BTEC Applied Science Transition Work

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The BTEC Applied Science Level 3 course is a mixture of different assignment modules and examined science theory and practice. It is a rigorous, academic course that is highly valued by higher education and employers. So to help you succeed we would like you to complete these tasks before you start the course. Please bring the completed work with you on the first day of college.

This is a science course where you will learn how to gather and analyse all crime-related physical evidence for which Biology Chemistry and Physics will form a key part of the course.

Forensic Science Questions

The Scene of Crime Questions

1. **What year was finger prints used to solve a murder case?**

- ☐ 1905
- ☐ 1985
- ☐ 1965

2. **What is the number one priority for officers who have just arrived at a crime scene?**

- Arrest any suspicious personnel immediately
- Save and preserve the life of any victims whilst remaining safe themselves
- Secure and preserve the crime scene

3. **Why are witnesses detained at the police station?**

- To stop them from escaping
- To stop them contaminating the scene
- To prevent them from discussing what they saw with other witnesses

4. **Why aren't digital images taken at a crime scene used in court?**

- Because the images are easy to alter
- Because digital images are not clear enough due to pixilation
- Because digital photos are not able to capture the minute details of a crime scene

5. **Why is adequate lighting important when photographing evidence?**

- To ensure the fingerprints are clearly captured
- To uncover latent fingerprints
- To get a good close-up shot of the evidence

6. **Why is it so important for investigators to secure a crime scene?**

- To stop police from entering the crime scene
- To stop unauthorised personnel from entering the crime scene and, in turn, destroying the evidence
- To stop evidence from escaping

7. **What important aspects about a person can a shoe print reveal?**

- The person's age and personality
- The type of weapon they carried
- The person's height, gait and the direction they entered and exited the crime scene

8. **What happens to evidence once it has been found?**

- It is sealed in a bag or airtight container, labelled, recorded and sent to a laboratory
- It is destroyed and thrown away
- It is taken straight to the laboratory

Forensic Science Questions

The Autopsy

9. An autopsy is performed to find out:

- What the victim's personality was like
- How and why the victim died
- Whether the victims was responsible for the crime

10. The term 'rigor mortis' refers to:

- The Latin word for 'responsible for death'
- A term used to describe the stiffening of the body after death
- The death of a person

11. What are two ways of determining if a person died of hypothermia?

- Burn marks on the skin and signs of burst blood vessels in the eyes
- The hyoid bone in the neck is broken and there is bruising present around the mouth
- The core temperature of the body is 35^{o} or below and the skin is blue in colour

12. How long does the digestive process take?

- 3 hours
- Usually more than one day
- 8 hours

13. Blood clots, cancerous masses and fatal haemorrhages can be revealed by a:

- CT scan
- Computer analysis
- Brain scan

14. Once the autopsy is completed, the samples of tissue are stored by:

- Placing the sample in containers and putting them in a storage cupboard
- Placing the samples in the bags and disposing of them
- Placing the samples in either containers or bags, labelling them and storing them in a refrigerated storage area

Forensic Science Questions

Piecing Together Identity

15. What does an anthropologist specialize in?

- Blood stain analysis
- The study of bones
- The study of fingerprints

16. Forensic odontologists specialize in:

- The examination of evidence
- The examination of bugs
- The examination of teeth

17. What does DNA stand for?

- Deoxyribonucleic Acid
- Do Not Approach
- Dinitrigen Astatine

Forensic Science Question

Tracing The Evidence

18. A toxicologist is responsible for:

- Examining the organs during an autopsy
- Testing bloody and bodily fluids for alcohol, illegal substances and poisoning

- Investigating whether a person died of natural causes

19. Chromatography is used for:

- Identifying poisons
- Examining whether there is poison in the blood of a deceased person
- Testing whether a person has a disease

20. What part of the body is responsible for filtering out the body's toxins?

- The appendix
- The liver
- The kidneys

21. What two agents reveal blood stains?

- Ultraviolet light
- Luminal and fluorescein
- Nitrogen

22. What can the dust and dirt that accumulates on the bottom of our shoes reveal?

- A person's physical characteristics
- A person's interests
- A person's hobbies, occupation, habits and movements

Forensic Science Questions

Murder Tools

23. When a criminal fires a gun, what is thrown everywhere?

- Evidence
- Fingerprints and DNA
- Fire and petrol

24. Blunt trauma refers to:

- Injuries caused by sharp objects
- Drowning and asphyxiation
- Fractures, broken bones and external bruising

25. Some example of poisonous gases that may be present after the burning down of a building are:

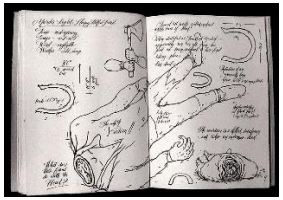
- The electrical insulator, toxic beryllium and oxide carcinogenic combustion products
- Argon, helium and xenon
- Petrol and paint thinners which are in the vaporised state

26. What is one way a medical examiner can use to find out who was driving a car when it crashed?

- Evidence such as hair, skin and make-up found on the airbags
- Recreation of the crash using computer programs
- Bruises and cuts on the body of a victim

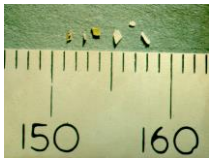
FORENSIC EVIDENCE COLLECTION

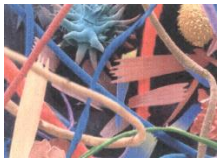
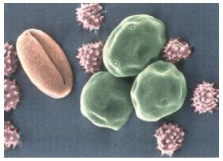
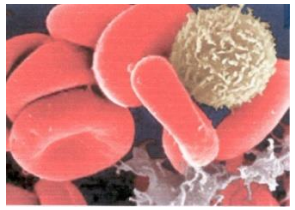



1. How is a crime scene preserved so that any evidence collected can be used in court?

2. What is documented at the crime scene and how?

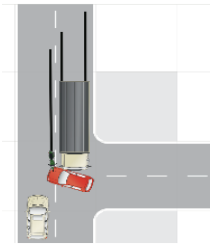


3. What evidence could be collected at a crime scene?

4. Who might be at a crime scene and what are their roles?

FORENSIC TRAFFIC INVESTIGATIONS



1. What evidence might be collected at the scene of an RTA (Road Traffic Accident)?

2. How could this information can be used to estimate the speed the vehicles were travelling immediately before the accident?

3. What factors affect the stopping distance of a vehicle?

4. Evaluate why motorways are less dangerous than rural roads.

PHYSICS

Wave Speed = Frequency x Wavelength
(m/s) (Hz) (m)

1. What is the speed of a wave that has a frequency of 20Hz and a wavelength of 5m?

2. What is the frequency of a wave that has a wavelength of 6m and a speed of 18m/s?

3. What is the speed of a wave that has f = 2kHz and wavelength = 200cm?

Type of energy	Description	Example
Electrical		
	From the sun and light bulbs	
		Speakers
Nuclear		
	From hot objects	
Gravitational potential		
	In stretched springs	Bungee jump
Chemical		
	Things that are moving	

Conservation of energy means that energy **can/can't** be created or destroyed. You **can /can't** only change energy from one type to another.

What are the energy transfers?

TV Electrical energy → sound energy+ light energy

Wind up toy _____ → _____ _____

Electric kettle _____ → _____ _____

Battery powered torch _____ → _____ _____

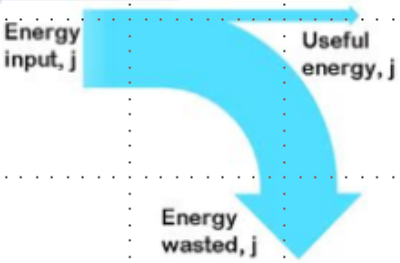
True or false?

- Sound energy can be transferred from one place to another. _____
- Sound energy doesn't need particles to travel. _____
- Sound energy is transferred by convection. _____
- Sound waves are caused by vibrations. _____

Heat energy is transferred from one place to another when there is a difference in temperature. **Match the types of heat transfer with descriptions**

Conduction	• When particles in solids pass on energy to the particles next to them.
Convection	• Heat is given out as infra red radiation. Objects can emit and absorb this.
Radiation	• When particles in liquids and gases move from a hot place to a cooler one.

Energy & Efficiency



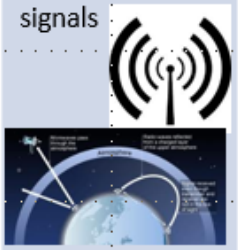
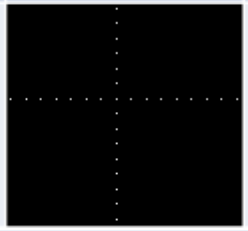
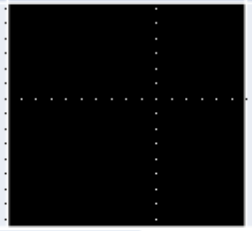
What does this diagram show?

What is it called?

$$\text{Efficiency} = \frac{\text{useful energy transferred by the appliance}}{\text{total energy supplied to the appliance}} \quad (\times 100\%)$$

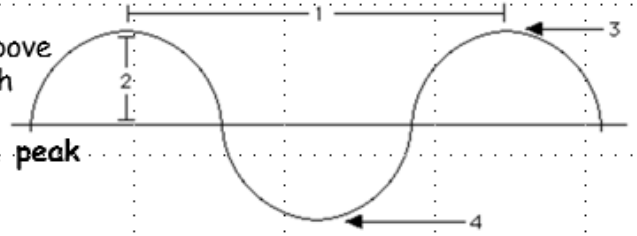
Does efficiency have a unit?

In a light bulb, for 25 joules of energy that are supplied to the bulb, 5 joules area usefully transferred into light energy. What is the efficiency of the bulb?

Electromagnetic spectrum	Radio Waves	M_____	I_____	V_____ L_____	U_____- V_____	X-_____	G_____ R_____
Uses Draw a picture or write the uses in	TV and radio signals 						
Dangers							

	Renewable	Non Renewable
Pros ☺		
Cons ☹		

Label the above diagram with **Amplitude, wavelength, peak and trough.**



Add more examples of each

Coal

Non-Renewable Energy sources

Wind power

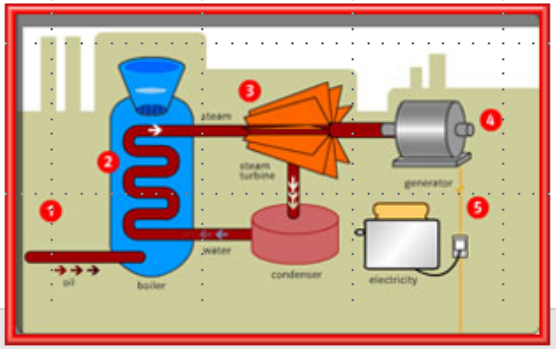
Renewable Energy sources

Match the statements with on of the numbers in the picture.

____ Water is heated by burning fossil fuels.

____ Steam turns the turbine.

____ The turbine turns the generator which generates electricity.



CHEMISTRY

Atomic Structure

1) Which part of the atom contains the protons? _____

2) What is the charge on an electron? _____

3) What does the atomic number measure? _____

4) Write the chemical symbol and number of protons, neutrons and electrons in an atom of the following elements

Element	Symbol	Protons	Neutrons	Electrons
Nitrogen				
Argon				
Copper				

Trends and Patterns

1) What are horizontal rows on the Periodic Table called? _____

2) What are the vertical columns on the Periodic Table called? _____

3) Circle the most reactive element in each of the following lists

   a. Lithium, Sodium, Potassium

   b. Fluorine, Chlorine Bromine

4) Describe and explain the trend in reactivity as you go down group 1.

_____

_____

_____

Chemical Bonding and Properties of Ionic and Covalent Compounds

1) Define the following types of bonding

   Ionic Bonding

   _____

   _____

   Covalent Bonding

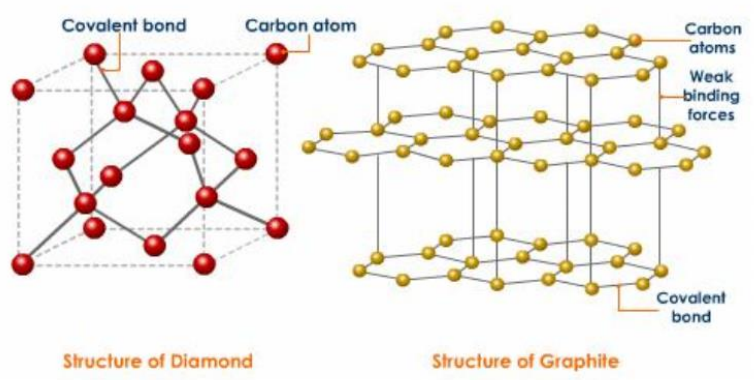
   _____

   _____

2) Draw a dot and cross diagram for the following molecules:-

   a. Magnesium Chloride, $MgCl_2$

   b. Methane, CH_4



3) Circle the correct answer and provide an explanation below

a. Diamond has a **very high/very low** melting point because

_____

_____

b. Diamond **can/cannot** conduct electricity because

_____

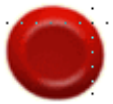
_____

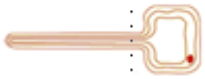
4) Complete the table:

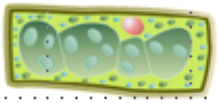
Material	**Use**	**Explanation for why they are suitable for this use**
Diamond		
Graphite		

BIOLOGY

Name the cell and explain how it is adapted



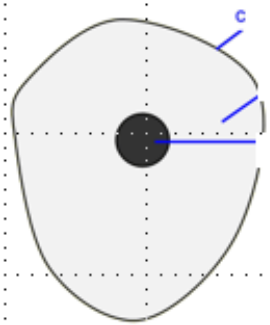




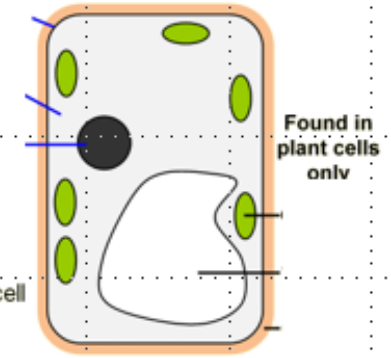
Which DNA base codes with which?

A	T
C	
T	
A	
T	
G	

Label the cells

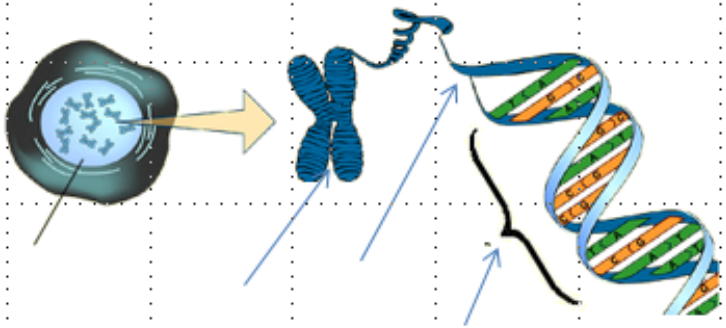


animal cell



plant cell

Draw a plant and label where the following parts are :roots, root hair cells, leaves, phloem and xylem, stomata



Dominant alleles are shown by **CAPITAL/lower case** letters.
If a characteristic is dominant it **will/will not** be shown is an allele is present. Eg BB- Blue eyes Bb blue eyes
Recessive alleles are shown by **CAPITAL/lower case** letters.

If a characteristic is recessive it **will/will not** be shown unless both recessive alleles are present eg. bb- brown eyes.

Put these labels in the right places:

Gene, Chromosome, Nucleus, DNA

Inside each normal human cell there is a _____ this contains genetic information in 23 pairs of _____s. Chromosomes are made of a chemical called _____.
A section of DNA that codes for a certain characteristic is called a _____.

Transpiration is when water is _____ from the plant. Water enters the plant through the _____ and leaves the plant from the _____.

Put these in size order
Organ, cell, tissue, organ system
_____ _____ _____ _____

Match up the parts to the functions

Mitochondria
Cell wall
Cell membrane
Chloroplast
Nucleus
Cytoplasm
Vacuole

Function	Animal	Plant
Contains genes and controls cell	Yes	Yes
Where respiration happens		
Gives cell structural support		
Lets substances in and out of cell		
Where chemical reactions happen		
Where photosynthesis happens		

Add to the spider diagrams to explain what happens when your body is:

Too hot

Too cold

Hormones are used to send messages around the body they are _____ that are released by _____ in the body. They travel in the _____.

The pancreas releases 2 hormones that control blood _____ level.

_____ is used to reduce the level of glucose in the blood.

_____ increases the amount of glucose in the blood.

Key words

Blood glucose glucagon insulin glands chemical

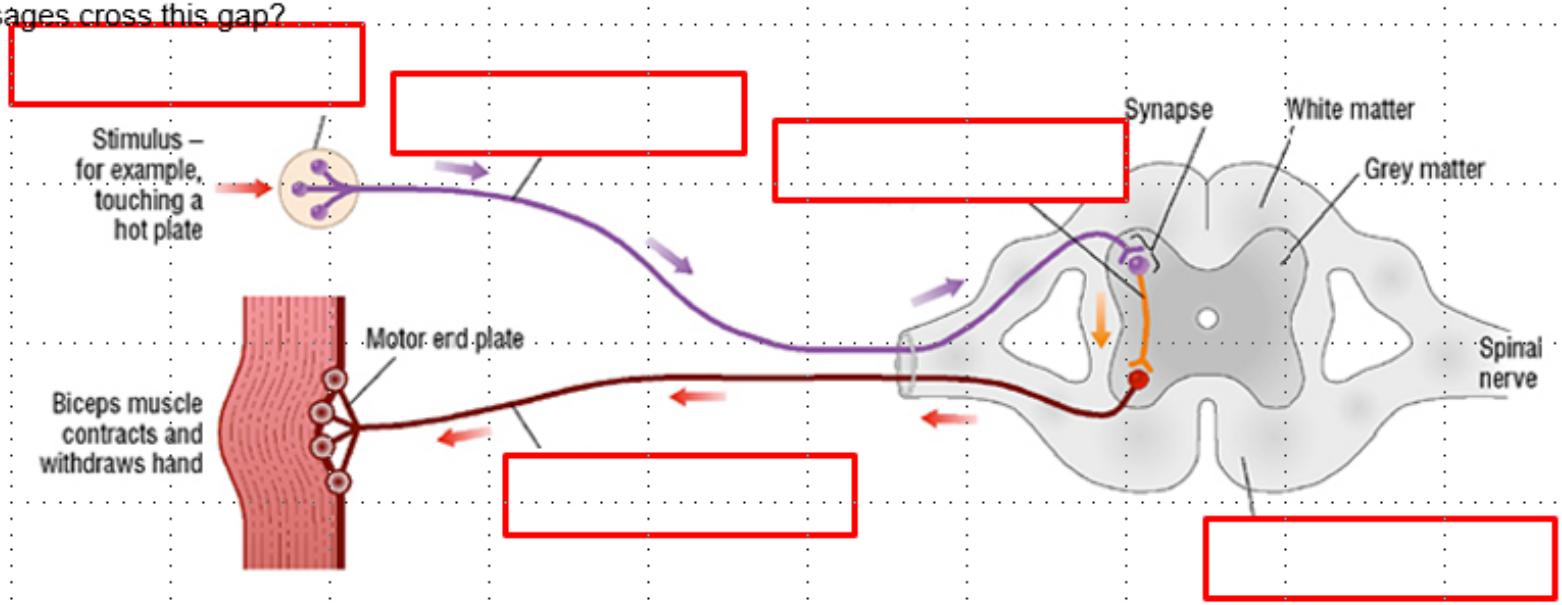
Fill in the boxes on the diagram with the words below:

Receptor **Motor neurone** **Sensory neurone** **Relay neurone**

Spinal cord

What is the name for the gap between neurones ?

How do messages cross this gap?



Complete the word search and find definitions for the words:

O	Y	V	C	E	N	T	R	I	O	L	E	S	S
E	L	O	U	C	A	V	R	C	I	B	T	M	C
E	L	C	N	Y	N	S	E	E	P	R	L	I	Y
T	L	L	C	O	C	E	W	L	R	T	Y	T	T
C	I	L	I	A	H	U	S	L	O	S	S	O	O
T	L	O	N	K	R	K	S	M	K	A	O	C	P
L	S	D	U	I	O	A	E	E	A	L	S	H	L
L	N	T	C	K	M	R	M	M	R	P	O	O	A
A	L	T	L	O	A	Y	O	B	Y	O	M	N	S
W	U	U	E	H	T	O	S	R	O	R	E	D	M
L	R	S	O	S	I	T	O	A	T	O	S	R	M
L	W	S	L	E	N	E	B	N	E	L	I	I	A
E	Y	B	U	Y	L	S	I	E	S	H	Y	A	O
C	O	A	S	R	O	S	R	A	T	C	S	I	S

NUCLEOLUS
RIBOSOMES
CYTOPLASM
CELL MEMBRANE
LYSOSOMES
CENTRIOLES
MITOCHONDRIA
CHROMATIN
CILIA
PROKARYOTES
VACUOLE
EUKARYOTES
CELL WALL
CHLOROPLAST