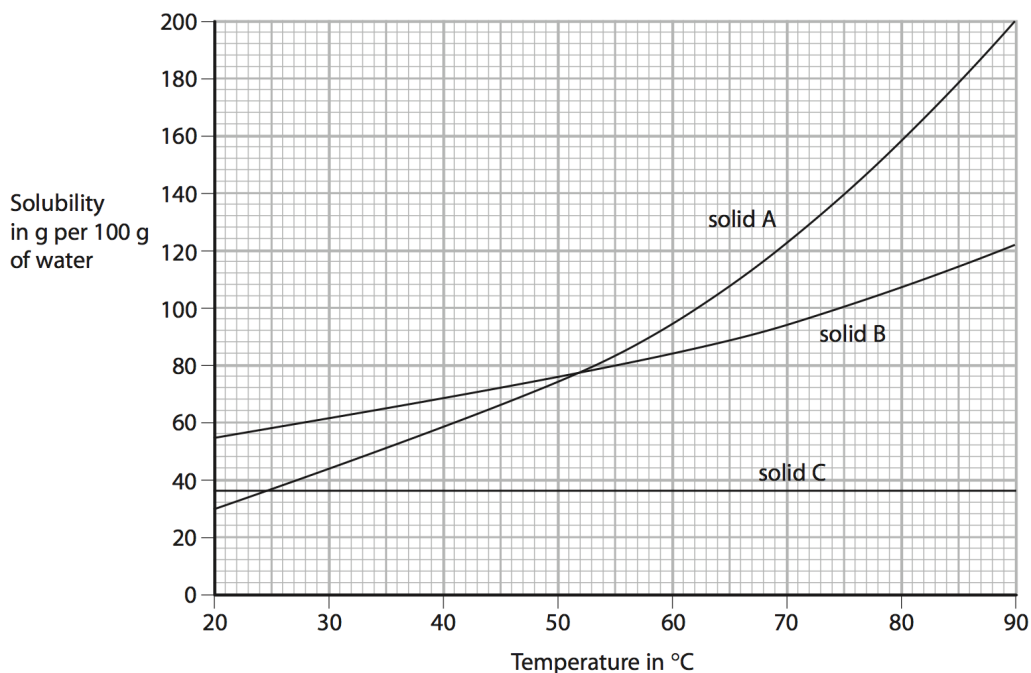
16. What is a dilute solution?

17. What is a saturated solution?

18. Draw a well labelled diagram to show how you could compare the thermal conductivity of different materials.



Examine the solubility graph below and answer the questions that follow.



19. What is the effect of increasing the temperature on the solubility of substance A?

20. What is the effect of increasing the temperature on the solubility of substance C?

21. Which substance has the highest solubility at 40 degrees Celsius?

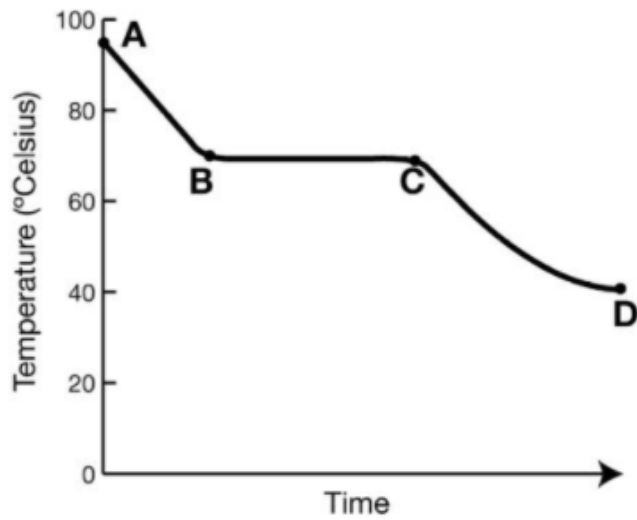
A scientist measured the amount of substance D that would dissolve in 100g of water at different temperatures and recorded the following data.

Temp	20	30	40	50	60	70	80	90
g/100g water	140	120	100	80	60	40	30	20

22. Plot the solubility curve for substance D on the same graph above.

23. How does the solubility of substance D change with temperature?

A student heated a sample of stearic acid to 95 degrees Celsius at then recorded the temperature as the stearic acid cooled. The graph below shows an analysis of the data collected.



24. What letter indicates the point at which liquid stearic acid changed to solid?

25. What is the name for this change of state?

26. At what temperature did this change of state occur?

27. What letter indicates the point at which all of the liquid had changed to solid?

28. Name the measuring instrument required to record the data in this investigation.

CW7 Rates of Reaction

1. What is a chemical change?

--

2. Mark the chemical changes in the following list.

Burning coal	Melting ice	Cooking eggs	Cutting grass
--------------	-------------	--------------	---------------

3. Explain the term reactant and product in a chemical reaction.

4. Examine the chemical reaction below and identify the reactants and the products.



Reactants	Products
-----------	----------

5. Place the following chemicals in the correct boxes to represent a common combustion reaction.

Carbon dioxide Oxygen Methane Water

Reactants	Products
-----------	----------

6. Complete the following statement.

A *change in which a new substance is formed is a _____ change.*

7. Arrange the following reactions in order of speed from fastest to slowest.

A Iron rusting, B Acid rain erosion of limestone,
C Dynamite exploding, D Paper burning

--

8. HCl is a common acid used in the lab. What is the full name of this acid?

9. The chemical formula for marble chips is CaCO_3 . What is the full name for CaCO_3 ?

10. Name the gas produced when HCl reacts with CaCO_3 ?

11. Describe a use for lime water in the lab.

12. Label the pieces of apparatus shown in the diagram.

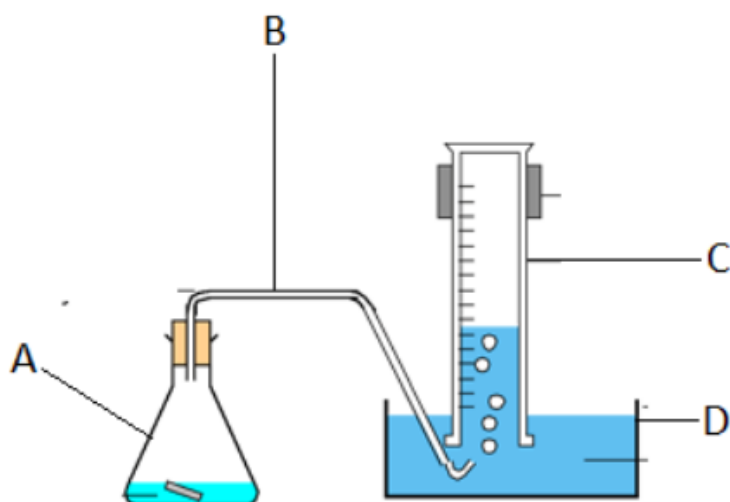


Diagram 7.1

A	
B	
C	
D	

13.Name the reactants required to produce CO₂ using the apparatus in diagram 7.1

--

14.List 2 safety precautions a student is required to take before carrying out this investigation.

--

15.What is meant by the rate of a chemical reaction?

--

16.How can the rate of a chemical reaction be measured?

--

17.List 5 factors that can affect the rate of a chemical reaction.

18.Explain the following terms used in scientific investigations.

Independent variable

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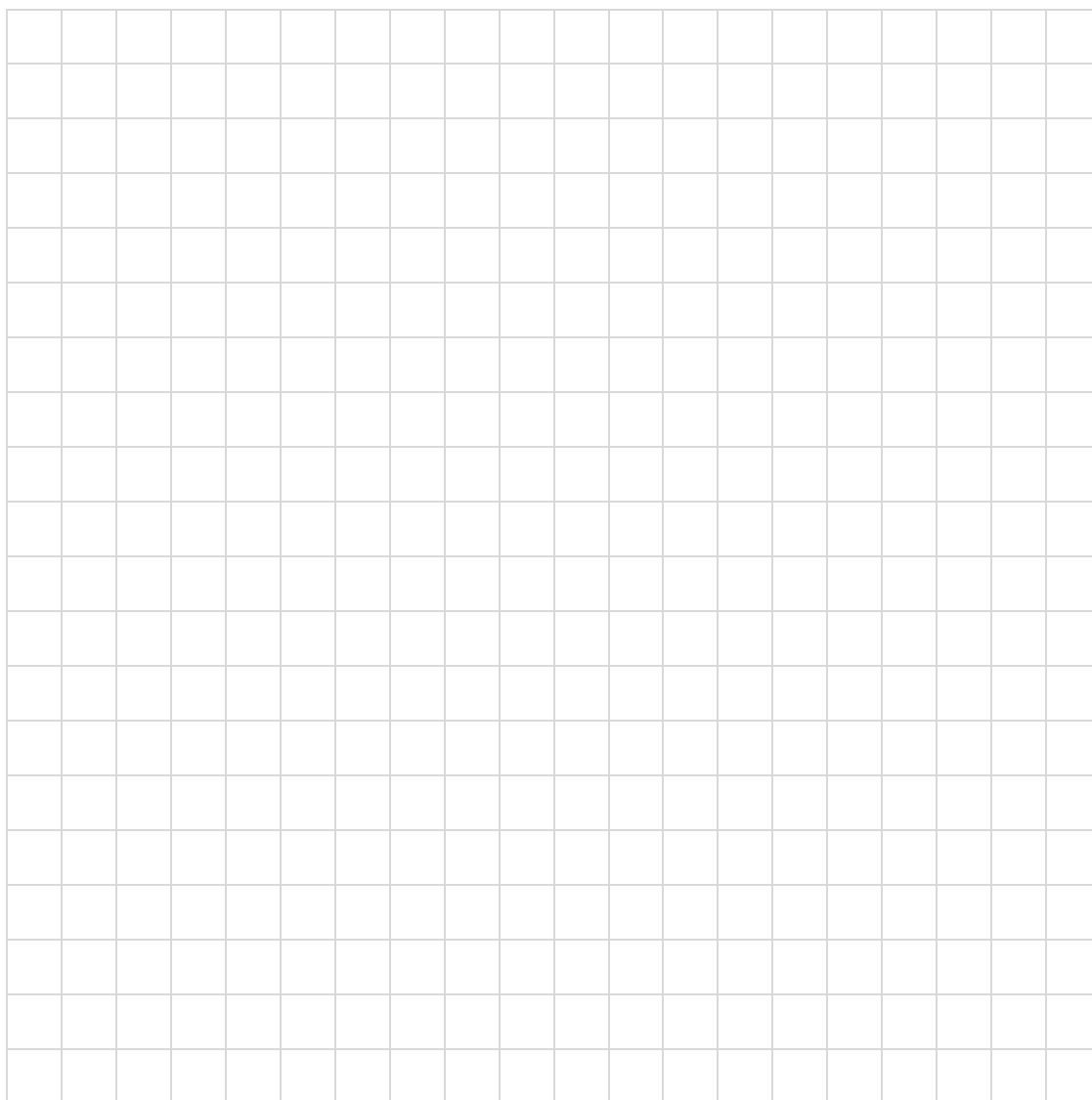
Dependent variable

--

19. The table shows the data collected for the reaction between HCL and CaCO₃ for 3 different temperatures. Plot this information on a graph.

Volume of gas produced each minute (cm³)

Temperature °C	1 minute	2 minutes	3 minutes	4 minutes	5 minutes
20	10	20	30	40	50
40	20	35	48	50	50
60	35	48	50	50	50

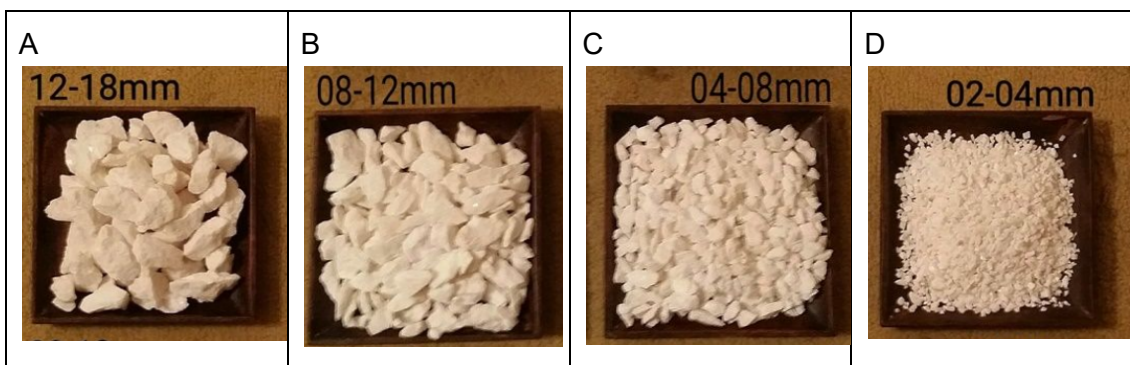


20. Identify 2 conclusions that can be made from the graph.

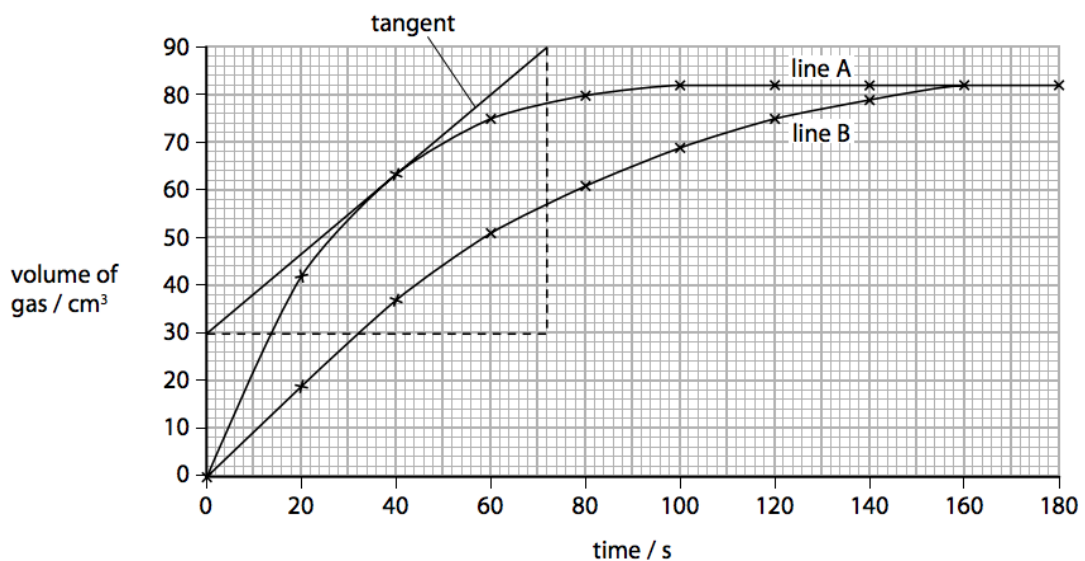
21. When marble chips are crushed into smaller pieces does the surface area of the marble chips increase or decrease?

22. What is the effect of smaller particle size on the rate of a reaction.

23. Examine the photographs of different sized pieces of marble chips and place the letters A, B, C and D in order of how they would react with HCL from slowest to fastest



24. The following graph shows the results obtained when students compared the reaction of 2 different sized pieces of marble chips with HCl.



25. Which graph represented the smaller size? Explain why you chose your answer.

26. In an experiment a student reacted 1 M HCl with magnesium and recorded the volume of gas produced every minute until the reaction stopped. The student then repeated the experiment with 3 M HCl. The students' results are recorded below. Plot a graph to show these results.

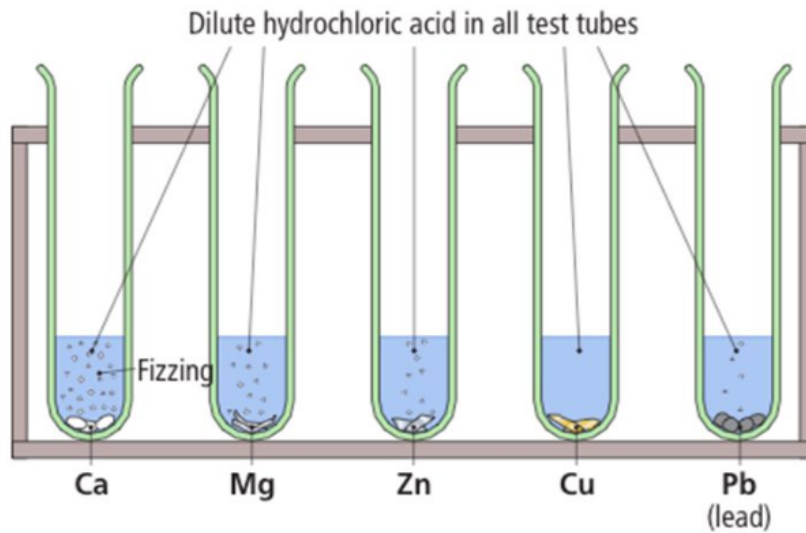
Volume of gas produced each minute (cm³)

Concentration	1 minute	2 minutes	3 minutes	4 minutes	5 minutes
1 M	10	20	30	40	50
3 M	20	45	48	50	50



27. Suggest what conclusions can be reached from the pattern in the graph.

28. The diagram shows the results of an investigation into the reaction of different metals with HCL. The bubbles show a gas being produced.



29. Arrange the metals in increasing order of reactivity from the least reactive to the most.

30. What is a catalyst?

31. Name a catalyst that speeds up the decomposition of hydrogen peroxide.

32. What are the products of the decomposition of hydrogen peroxide?

33. What is the name given to biological catalysts (catalysts made inside living cells)?

34. Name the biological catalyst that speeds up the decomposition of hydrogen peroxide.

35. What is the optimum temperature for human enzymes?

36. How does high temperature affect enzyme action?

37. How does low temperature affect enzyme action?

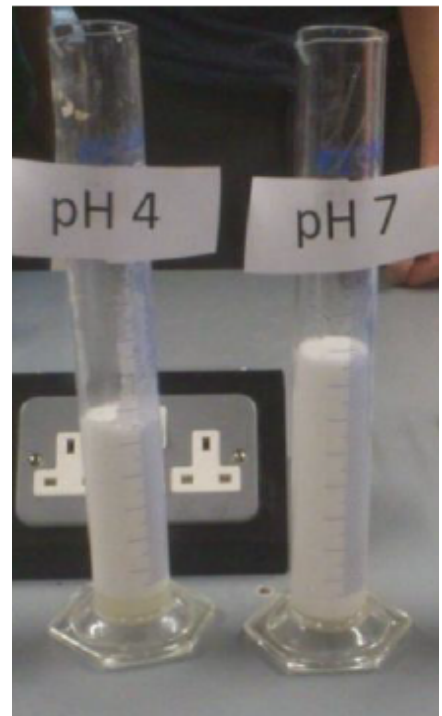
38. Name the substrate for the enzyme catalase.

Examine the photograph which shows a student's investigation into the effect of pH on the enzyme decomposition of hydrogen peroxide.

39. Name a suitable source of the enzyme catalase for this experiment

40. What gas caused the foam produced in this experiment

41. Which pH allowed the reaction to happen faster?



CW8 Acids and Bases -pH scale, Neutralisation reactions

1.What is an acid?

2.Name 2 laboratory acids

3.Name 2 household acids.

4.What is a base?

5.Name 2 laboratory bases?

6.Name 2 household bases.

7.What is meant by pH?

8.What is the pH range of bases?

9.What is meant by an alkaline substance?

10.What is a neutral pH?

11. What is the pH range for acids?

--

12. What is an indicator?

--

13. Describe how an indicator can be extracted from a plant such as red cabbage.

--

14. Place the letter corresponding to each of the following substance in an **approximate** appropriate position on the pH scale

A Vinegar B Hydrochloric Acid C Sodium Hydroxide, D Toothpaste.

pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Use coloured pencils to colour the pH chart above for universal indicator.

15. Describe how to find the pH of an unknown substance.

--

16. What is meant by a neutralisation reaction?

--

17. Give an example of a neutralisation reaction

--

18. Give an everyday use of knowledge of neutralisation reactions.

--

19. Write down the word equation for the reaction between sodium hydroxide and hydrochloric acid.

20. Write down the chemical equation for the reaction between sodium hydroxide and hydrochloric acid.

21. What is a titration procedure?

22. Describe how you prepared the salt sodium chloride in the laboratory. Include a detailed diagram in your answer.

CW9 Exothermic reactions, Energy profile diagrams

1. What is an exothermic reaction?

2. Give an example of an exothermic reaction.

3. Give an example of an everyday use of an exothermic reaction.

4. What is an endothermic reaction?

5. Give an example of an endothermic reaction.

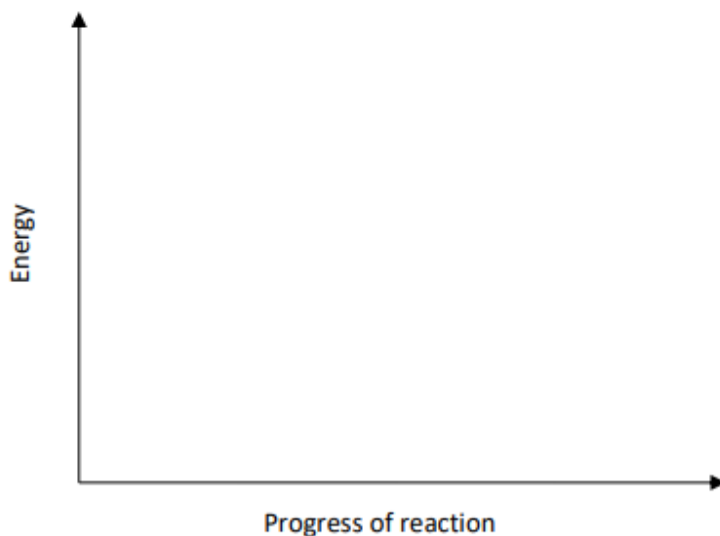
6. Give an example of an everyday use of an endothermic reaction.

7. What is meant by the activation energy of a chemical reaction?

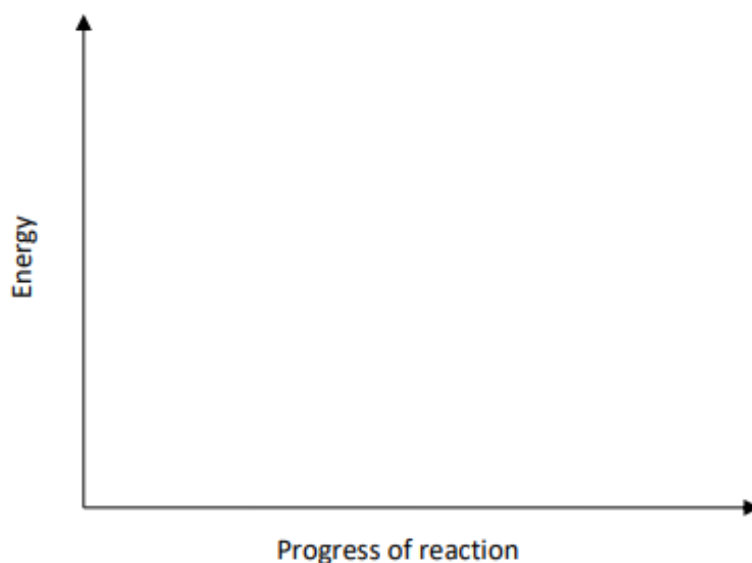
8. When calcium reacts with water, the temperature changes from 18°C to 39°C. Is this an exothermic or endothermic reaction?

9. If a reaction releases more energy when new bonds are made than the amount of energy absorbed to break bonds in the reactants, is it an exothermic or endothermic reaction?

10. Energy profile diagrams show the energy stored in the reactants and the products before and after a chemical reaction. Complete this energy profile diagram for a typical **exothermic reaction**. Label the activation reactants, products and activation energy.



11. Complete this energy profile diagram for a typical **endothermic reaction**. Label the activation reactants, products and activation energy.



12. Complete the following sentences that describe an exothermic reaction by inserting the appropriate words from the list.

Break Reactants Released Products Supplied

Energy must be _____ to _____ the bonds in the

_____. Energy is _____ when bonds in the

_____ are formed.

13. Indicate whether the following graphs represent exothermic or endothermic reaction and indicate the position on the graph of the reactants and products for each reaction. Calculate the activation energy for each reaction

A.	B.
Activation Energy	Activation Energy

14. Describe an experiment you have carried out to investigate an energy change reaction in the laboratory. Include any data you collected.

CW10 Sustainability, Critical Elements

1. What is meant by sustainability

2. Give 4 examples of materials that are removed from the earth for human processing

3. Give an example of how the extraction of materials negatively affects the environment.

4. Describe how the disposal of materials harms the environment.

5. Why is recycling of materials necessary?

6. Name 2 materials that are easily recycled.

7. Name a non recyclable material and describe how it is disposed.

8. What is meant by a conflict mineral?

9. Give an example of an important material or mineral that is in short supply.

10. What is E Waste?

PW1 Measuring Instruments

1.Name the following measuring instruments

2.Name the measuring instruments required to measure each of these.

Length of a book	
Mass of a rock	
Force needed to open a door.	
Strength of a battery	
Temperature of the body	
Volume of a liquid	
Resistance of a coil of wire	

3.What units are the following quantities measured in?

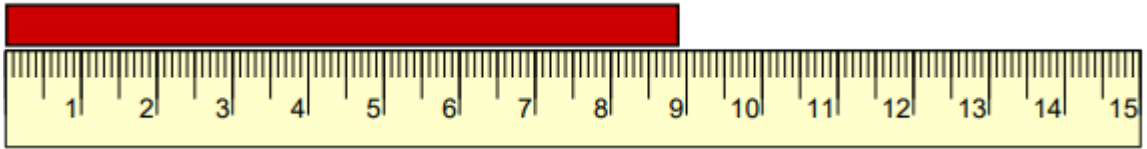
Length	
Mass	
Force	
Potential Difference	
Temperature	
Volume	
Resistance	
Electric Current	

4.What quantity are the following units used to measure?

cm	
cm ²	
cm ³	
N	
°C	
A	
V	
Ω	

PW2 Measurement and calculations

1. Write down the length in mm of each of the following object



--

2. Make a list of 10 items in your house that have metric measurements. Record the stated mass and units of each. Also include what type of measurement it is such as for volume, mass or temperature. The first one is done for you.

Sugar 1 kg bag Mass				

3. Measure and record the length of the following items.

Length of your shoe	
Your height	
Width of the room	

4. Record the time taken for the following

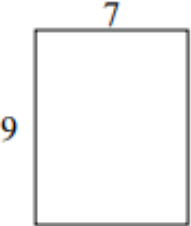

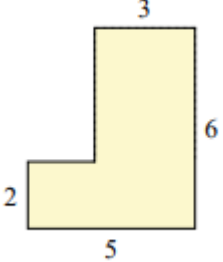
Time to boil 100 cm ³ of water	
Time for a toy car to roll down a ramp	
Time for an ice cube to melt.	

Area

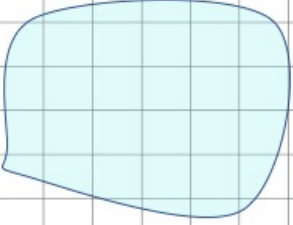
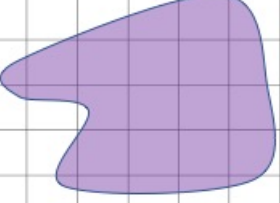
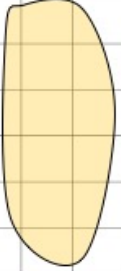
5. What is the formula to calculate the area of a rectangular shape?

6. What are the units for area?

7. Calculate the area of the following shapes. Dimensions are in cm.

		
<input type="text"/>	<input type="text"/>	<input type="text"/>

8. Sometimes it is necessary to estimate the area of irregular shapes such as leaves or the surface area of a pond. Estimate the area of the following shapes. Each square in the grid is 1 cm^2 .

		
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9. A single solar panel is 1.5 m wide and 75 cm high. Calculate the total area exposed to the sun if 12 of these panels are placed onto the roof of a building.

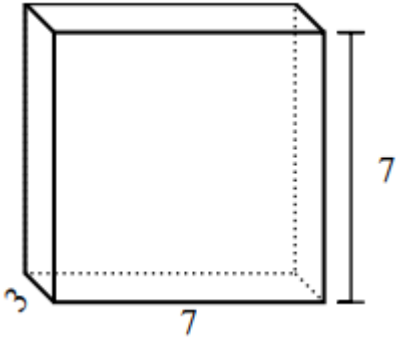
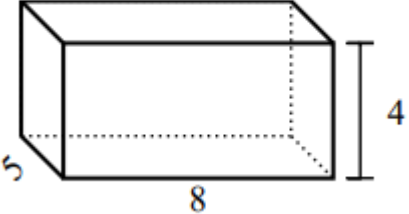
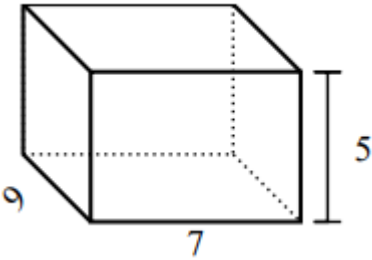
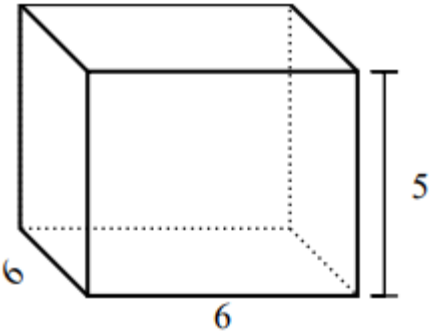


Volume of regular solid

10. What is the formula to calculate the volume of a rectangular box?

11. What units do we record for volume?

12. Calculate the volume for the following rectangular boxes. Dimensions given in cm.

	
	
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13. A rectangular block has a width of 5 cm, a height of 8 cm and a depth of 2 cm. What is the volume of the block?

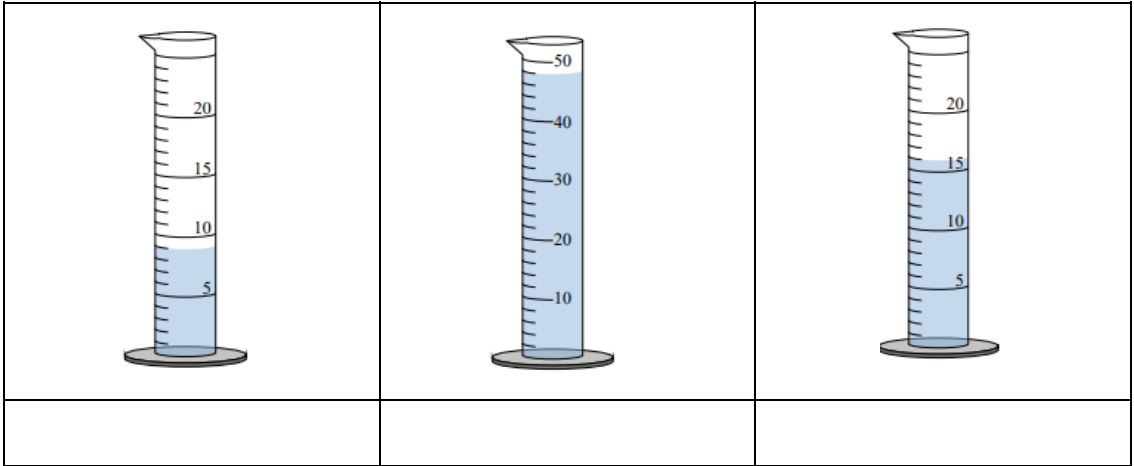
14. A rectangular block has a width of 9 cm, a height of 10 cm and a depth of 5 cm. What is the volume of the block?

Volume of Liquids

15. What measurement instrument do we use to find liquid volume?

16. In what units do we record liquid volume?

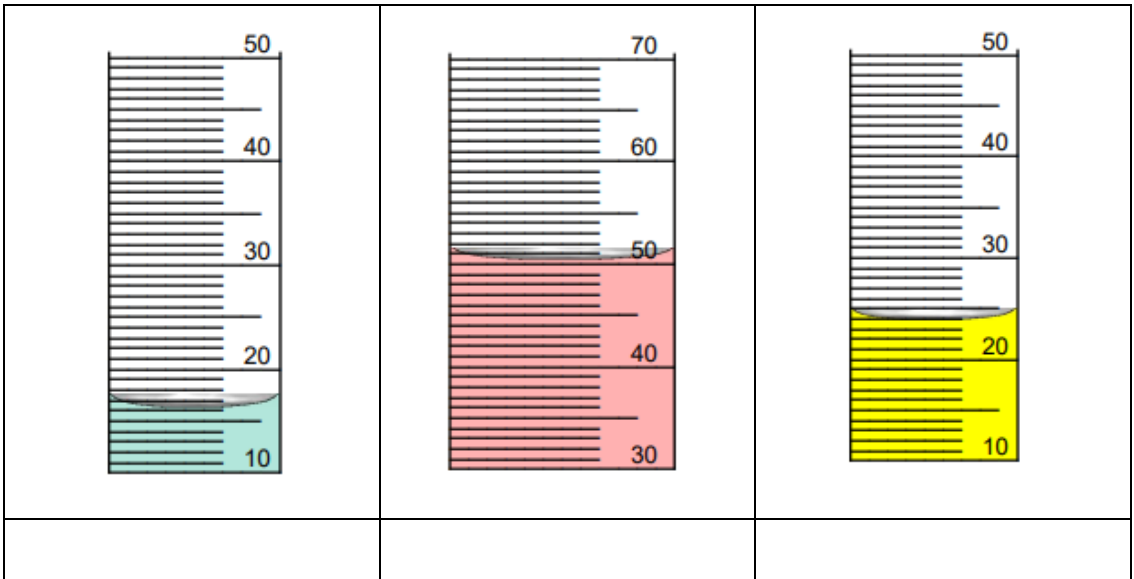
17. Read the volume of the following liquids



18. What is the meniscus?

19. How does the meniscus affect reading the correct volume?

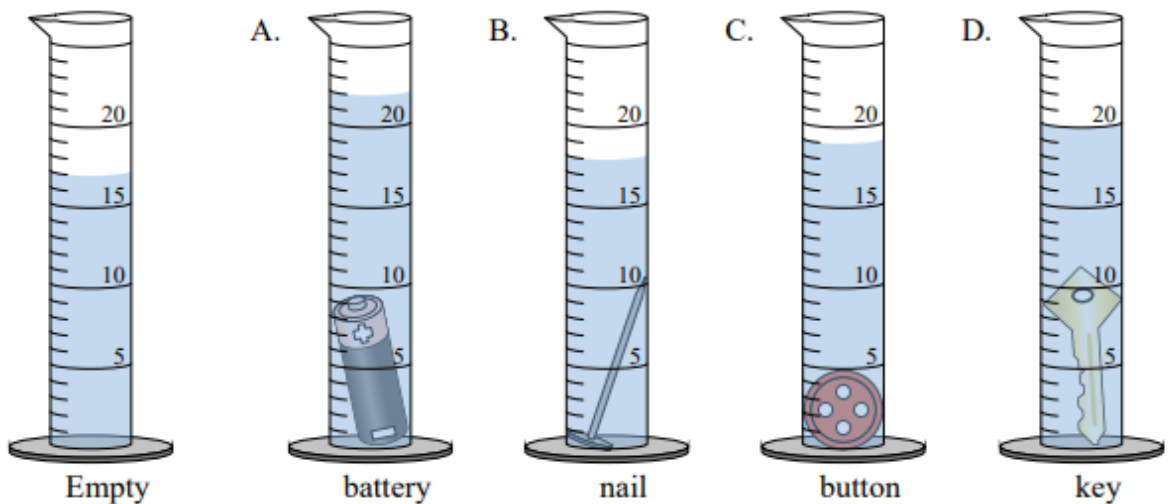
20. Read the volume of the following liquids taking the meniscus into account.



Volume of irregular objects

21. Describe how to calculate the volume of an irregular shaped object such as a small stone?

22. 4 different objects were placed in a graduated cylinder of water in turn. Calculate the volume of each object. Show your work in each case.



Battery	
Nail	
Button	
Key	

Temperature

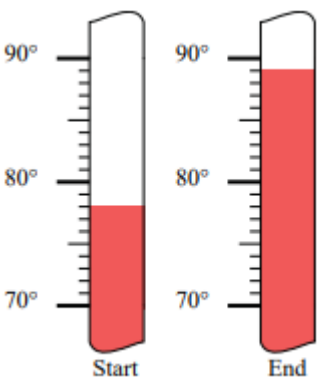
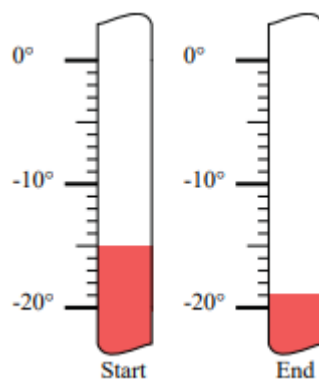
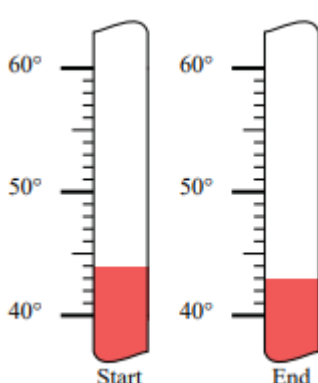
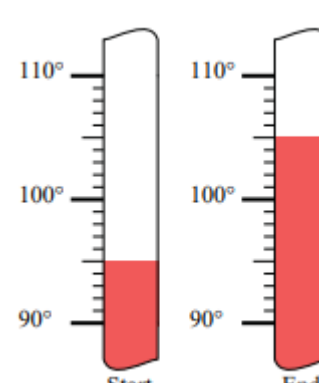
23. What instrument is used to measure temperature?

24. What units is temperature measured in?

25. Use a thermometer to record the following temperatures.

Room temperature	
Temperature of a cup of tea.	
Temperature inside fridge.	

26. Calculate the temperature change that occurred in each of the following thermometers.

Mass

27. What is mass?

28. What are the units used to measure mass?

29. What instrument is used to measure mass?

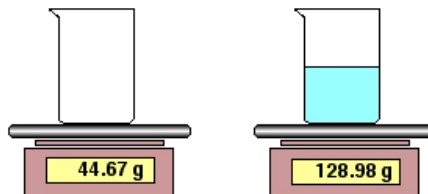
30. Convert the following masses from g to kg

5100 g	12000 g	750g	20g

31. Convert the following masses from kg to g

2.4 kg	120 kg	0.5 kg	0.04 kg

32. In order to calculate the mass of a liquid a student first calculated the mass of an empty beaker as shown. Calculate the mass of the liquid in the beaker.



33. A 20c coin has a mass of 6 grams. How much would €2.60 in 20c coins weigh? Show your work.

34. John's pet guinea pig has a mass of 950 grams. Mary's pet rabbit has a mass of 2.1 kilograms. How much more does Mary's pet weigh than John's? Explain how you found your answer.

Density

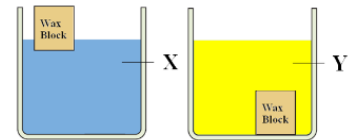
35. What is Density

36. What is the formula for calculating density?

37. What are the units we use for density?

38. Why does oil float on water?

39. Which liquid X or Y in the diagram has the greatest density?



40. A student finds a rock on the way to school. In the laboratory he finds that the volume of the rock is 22 cm^3 , and the mass is 66g . Calculate the density of the rock?

41. If 30g of a liquid occupies a space of 35 cm^3 what is the density of the liquid?

42. Calculate the density of a rectangular block of wood that has a mass of 90g and measurements of length 5cm , width 3cm and height 3cm .

43. A ring was weighed and found to be 54g . The volume of the ring was 6 cm^3 .



Calculate the density of the ring and use the table of densities to tell from what material it is made. Show your work.

Metal	Density gcm^{-3}
Aluminium	2.7
Copper	9.0
Brass	8.5
Bronze	8.8

Speed

44. What is speed ?

45. What are the units of speed?

46. What is velocity?

47. What is the speed of a ball that travels 49 meters in 2.4 seconds?

48. Which has a greater speed, a ball rolling down a 3.4 meter hill in 6 seconds or a fish swimming upstream and covering 5.4 meters in 0.4 minutes?

49. How long does a horse take to walk to water 6 km away at a speed of 20 m/s.

50. If Dungarvan Shopping Centre is 300 meters long and you walk at a pace of 1.3 m/s, how long will it take you to walk from one end to the other?

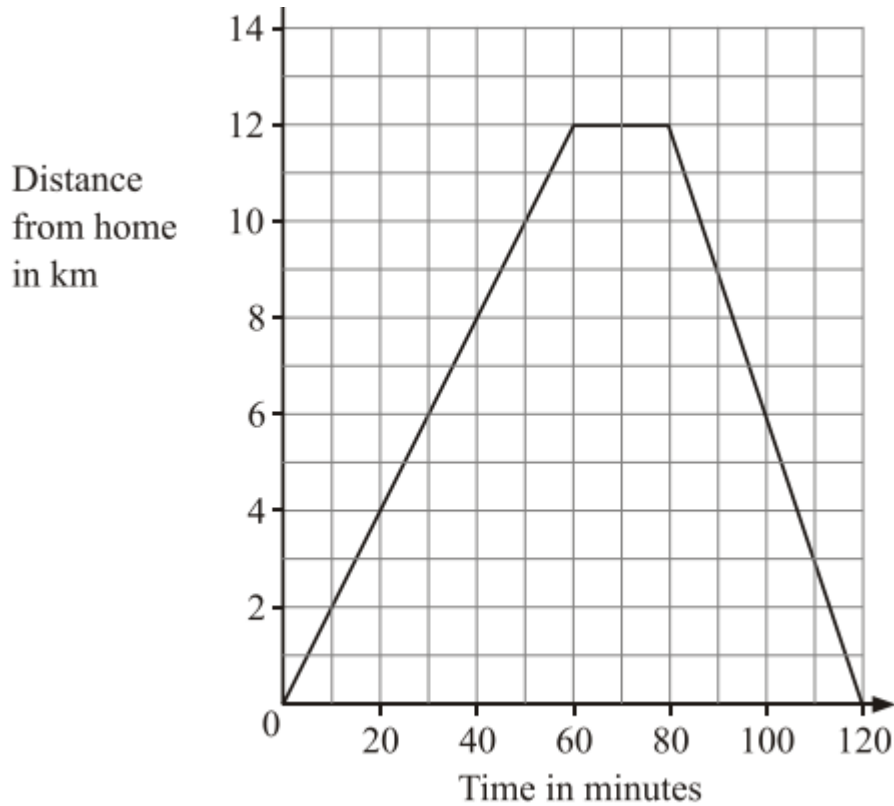
51. If my toy train in class can move at a speed of 0.04 m/s, how long will it take for the train to move 5 meters?

52. You arrive in my class 45 seconds after leaving math which is 90 meters away. How fast did you travel?

53. How far can you get away from your little brother with the squirt gun filled with paint if you can travel at 3 m/s and you have 15s before he sees you?

Distance Time Graphs

Margaret went on a cycle ride. The travel graph shows Margaret's distance from home on this cycle ride



54. How far had Margaret cycled after 30 minutes?

55. After 60 minutes, Margaret stopped for a rest. For how many minutes did she rest?

56. How far did Margaret cycle in total on her ride?

57. What was Margaret's average speed for the first 60 mins?

58. What was Margaret's average speed for her return journey home?

Acceleration

59. What is acceleration?

60. How is acceleration calculated?

61. What are the units used in acceleration

62. A cyclist accelerates from 0 m/s to 8 m/s in 3 seconds. What is his acceleration ?

63. A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its average acceleration?

64. A car advertisement states that a certain car can accelerate from rest to 70 km/h in 7 seconds. Find the car's average acceleration.

65. A lizard accelerates from 2 m/s to 10 m/s in 4 seconds. What is the lizard's average acceleration?

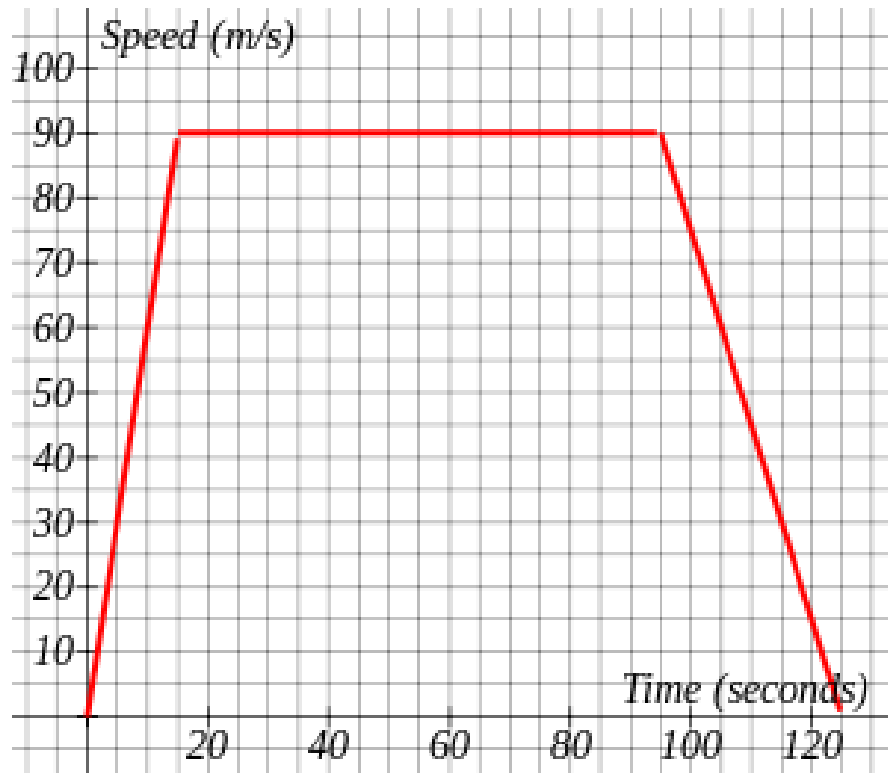
66. A runner covers the last straight stretch of a race in 4 s. During that time, he speeds up from 5 m/s to 9 m/s. What is the runner's acceleration in this part of the race?

67. A ball is dropped from the top of a building. After 2 seconds, its velocity is measured to be 19.6 m/s. Calculate the acceleration for the dropped ball.

68. If a Ferrari, with an initial velocity of 10 m/s, accelerates at a rate of 50 m/s/s for 3 seconds, what will its final velocity be?

Speed Time Graphs

The speed-time graph below shows the journey of a train between stations.



69. Calculate the time to accelerate to a constant speed?

70. Calculate how long the train travelled at a constant speed

71. Calculate the constant speed of the train?

72. Calculate the acceleration of the train at the start of the journey?

Force

73. What is a force?

74. What are the units of force?

75. What is meant by the weight of an object?

76. What is the weight of an object of mass 20kg?

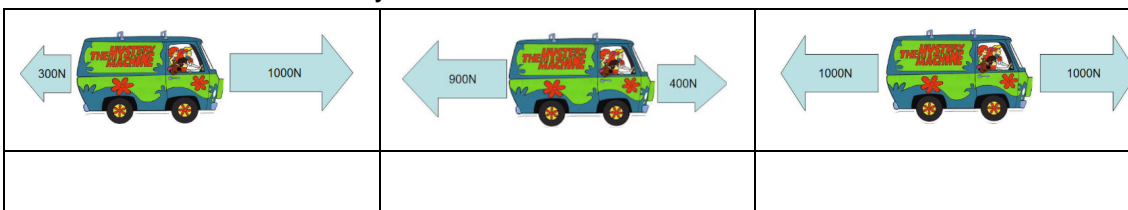
77. What is friction?

78. Give an example of where friction is useful.

79. Give a disadvantage of friction.

80. Name the force that pulls all objects towards the earth.

Newton's First law states that objects will either stay at rest or at constant velocity unless acted on by an unbalanced force. The size of the forces can be represented by using arrows of different sizes. The arrows shown in the diagrams below represent the forces of friction and thrust. Indicate whether the van accelerates, decelerates or remains at a constant velocity in each case.



81. Name another force on the van not indicated on the diagram above.

Potential Difference and Electric Current

82. What is meant by potential difference?

83. What are the units used to measure potential difference

84. What instruments are used to measure potential difference?

85. What is the total potential difference in the following images?

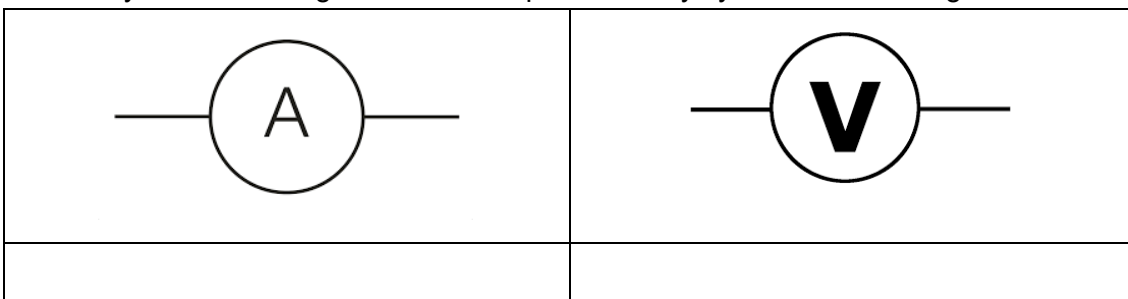


86. What is meant by electrical current?

87. What are the units used to measure electrical current?

88. What instrument is used to measure electric current?

89. Identify the measuring instruments represented by symbols in the diagram



Resistance

90. What is meant by resistance in circuit?

91. What are the units used to measure resistance?

92. What instrument is used to measure resistance?

93. How is resistance calculated?

94. Calculate the resistance R for the following: $I = 4 \text{ A}$ and $V = 20 \text{ V}$ ($I = \text{current}$)

95. Calculate the resistance R for the following: $I = 20 \text{ A}$ and $V = 10 \text{ V}$

96. Calculate the resistance R for the following: $I = 15.5 \text{ A}$ and $V = 5.5 \text{ V}$

97. A hairdryer uses mains voltage (230 V). It takes a current of 5 A . Work out the resistance.

98. A torch takes a 3 V battery. The light bulb for the torch has ' 0.2 A ' stamped on the side, so 3 V gives a current of 0.2 A . What is the resistance of the bulb?

99. When a $5 \text{ k}\Omega$ resistor is connected to a power supply 18 mA of current passes through it. What is the voltage of the power supply?

Electrical power

100. What is power?

101. What is power measured in?

102. A small motor does 4000J of work in 20 seconds. What is the power of the motor in watts?

103. The power rating of an electrical device is printed on a label. What is the power rating of the electrical device shown?



104. Name an appliance in the home that would have a high power rating

105. How is electrical power calculated?

106. What is the electric power consumed by the circuit with a 1.5 V battery and 2A of current?

107. The electric power consumed by a circuit with one light bulb is 3 W. The voltage of the battery is 3 V. What is the current in the circuit?

108. The electric power consumed by a circuit with one light bulb is 6 W. The current in the circuit is 4 A. What is the voltage of the circuit?

PW3 Patterns and Relationships

1. Give an example of a physical observable and how it is measured.

--

2. What is an independent variable in an experiment?

--

3. What is a dependent variable in an experiment?

--

4. In order to verify a law in physics known as Hooke's law a student added different weights to a spring suspended from a hook and recorded the extension of the spring each time. Name the independent and dependent variables in the experiment on Hooke's law.

--

5. In order to verify a law in physics known as Ohm's law a student changed the voltage across a resistor and measured the current flowing through it for each voltage. Name the independent and dependent variables in the experiment on Ohm's law.

--

6. Identify the independent and dependent variables in the following examples

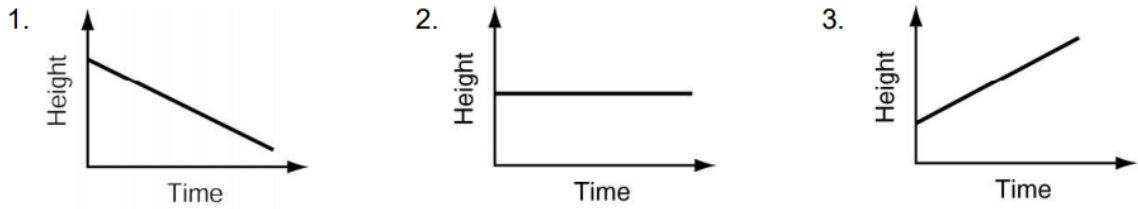
Investigating the effect of temperature on the mass of solute that will dissolve in 100g of water.

Independent	
Dependent	

Investigating the effect of pH on the rate of a chemical reaction.

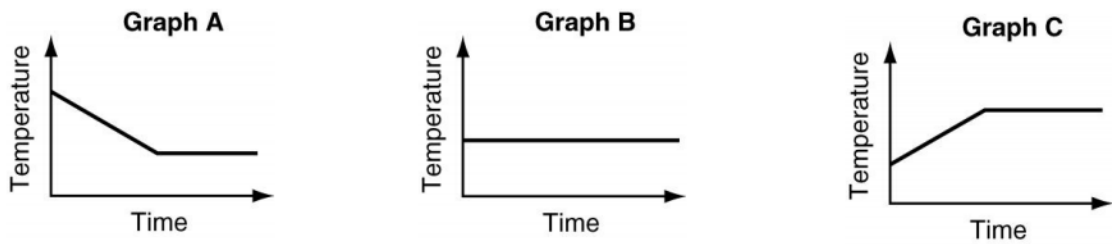
Independent	
Dependent	

7. Examine the following graphs and describe the relationship between the variables.



1
2
3

8. Examine the following graphs and choose the graph that best represents each situation.



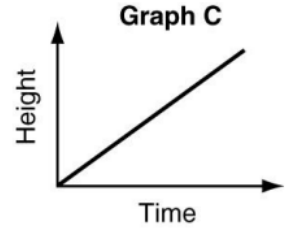
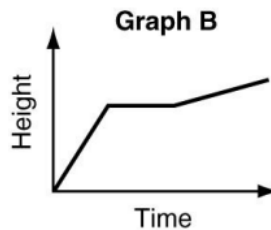
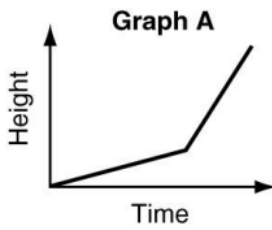
The temperature of the water in a glass remained constant.	
The temperature of the water in a glass rose steadily for several hours until it reached room temperature, then remained constant.	
The temperature of the water in a glass cooled down steadily with the addition of ice, then remained constant when all the ice had melted.	

9. A student carried out an investigation to measure the effect of changing the voltage across a resistor on the current flowing through the resistor and collected the following data.

Describe the relationship between voltage and current observed in the investigation.

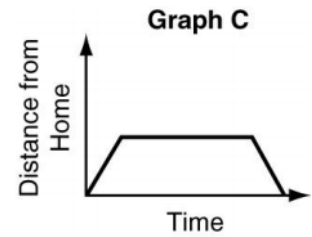
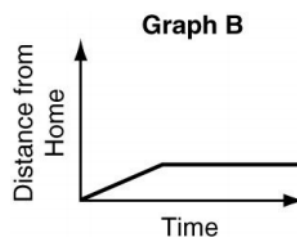
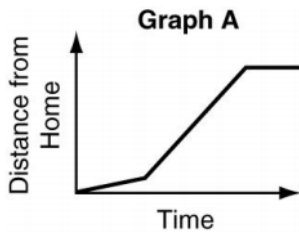
Voltage (V)	Current (A)
2	0.19
4	0.41
6	0.59
8	0.8

10. Examine the following graphs and choose the graph that best represents each situation.



A tomato plant grows taller at a steady pace.	
A tomato plant grows quickly at first, remains a constant height during a dry spell, then grows at a steady pace.	
A tomato plant grows at a slow pace, then grows rapidly with more sun and water.	

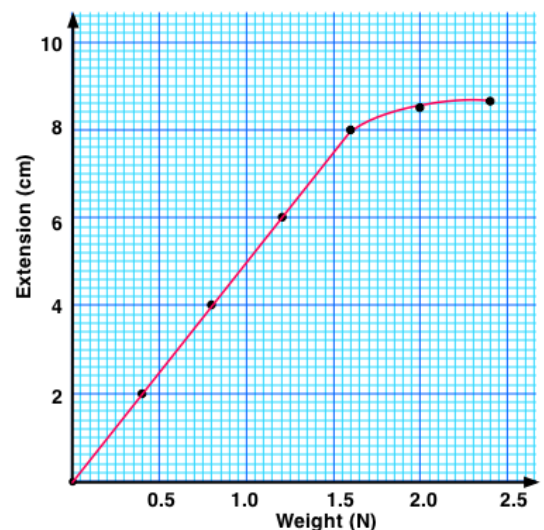
11. Examine the following graphs and choose the graph that best represents each situation.



A person leaves home, drives through town, then on the highway, and finally stops at a rest area.	
A person leaves home, drives to the other end of town and buys groceries, then returns home.	
A person walks to a friend's house where she stays overnight.	

12. A student carried out an investigation to measure the effect of changing the force applied to a spring on its extension and plotted the following graph.

Examine the graph obtained and describe the relationship between weight and the extension of the spring between 0 and 1.7 N



PW4 Applications of Physics

Describe an everyday application or use related to each of the following areas of physics. For each application describe how in your opinion it has either improved or damaged society and describe any effect this application has had on the environment

Mechanics - the study of objects in motion.

Thermodynamics the study of heat

Electricity and Electronics

Magnetism

Optics - the study of light

Sound

Radiation and Nuclear physics

PW5 Electronic Circuits

1. Draw the symbol and describe the function for each of the following components.

Component	Symbol	Function
Battery		
Switch		
Bulb		
Resistor		
Variable resistor		
Light Dependent Resistor LDR		
Thermistor		
Diode		
Light Emitting Diode LED		
Voltmeter		
Ammeter		
Ohmmeter		
Motor		
Buzzer		

<p>2. Draw a circuit diagram to show a 6V battery in series with a switch and 2 bulbs.</p>	<p>3. Draw a circuit diagram to show a 6V battery in series with a switch. The circuit should also include 2 bulbs connected in parallel.</p>
<p>4. Draw a circuit diagram to show a 6V battery in series with a resistor and LED.</p>	<p>5. Draw a circuit diagram to show a 6V battery in series with a switch LDR and a buzzer. Under what conditions will the buzzer make a sound in this circuit?</p>
<p>6. Draw a circuit diagram to show a 6V battery in series with a switch thermistor and a motor. Under what conditions will the buzzer make a sound in this circuit?</p>	<p>7. Design and draw a circuit to allow 2 lamps to be switched on and off independently.</p>

<p>8.Design and draw a simple circuit to switch on a buzzer when it is bright.</p>	<p>9.Design and draw a simple circuit to measure the current in a simple torch.</p>
<p>10.Design and draw a simple circuit to measure the voltage of a battery in a simple torch.</p>	<p>11.Design and draw a simple circuit to switch on a buzzer and a lamp at the same time.</p>
<p>12.Design and draw a simple circuit to switch on a motor and LED.</p>	<p>13.Design and draw a simple circuit to switch on a buzzer when the temperature rises..</p>

PW6 Law of Conservation of Energy

1.What is energy?

2.What are the units for energy?

3.What is work?

4.How is work calculated?

5.How much work is done when a 5N weight is moved 4 m?

6.How much work is done when a 1.5 N force moves an object 4m?

7.Power is the amount of work done divided by the time taken. Calculate the power used when a 6 N force moves an object 5m in 3 seconds. The units are watts.

8.Name 4 forms of energy.

9.Name the form of energy stored in moving objects.

10.Name the form of energy stored in a raised object.

11.Name the form of energy stored in batteries,

12.Name the form of energy stored on hot objects.

13.Name the form of energy stored in an electrically charged object.

14.How is energy from the sun transferred to the earth?

15.What is the law of conservation of energy?

16.Describe the energy dissipation in a light bulb.

17.What happens to energy that is dissipated?

18.Give an example of energy dissipation?

19.Give an example where chemical energy is transformed to heat of thermal energy.

20. Give an example where chemical energy is transformed to kinetic energy.

--

21. Give an example where potential energy is transformed to kinetic energy.

--

22. Give an example where kinetic energy is converted to potential energy.

--

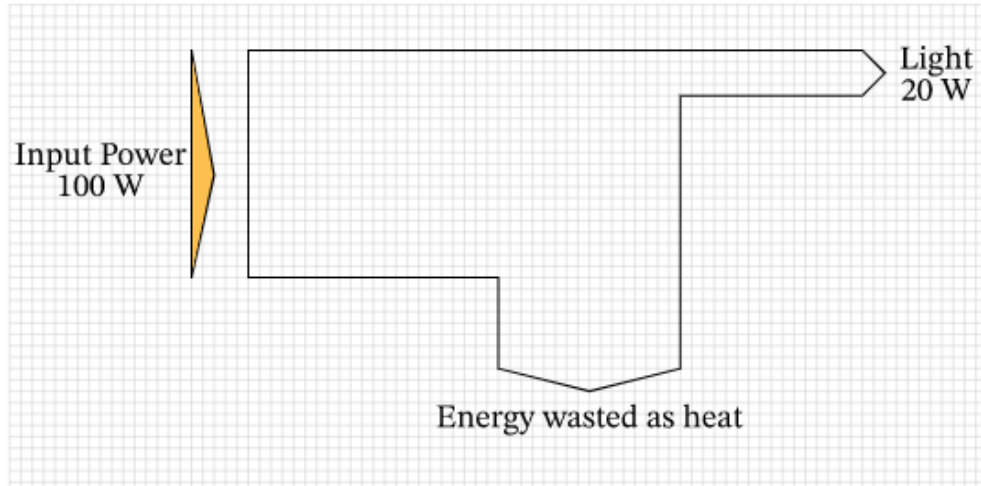
23. Name 2 forms of potential energy.

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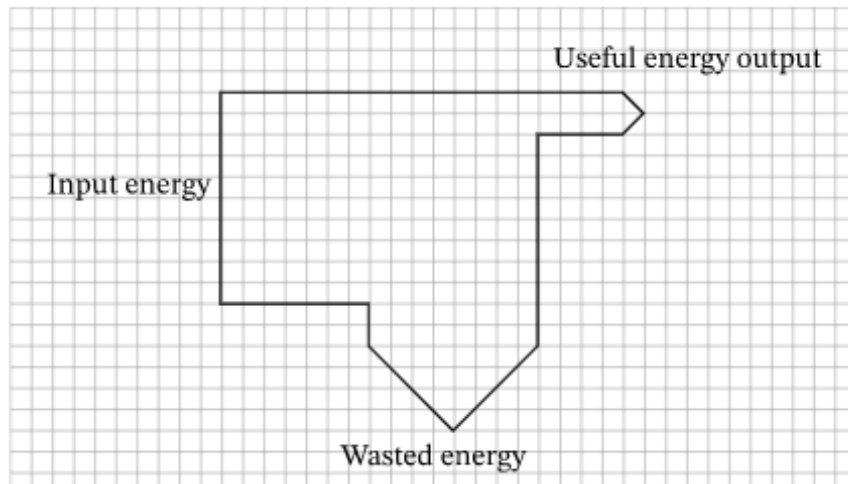
24. Describe an energy transformation that occurs in each of the following examples.

 <p>Hydroelectric Powerstation</p>	
 <p>Hand Warmer</p>	
 <p>Hair Dryer</p>	

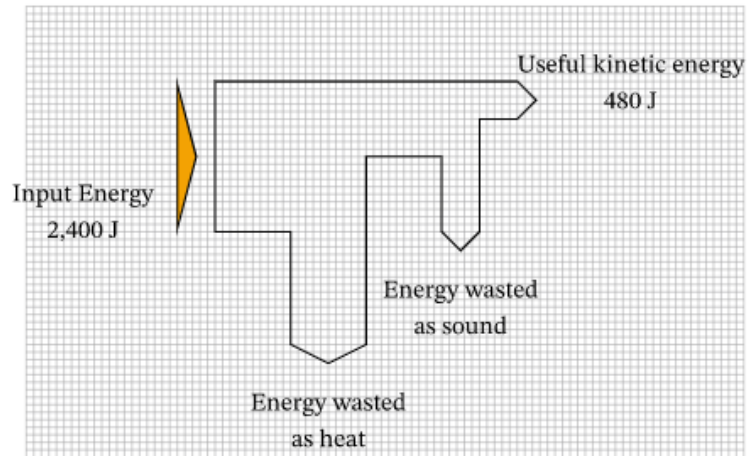
25. This is a Sankey diagram of a 100 W light bulb. How much energy is wasted as heat by the light bulb? What is the efficiency of the light bulb?



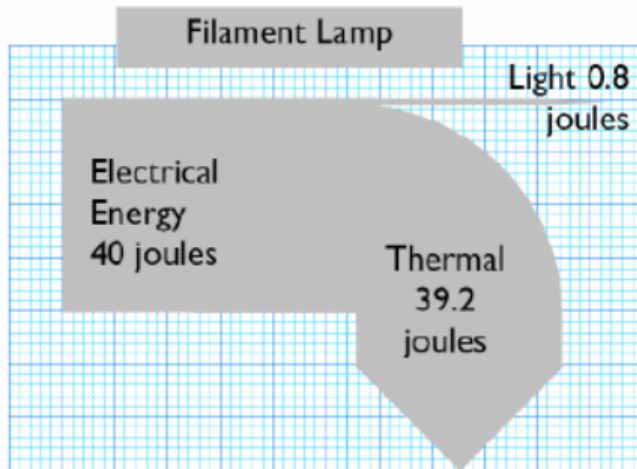
26. Calculate the energy efficiency for the process represented by this diagram by counting the small squares.



27..The image shows a Sankey diagram for a car motor that is supplied with 2,400 J of energy, where 480 J of the energy is converted into useful kinetic energy. How much energy is wasted?



28..Calculate the energy efficiency of the filament lamp represented in the sankey diagram..



29..Draw your own Sankey diagram for a 60W filament bulb given that:

- Total input energy =60W
- Useful (light) energy = 10W
- Waste (heat) energy = 50W

Use the squares below as a guide for drawing your arrows.



30.Calculate the energy efficiency of each of the following devices.

(Hint: what % of the energy output was intended?)

	Energy in	Energy out	Efficiency?
Electric Drill	160W	Kinetic 90W Sound 30W Heat 40W	
Hair drier	180W	Heat 170W Sound 10W	
Mobile phone charger	1W	0.8W Electrical 0.2W Heat	
Electric hob	1500W	Heat 1300W Light 150W Sound 50W	
Kettle	2.5kW	Heat 2.2kW Sound 0.3kW	

PW7 Energy transformation Device

As part of your studies you designed and built a device to transform energy from one form to another.

1. Describe the device you produced. You may use a well labelled diagram.

2. What was the energy input in your device?

3. What was the energy output of your device?

4. What form of energy was dissipated during the energy transformation.

5. Suggest how the amount of dissipated energy could be reduced to increase the efficiency of the device.

PW8 Sustainable Electricity Production

1.What does sustainability mean?

2.What resources do we enjoy that future generations may not have the opportunity to enjoy?

3.Name 3 fossil fuels used to generate electricity.

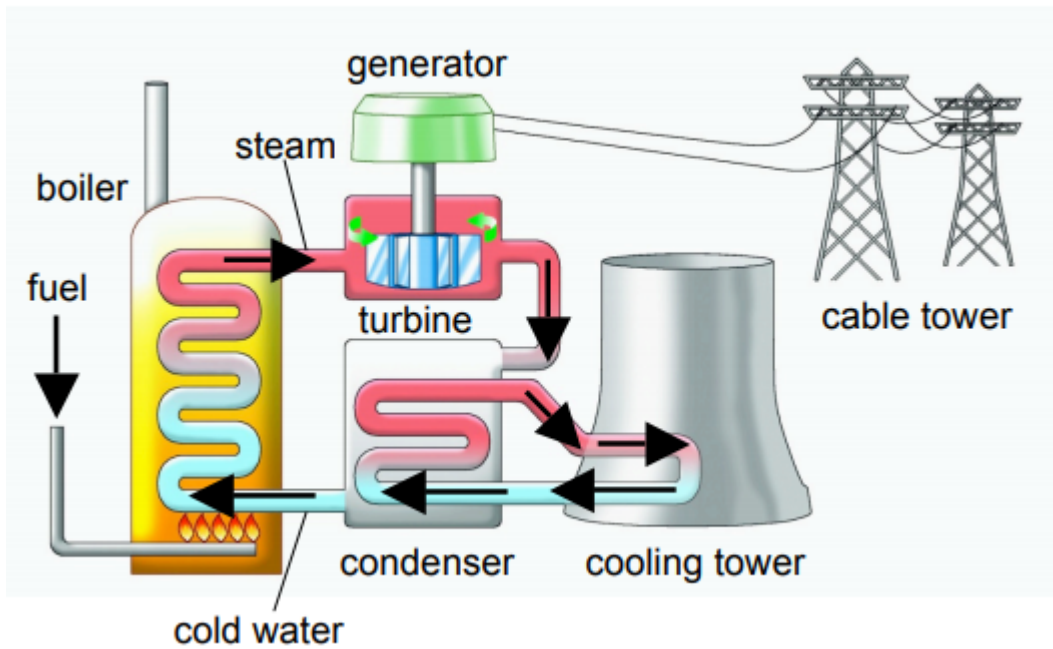
4.Name 3 alternative methods used to generate electricity.

5.Describe one way that current electricity generation can damage the environment?

6.What methods of electricity production are least damaging to the environment.

7.Nuclear power remains a controversial form of power generation. List the arguments for and against its use being increased as a way to reduce reliance on fossil fuels?

The diagram shows a traditional fossil fuel burning power station.



8. Complete the following sentences using labels from the diagram above.

The _____ is burnt to release _____

The _____ released boils the water to _____.

The _____ turns the _____.

The _____ drives the _____

The _____ produces _____.

9. What energy transformations occur during the steps above?

10. What are the negative effects of generating electricity in this way?

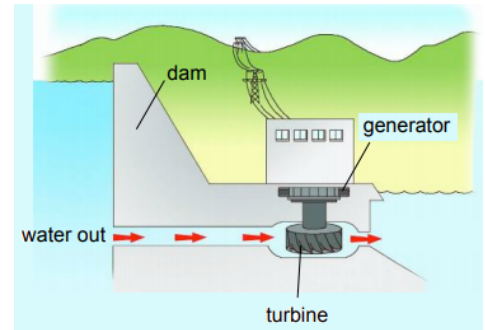
The diagram shows a hydroelectric power station.

11. What does the dam do?

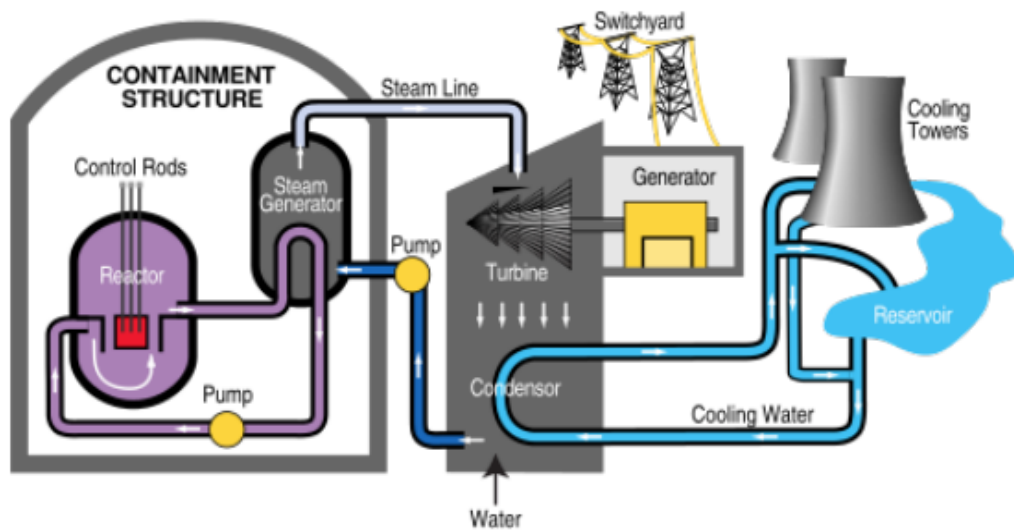
12. What does the turbine do?

13. What does the generator do?

14. What energy transformations occur in a hydroelectric power plant?



The diagram shows a nuclear power station.



15. Explain in general terms how electricity is generated in a nuclear power station.

16 What are the negative effects of generating electricity by nuclear power?

17. What is meant by renewable sources of energy?

18. Give an example of a renewable source of energy.

19. What is meant by non renewable sources of energy?

20. The kinetic energy of fast moving air or wind is often called wind energy. Draw a simplified well labelled diagram to explain how wind energy can be used to generate electricity.

BW1 Cells

1. All living things are composed of one or more _____

2. Give a function for each of the following structures found in cells.

cell membrane,	
cell wall,	
cytoplasm,	
nucleus,	
vacuole,	
chloroplast,	
mitochondria.	

3. Name the part of a cell that contains chromosomes and controls the cell's activity.

4. Name the part of a cell that controls what enters and exits the cell.

5. Name the part of the cell that gives it strength and prevents the cell from over expansion.

6. Name the cell structure responsible for photosynthesis.

7. Name the cell structure responsible for aerobic respiration.

8.Name the semi liquid part of the cell in which chemical reactions occur.

9.Name the membrane enclosed structure that contains mainly water and salts inside cells.

10.What is a tissue?

11.Give an example of an animal tissue.

12.Give an example of a plant tissue.

13.What is an organ?

14.Give an example of an animal organ.

15.Give an example of a plant organ.

16.What is a system?

17. Give an example of a plant system.

--

18. Give an example of an animal system.

--

19. Give one way each of the following cells is adapted to its function.

Muscle cell	
Sperm cell	
Nerve cell	
Root hair cell	
Xylem cell in plant stems	

20. What are the functions of the following parts of a microscope?

Eyepiece lens	
objective lens	
stage	
lamp	
focus wheel	

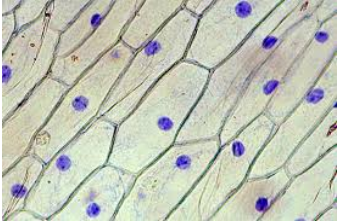
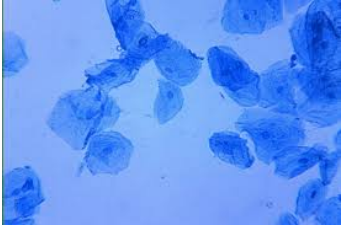
21. What is the function of a stain when examining a plant or animal tissue.

--

22. Name a strain used to examine onion cells.

--

23. Identify the cells shown in the following photographs.

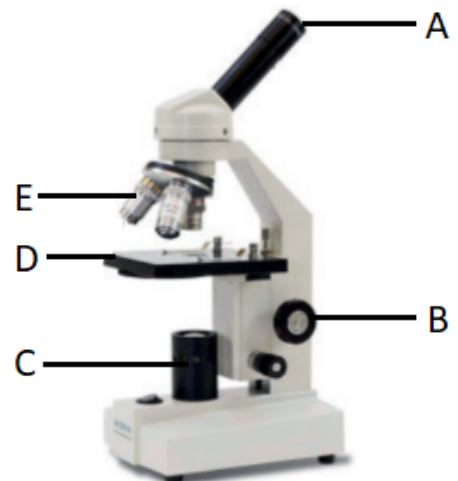
	

24. Describe the procedure used to prepare and examine a specimen using a microscope.

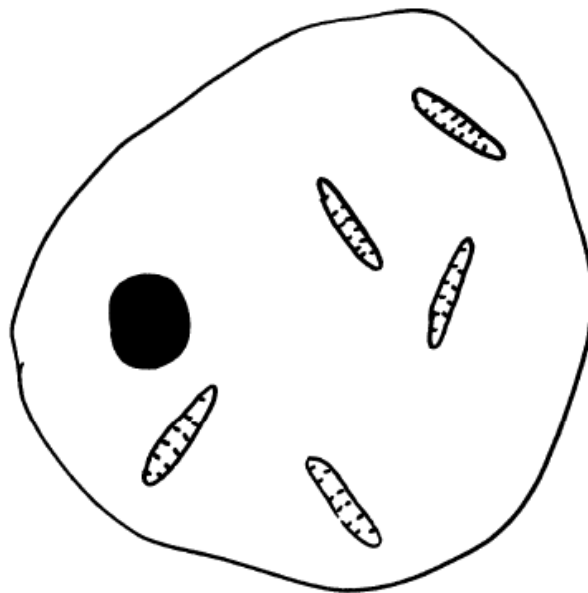
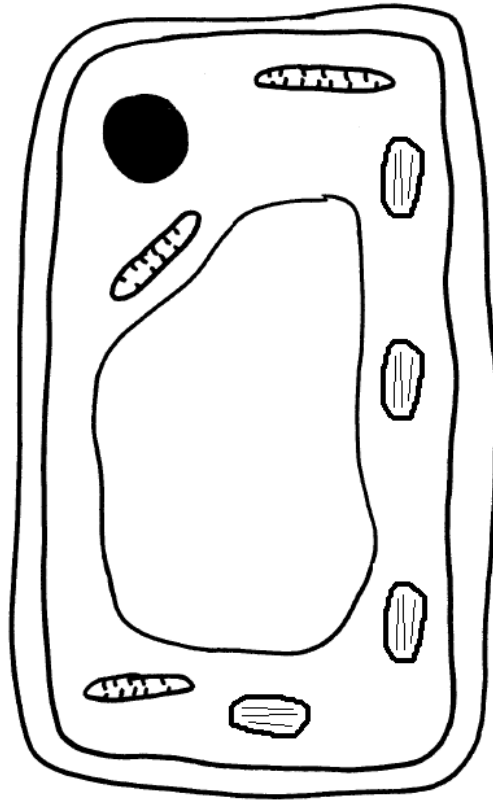
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25. Label the parts of the microscope shown in the diagram

A	
B	
C	
D	
E	



26. Label the following diagrams of a plant and animal cell.



BW2 Sexual and asexual reproduction, Inheritance

1. What is meant by reproduction in biology?

2. What is meant by asexual reproduction?

3. Give an example of how an organism reproduces asexually.

4. What is meant by sexual reproduction?

5. Give an example of how an organism reproduces sexually.

6. Give 2 advantages of asexual reproduction.

7. Give 2 advantages of sexual reproduction.

8. What is meant by the term species:

8. What is meant by variation within a species.

10. Give 2 examples of inherited characteristics

11. Give 2 examples of non inherited characteristics

12. Name the structures in the nucleus that carry instructions for characteristics

13. Name the chemical that carries these instructions.

14. How many chromosomes are found in a human body cell? _____

15. What is a gamete?

16. How many chromosomes are found in a human gamete? _____

17. Explain the term genotype.

18. Explain the term phenotype.

19. Name the unit of DNA that controls a characteristic.

20. What is a dominant gene?

21. What is a recessive gene?

22. How many genes do cells carry for each characteristic? _____

23. How many genes do gametes carry for each characteristic? _____

24. Describe what happens at fertilisation.

25. If the gene for tall plants (T) is dominant to the gene for dwarf plant (t), describe the physical appearance of a plant that has the genes Tt.

26. What would the genetic code for a dwarf plant be?

27. Give the possible genetic codes for a tall plant.

28. The gene for brown eyes is dominant over the gene for blue eyes. Complete the genetic cross between a brown eyed parent with genetic code Bb and a blue eyed parent.

29. In pea plants the gene that causes tall plants (T) is dominant to another gene that results in dwarf plants (t). Complete the following genetic crosses by showing the parents physical characteristics, the gametes produced and the resulting offspring's genetic code and physical characteristics.

Parents TT X tt

Parents TT X Tt

Parents Tt X Tt

BW3 Evolution

1. Give an example of an inheritable variation within a species.

2. What is meant by a mutation?

3. Give an example of a non inheritable variation.

4. Explain the term species.

5. What is evolution?

6. Name a scientist responsible for the theory of evolution.

7. Give an example of variations in a predator and how it would improve its chance of survival.

8. What does it mean when an individual survives?

9. Explain the term "survival of the fittest"

10. Summarise the main events of natural selection.

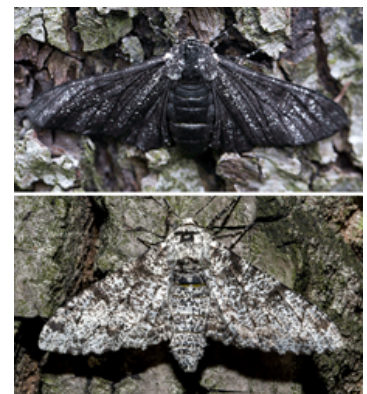
11. What evidence is there that animals such as the modern horse are very different to horses that lived millions of years ago?

12. Using your knowledge of evolution, explain how giraffes developed long necks by selecting the correct word from the list and insert it into the paragraph below.

Genes competition reproduce variations shorter longer extinct.

In every generation of giraffes _____ occur in neck length. _____ exists between giraffes for scarce food. Giraffes with _____ necks are less likely to feed and generally don't survive to _____. The giraffes with the _____ necks are more likely to be able to feed and survive to reproduce and pass on their _____ to the next generation. After many generations long necks will be dominant in the population and giraffes with short necks will become _____

13. Before the industrial revolution, there are more white peppered moths than black peppered moths living on trees. However, during and after the Industrial Revolution period, the number of black peppered moths drastically increased. Explain in detail.



BW4 Digestion, Circulation, Breathing

1.Name the blood components that carry out the following functions.

Carry oxygen	
Fight infection	
Clot the blood	
Liquid part that transports food	

2.What are arteries?

3.What are veins?

4.Name the small blood vessels that allow materials to be exchanged with a body cell.

5.What is the function of the heart?

6.Where in the body is the heart located?

7.Name the upper 2 chambers of the heart.

8.Name the lower 2 chambers of the heart.

9. Name the structures that prevent backflow of blood in the heart.

--

10. What is the average human heart rate in beats per minute (bpm) _____

11. Why does heart rate increase with exercise?

--

12. Name the blood vessel that supplies the heart muscle with its own oxygen supply.

--

13. Describe an activity that can damage the heart's ability to pump blood.

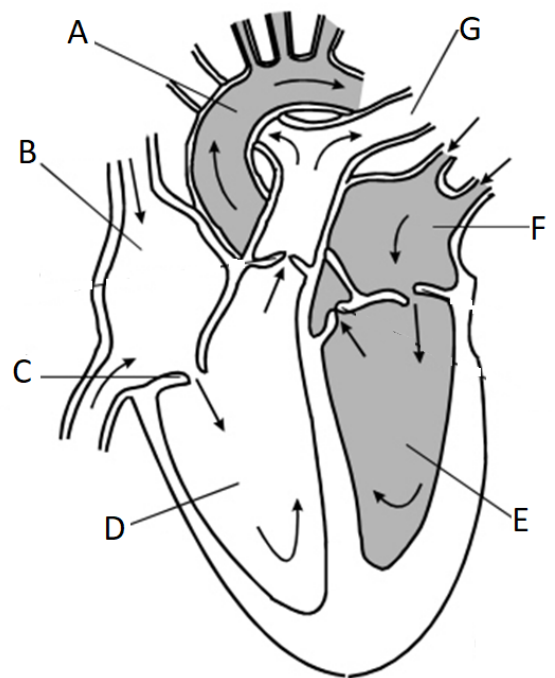
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14. A patient may suffer heart disease when the coronary artery becomes blocked. What procedure could a cardiac surgeon carry out to treat this disorder?

--

15. Label the parts of the heart in the diagram.

A	
B	
C	
D	
E	
F	
G	



16. Where does blood in the right atrium flow to next?

17. Why do arteries not have valves?

18. Why is the wall of the left ventricle thicker than the right ventricle?

19. Name the blood vessel that carries deoxygenated blood back to the heart.

20. Name the blood vessel that carries deoxygenated blood to the lungs.

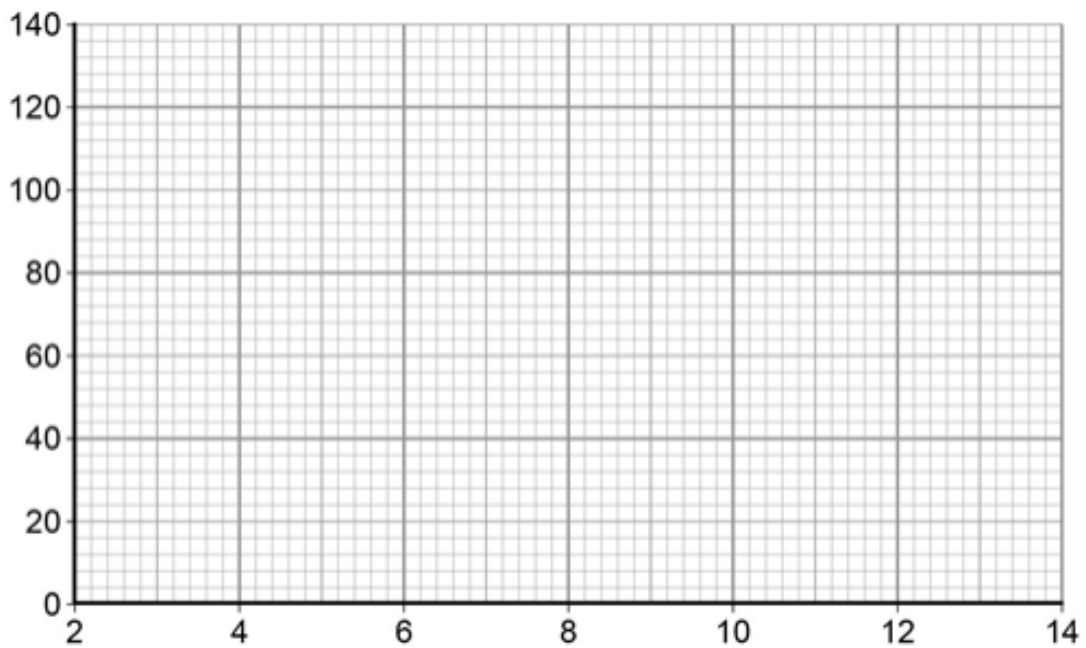
21. Name the small air sacs in the lungs that allows oxygen to enter the blood.

22. Name the molecule inside red blood cells that carries oxygen.

23. Name a mineral essential in the diet for this molecule to carry oxygen in the blood.

24. The following table shows the heart rates recorded by a 20-year-old athlete during exercise. Heart rates, bpm, was recorded every two minutes. Plot the information shown in the table to show how heart rate has changed over time. Label the axes and join up the points.

Time (mins)	2	4	6	8	10	12	14
Heart rate bpm	70	80	100	110	110	110	80

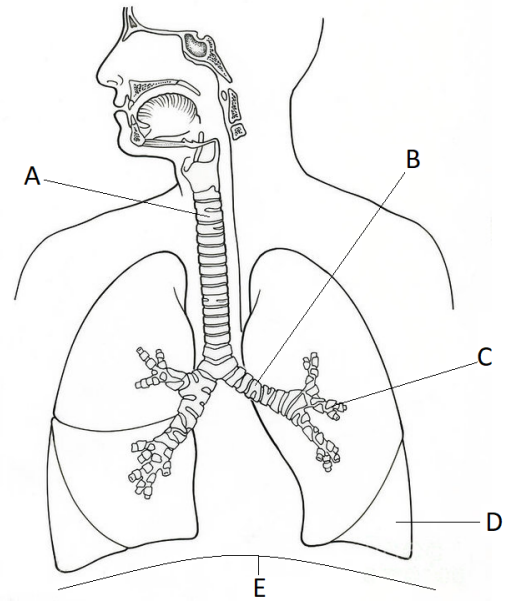


25. Explain the shape of the graph between 2 and 6 minutes

26. Explain the shape of the graph between 12 and 14 minutes.

27. Name the parts of the breathing system labelled in the diagram.

A	
B	
C	
D	
E	



28. What is the function of the rings of cartilage?

29. Name the tubes that carry air into each lung.

30. What can stimulate an asthma attack?

31. Name the small tubes that may become narrow in an asthma attack.

32. How is an asthma attack treated?

33. What structures trap dust that enters the breathing system?

34. Name the muscles responsible for breathing.

35. Inhalation is active and exhalation is passive. Explain the terms active and passive.

36. What change in carbon dioxide concentration in the blood stimulates inhalation?

37. Complete the paragraph below using words from the following list.

Expand deflate enters leaves increases
decreases brain diaphragm intercostals contract

During inhalation the _____ sends a nerve impulse to the
_____ and the _____ causing them to
_____. The volume of the chest _____
and the pressure inside the chest _____. The lungs
_____ and air _____.

During exhalation the _____ and _____ relax.

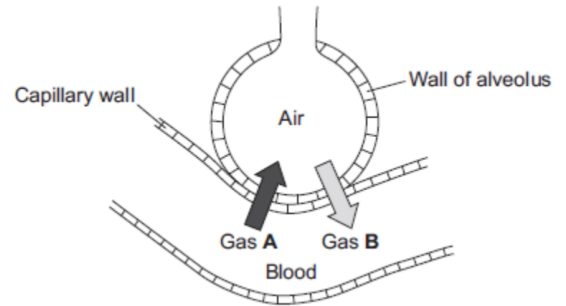
The volume of the chest _____ and the pressure inside
the chest _____. The lungs _____ and air
_____.

38. Explain the term gas exchange.

--

39. Label gas A and Gas B in the diagram of an alveolus in the lung.

A	
B	



40. Name an activity that can damage the lungs ability to transfer oxygen to the blood

--

41. What is the effect of exercise on the breathing rate?

--

42. Name the blood vessel that carries oxygenated blood from the lungs to the heart.

--

43. The heart pumps blood all around the body through arteries. Where in the body does food enter the blood?

--

44. Name the type of food the body requires for each of the following functions.

Energy	
Growth and Repair	
Energy and heat insulation	

45. Before entering the blood, food needs to be digested. Explain the term digestion?

--

46. What is physical digestion?

--

47. Where does physical digestion begin?

--

48. Name the 4 types of teeth and give a function for each type.

49. What is chemical digestion?

--

50. Name the liquid produced in the mouth to help swallowing and digestion.

--

51. What is an enzyme?

--

52. Name the enzyme produced in the mouth that digests food.

--

53. Give another location that this enzyme is produced in the body.

--

54. Why does the body produce the same enzyme amylase in 2 locations?

--

55. Name the substrate and product of the enzyme amylase.

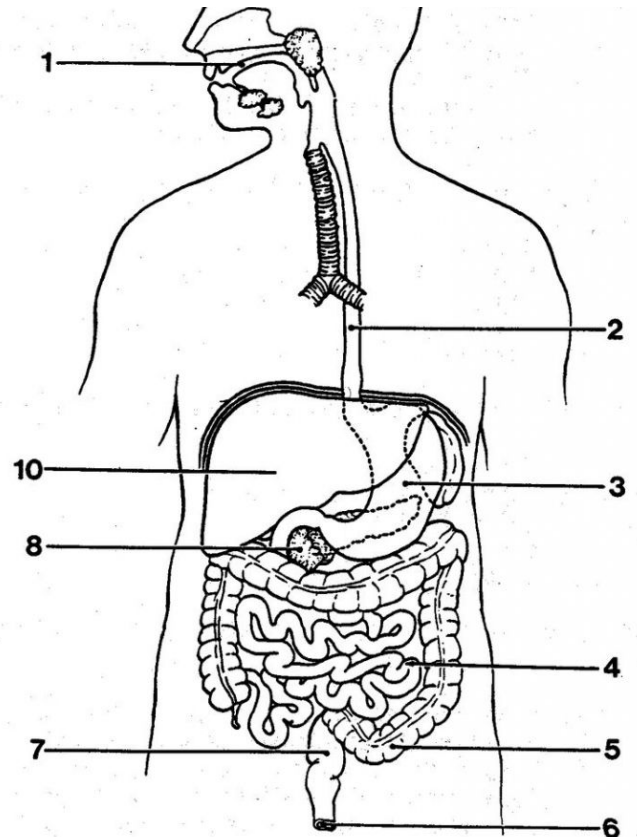
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56. Give 2 reasons why the stomach contains HCl

--

57. Name the parts of the digestive system in the diagram.

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	



58. What is the function of the liver?

--

59. Give 2 functions of the pancreas.

60. Why is the small intestine so long?

61. Where is bile produced?

62. Name the muscular tube that carries food from the mouth to the stomach.

63. What prevents food entering the windpipe?

64. What is peristalsis?

65. Where in the digestive system is water reabsorbed back into the bloodstream?

66. What food type can prevent constipation?

67. Where is solid food waste stored before being removed from the body.

68. What is egestion?

BW5 Habitat study

1.What is an ecosystem?

2.Give 3 examples of ecosystems.

3.What is a habitat?

4.Give 2 examples of habitats.

5.What is the biosphere?

6.What is a community?

7.What is Biodiversity?

8.Name 2 trees found in native Irish woodland.

9.Name 2 animals commonly found in Irish woodlands.

10. What is meant by niche?

11. Give an example of an organism that is in the decomposer niche.

12. What is a biotic factor?

13. Give an example of a biotic factor that influences organisms.

14. What is an abiotic factor?

15. Give an example of an abiotic factor that influences organisms.

16. How is a named abiotic factor measured?

17. Give 2 reasons for carrying out a habitat survey.

18. What is a special area of conservation?

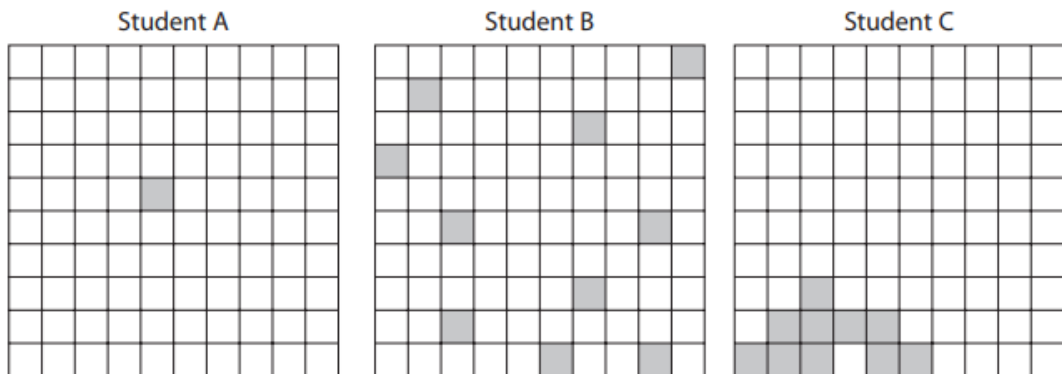
19. What is a biological key?

20. What is a quantitative survey?

21. How can a student select a sample area to study plant frequency?

22. How can a student ensure this area is selected randomly?

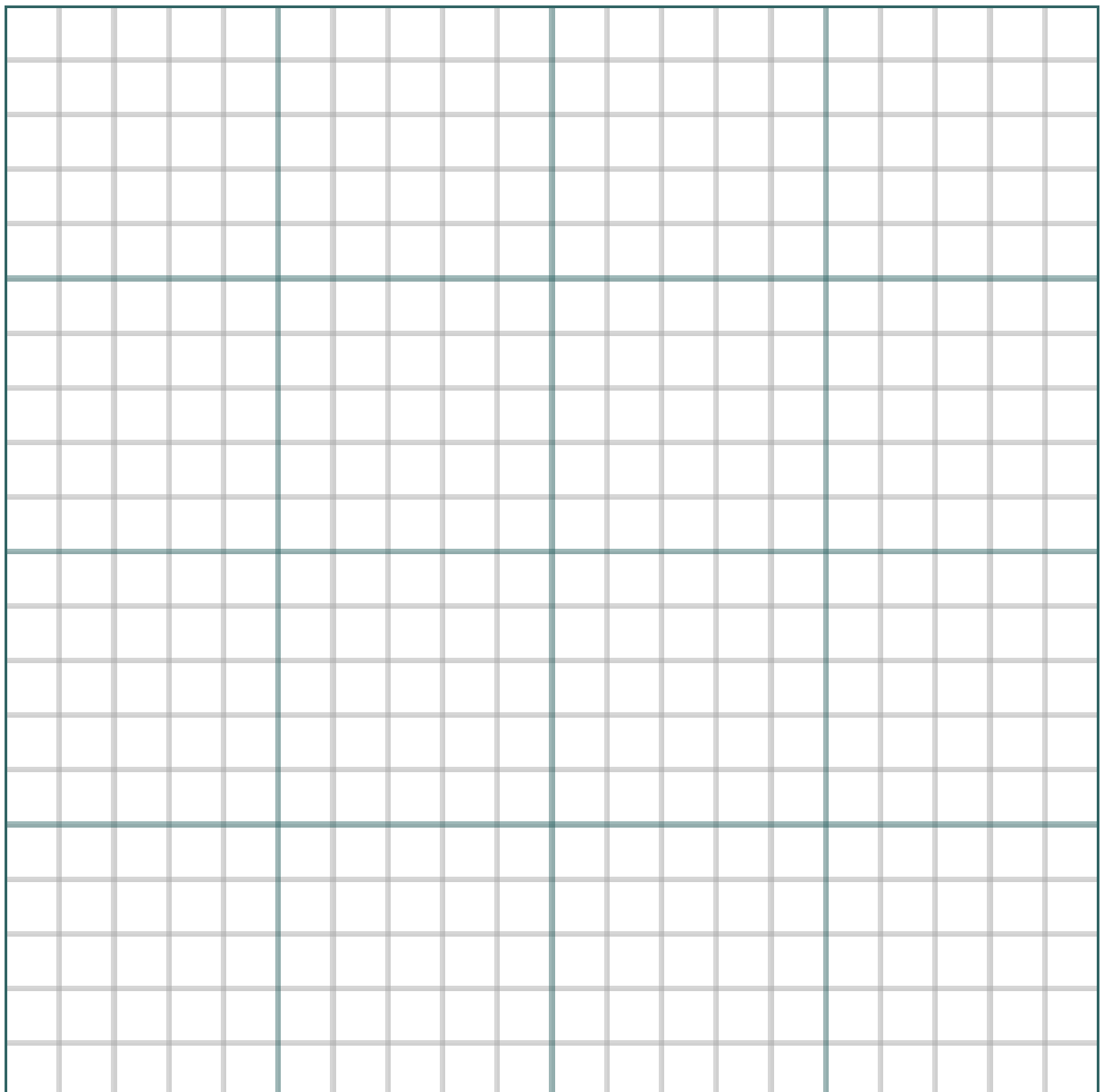
Some students were asked to carry out a % frequency survey of plants in an area. The diagram shows where each student placed a quadrat in the area.



23. Which student would obtain the most reliable result? Explain your answer.

24. A student used a quadrat to survey 10 sample points in an ecosystem and collected the following data. Draw a bar chart to present the % frequency for the plants identified in the survey.

	1	2	3	4	5	6	7	8	9	10
Grass	✓	✓		✓	✓	✓	✓	✓		
Dandelion		✓	✓	✓		✓				✓
Daisy	✓	✓	✓	✓	✓		✓			
Plantain	✓							✓		



25. What is a pitfall trap used for?

26. What is a pooter used for?

27. What is a sweep net used for?

28. What is an adaptation?

29. Describe how a predator such as a fox is adapted for survival.

30. Describe how a named plant is adapted for survival.

31. What is meant by interdependence?

32. Give an example of interdependence in the ecosystem.

33. What is competition?

BW6 Health

1.What is a gene mutation?

2.Name an inherited disorder caused by a gene mutation.

3.Name an inherited disorder caused by a change in chromosome number.

4.What causes cystic fibrosis.

5.Describe the symptoms of cystic fibrosis.

6.What are the treatments available to a person with cystic fibrosis?

7.What causes down syndrome.

8.Describe the physical characteristics of a person with down syndrome.

9.What is meant by genetic screening?

10.Name a condition that may be genetically screened for.

11.What is gene therapy?

12.Describe the components of a balanced diet.

13.What is the function of carbohydrates in the diet?

14.Name 3 types of carbohydrates.

15.Give a good source of starch in the diet.

16.Name the chemical used to detect starch in a laboratory food test.

17.Describe the colour change for a positive test for starch.

18.What is the function of proteins in the diet?

19.Name the building blocks of protein.

20. Give a good source of protein in the diet.

21. Name the chemical used to detect protein in a laboratory food test.

22. Describe the colour change for a positive test for protein.

23. Name the chemical used to detect simple sugars such as glucose in a lab food test.

24. Describe the colour change for a positive test for glucose.

25. What is the function of fats in the diet?

26. Give a good source of fat in the diet.

27. Describe how to detect fat in a laboratory food test.

28. What is obesity?

29. How is a person's BMI calculated?

30. Vitamin C and vitamin D are necessary for a healthy diet.

Give a function for vitamin C.

31. Give a food that is rich in vitamin C

32. Describe the symptoms that result from a deficiency in Vitamin C

33. Give a function for vitamin D.

34. Give a food that is rich in vitamin D

35. Describe the symptoms that result from a deficiency in Vitamin D

36. Calcium and Iron are necessary for a healthy diet. Give a function for Calcium

37. Give a food that is rich in Calcium

38. Describe the symptoms that result from a deficiency in Calcium.

39. Give a function for Iron

40. Give a food that is rich in Iron

41. Describe the symptoms that result from a deficiency in Iron.

42. What is a calorie?

43. Give an example of a food that contains a high amount of calories.

44. What benefit do calories give the body?

45. What harm is caused by eating foods containing excess calories?

46. Radiation is a type of energy released by atoms when they break down.
How can harmful radiation damage the body?

47. Give a source of harmful radiation.

48. Describe a precaution that can be taken to reduce the risk of radiation.

Answer the following questions by reading the Nutrition Facts label for cinnamon graham crackers shown.

49. How large is the serving size listed on the label?

50. How many calories are in one whole graham cracker?

51. If you eat three whole graham crackers, how many calories are you taking in?

52. What is the main ingredient in this cracker?

53. How many whole graham crackers would a person on a 2,000 calorie diet need to eat to obtain 100% of the Daily Value (DV) for fiber? Would this be a healthy way to get 100% of your DV?

54. How many grams of added sugar are in one serving of the graham crackers?

Nutrition Facts	
8 servings per container	
Serving size 2 whole crackers (31g)	
Amount per serving	
Calories 130	
% Daily Value*	
Total Fat 3.5g	5%
Saturated Fat 0.5g	3%
<i>Trans Fat</i> 0g	
Cholesterol 0mg	0%
Sodium 115mg	5%
Total Carbohydrate 24g	8%
Dietary Fiber 1g	4%
Total Sugars 9g	
Includes 8g Added Sugars	16%
Protein 2g	
Vitamin D 0mcg 0%	
Calcium 7mg 1%	
Iron 1mg 6%	
Potassium 55mg 2%	
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	
INGREDIENTS: ENRICHED FLOUR (WHEAT FLOUR, NIACIN, REDUCED IRON, THIAMIN MONONITRATE, RIBOFLAVIN, FOLIC ACID), WHOLE GRAIN WHEAT FLOUR, SUGAR, CANOLA AND/OR SOYBEAN OIL WITH CITRIC ACID AND TBHQ ADDED TO PRESERVE FRESHNESS, CONTAINS 2% OR LESS OF: MOLASSES, HONEY, BAKING SODA AND/OR CALCIUM PHOSPHATE (LEAVENING), SALT, DEXTROSE, CINNAMON, SOY LECITHIN, NATURAL CINNAMON FLAVOR, SODIUM SULFITE.	
CONTAINS: WHEAT, SOY.	

55. Examine the labels shown for pizza brand A and B.

56. Which pizza is the healthy option?

Pizza brand A	
Ingredients:	
Wheat flour, vegetable oil (rapeseed oil) water, mozzarella, tomato, cheddar cheese, parmesan cheese, tomato puree, salt, yeast, thickener E460, salt, sugar, herbs, spices.	
Nutritional Information: Typical values per 100g	
List of Nutrients	
Energy	953kJ/228kcal
Fat	12.0g
Of which saturates	3.0g
Carbohydrate	25g
Of which sugars	7.9g
Protein	9.1g
Salt	1.8g

Pizza brand B	
Ingredients:	
Wheat flour, water, mozzarella, tomato, mushrooms, peppers, onions, tomato puree, vegetable oil (rapeseed oil), yeast, thickener, salt, sugar, garlic, herbs, spices.	
Nutritional Information: Typical values per 100g	
List of Nutrients	
Energy	820kJ/196kcal
Fat	6.5g
Of which saturates	1.5g
Carbohydrate	27g
Of which sugars	6.0g
Protein	6.8g
Salt	0.5g

57. Give 2 reasons for your choice.

Front-of-package (FOP) nutrition labels helps to provide simple nutrition information in a more accessible form by combining color with simple text.

Criteria for 100g of food

Text	LOW	MEDIUM	HIGH
Colour code	Green	Amber	Red
Fat	≤3.0g/100g	>3.0g to ≤17.5g/100g	>17.5g/100g
Saturates	≤1.5g/100g	>1.5g to ≤5.0g/100g	>5.0g/100g
(Total) Sugars	≤5.0g/100g	>5.0g and ≤22.5g/100g	>22.5g/100g
Salt	≤0.3g/100g	>0.3g to ≤1.5g/100g	>1.5g/100g

58. Examine the nutritional information on the four labels shown. Consider whether each product is high, medium or low in fat, saturated fat, sugars and salt. Show your answer in the boxes below by writing or colouring red, amber or green in each of the circles.

Label 1

Fat 1.4g	Saturates 0.4g	Sugars 2.4g	Salt 1.1g
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Fat
Saturates
Sugars
Salt

Label 2

Fat 32g	Saturates 19.9g	Sugars 0.0g	Salt 0.8g
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Fat
Saturates
Sugars
Salt

Label 3

Fat 2.5g	Saturates 1g	Sugars 35g	Salt 0.75g
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Fat
Saturates
Sugars
Salt

Label 4

Fat 8.4g	Saturates 6.4g	Sugars 14.05g	Salt 0.63g
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Fat
Saturates
Sugars
Salt

59. Reference intakes on food labels show the maximum amount of calories and nutrients you should eat on average in a day. Use the RI information and formula provided to calculate the percentage contribution of this bar to the reference intake.

RI values for adults 8400kJ/200kcal

Nutrient	Reference Intake
Energy	2000
Total Fat	70g
Saturates	20g
Sugars	90g
Salt	6g

Formula

$$\frac{\text{Amount of Nutrient per portion}}{\text{Reference intake value}} \times 100$$



One bar contains (58g)				
Energy	Fat	Saturates	Sugars	Salt
1089kJ 260kcal	9.9g	4.8g	34.6g	0.23g

Fat	
Saturates	
Sugars	
Salt	

60. Examine the labels shown below. Compare the products in each category. Tick the product that is the healthier option and explain your choice.

Pizza

Thin & Crisply Cajun Chicken

Half a pizza contains

Energy 1642kJ 391 kcal	Fat 9.1g	Saturates 4.8g	Sugars 4.8g	Salt 1.4g
16%	13%	24%	5%	23%

Of an adult's reference intake

Italian Pepperoni

Half a pizza contains

Energy 2289kJ 545 kcal	Fat 25.2g	Saturates 8.7g	Sugars 4.5g	Salt 3g
27%	35%	44%	5%	50%

Of an adult's reference intake

61.What is the benefit of daily exercise?

62.Describe 2 ways smoking can damage your health.

63.What is asthma?

64.What causes asthma?

65.Describe a treatment for asthma.

66.Name 3 types of microorganisms

67.Name a common disorder caused by bacteria.

68.How does a bacteria differ from other cells?

69.Suggest how a bacteria infection could be avoided.

70.Name a common disorder caused by fungi

71.Name a disorder caused by a virus

72.How does a virus differ from living organisms?

73.Describe how the transmission of a virus such as Covid-19 can be reduced.

74.What is meant by immunity?

75.What is a pathogen?

76.How does the body prevent the entry of pathogens?

77.How does the immune system attack pathogens that enter the body?

78.What is a vaccine?

89.What is an antibody?

80.What is an antibiotic?

BW7 Photosynthesis and Respiration

1.What is an autotroph?

2.What is photosynthesis?

3.Why is photosynthesis important to humans?

4.Where does the energy for photosynthesis come from?

5.What gas do plants need for photosynthesis?

6.Name the organ that plants use for photosynthesis.

7.What gas to plants produce in photosynthesis

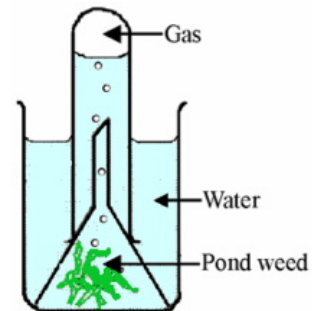
8.Write a word equation for photosynthesis.

9.Write a chemical equation for photosynthesis.

10. Name the structure in plant cells in which photosynthesis occurs.

11. Name the green pigment plants use for photosynthesis.

12. A student placed pondweed in water as shown.
Name the gas collected in the test tube.

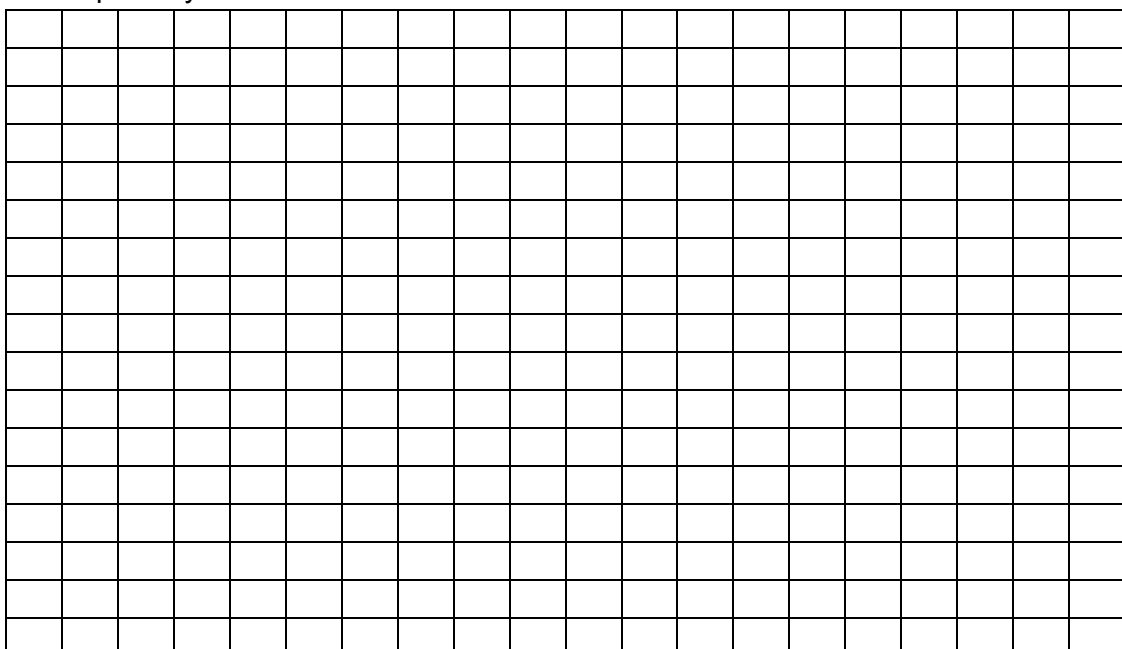


13. What would happen if a lamp was moved closer to the pondweed?

14. A student carried out an investigation by changing the distance between a lamp and the pondweed and counting the number of bubbles of oxygen produced per minute at different light intensities as a measure of the rate of photosynthesis. The following data was collected.

Light Intensity	0	10	20	30	40
Bubbles per minute.	0	20	40	60	80

Plot a graph, using the data above, to show the relationship between light intensity and rate of photosynthesis.



15. Describe the relationship between light intensity and the rate of photosynthesis.

16. Name another environmental condition that can affect the rate of photosynthesis.

17. What is respiration?

18. What is aerobic respiration?

19. What is anaerobic respiration?

20. What is the energy produced in respiration used for?

21. What gas do cells need for aerobic respiration?

22. What gas is produced by cells in aerobic respiration?

23. Write a word equation for respiration.

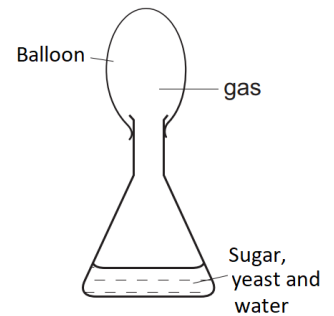
24. Write a chemical equation for aerobic respiration.

25. Name the structure in cells in which aerobic respiration occurs.

Yeast are living cells that respire in the presence of a source of food. A student placed yeast cells in sugar solution as shown.

26. Name the gas released in the investigation.

27. How would the results of this investigation change if warm water was used in the flask?

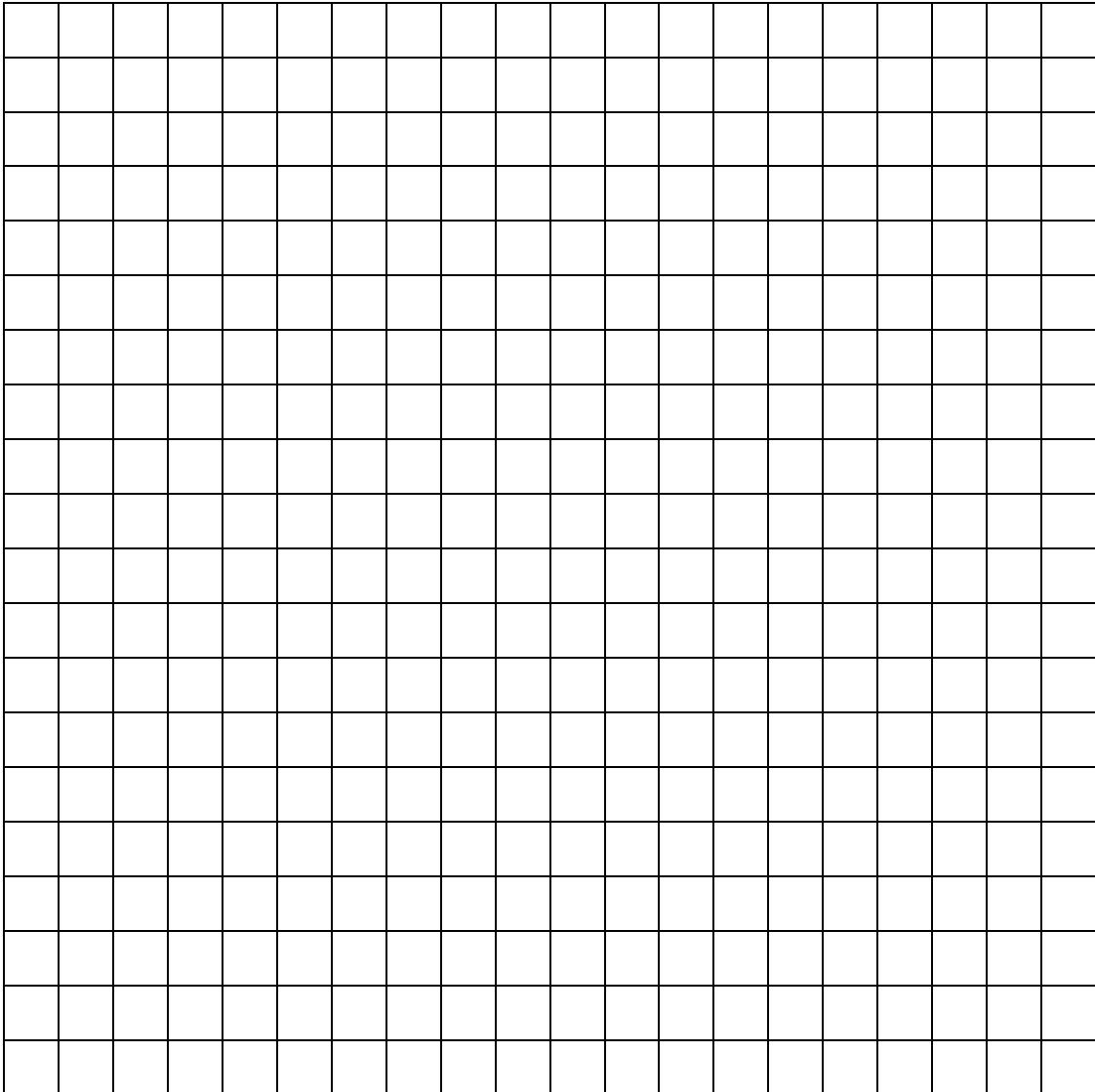


28. A student carried out an investigation by changing the temperature of a yeast and sugar solution and recording the number of bubbles produced per minute at different temperatures. Draw a diagram of an apparatus suitable for this investigation.

29. The following data was collected.

Temperature °C	10	15	20	25	30
Bubbles per minute.	0	5	10	20	25

Plot a graph, using the data above, to show the relationship between light intensity and rate of photosynthesis.



30. Describe the relationship between temperature and the rate of respiration.

BW8 Matter and energy flow in ecosystems

1.Explain the term matter.

2.Where is matter located in ecosystems.

3.What is energy?

4.Where is energy located in ecosystems?

5.What is an ecosystem?

6.How is matter transferred in photosynthesis?

7.How is energy transferred in photosynthesis?

8.How is matter transferred in respiration?

9.How is energy transferred in respiration?

10.What is a decomposer?

11. Give an example of a decomposer.

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12. Explain the role of decomposers in the ecosystem.

--

13. Explain the following terms:

Producer	
Consumer	
Herbivore	
Carnivore	
Omnivore	

14. What is a food chain?

--

15. Give an example of a food chain.

--

16. Explain the term trophic level.

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17. What is the source of energy in a food chain?

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18. Name the type of organism at the start of a food chain.

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19. Why are food chains limited to 4 or 5 organisms in length?

20. What % energy is passed from one organism to another in a food chain?

21. What happens to the energy that is not passed to the next organism in a food chain.

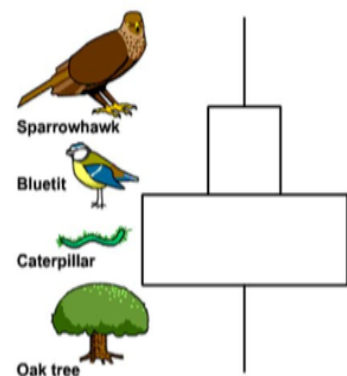
22. Draw a pyramid of numbers to represent a simple food chain with 3 organisms.

Examine the pyramid of numbers shown and answer the questions that follow.

23. Which organism is the producer?

24. Which organism is the herbivore?

25. Which organism is the carnivore?



26. Which organism is found in the greatest numbers?

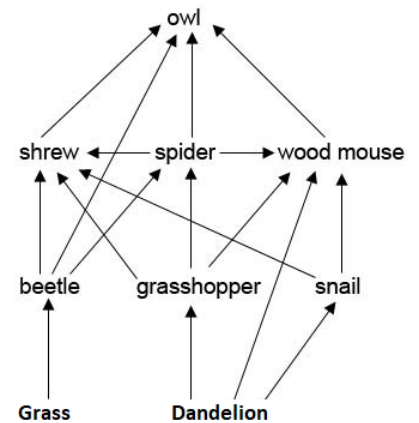
27. Draw a food chain using the following organisms:

grasshopper, hawk, rat, grass, snake.

Label the food chain e.g. producer, consumer, herbivore, carnivore.

28. Examine the food web shown and identify an organism that matches the following description.

Producer	
Consumer	
Herbivore	
Carnivore	



29. Describe 2 effects on other organisms in this food web if all the beetles died.

30. What happens to the biological matter and chemical energy in the owl when it dies?

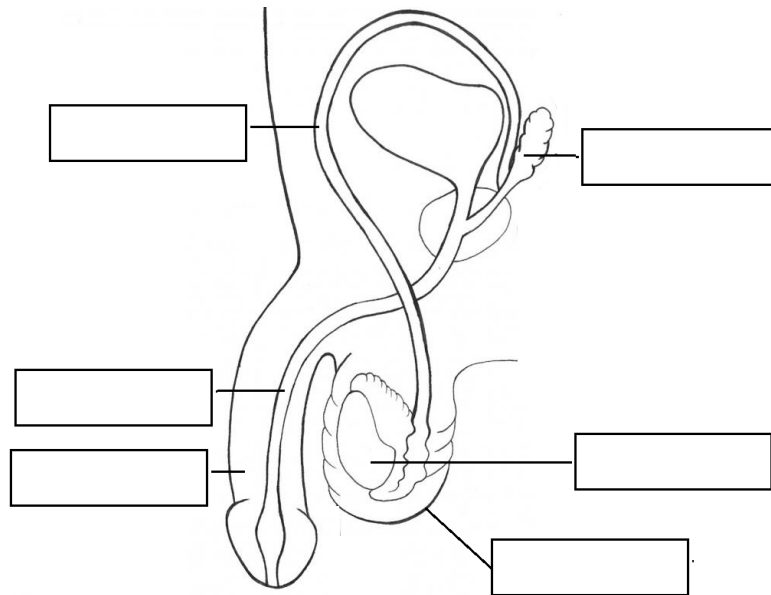
BW9 Human Reproduction

1. Sexual reproduction occurs in 5 stages. Place the stages in the correct order.

Pregnancy, Intercourse, Implantation, Birth, Fertilisation

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2. Label the following diagrams of the male reproductive system.



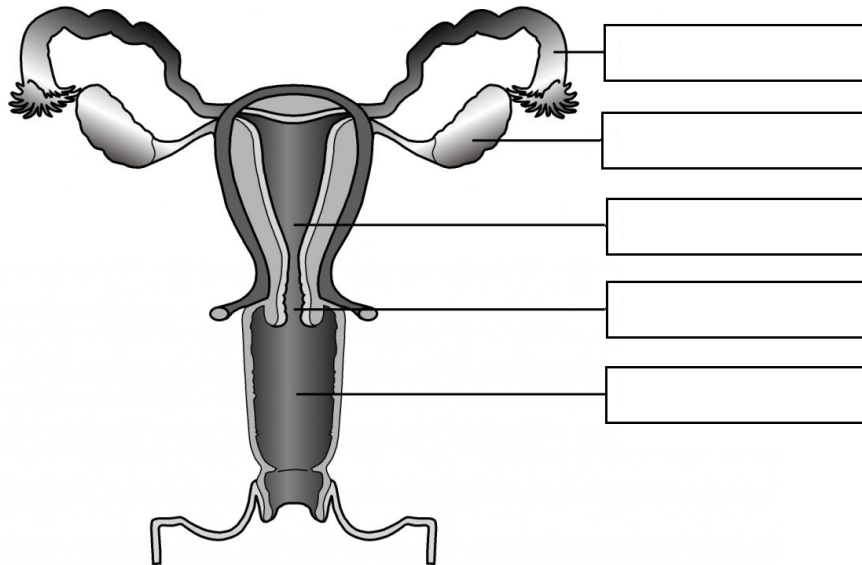
3. Give the function for the following structures in the male reproductive system.

Scrotum	
Testes	
Sperm duct	
Gland	
Urethra	
Penis	

4. What is meant by puberty?

--

5. Label the following diagrams of the male and female reproductive system.



6. Give the function for the following structures in the male reproductive system.

Ovary	
Fallopian tube	
Womb	
Cervix	
Vagina	

7. Describe the changes that occur in boys and girls during puberty.

Boys	
Girls	

8.Explain the following words

Gamete	
Fertilisation	
Zygote	
Menstruation	
Ovulation	
Implantation	

9.How many days on average are in the menstrual cycle _____

10.On what days is fertilisation most likely to occur? _____

11. Place the following stages of the menstrual cycle in the correct order

Egg is released, Womb lining repaired, Womb lining breaks down, Womb lining is maintained.

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12.What is the function of the following structures that form during pregnancy?

Placenta	
Umbilical Cord	
Amniotic Fluid	

13.Where in a woman's body does fertilisation occur? _____

14.Where in a woman's body is sperm released during intercourse. _____

15. In what way is the sperm cell adapted to its function?

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16. Name a male and female sex hormones and describe their function

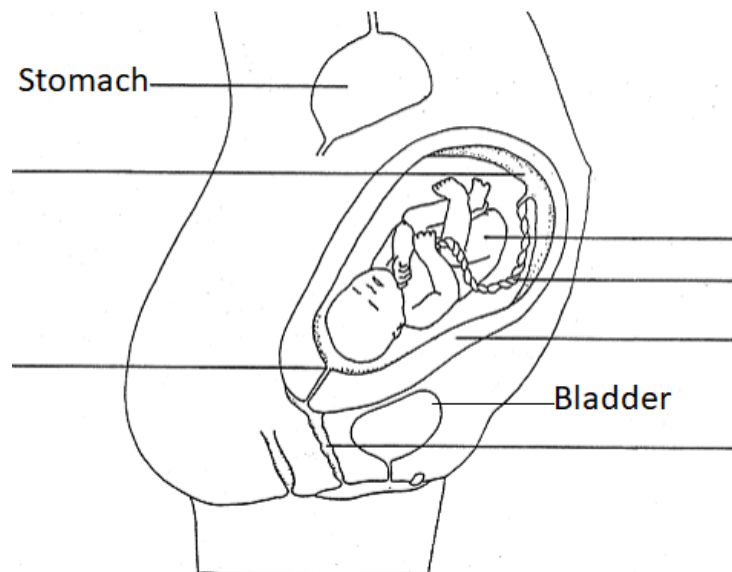
17. Infertility is the inability to become pregnant. Give two reasons that may cause infertility in a couple.

18. Describe a treatment to help couples experiencing infertility problems to have children.

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19. Label the diagram below using the following words.

Cervix, Foetus, Placenta, Umbilical Cord, Womb/Uterus, Vagina



20. What is contraception?

--

21. Describe two methods of contraception.

22. Outline the main events of childbirth

--

23. Give an advantage to the baby of breastmilk.

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BW10 Biodiversity and conservation, food production

1. What is meant by biodiversity?

2. Give 2 reasons for maintaining biodiversity.

3. What are the dangers of invasive species?

4. What evidence is there that biodiversity is declining in Ireland?

5. What makes a species disappear?

6. Explain the term conservation.

7. Give an example of a conservation practice.

8. What is meant by the term extinction?

9. How has agriculture changed over the last 30 years?

10. What types of farming is most common in Ireland?

11. What is monoculture?

12. What role does Ireland play in global food production?

13. Describe how modern agriculture can negatively affect biodiversity.

14. Describe one way farming practices can be changed to maintain biodiversity.

15. What are the negative effects of replacing bogland with grassland for grazing?

16. Give an advantage of industrial farming over traditional methods of farming.

17. Describe any 3 "Sustainable Development Goals" outlined by the UN