Cambridge NATIONALS

Accredited

SCIENCE
LEVEL 1/2

UNIT R071 - HOW SCIENTIFIC IDEAS HAVE AN IMPACT ON OUR LIVES

LEARNER STYLE WORK

LEVEL 1 PASS

VERSION 1 JUNE 2013

OCR

CONTENTS

INTRODUCTION

This work has been developed to provide examples of the content and standard of work required to evidence the identified assessment criteria (Level 1, R071 Model Assignment). This is one approach that could be used but it must not be directly replicated or any part plagiarised by learners.

Teachers may choose to identify their own approach for learners to follow but evidence submitted must clearly meet the assessment criteria.

This is not real learner work; its purpose is to provide ideas and approaches.

The text in the blue boxes are examples of annotations teachers may add to work. The annotations are examples of good practice and are not a compulsory element of teacher marking.

All centres should complete a unit record sheet for each candidate. The unit record sheet should include comments related to the marking of candidates work. The unit record sheet should not be returned to candidates once work has been marked.

LEVEL 1 PASS

TASK 1 - ANALYTICAL TASK: CHOOSING AN ENERGY SUPPLY

Demand for electricity is increasing. Planners are considering possible ways of supplying energy to a new community on the west coast of England.

You are the representative of the local home owners group.

As the representative of the local home owners group,
I will make leaflets:
1. What energy sources available
2. How good each energy source is

I will make a handout
3. Local Geography

I will chair a discussion
4. What the local home owners worry about

LO1 - MB1 Lists

1. Leaflet - Energy sources available

Renewable	Non-renewable
Hydroelectric energy, Solar energy, Wind energy, Biomass, Tidal energy, Geothermal/ Ground source, Wave energy	Coal, Oil, Nuclear, Gas

This resource...	Coal	Oil	Gas	Uranium	Hydrooelectirc energy	Wind energy	Solar energy	Biomass	Geothermal/ Ground Source	Wave energy	Tidal energy
...will never run out					✓	✓	✓	✓	✓	✓	✓
...is a fossil fuel	✓	✓	✓								
...is available 24 hours a day	✓	✓	✓	✓	✓			✓	✓		
...generates waste that must be dealt with	✓	✓	✓	✓				✓			
...was formed millions of years ago	✓	✓	✓	✓					✓		
...produces CO_2, which causes global warming	✓	✓	✓					✓			
Energy source	X	X	X	X	?	✓	✓	X	X	✓	✓

The best energy sources are: Wind, Solar, Wave, Tidal

LO1 - MB1 Energy choice

2. Leaflet - How good is each energy source

Wind Energy

Energy	free, renewable, no fumes, lots to power a town.
Energy lost	a little from friction and noise.
Cost	small only £1 million a big turbine
Transport	none
Problems	need wind, too much can break turbine, tall, noise, kill birds

Solar Energy

Energy	free, renewable, no fumes, little power can run a home or office
Energy lost	a little from light and heat
Cost	a lot to make, needs lots of them
Transport	none
Problems	need sunlight do not work on dark days or nights, can get dirty, needs to be on roofs, take up a lot of space, easily broken

Wave Energy

Energy	free, renewable, no fumes, little power
Energy lost	a little from sound and heat
Cost	a lot to make, needs lots of them
Transport	none
Problems	Need waves, but in big waves can break, getting electricity to land. Can kill fish

Tidal Energy
Tide comes in and out and turns turbines.

Energy	free, renewable, no fumes, lots of power can power a town
Energy lost	a little from sound and heat
Cost	a lot to build
Transport	none
Problems	Need tides only twice a day, big, can kill fish, need to get electricity to land.

3. Handout - local geography

Physical description

- Consistent, temperature climate
- Cool and wet
- Hills and some mountains
- Average annual rainfall
- Windy near coast and on hills
- Few full days of sunshine when not summer

Human description

- A community of 8,000 households
- Light industry
- Farming and tourism

It is recommended that a wind farm of 20 turbines is used
As there is no waves or tide; little sunshine.
A wind farm of 20 turbines is recommended.

A wind turbine can produce 3.5 megawatts, can support 560 households
So a wind farms of: 15 turbines can generate support 8,000 households.(52.5 megawatts)
5 turbines can generate support for services and light industry (17.5 megawatts)

Discussion on choice

LO1 - MB1 Analysis

Home owners worries
against
View – on hills easily seen
Noisy – can make a hum
Environment - birds
Traffic – when built
House prices – view will put prices down

for
Employment – produced by company
Reduce global warming
Reduce price of electricity
Wind energy 98% efficient

From national public surveys up to 90% are for 10% against

After discussion summary
Everyone has got use to Pylons; makes view more interesting.
People have double glazing; more noise from normal traffic
Recorded bird deaths in a similar size farm only 2 birds in 3 years.
Traffic no more than normal farm traffic.
No measured effect on house prices

Gives jobs
Reduces global warming so saves land from flooding
Reduces electricity bills
Sustainable so Russians cannot turn off the tap

Wind Farm of 20 turbines voted in 23 to 1

TASK 2 - RESEARCH REPORT: NUCLEAR RADIATION - THE BENEFITS, DRAWBACKS AND RISKS

Stories in the media about nuclear radiation are often misleading and alarmist.

Produce briefing notes to explain why nuclear ionising radiation is used despite the risks.

Should this be allowed to happen again?

The six-reactor Fukushima Daiichi nuclear plant was badly damaged after the 11 March 2011 earthquake and tsunami knocked out cooling systems to reactors, leading to meltdowns and the release of radioactivity into the air and contaminated waste-water leaking out.
Although no deaths or cases of radiation sickness from the nuclear accident, over 100,000 people had to be evacuated from their homes to ensure this.

Why is nuclear radiation dangerous
Radiation from uranium can pass through paper, aluminium and lead.
It can damage organs, bones and can kill.
The half life – how long they are radioactive can be 1000s of years.

But we do not just use nuclear power in bombs and for producing electricity we use it every day.

We use radiation in health care in X-rays and treatments

LO2 - MB1/positive uses, risks and benefits, no comparison

An X-ray image shows a broken leg. Gives a diagnosis without hurting and a better chance of recovery.
But X-rays can kill you so dosage and number per year have to be restricted .

Irrelevant information

Radioactive tracers can see how a disease is acting on a leg or organ when X-rayed.
They can also kill disease such as cancer

Also radiation is used to sterilise equipment to stop disease spreading.

We use radiation in industry

Check pipes underground without having to dig them up.
But If not controlled can spill out and kill tissue in people

Automatically check material thickness like paper.
If not controlled can spill out and kill tissue in people

Nuclear radiation is still used for electricity

No fumes are made when the station is working so no greenhouse gases no global warming.
There is a lot of power output for a small amount of fuel , not like with coal or gas.

Hazardous radioactive waste is produced and hard to store.
If a disaster can spill out and kill people.

It is not just in power stations nuclear power is used but because you use small amounts of uranium you can power submarines and warships and they do not have to be refuelled for months. Submarines can even go under the North pole as they can be submerged for days and keep every one safe.

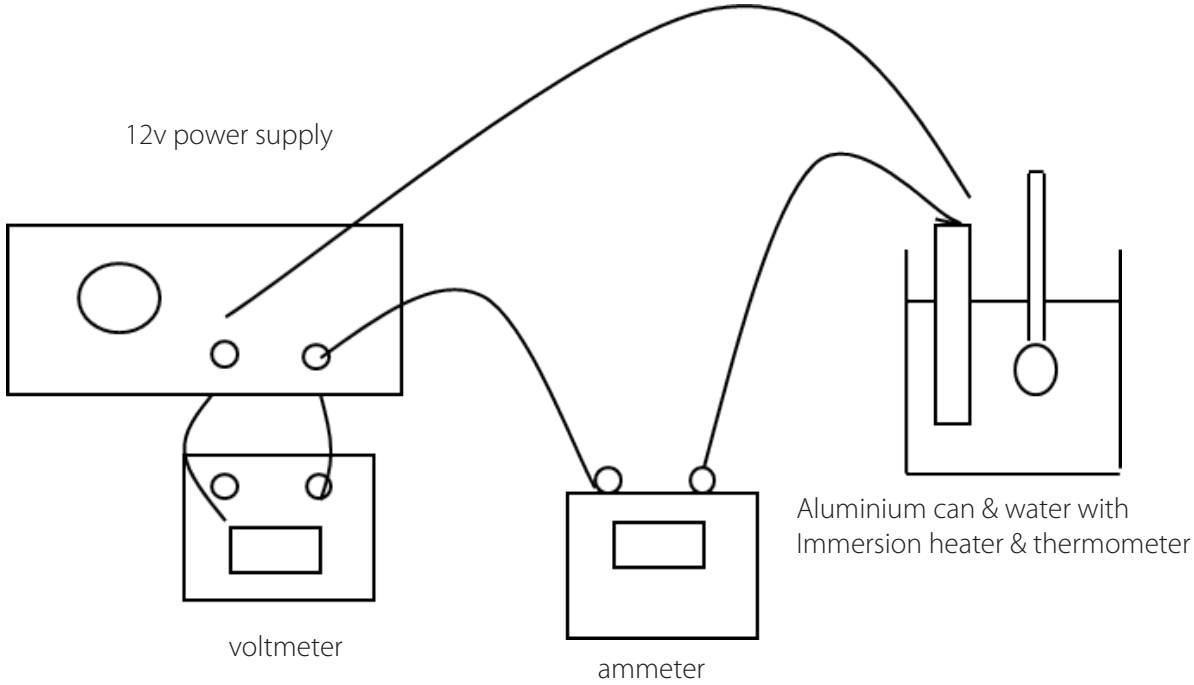
TASK 3 - BE ABLE TO MEASURE ENERGY TRANSFERS AND CALCULATE EFFICIENCIES: EFFICIENCY OF AN IMMERSION HEATER

Your task is to measure the efficiency of an electric immersion heater by measuring the temperature rise of a known volume of water over a 300s period.

Apparatus:
12V power supply; ammeter; voltmeter; 5 x connecting wires; immersion heater; thermometer; aluminium can; stop-clock; 100 cm^3 measuring cylinder.

Method:
1. Pour 100cm^3 water into the aluminium can.
2. Set up the apparatus as shown in the diagram.
3. Measure temperature of water
4. Switch on set current and voltage switch off after 300s
5. Measure final temperature of water

LO3 - MB1 Method provided by teacher. Support given to set up.



Results

Water (cm^3)	Time (s)	Voltage (V)	Current (A)	Initial temp. (°C)	Final temp. (°C)	Temp. Rise (°C)
100	300	12	2	21	31	10

Heat energy absorbed by the water over 5 minutes

4.2 x 100 x 10 = 4200

LO3 - MB1 Results

Heat energy supplied by the immersion heater over 300s.

300 x 2 x x12 = 7200J

LO3 - MB1 Teacher support needed to complete calculations

$$\frac{\text{Heat energy absorbed by the water}}{\text{Heat energy supplied by the immersion heater}} \times 100 = \frac{4200 \times 100}{7200}$$

Efficiency of the heater = 58.3%

Large amount of help needed to complete final part of calculation

Witness Statement

Competency	MB1	MB2	MB3
Taking measurements Some support needed to choose correct equipment Choose correct equipment Zero or calibrate apparatus Some data recorded Record result Recorded data to correct significant figures Correctly position eye when taking measurement	✓ ✓		
Maintaining a safe and uncluttered working environment Most of the time All of the time Rigorously and with prior thought and planning With support carries out risk assessment Carries out risk assessment	✓ ✓		
Following standard procedures With support follows basic standard procedures correctly Follows basic standard procedure correctly Follows complex procedure correctly Makes own adaptations to standard procedure to improve reliability	✓		
Assessors signature: XXXXXXXXX Assessors name: XXXXXXXXXX Date:XXXXXXXX			

TASK 4 - CASE STUDY: DESIGNING A HEALTH EDUCATION PROGRAMME

To reduce time off due to sickness design a health education programme for a group of office workers for Kinnear Moodie's tunnelling division.

I will produce:
1. Health warning posters
2 . Healthy eating leaflets
3 . Healthy exercise leaflets

This will keep the office works healthy so they will not go off sick.

1 .Health warning posters

LO4 - MB1 Factors that affect health

The most important thing is your health.
Are you healthy?

Do you smoke?	100,000 people in the UK die each year due to smoking. A long-term smoker, will die 10 years before a non-smoker. The younger you are the more likely you are to smoke for longer and to die early from smoking.
Do you drink?	Each year 5,000 to 10,000 people die before they should. It can increase blood pressure, destroy your liver lead to memory loss. Excessive drinking can lead to unconsciousness being sick and choking on your own vomit.
Do you take drugs?	In 2011 there were 2,652 drug-related deaths in England and Wales. Stimulants can stress the body and make a you feel anxious. Depressants can affect the mind and lead to suicide. Hallucinogens can lead to you do not know what you are doing and so can damage yourself like thinking you can fly and jumping out of a window
Do you eat unhealthily?	A lot of body fat is bad for blood pressure, your heart and your organs Fat blocks arteries and you have strokes. The extra weight is bad for your joints. Lack of vitamins can lead to disease and a lack of fibre can lead to bowel cancer. More than 41,000 people were diagnosed with bowel cancer in 2009.
Do you think of others?	Noise can be irritating and cause stress. People may not be able to hear what's going on and miss messages. Your mess can lead to disease. If your ill do not spread your llness So think of others around you.

LO4 - MB1 Student work (qualitative)

Eat a balanced diet

Eat the right number of calories.
The average man needs around 2,500 calories a day.
The average woman needs 2,000 calories.

5 A DAY Tips Leaflet

Eat 5 portions of fruit or veg a day
At breakfast, add fruit to cereal.
Choose fruit canned in juice rather than sugary syrup.
Swap biscuits, for a piece of fruit.
Drink a glass of fruit juice rather than a coffee.
Make a quick smoothie using your favourite fresh or frozen fruits.

Add veg from the freezer to a meal,
Put kidney beans, peas or sweetcorn into soup
Add some crunch to your sandwiches with lettuce, tomatoes, cucumber or grated carrots.
Sticks of cucumber, peppers and carrot, and are delicious with dips
Have a salad or vegetable side dish with your main meal.

3. Healthy exercise leaflet

For general health you should do at least 30 minutes a day of moderate physical activity on 5 or more days of the week.

Tips for being active

- Pick activities you like and that fit easily into your daily routine.
- Work out what time is best for you to exercise and stick to it.
- Be active with friends and family to keep you motivated.
- Reduce the amount of time you sit or lie down during the day

LO4 - MB1 Health programme and briefing material

LO4 - MB1 Health programme

At least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity such as cycling or fast walking every week, **and**

muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

OR

75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic activity such as running or a game of singles tennis every week, **and**

muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms).

OR

An equivalent mix of moderate- and vigorous-intensity aerobic activity every week (for example 2 30-minute runs plus 30 minutes of fast walking), **and**

muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms

TASK 5 - CASE STUDY: THE BENEFITS AND RISKS OF MEDICAL TREATMENT

New developments in healthcare include new drugs and instruments for diagnosis and treatment, including gene therapies and stem cell technologies. For patients in hospital, these new developments can be worrying.

You should produce leaflets to reassure worried patients.

LO5 - MB1 Risks and benefits materials produced

Patient leaflets

Blood Transfusions
Blood transfusions are very safe. Donated blood is carefully tested. It is very rare to get a disease through a blood transfusion.

Getting the wrong blood type happens in about 1 out of 14,000 transfusions.

If you have many blood transfusions, you are more likely to have problems from your immune system such as fever or chills

But without a needed blood transfusion you will go into shock and probably die.

Centre has extended the brief beyond the single treatment expected in the model assignment.

Transplant Surgery
Transplant surgery is the final way of treating organ failure such as a kidney.

Implant surgery is when mechanical parts are used to replace worn organic body parts.

The most famous transplant surgery, a heart transplant in South Africa in 1967, by 1984 its common for even children to it.

Replacement surgery replace joints that have worn out due to age or disease, so getting rid of pain and getting back movement.

Immunisation
Immunisation is a way of protecting against serious diseases.

A vaccine, a weakened form of a disease,is injected into the body, which causes the body itself to generate immunity against the disease by making antibodies

Once we have been immunised, our bodies are better able to fight these diseases if we come into contact with them.

Gene Therapy
Gene therapy corrects defective genes that can develop diseases. Therapy can be in different ways. The most common is to insert a normal gene to replace the gene that is not functioning or is missing.

Besides cancer this method is also used for diseases caused by a faulty gene inherited from a parent.

Clinical Trials
Before any new treatment is used on a patient it is rigorously tested.

First in a laboratory. The test medicine is tried out on the cells in a chemical soup and each chemical within the medicine is analysed for its effect. Concentration of the chemicals in the medicine are also tested to get safe dosages.

In vitro testing

Then the medicine is tested In vivo on several animal species. This is to check the side effects and dosage on a living creature.
Most of the medicines that are tested go no further. And only the safest go onto clinical trials.

In a clinical trail there are a number of phases. A limited number of volunteers are tested first because if there is a problem with the medicine then very few people will be affected.
Phase I trials are on a small number of humans perhaps 40 testing the drug's safety and use in humans,

Phase II a larger group perhaps 100 who have the disease that the drug is designed to treat. Side effects are checked for.

Phase III trials test the drug on a large number of people.
These phases may be blind when the person does not know if they get the drug or a placebo. the effect of the treatment (single blind), or both of these people (double blind).

LO5 - MB1 Clinical trials

TASK 6 - BE ABLE TO MEASURE ENVIRONMENTAL EFFECTS ON HUMAN ACTIVITY

Check the quality of the village stream by investigating the invertebrates (living indicators), any possible chemicals (non-living indicators) and any other visible pollution.

Produce a short Environmental Report for the local council.

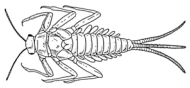
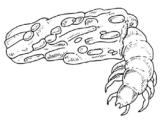
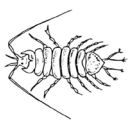
LO6 - MB1 Support given to set up and carry out

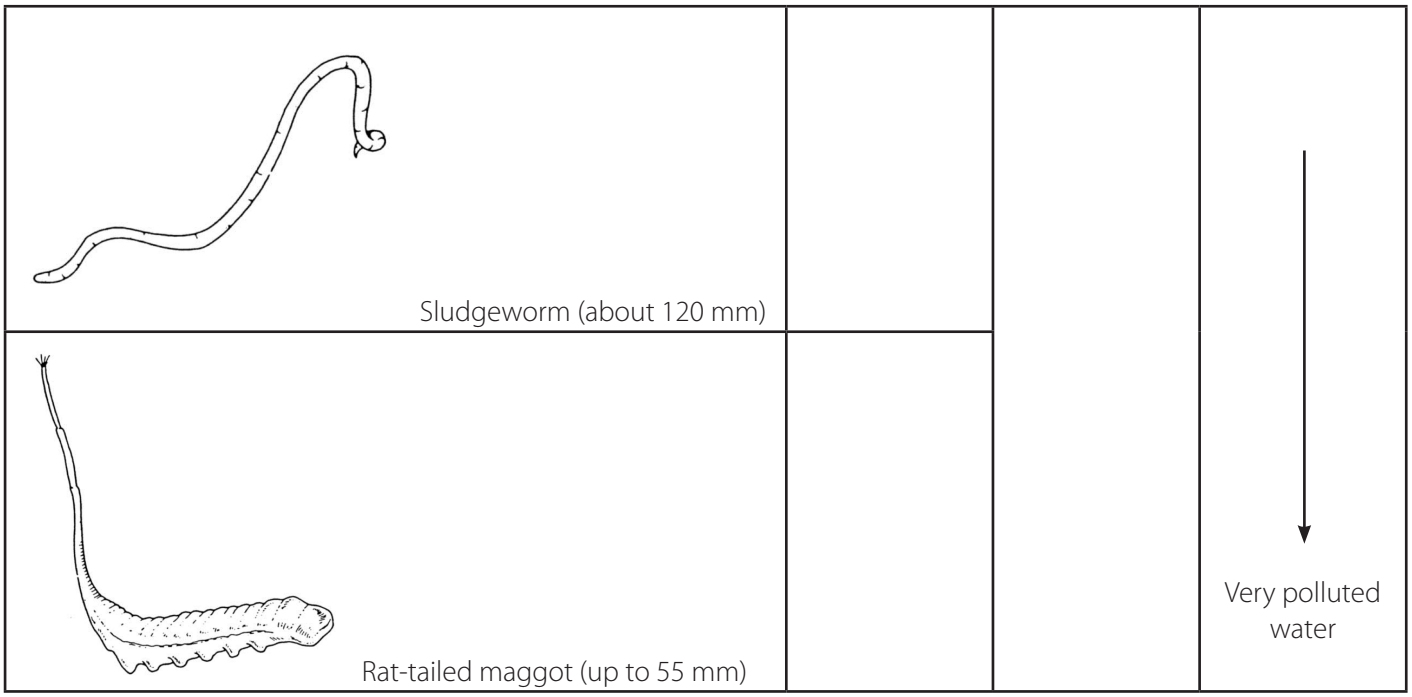
Collecting water samples for biological analysis

View the stream and record physical measurements.
Gently sweep the net through the water at the surface of the stream
Put any invertebrates in the net into a plastic tray.
Repeat this at the middle and lower levels of the stream

Location - physical measurements

water	depth 1.5m width 3m
water movement	speed slow direction down stream
weather conditions	sun moderate shade none temperature 70C wind gentle
pollution	No litter no scum

Location: Stream XXXXXX		Date: XXXXXX	
Invertebrates	**Count from all samples**	**Frequency**	
 Mayfly nymph (about 20 mm)	2	3	Clear water ↑
 Stonefly nymph (about 10 mm)	1		
 Freshwater shrimp (about 20 mm)		2	
 Caddis fly larva (about 10 mm)	2		
 Bloodworm (about 20 mm)			
 Water louse (about 10 mm)			



LO6 - MB1 Data collected and recorded

Collecting water samples for chemical analysis

View the stream and record physical measurements.
Hold a jar about elbow depth below the surface of the stream. collecting a sample.
Screw the lid on the jar under the water.
Put the sample in a fridge.
Carry out the test as soon as is possible.

Location - physical measurements

water	depth 1.5m width 3m
water movement	speed slow direction down stream
weather conditions	sun moderate shade none temperature 70°C wind gentle
pollutions	No litter no scum

Investigations in the laboratory

Ion	Test	Result
Chloride	Add silver Nitrate Solution	White precipitate
Sulphate	Add acidified Barium Chloride solution	White precipitate
Carbonate	Add dil acid and test gas with lime water	Milky white precipitate
Copper (Cu^{++})	Add Sodium Hydroxide solution	Blue precipitate
Iron	Add Sodium Hydroxide solution	Brown precipitate

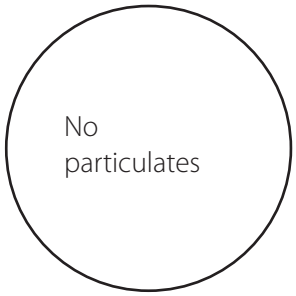
Chemical test for ions Results - tick the positive test for each of the samples

Test	Samples							
	1	2	3	4	5	6	7	8
Add silver Nitrate solution								
Add acidified Barium Chloride solution								
Add dil acid and bubble gas through lime water	✓		✓					
Add Sodium Hydroxide								
Sample ion	Carbonate							

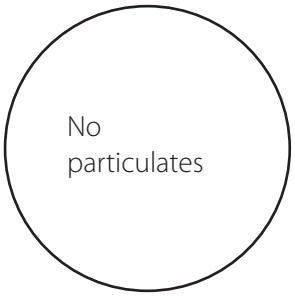
pH results

Samples							
1	2	3	4	5	6	7	8
6.98	7.01	7.00					

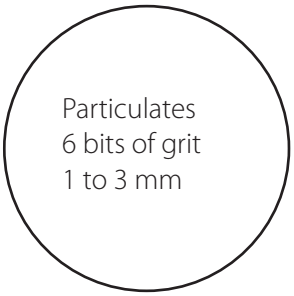
Observing Fine Detail with a Microscope



Sample 1 magnification x 100



Sample 2 magnification x 100



Sample 1 magnification x 100

Competency	MB1	MB2	MB3
Using a microscope With support throughout use a microscope Setting up mirror and lamp correctly Course focus at low power Fine focus at low power Course focus at medium power Fine focus at medium power Course focus at high power Fine focus at high power		 ✓ ✓	
Integrity of samples With guidance prevents contamination Preventing contamination Meeting clean room requirements Correct labelling Accurate and complete labelling Samples stored/disposed	 ✓		
Measuring a volume of liquid Meniscus on line Measured at horizontal Selecting appropriate equipment Explanation including reliability and sensitivity Calculation of percentage error		 ✓ ✓	
Maintaining a safe and uncluttered working environment Most of the time All of the time Rigorously and with prior thought and planning With support carries out risk assessment Carries out risk assessment	 ✓ ✓		
Following standard procedures With support follows basic standard procedures correctly	 ✓		
Follows basic standard procedure correctly Follows complex procedure correctly Makes own adaptations to standard procedure to improve reliability			
Assessors signature: XXXXXXXXXX Assessors name: XXXXXXXXX Date: XXXXXXXXXX			

Environmental Report

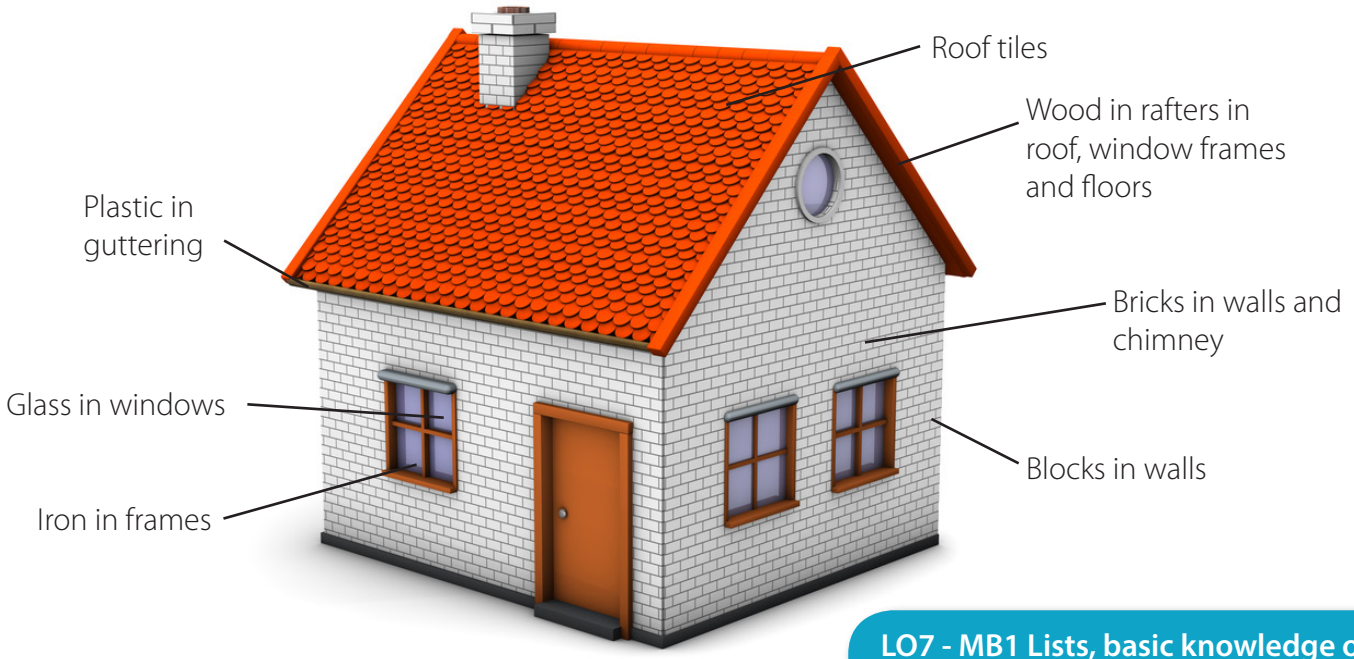
The village stream was investigated using:
Living indicators – invertebrates that indicate the clarity of the stream
Non- living indicators – acidity, chemicals, particles.

The water was clear when looked at and the presence of mayfly and stonefly nymphs indicate its cleaness.
The water was neutral at pH 7
Only chemical found was carbonate
Little dirt was found and that was towards the bottom of the stream.
The stream is clean and not polluted.

TASK 7 - ANALYTICAL REPORT: THE ENVIRONMENTAL: IMPACT OF MATERIALS USED IN HOUSE BUILDING

The increasing population of the UK creates a demand for new housing. Materials for the construction of new houses are made from natural materials.

Identify a range of materials used in the construction of a new house and analyse the environmental impact of the production of the materials from natural resources.



LO7 - MB1 Lists, basic knowledge of chemical processing, word equations, limited qualitative analysis

Materials used in construction of a house.

Material	Manufacture	Environmental impact
Bricks	Raw materials: clay, water Made from clay and water. The clay is moulded into shape, dried then fired to make it a hard brick.	Fossil fuels used in firing – greenhouse gases giving climate warming and acid rain. Quarrying makes big holes in the environment.
Blocks	Raw materials: cement mixed and cinders . Limestone to make the cement Calcium carbonate → Calcium oxide + carbon dioxide **Word equation**	Heavy transport carrying the materials Quarrying can destroy the habitats of animals and birds. Burning fossil fuels releases greenhouse gases. This can be reduced by: Manufacture close to the quarry. Use of renewable fuels when heating

Wood	Raw material: Wood, wood chips, resin Wooden struts are sawn to shape. Chipboard is chipped wood pressed and heated resin.,	Trees cut down can lead to soil erosion. So plant more when trees are cut down.
Plastic	Raw materials: fractions of crude oil Crude oil hydrocarbons are separated into fractions of similar size. Crude oil fraction are joined together to make long chained polymers	Oil spills when oil is transported. The waste from plastics is mostly not biodegradable. Oil has a finite life and will be used up. The use of crude oil can be reduced from making plastics from cellulose.
Iron	Raw materials iron ore, limestone coke Heated in a blast furnace Iron oxide + carbon monoxide ⟶ iron + carbon dioxide **MB1 - LO7 Simple alternative suggested**	Loss of land due to mining. Air pollution form blast furnace - greenhouse effect Disposal of slag and transport of materials. Other processes could be used to reduce environmental impact. Direct smelting process, iron is produced with no slag and is cheaper.
Glass	Raw materials: sand, limestone Glass is made by melting sand and then cooling it. Flat sheets of glass for windows are made by floating molten glass on a layer of molten tin. Limestone heated with sand and soda (sodium carbonate).	Limestone quarries Quarrying creates noise and heavy traffic. Sodium carbonate is added to sand to reduce the melting temperature of the sand and so save energy.

TASK 8 - RESEARCH REPORT: HOW THE PROPERTIES OF MATERIALS USED IN MANUFACTURING A CAR ARE DETERMINED BY STRUCTURE AND BONDING

Manufacturing a complex product, such as a car, uses a range of different materials. These materials are selected because of their properties.

Identify a range of solid materials used in a manufacturing a car. Say why they are used and how the structure and bonding of these materials makes them suitable.

LO8 - MB2 Materials identified, reasons given. Limited support to identify materials

Material	Type	Properties	Uses
ABS (Acrylonitrile Butadiene Styrene)	Thermoplastic	Very strong Very tough Does not bend with heat	Bumpers, dashboards, interior door panels; generally used because of its resistance to wear and tear
Polycarbonates	Thermoplastic	Transparent low water soak up Ductile Resistant to impact	Headlight lenses Non-shatter sports car windows
Fibres	Polymer	Fibre polymers can be drawn into long very thin fibres.	Carpeting/Flooring Mats Trim Headliners

Glass Reinforced Polymer	Composite	Components can be made quickly and cheaply. Complex shapes can be formed. Does not corrode.	Hand built bodies and chassis for sports cars
Mild steel	Metal	Cheap Available Can use traditional tooling Can spot and seam welding as well as bolting Easy to repair But heavy and corrodes	Used in mass production of car bodies
Aluminium	Metal	Aluminium is light Resistant to corrosion But expensive and to weld	Suitable material for all elements of a vehicle's body and engine block

Material	**Structure**
Metal – copper	Copper is a metal made up of atoms closely packed so is heavy Electrons in outer shell are free and flow passing electricity so used in wiring. Strong bonds hold the atoms together making it strong but atoms can slide over each other so it can bend.
Ceramic – glass	Glass is an elastic solid but being strong and transparent it is used as windows.
Polymer – Nylon	Nylon has a atoms in long parallel chains with chemical groups locking them together. So nylon wears well it can replace metal cogs in gear boxes.
Natural fibre - Cotton	Cotton is a natural fibre made from the cellulose of plants. Cellulose is a polymer, the polymer is strong in one direction, as the atomic bonds are strong, allowing it to make thread.
Alloys	An alloy is a mixture of two elements, one of which is a metal. Alloys have properties that are different to the metals they contain. Alloys contain atoms of different sizes, which distorts the regular arrangements of atoms. This makes it more difficult for the layers to slide over each other, so alloys are harder than the pure metal.

LO8 - MB2 Properties linked to structure/bonding

TASK 9 - BE ABLE TO MEASURE THE PROPERTIES OF MATERIALS TO RECOMMEND APPROPRIATE USE: CAN COPPER WIRE BE USED FOR ELECTRICAL WIRING?

Investigate which wire is the strongest when weights are attached to them.
To do this find their:
Tensile strength (N mm^{-3}) = maximum load before breaking (N) / original cross sectional area (mm2)

Equipment
G- clamp screwed to table
Calipers
Weights
Different wires

Method:
Attach wire to the G clamp and knot a 10 N mass at the other end of the wire.
Measure wire diameter
Add weights
Record the weights when wire breaks
Repeat this with different metal wires.

Tensile strength (N mm^{-3}) = maximum load before breaking (N) / original cross sectional area (mm^2)

LO9 - MB1 Some support needed to set up practicals, results clearly presented, calculations correctly processed

Results:

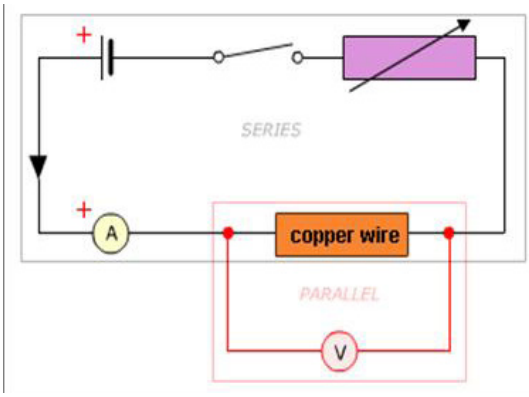
Metal	Mass before breaking (g)	Diameter (mm)	Breaking weight (N)	Area of Wire (mm^2)	Tensile Strength (N/mm^2)
Copper	800	0.19	8	0.03	282
Nichrome	2100	0.18	21	0.03	825
Steel	1300	0.18	13	0.03	511
Constantan	16,000	0.68	160	0.36	440

The metal that has the greatest tensile strength, the strongest is nichrome, then steel with copper the weakest but copper will not be broken if pulled.

INVESTIGATE THE ELECTRICAL RESISTANCE OF COPPER WIRE

Can it be used as electrical wiring in a car?

Equipment
1m of copper wire
Power pack
Variable resistor
Ammeter
voltmeter



Method

- Set up the circuit as shown in the diagram.
- Use the variable resistor to set the current at different values and measure the voltage across the wire.
- Complete the results table.

Current (Amps, A)	Voltage (Volts, V)
0.30	0.02
0.50	0.03
1.00	0.05
1.50	0.08
2.00	0.11
1.06	0.058

Calculating Resistance using average values

Average

Resistance $= \frac{\text{potential difference (V)}}{\text{current (A)}} = \frac{0.058\ \text{V}}{1.06\ \text{A}} = 0.055$

Because of its low electrical resistance I would use copper in electrical wires.

Witness statement

Competency	MB1	MB2	MB3
Taking measurements			
Some support needed to choose correct equipment	✓		
Choose correct equipment			
Zero or calibrate apparatus		✓	
Some data recorded			
Record result		✓	
Recording data to correct significant figures		✓	
Correctly position eye when taking measurement			
Maintaining a safe and uncluttered working environment			
Most of the time	✓		
All of the time			
Rigorously and with prior thought and planning			
With guidance carries out risk assessment	✓		
Carries out risk assessment			
Sand bags under lifted masses (in case support wire breaks)		✓	
Electrical tests			
With support connects circuit correctly	✓		
Connect circuit correctly			
Limit current to safe limit to achieve useable results		✓	
Consideration of length of test wire (useable results/heating)			

Linking test to require results Little linkage of the chosen tests to the function of the material Linkage of the chosen tests to the function of the materials Full linkage of the chosen tests to the function of the materials.		✓	
Following standard procedures With support follows basic standard procedures correctly Follows basic standard procedure correctly Follows complex procedure correctly Makes own adaptations to standard procedure to improve reliability	✓		
Assessors signature: XXXXXXXXX Assessors name: XXXXXXX Date: XXXXXXXX			

UNIT RECORDING SHEET

OCR
RECOGNISING ACHIEVEMENT

Science

OCR J815 Unit R071 Level 1/Level 2
Cambridge National Certificate in Science
Unit Recording Sheet

Please read the instructions printed at the end of this form. **One** of these sheets, suitably completed, should be attached to the assessed work of **each** candidate.

Unit Title	**How scientific ideas have an impact on our lives**	**Unit Code**	**R071**	**Session**	Jan / June	**Year**				
Centre Name	XXXXXXXXX				**Centre Number**					
Candidate Name	L1 Pass 1				**Candidate Number**					

Criteria			**Teacher Comments**	**Mark**
LO1: Be able to analyse personal and social choices related to energy supply			The EON energy site was used with the quizzes outcomes listing the energy sources. Energy transfers for four energies given with the national grid. From the EON energy site – "choice of energy source" a wind farm was chosen. The learner took part in a group discussion of "home owners" with pros/cons recorded. A vote took place.	**4**
MB1: 1 – 7 marks	**MB2: 8 – 13 marks**	**MB3: 14 – 18 marks**		
• **Lists** different energy sources available • **Basic** understanding of factors with influence the choice of energy supply • **Limited qualitative** analysis of efficiencies of energy transfer in electricity generation **[1 2 3④5 6 7]**	• **Limited** description of the different energy sources available for electricity generation • **Sound** understanding of some of the relevant factors which influence the choice of energy supply • **Limited quantitative** analysis of efficiencies of energy transfer in electricity generation **[8 9 10 11 12 13]**	• **Detailed** description of the different energy sources available for electricity generation • **Comprehensive** understanding of the relevant factors for the interest group which influence the choice of energy supply • **Complex quantitative** analysis of efficiencies of energy transfer in electricity generation and distribution • Quantitative data displayed in **appropriate** formats **[14 15 16 17 18]**		

<table>
<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th></tr>
<tr><td colspan="3">LO2: Understand the risks and benefits related to the applications of nuclear radiation</td><td rowspan="2">Applications of nuclear radiation in health and industry have been made with risks and benefits.</td><td rowspan="2">3</td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• Identifies a relevant beneficial use (application) of nuclear ionising radiation
• Lists risks and benefits of the application
• Limited justification of application in terms of benefit outweighing risk
[1 2③4]</td><td>• Selection of relevant beneficial uses (applications) of nuclear ionising radiation
• Some detailed analysis of applications in terms of characteristics of radiation
• Some detailed analysis of risks and benefits of energy transfer to the individual or wider society, to include a qualitative evaluation of risk
• Relevant analysis of the ways risks from the applications are reduced
[5 6 7]</td><td>• Selection of a wide range of beneficial uses (applications) of nuclear ionising radiation to include healthcare, industrial and power generation examples
• Thorough analysis of applications in terms of characteristics of radiation
• Thorough analysis of the risks and benefits of energy transfer to the individual / wider society, to include a quantitative evaluation of risk
• Well justified realistic analysis of the ways risks from the applications are reduced
[8 9 10]</td></tr>
<tr><td colspan="3">LO3: Be able to measure energy transfers and calculate efficiencies</td><td rowspan="2">Apparatus was set up with some support and the necessary results are taken.

Some measurements taken but no repeats.

Calculations were carried out with help.</td><td rowspan="2">4</td></tr>
<tr><td>MB1: 1 – 5 marks</td><td>MB2: 6 – 9 marks</td><td>MB3: 10 – 12 marks</td></tr>
<tr><td>• When provided with method and equipment, significant support needed to set it up and to take measurements
• Some measurements taken and recorded
• When provided with equations, data substituted correctly and some calculations carried out correctly
[1 2 3④5]</td><td>• Independent selection of equipment to take measurements; little support needed to set up correctly
• Measurements taken and recorded using an appropriate format
• Correct equations independently selected; support needed to manipulate equations where necessary
• Some calculations carried out correctly and one outcome derived correctly
[6 7 8 9]</td><td>• Independent selection of equipment to take measurements; equipment set up correctly
• Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Correct equations independently selected and manipulated where necessary
• Both outcomes calculated correctly to appropriate numbers of significant figures
[10 11 12]</td></tr>
</table>

<table>
<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th></tr>
<tr><td colspan="3">LO4: Understand how human health can be improved</td><td rowspan="3">The report contains a range of health warning posters, healthy eating leaflets, and healthy exercise leaflets with a fitness record.</td><td rowspan="3">6</td></tr>
<tr><td>MB1: 1 – 7 marks</td><td>MB2: 8 – 13 marks</td><td>MB3: 14 – 18 marks</td></tr>
<tr><td>• Lists some of the ways in which factors affect health
• Some suggestions made for a health education programme
• Limited qualitative data displayed on the impact on health of some of the factors identified
• Some brief materials and resources produced
[1 2 3 4 5⑥7]</td><td>• Description of the way in which factors affect health of a client group of workers used to design a health education programme
• Some quantitative data displayed on the impact on health from the factors identified
• A range of relevant materials and resources produced
[8 9 10 11 12 13]</td><td>• Detailed explanation of the way in which factors affect health of a client group of workers used to design a detailed, relevant health education programme
• A range of relevant quantitative data on the impact on health of the factors identified and displayed accurately in appropriate formats
• A wide range of relevant and imaginative materials and resources
[14 15 16 17 18]</td></tr>
<tr><td colspan="3">LO5: Understand the risks and benefits of medical treatments</td><td rowspan="3">Patient leaflets of some risks and benefits of medical treatment.

Explanation of testing medicines have been given.</td><td rowspan="3">4</td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• Lists risks and benefits of a medical treatment
• Basic understanding of the reasons for the testing of medical treatments
• Some materials produced
[1 2 3④]</td><td>• Simple qualitative analysis of the risks and benefits of a medical treatment
• Sound understanding of the reasons for the testing of medical treatments
• Materials are relevant to the needs of the client group
[5 6 7]</td><td>• Quantitative and qualitative analysis relevant for the client group of the risks and benefits of a medical treatment
• Thorough understanding of the reasons for the testing of medical treatments
• Materials are concise and sensitive to the needs of the client group
[8 9 10]</td></tr>
</table>

<table>
<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th></tr>
<tr><td colspan="3">LO6: Be able to measure the environmental effects of human activity</td><td rowspan="3">Some support was given throughout the practical.

Data has been clearly recorded.</td><td rowspan="3">4</td></tr>
<tr><td>MB1: 1 – 5 marks</td><td>MB2: 6 – 9 marks</td><td>MB3: 10 – 12 marks</td></tr>
<tr><td>• When provided with method and equipment, some support needed to set up equipment and carry out the testing
• Some data collected and recorded
• Some simple visualisation of data

[1 2 3④5]</td><td>• Appropriate choice of measures of effects of human activity on a local environment
• Independent selection of appropriate sampling and testing methods; little support needed to select and set up the equipment needed to carry out testing
• A range of relevant data collected and recorded using an appropriate format
• Some relevant visualisation of data and calculation of simple measures such as frequency

[6 7 8 9]</td><td>• Justification of choice of measures of the effects of human activity on a local environment
• Independent selection of appropriate sampling and testing methods and the equipment needed to carry out testing; equipment set up correctly
• A range of data collected and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Relevant and accurate visualisation of data and correct calculation of complex measures such as indices of biodiversity

[10 11 12]</td></tr>
<tr><td colspan="3">LO7: Understand how materials we use are made from natural resources</td><td rowspan="3">A list of six different materials used in the construction of a house with limited discussion of the manufacturing processes and the impacts on the environment. Simple word equations included.

Simple alternatives suggested.</td><td rowspan="3">6</td></tr>
<tr><td>MB1: 1 – 7 marks</td><td>MB2: 8 – 13 marks</td><td>MB3: 14 – 18 marks</td></tr>
<tr><td>• Lists some different materials used for a construction project
• Basic knowledge of chemical processes, including some use of word equations
• Limited qualitative analysis of the impact on the environment of the production of materials from natural resources
• Some alternative production methods or materials suggested which would have a lower environmental impact

[1 2 3 4 5⑥7]</td><td>• Some support needed for selection of a range of different materials linked to different parts of a construction project
• Sound knowledge of chemical processes, including some use of symbol equations and chemical nomenclature
• Analysis of the impact on the environment of the production of materials from natural resources, to include some data on production quantities, yields or energy budgets
• Some evaluation of alternative production methods or materials which would have a lower environmental impact

[8 9 10 11 12 13]</td><td>• Independent selection of a range of different types of materials linked to different parts of a construction project, chosen for their properties
• Detailed knowledge of chemical processes, including correct and appropriate use of balanced symbol equations and chemical nomenclature
• Thorough analysis of the impact on the environment of the production of materials from natural resources, to include relevant data on production quantities, yields and energy budgets
• Well justified realistic evaluation of alternative production methods or materials which would have a lower environmental impact

[14 15 16 17 18]</td></tr>
</table>

<table>
<tr><th colspan="3">Criteria</th><th>Teacher Comments</th><th>Mark</th></tr>
<tr><td colspan="3">LO8: Understand how the properties of materials we use are determined by structure and bonding</td><td rowspan="2">Materials with uses and properties (qualitative) for a car are given in a table (limited teacher support provided).

There is a limited description of the materials structure and why they are used.</td><td rowspan="2">6</td></tr>
<tr><td>MB1: 1 – 4 marks</td><td>MB2: 5 – 7 marks</td><td>MB3: 8 – 10 marks</td></tr>
<tr><td>• Significant support needed to identify some different types of materials used in a complex product; some simple reasons for their use suggested
• Limited description of the properties of selected materials and their structures
• Qualitative information on the properties of materials and performance of components
[1 2 3 4]</td><td>• Limited support needed for selection of a range of different materials used in a complex product; sound understanding of the reasons why these materials are used, with some links to their properties
• Limited explanation of how the properties of these materials depend upon structure and bonding
• Some quantitative data displayed on the properties of materials and performance of components
[5 6 7]</td><td>• Independent selection of an appropriate range of different types of materials used in a complex product; thorough understanding of the reasons why these materials are used, clearly related to their properties
• Detailed explanation of how the properties of these materials depend upon structure and bonding
• Independent selection of relevant quantitative data on the properties of materials and performance of components used to support explanations
• Quantitative data displayed in appropriate formats, including use of correct units
[8 9 10]</td></tr>
<tr><td colspan="3">LO9: Be able to measure the properties of materials to recommend appropriate uses</td><td rowspan="2">Little support needed to set up practical work and to take measurement.

Result tables clear.

Calculations carried out with when given equations.</td><td rowspan="2">6</td></tr>
<tr><td>MB1: 1 – 5 marks</td><td>MB2: 6 – 9 marks</td><td>MB3: 10 – 12 marks</td></tr>
<tr><td>• When provided with method and equipment, some support needed to set up and take measurements.
• Some measurements taken and recorded
• When provided with the mathematical techniques to use, some data processed correctly
[1 2 3 4 5]</td><td>• Independent selection of equipment to take measurements; little support needed to set up correctly
• Measurements taken and recorded using an appropriate format
• Support needed to process data using appropriate mathematical techniques
[6 7 8 9]</td><td>• Independent selection of equipment to take measurements; equipment set up correctly.
• Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units
• Data processed accurately using appropriate mathematical techniques to identify trends or patterns
[10 11 12]</td></tr>
<tr><td colspan="4">Total/120</td><td>43</td></tr>
</table>

If this is a re-sit, please tick		Session and Year of previous submission	Jan / June	2	0			Please tick to indicate this work has been standardised internally	

MODERATORS COMMENTS

<table>
<tr><td colspan="3">R071: How scientific ideas have an impact on our lives L1 Pass</td></tr>
<tr><td colspan="3">LO1: Be able to analyse personal and social choices related to energy supply</td></tr>
<tr><td>MB1: 1 – 7 marks</td><td>MB2: 8 – 13 marks</td><td>MB3: 14 – 18 marks</td></tr>
<tr><td>• Lists different energy sources available
• Basic understanding of factors with influence the choice of energy supply
• Limited qualitative analysis of efficiencies of energy transfer in electricity generation</td><td>• Limited description of the different energy sources available for electricity generation
• Sound understanding of some of the relevant factors which influence the choice of energy supply
• Limited quantitative analysis of efficiencies of energy transfer in electricity generation</td><td>• Detailed description of the different energy sources available for electricity generation
• Comprehensive understanding of the relevant factors for the interest group which influence the choice of energy supply
• Complex quantitative analysis of efficiencies of energy transfer in electricity generation and distribution
• Quantitative data displayed in appropriate formats</td></tr>
<tr><td>The report was based on EON's energy site in which test the understanding of the learner.
The learner was able to differentiate between renewable and non-renewable sources and produce a list but there was a simple description of the sources in terms of sustainability and dependability and from this suitable sources were selected.
The energy transfers in these selected sources was described visually and in terms of advantages and disadvantages cost and transport. Reference to the National grid was also made.
The EON site "choice of energy source" was used leading to a discussion of "home owners". It would have been helpful if a record of the leaner's level of participation in the discussion.
[4 marks]</td><td></td><td></td></tr>
</table>

LO2: Understand the risks and benefits related to the applications of nuclear radiation		
MB1: 1 – 4 marks	**MB2: 5 – 7 marks**	**MB3: 8 – 10 marks**
• Identifies a relevant beneficial use (application) of nuclear ionising radiation • Lists risks and benefits of the application • Limited justification of application in terms of benefit outweighing risk	• Selection of relevant beneficial uses (applications) of nuclear ionising radiation • Some detailed analysis of applications in terms of characteristics of radiation • Some detailed analysis of risks and benefits of energy transfer to the individual or wider society, to include a qualitative evaluation of risk • Relevant analysis of the ways risks from the applications are reduced	• Selection of a wide range of beneficial uses (applications) of nuclear ionising radiation to include healthcare, industrial and power generation examples • Thorough analysis of applications in terms of characteristics of radiation • Thorough analysis of the risks and benefits of energy transfer to the individual / wider society, to include a quantitative evaluation of risk • Well justified realistic analysis of the ways risks from the applications are reduced
The report explains the results from a nuclear disaster and gives a simple explanation as to why radiation is dangerous. Two examples of the use of radiation have been made for industry with simple references to benefits and risks. X-rays were confused with other sources of ionising radiation. The report goes onto explain why nuclear radiation is used as an energy source. [3 marks]		

LO3: Be able to measure energy transfers and calculate efficiencies		
MB1: 1 – 5 marks	**MB2: 6 – 9 marks**	**MB3: 10 – 12 marks**
• When provided with method and equipment, significant support needed to set it up and to take measurements • Some measurements taken and recorded • When provided with equations, data substituted correctly and some calculations carried out correctly	• Independent selection of equipment to take measurements; little support needed to set up correctly • Measurements taken and recorded using an appropriate format • Correct equations independently selected; support needed to manipulate equations where necessary • Some calculations carried out correctly and one outcome derived correctly	• Independent selection of equipment to take measurements; equipment set up correctly • Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units • Correct equations independently selected and manipulated where necessary • Both outcomes calculated correctly to appropriate numbers of significant figures
A witness statement supports the competency level at MB1. There is a list of apparatus with a simple method and diagram – provided by teacher. Just one set of results have been collected but they are clearly recorded. Some calculations were carried out independently others required substantial support (as annotated by teacher). [4 marks]		

LO4: Understand how human health can be improved		
MB1: 1 – 7 marks	**MB2: 8 – 13 marks**	**MB3: 14 – 18 marks**
• **Lists some** of the ways in which factors affect health • **Some** suggestions made for a health education programme • **Limited** qualitative data displayed on the impact on health of some of the factors identified • **Some** brief materials and resources produced	• **Description** of the way in which factors affect health of a client group of workers used to design a health education programme • **Some** quantitative data displayed on the impact on health from the factors identified • A **range** of **relevant** materials and resources produced	• **Detailed** explanation of the way in which factors affect health of a client group of workers used to design a **detailed, relevant** health education programme • A **range of relevant** quantitative data on the impact on health of the factors identified and displayed accurately in appropriate formats • A **wide range** of relevant and **imaginative** materials and resources
The warning posters have an eye catching picture with qualitative (and quantitative) data displayed on the impact on health of some of the factors identified. The quantitative data does not include any discussion on impact therefore not in MB2. The exercise programme is supported by some relevant exercise and diet leaflets with a fitness record holding it together. Extensive material included in student work and some purposefully selected by the student. [6 marks]		

LO5: Understand the risks and benefits of medical treatments		
MB1: 1 – 4 marks	**MB2: 5 – 7 marks**	**MB3: 8 – 10 marks**
• Lists risks and benefits of a medical treatment • Basic understanding of the reasons for the testing of medical treatments • Some materials produced	• Simple qualitative analysis of the risks and benefits of a medical treatment • Sound understanding of the reasons for the testing of medical treatments • Materials are relevant to the needs of the client group	• Quantitative and qualitative analysis relevant for the client group of the risks and benefits of a medical treatment • Thorough understanding of the reasons for the testing of medical treatments • Materials are concise and sensitive to the needs of the client group
A good use of pictures has been made in the patient leaflets. Simple benefits of medical treatments are given backed by quantitative risk factor for blood transfusions. Both laboratory testing and clinical trials were explained but no reasons given as to why these are carried out. [4 marks]		

LO6: Be able to measure the environmental effects of human activity		
MB1: 1 – 5 marks	**MB2: 6 – 9 marks**	**MB3: 10 – 12 marks**
• When provided with method and equipment, **some support** needed to set up equipment and carry out the testing • **Some** data collected and recorded • **Some simple** visualisation of data	• **Appropriate** choice of measures of effects of human activity on a local environment • **Independent** selection of **appropriate** sampling and testing methods; **little support** needed to select and set up the equipment needed to carry out testing • A range of relevant data collected and recorded using an **appropriate** format • **Some** relevant visualisation of data and calculation of **simple** measures such as frequency	• **Justification** of choice of measures of the effects of human activity on a local environment • **Independent** selection of **appropriate** sampling and testing methods and the equipment needed to carry out testing; equipment set up correctly • A **range** of data collected and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units • **Relevant** and **accurate** visualisation of data and correct calculation of complex measures such as indices of biodiversity
A witness statement supports the competency level at MB1. Data has been clearly recorded however it is unclear if the learner created the recording templates. A simple environmental report has been made based on the collected data. [4 marks]		

LO7: Understand how materials we use are made from natural resources		
MB1: 1 – 7 marks	**MB2: 8 – 13 marks**	**MB3: 14 – 18 marks**
• **Lists some** different materials used for a construction project • **Basic** knowledge of chemical processes, including **some** use of word equations • **Limited qualitative** analysis of the impact on the environment of the production of materials from natural resources • **Some** alternative production methods or materials suggested which would have a lower environmental impact	• **Some support** needed for selection of a **range** of different materials linked to different parts of a construction project • **Sound** knowledge of chemical processes, including some use of symbol equations and chemical nomenclature • Analysis of the impact on the environment of the production of materials from natural resources, to include **some** data on production quantities, yields or energy budgets • **Some** evaluation of alternative production methods or materials which would have a lower environmental impact	• **Independent** selection of a range of different types of materials linked to different parts of a construction project, chosen for their properties • **Detailed** knowledge of chemical processes, including correct and appropriate use of balanced symbol equations and chemical nomenclature • **Thorough** analysis of the impact on the environment of the production of materials from natural resources, to include **relevant** data on production quantities, yields and energy budgets • Well **justified realistic** evaluation of alternative production methods or materials which would have a lower environmental impact
Over ten materials and their uses have been identified in the construction of a house visually on a diagram. No support was indicated in choosing the materials The raw materials used in manufacture have been listed, with some word equations. Simple analysis of the impact of production has been made with some basic alternative or modifications given. [4 marks]		

LO8: Understand how the properties of materials we use are determined by structure and bonding		
MB1: 1 – 4 marks	**MB2: 5 – 7 marks**	**MB3: 8 – 10 marks**
• **Significant support** needed to identify some different types of materials used in a **complex** product; **some simple** reasons for their use suggested • **Limited description** of the properties of selected materials and their structures • Qualitative information on the properties of materials and performance of components	• **Limited support** needed for selection of a **range** of different materials used in a **complex** product; **sound** understanding of the reasons why these materials are used, with **some** links to their properties • **Limited explanation** of how the properties of these materials depend upon structure and bonding • **Some quantitative** data displayed on the properties of materials and performance of components	• **Independent** selection of an **appropriate range** of different types of materials used in a **complex** product; **thorough** understanding of the reasons why these materials are used, **clearly** related to their properties • **Detailed** explanation of how the properties of these materials depend upon structure and bonding • **Independent** selection of **relevant** quantitative data on the properties of materials and performance of components used to support explanations • Quantitative data displayed in **appropriate** formats, including use of correct units
	Limited support was needed to list a range of materials in a car There is a limited explanation of the properties which have been linked to their molecular structure and there is basic linkage to their uses in the car, the knowledge shown moves the task outcome to MB2. There is no quantitative data included so cannot award 7 marks. [6 marks]	

LO9: Be able to measure the properties of materials to recommend appropriate uses		
MB1: 1 – 5 marks	**MB2: 6 – 9 marks**	**MB3: 10 – 12 marks**
• When provided with method and equipment, **some support** needed to set up and take measurements. • **Some** measurements taken and recorded • When provided with the mathematical techniques to use, **some** data processed correctly	• **Independent** selection of equipment to take measurements; **little support** needed to set up correctly • Measurements taken and recorded using an **appropriate** format • **Support** needed to process data using **appropriate** mathematical techniques	• **Independent** selection of equipment to take measurements; equipment set up correctly. • Measurements taken and recorded to appropriate accuracy and precision using an appropriate format, including use of correct units • Data processed **accurate**ly using **appropriate** mathematical techniques to identify trends or patterns
Two procedures have been undertaken – tensile strength of 4 metals and the electrical resistance of copper (it might be expected that the full range of materials should be tested) with a witness state putting competences across MB1 and MB2. Appropriate measurements have been recorded clearly and calculations are correct. [6 marks]		
Overall: The learner is within MB1 at upper middle range .		
LO1 4/18 LO2 3/10 LO3 4/12 LO4 6/19 LO5 4/10 LO6 4/12 LO7 6/18 LO8 6/10 LO9 6/12 43/120		

To give us feedback on, or ideas about the OCR resources you have used, email resourcesfeedback@ocr.org.uk

cambridgenationals.org.uk

Contact us

Staff at the OCR Customer Contact Centre are available to take your call between 8am and 5.30pm, Monday to Friday.

Telephone 02476 851509

Email cambridgenationals@ocr.org.uk

PART OF THE CAMBRIDGE ASSESSMENT GROUP

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored.