MYP 4&5 Physics - 4 - copy

Subject	Grade	Points
Physics	MYP 5	A 26 B 27 C 23 D 24

Question 1

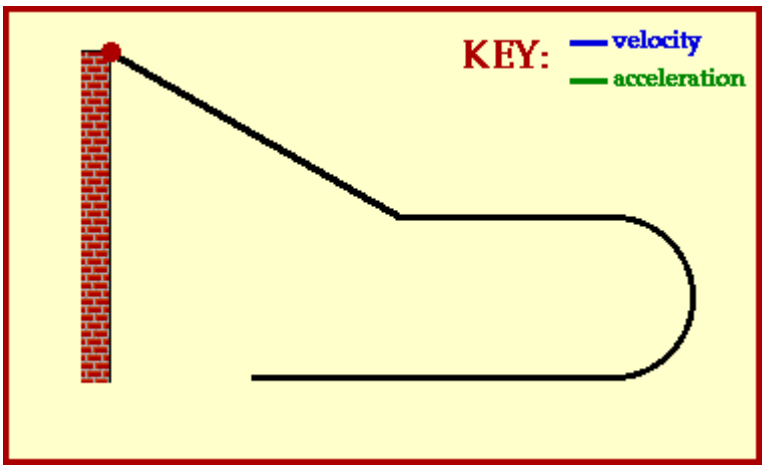
Knowing and understanding

This task (questions 1 to 3) addresses the key concept of **relationships** and focuses on **criterion A** (Knowing and understanding).

Constant velocity: steady speed, no change in direction.

Constant velocity means that the object in motion is moving in a straight line at a constant speed.

Image 1



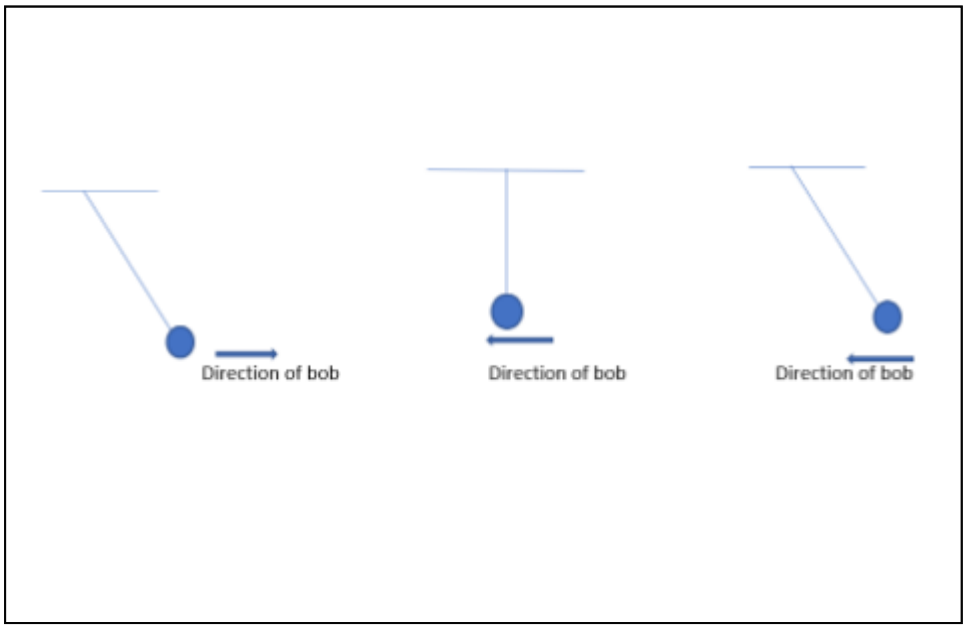
Q 1.1 **Calculate** the average speed of a car if it travels 150 km north in 1.5 hrs, then 100 km south in 1 hr. **Present** your answer in proper units. A 2

Words: 0

Q 1.2 A person from his house travels 30 km east, turns north and walks for another 40 km. Later he travels another 50 km in south-west direction. **Measure** the displacement of this person. A 2

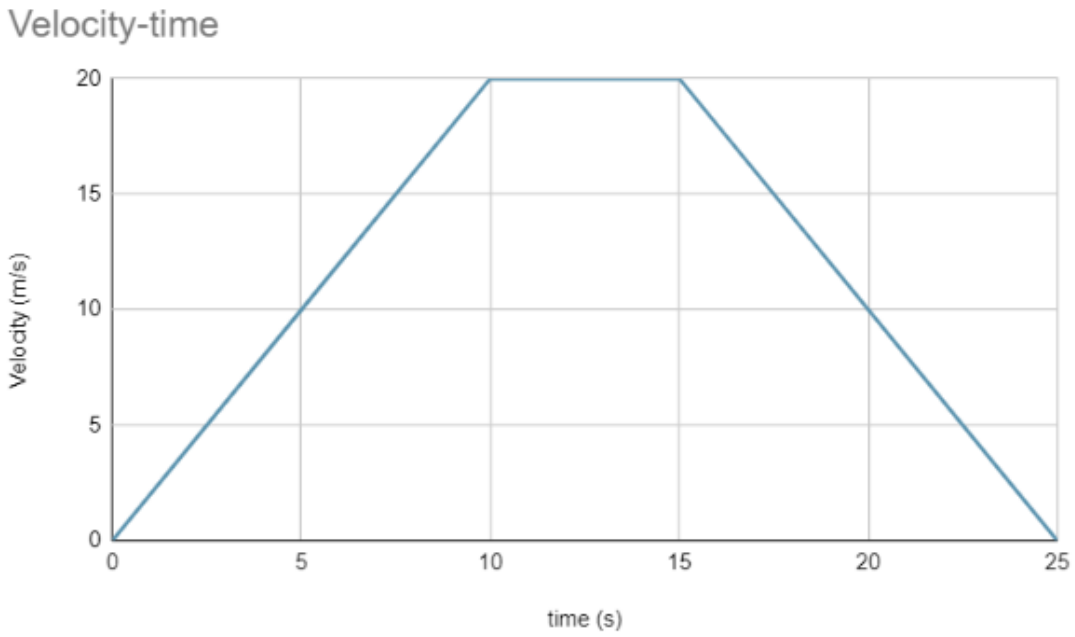
Words: 0

Q 1.3 **Predict** the direction of acceleration and velocity of the bob in the simple pendulum shown in all the cases A 3



#22194D R 34 G 25 B 77

Q 1.4 The graph shows the velocity change with time of a vehicle. From the graph, **find** the displacement covered by the vehicle between 0 to 15 s. A 2



Words: 0

Question 2

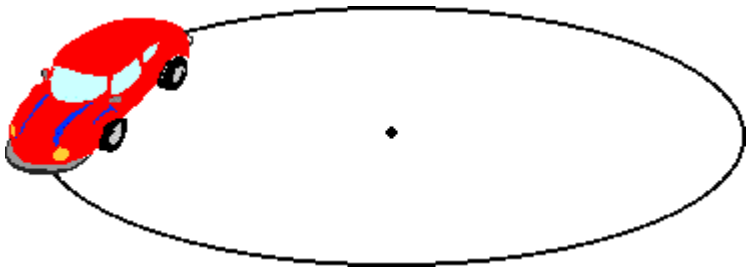
Circular motion: A force constantly pulling inward, keeping the object turning in a loop.

In physics, circular motion is a movement of an object along the circumference of a circle or rotation along a circular path. It can be uniform, with constant angular rate of rotation and constant speed, or non-uniform with a changing rate of rotation. The rotation around a fixed axis of a three-dimensional body involves circular motion of its parts. The equations of motion describe the movement of the center of mass of a body.
Examples of circular motion include: an artificial satellite orbiting the Earth at a constant height, a ceiling fan's blades rotating around a hub, a stone which is tied to a rope and is being swung in circles, a car turning through a curve in a race track, an electron moving perpendicular to a uniform magnetic field, and a gear turning inside a mechanism.

Q 2.1 **State** **the force responsible for the acceleration produced in a uniform circular motion.** A 1

Words: 0

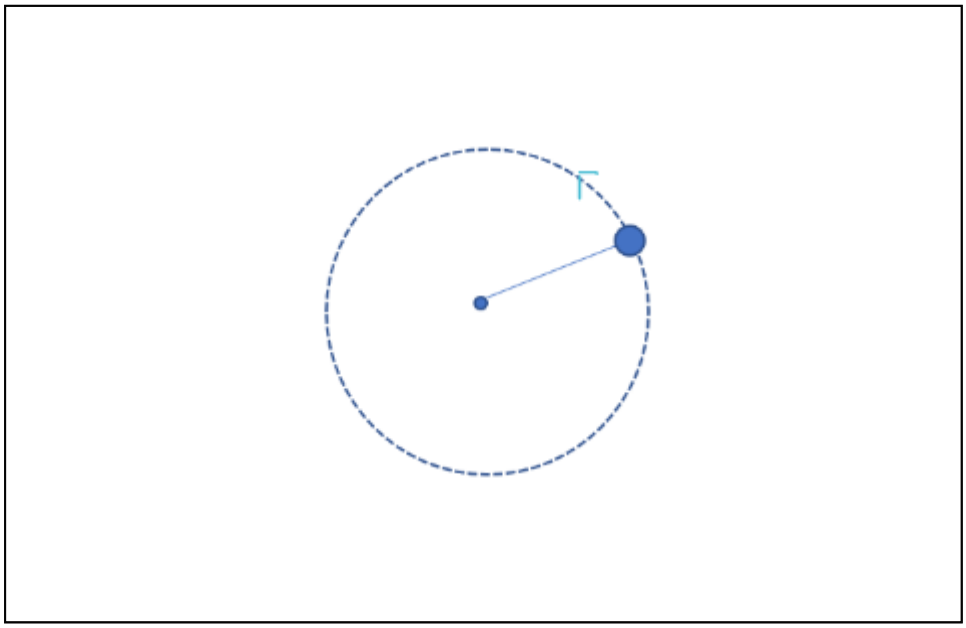
Image 1



Q 2.2 **Identify** the forces acting on the car. A 3

Words: 0

Q 2.3 **Draw** the direction of motion of the ball, if the string snaps suddenly at point shown. A 1



#22194D R 34 G 25 B 77

Q 2.4 If a car of mass 500 kg is moving with a uniform velocity 2 m s^{-1} on a circular track of radius 30 m, **calculate** the centripetal force acting on the car. A 2

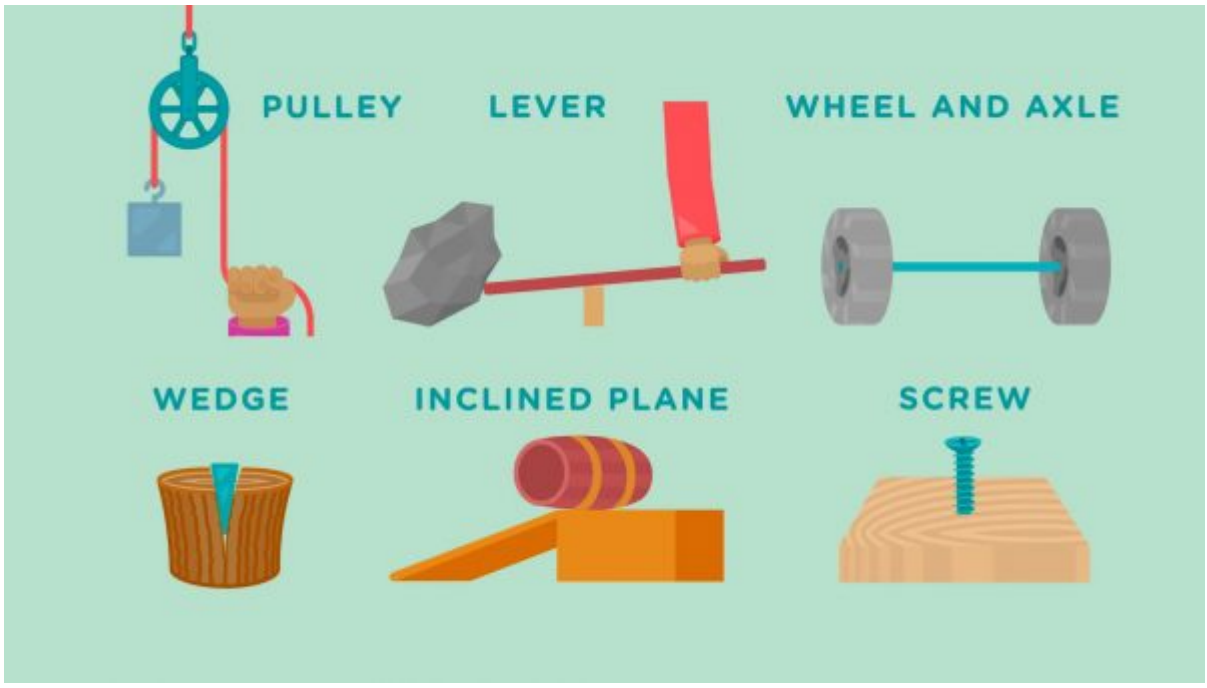
Words: 0

Question 3

Simple machines are basic tools that make work easier.

The simple machines used in mechanics are given below.

Image 1



Q 3.1 **List** any **two** examples of each of the simple machine. A 4

Lever:

Pulley:

Inclined Plane:

Wheel and axle:

Screw:

Words: 0

Q 3.2 **State** in which of the case, the input force is maximum. **Justify** your answer. A 2

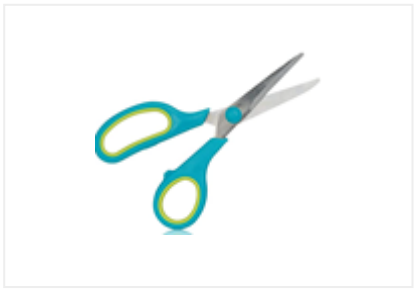
Words: 0

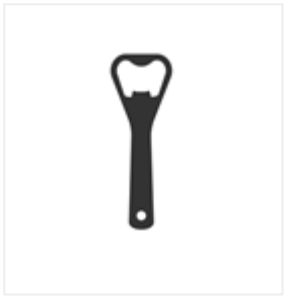
Q 3.3 **Calculate** the distance at which you should apply a force of 60 N to lift an object of weight 180 N using a lever. Let the length of load arm be 3 m. A 2

Words: 0

Q 3.4 **Classify** the levers into different categories. A 2

First class lever	Second class lever	Third class lever





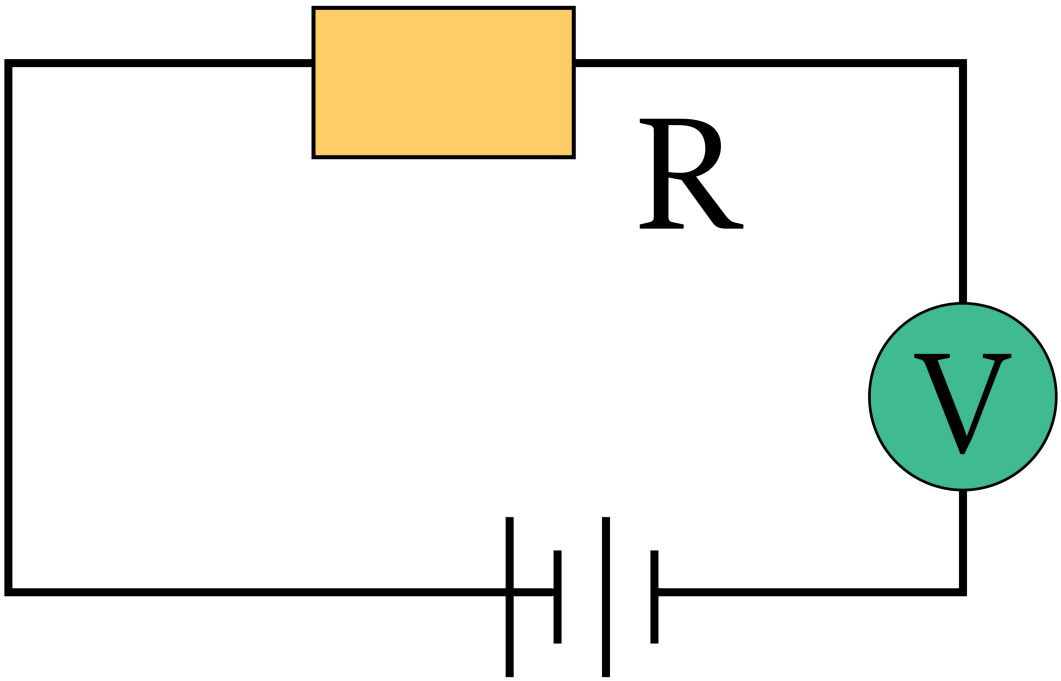
Question 4

Investigation skills

This task (questions 4 to 6) addresses the key concept of **change** and focuses on **criterion B** (Inquiring and designing) and **criterion C** (Processing and evaluating). In this task, you will investigate how different factors affect the current in an electric circuit.

Electric circuit is a network of interconnected components allowing electricity to flow.

An MYP student during his classes realized that there is a relationship between the potential difference across a wire and the current flowing through it. He decides to investigate it. For that he designs a circuit and moves forward with his investigation. But he is not able to get any results. The circuit used by him is given below.



Q 4.1 **State** a question that could be answered in this investigation. B 1

Words: 0

Q 4.2 **Formulate** and **explain** a hypothesis that could be tested in this question. B 3

Words: 0

Q 4.3 **Identify** the variables in this investigation. B 4

Dependent Variable:

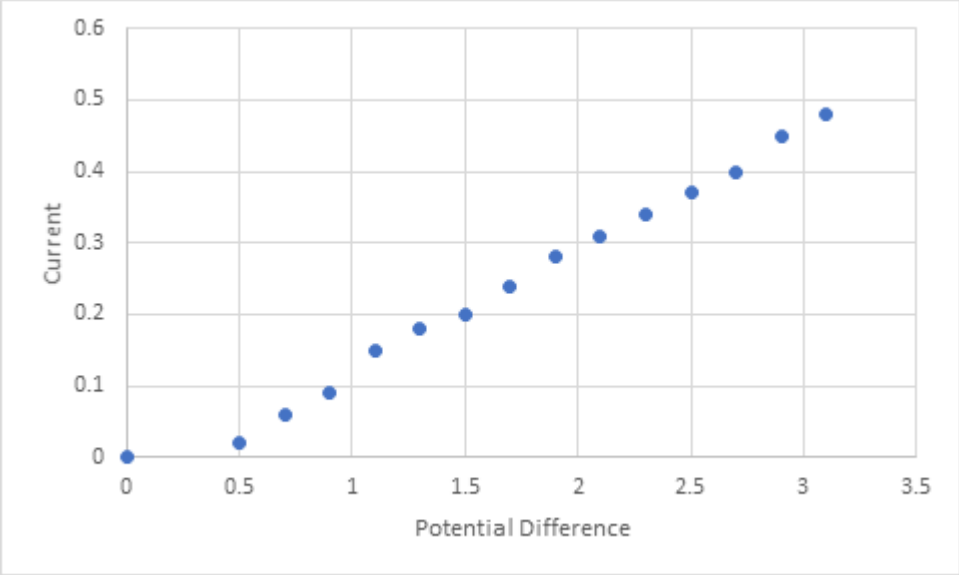
Independent Variable:

Control Variable:

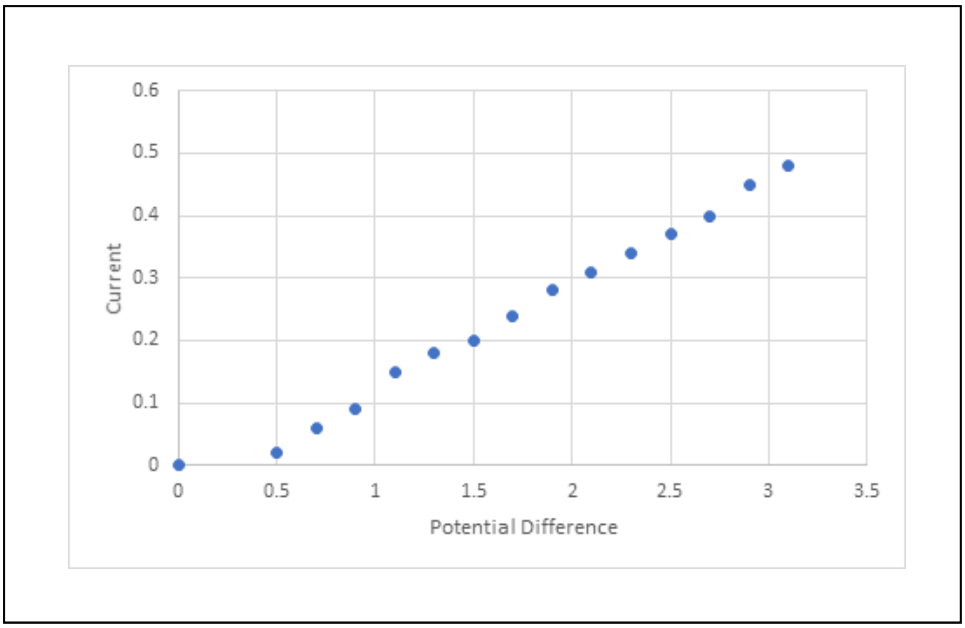
Control Variable:

Words: 0

Another student completed the investigation and collected the data.



Q 4.4 **Present** a line that best fits the observation. C 1



#22194D R 34 G 25 B 77

Q 4.5 **Identify** the relationship between the two variables of the investigation. C 2

Words: 0

Q 4.6 **Outline** the validity of the method followed to determine this relationship. C 2

Words: 0

Q 4.7 Using the observations, **estimate** an approximate value for the current flowing through the circuit when the potential difference across it is 4 V. C 3

Words: 0

Q 4.8 **Evaluate** the validity of the hypothesis that was tested. C 3

Words: 0

Q 4.9 **Suggest** an extension to this investigation. C 1

Words: 0

Question 5

Resistance is the vital element that controls current and ensures electrical safety.

Another MYP student decided to further investigate the variation in current with a change in resistance of the circuit.

Q 5.1 **Design** **an experiment to undertake this study. In your design you should include:** B 13

- **The independent and dependent variables.**
- **Any assumptions you will make about control variables**
- **The equipment you use**
- **The method you will use**
- **How you will collect sufficient data**

Words: 0

Question 6

Temperature alters resistance, impacting electrical characteristics.

A student decides to investigate the dependence of temperature on the resistance of a conductor.

Q 6.1 **State** a question that could be answered with this investigation. B 1

Words: 0

Q 6.2 **Formulate** and **explain** a hypothesis that could be tested with this question. B 3

Words: 0

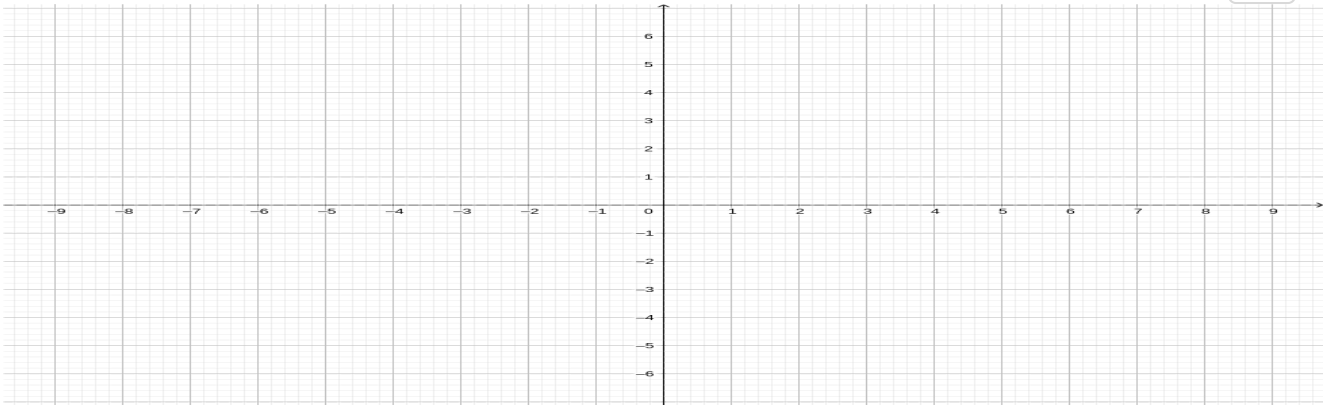
Q 6.3 **State** **one** variable that should be controlled in this investigation. **Describe** how and why this variable should be controlled. B 2

Words: 0

The data collected by the student is shown in the table below.

Temperature (in ^{o}C)	Resistance (in Ohms)
30	50
45	60
60	70
75	80
90	90

Q 6.4 **Plot** this collected data into graphical form giving suitable title to the graph. C 5



Q 6.5 **Interpret** the results from the graph. C 3

Words: 0

Q 6.6 **Discuss** the validity of your hypothesis. C 3

Words: 0

Question 7

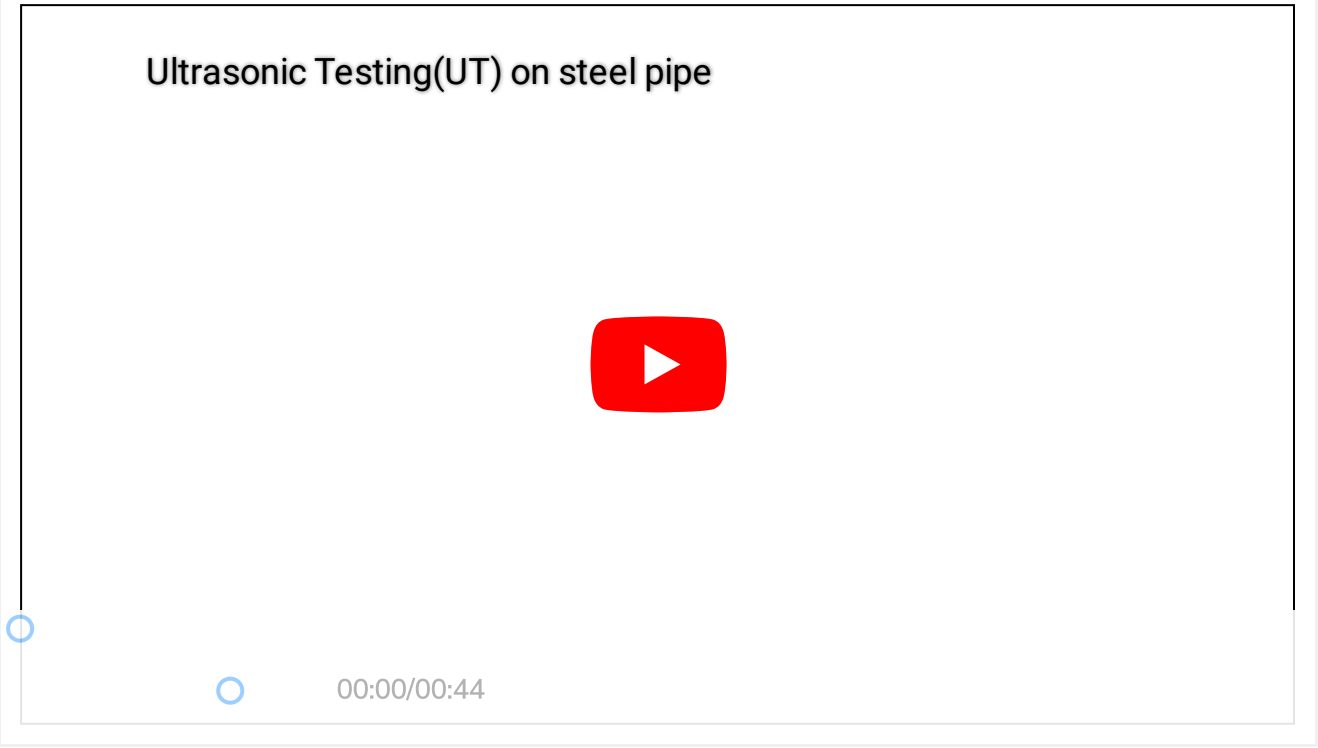
Applying science

The global context is **scientific and technical innovation**. This task (questions 7 and 8) addresses the key concept of **systems** and assesses **criterion D** (Reflecting on the impacts of science).

Ultrasound are high-frequency sound waves, used in medical imaging and beyond.

Sound is a vibration that propagates as an acoustic wave, through a transmission medium

Video 1



Q 7.1 **Select** the correct statement among the following. D 1

A Ultrasound are sound waves with frequencies lower than the audible frequency.

B Ultrasound are sound waves with frequencies higher than the audible frequency.

C Ultrasound is produced when an object in motion exceeds the speed of sound

D The wavelength of ultrasound is large and ranges to few meters.

Q 7.2 **Suggest** another application of ultrasound. D 1

Words: 0

Q 7.3 **Outline** how the above-mentioned technology is helping the industry in maintaining the safety standards D 4

Words: 0

Question 8

Ultrasound is versatile tool with applications in imaging, cleaning, and more.

In medicine, ultrasound is used to detect changes in the appearance of organs, tissues, and vessels and to detect abnormal masses, such as tumours.
In an ultrasound exam, a transducer both sends the sound waves and records the echoing waves. When the transducer is pressed against the skin, it sends small pulses of inaudible, high-frequency sound waves into the body. As the sound waves bounce off internal organs, fluids and tissues, the sensitive receiver in the transducer records tiny changes in the sound's pitch and direction. These signature waves are instantly measured and displayed by a computer, which in turn creates a real-time picture on the monitor. One or more frames of the moving pictures are typically captured as still images. Short video loops of the images may also be saved.
Doppler ultrasound, a special ultrasound technique, measures the direction and speed of blood cells as they move through vessels. The movement of blood cells causes a change in pitch of the reflected sound waves (called the Doppler effect). A computer collects and processes the sounds and creates graphs or colour pictures that represent the flow of blood through the blood vessels.

Q 8.1 **Suggest** **two** **benefits of using ultrasound to detect the abnormalities instead of other medical techniques such as MRI.** D 4

Words: 0

Q 8.2 Using the information provided and from your wider MYP studies, **discuss** and **evaluate** the use of this type of technological advances in the early detection of abnormalities in the organs. Your answer should include: D 14

- The advantages of the technology
- The disadvantages of the technology
- Economic concerns
- Social concerns
- A concluding appraisal

Words: 0