Integrated Science e-Assessment
November 2019

Question 1 (8 marks)

Metals such as aluminium (Al) are extracted from their ores and transformed into useful materials. Aluminium is the second most used metal after iron (Fe). Aluminium and iron have different properties. They are represented in the periodic table in different groups and periods.

Question 1a (1 mark)

Select the correct definition for group and period.

Draggable labels:

Elements arranged in vertical columns that show similar chemical properties

Elements arranged in horizontal rows that show different chemical and physical properties

Group	
Period	

Scroll down to continue

Question 1a (1 mark)

Select the correct definition for group and period.

Draggable labels:

Elements arranged in vertical columns that show similar chemical properties

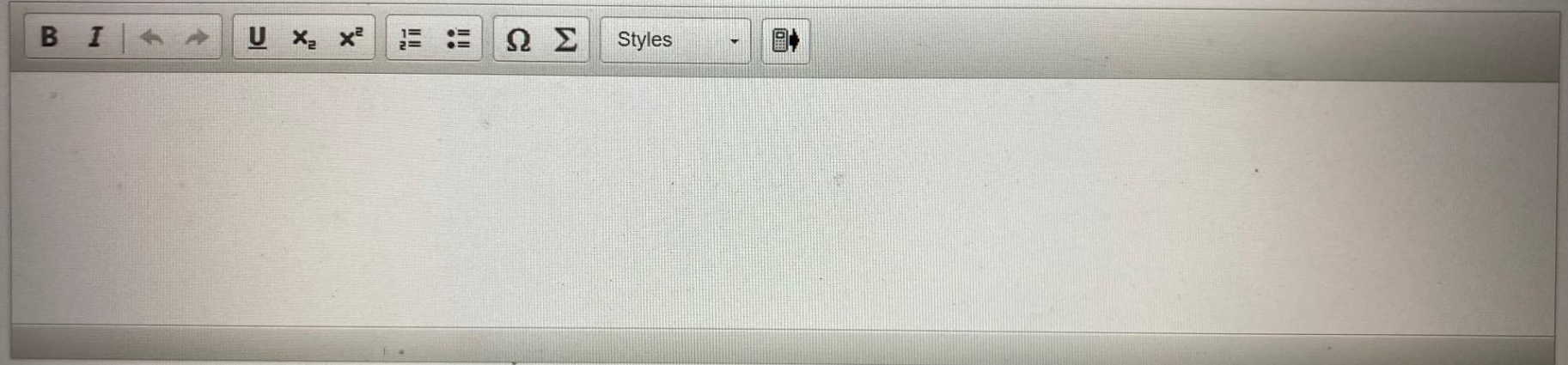
Elements arranged in horizontal rows that show different chemical and physical properties

Group	
Period	

Scroll down to continue

Question 1b (1 mark)

Use the information from the periodic table to **state** the electronic configuration of an aluminium atom.



Question 1c (2 marks)

Aluminium can be used in a huge variety of ways including in products such as cans, foils, household items, materials for houses, and in aircraft manufacturing.

Scroll down to continue

Question 1c (2 marks)

Aluminium can be used in a huge variety of ways including in products such as cans, foils, household items, materials for houses, and in aircraft manufacturing.

©

Suggest different properties of aluminium metal that make it suitable for the following uses.

Aircraft

Scroll down to continue

Suggest different properties of aluminium metal that make it suitable for the following uses.

Aircraft

Soda cans

Scroll down to continue

Question 1d (1 mark)

Aluminium is commonly used in medicine in different compounds. For example, aluminium hydroxide, $Al(OH)_3$ is often used as an antacid to relieve acid indigestion caused by excess stomach acid (HCl). The $Al(OH)_3$ reacts with the excess stomach acid to relieve the symptoms of acid indigestion.

Scroll down to continue

State the type of chemical reaction between $Al(OH)_3$ and HCl.

B I U x_2 x^2 Ω Σ Styles

Question 1e (3 marks)

Write down a balanced chemical equation for the reaction in part (d).

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 2 (12 marks)

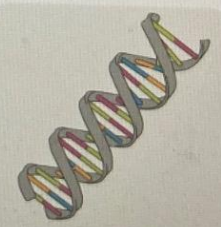
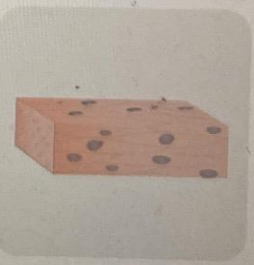
Our human body consists of different systems that carry out specific functions necessary for life. The body is divided into specific levels of organization which make the human body a complex organism.

Question 2a (2 marks)

Organize the images below in order of complexity.

Draggable items:



Most complex

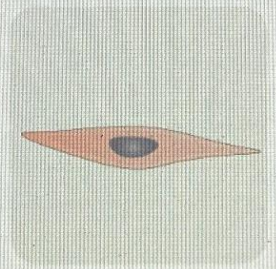
Scroll down to continue

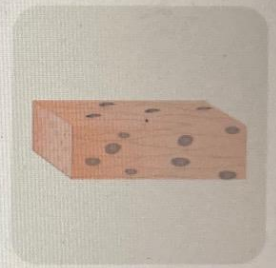
Middle Years Programme | Scooby Doo | INT SCIENCES | Assistance

Question 2a (2 marks)

Organize the images below in order of complexity.

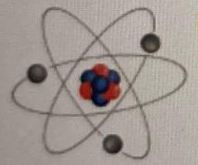
Draggable items:



Least complex

Most complex




Question 2b (2 marks)

Outline the meaning of the terms *tissue* and *organ*.

Tissue

Organ

Scroll down to continue

- break down foods into nutrients that can be used by the body
- absorb these nutrients that are necessary for energy and growth.

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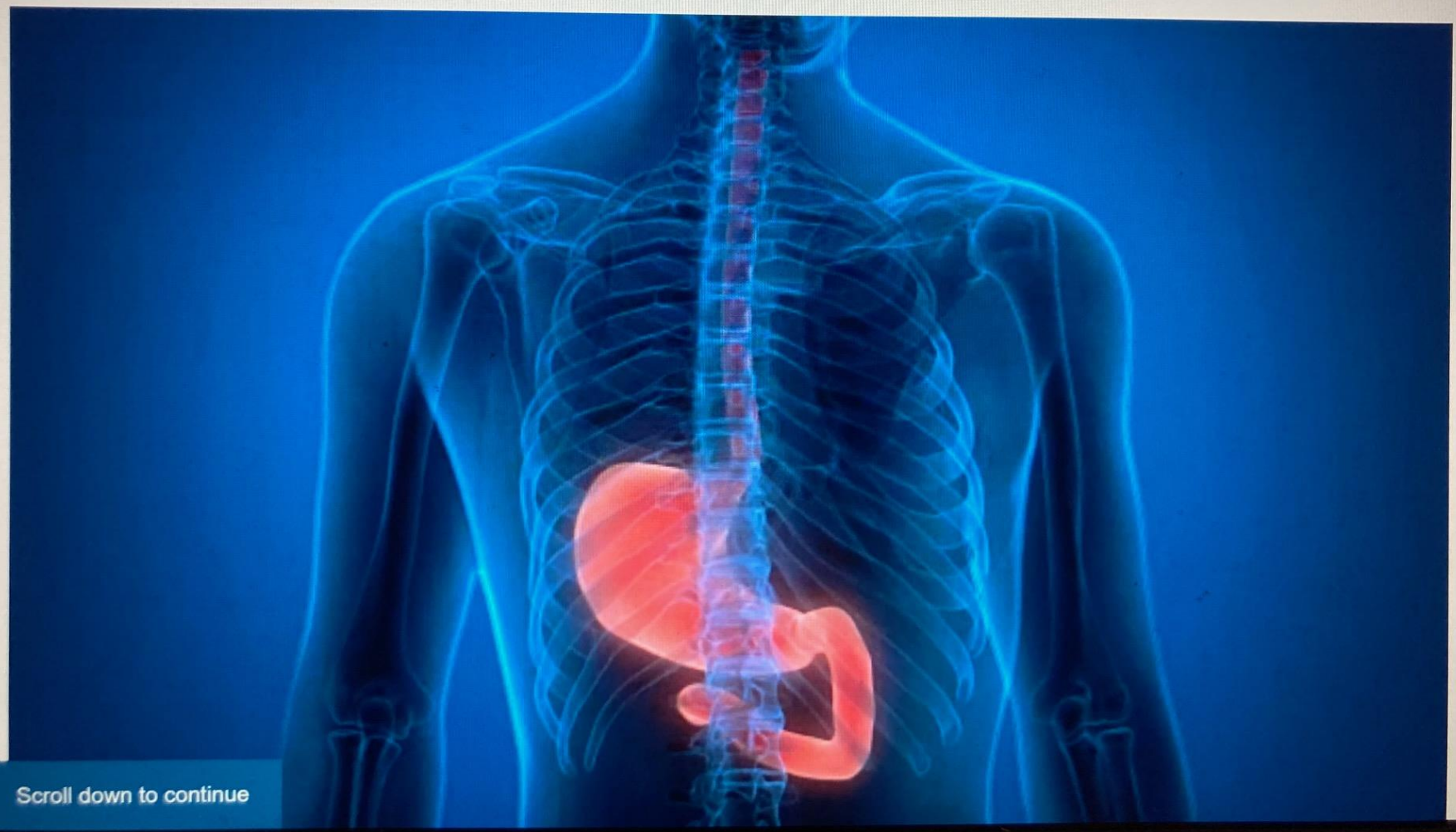


Scroll down to continue

State the nutrients that are necessary for energy and growth.

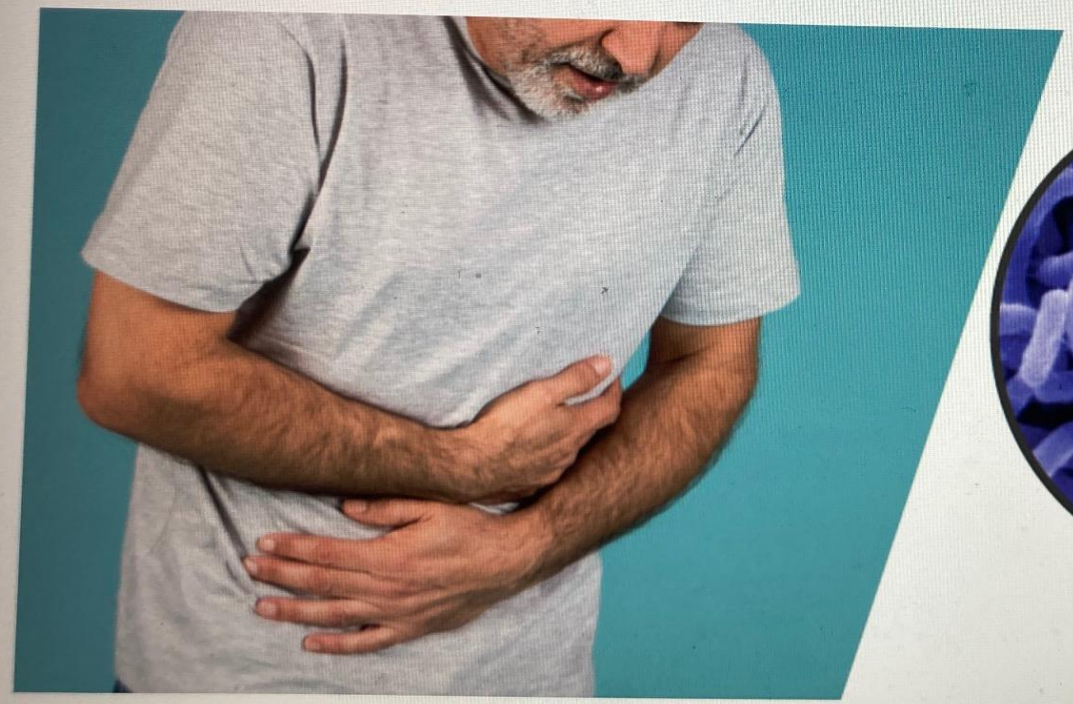
Energy

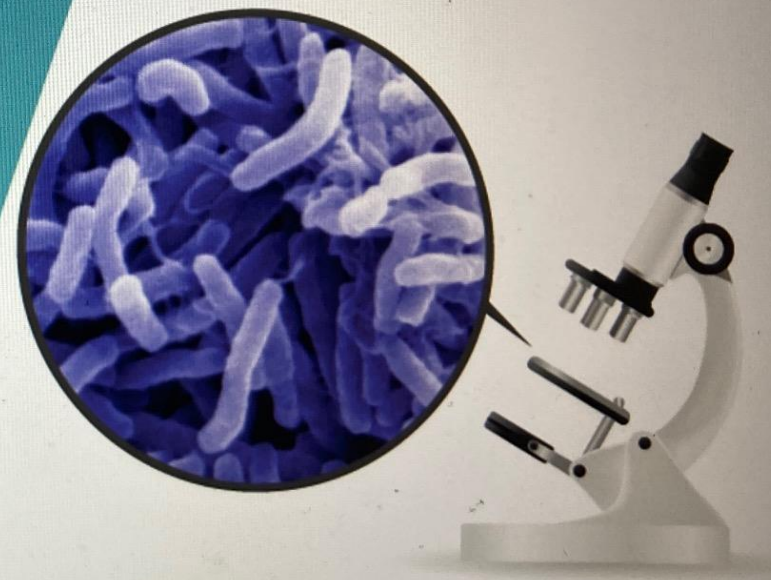
Growth

Scroll down to continue

Question 2d (1 mark)

Cholera is an infectious disease caused by bacteria called *Vibrio cholerae.* These bacteria affect the digestive system and cause severe watery diarrhoea which can lead to dehydration and even death if untreated. Cholera is caused by eating contaminated food or drinking water. The disease is most common in places with poor sanitation and over-crowding.





Scroll down to continue

Cholera causes severe watery diarrhoea. **Suggest** which part of the digestive system is affected by these bacteria.

B I U x_2 x^2 Ω Σ Styles

Question 2e (3 marks)

Suggest why dehydration can lead to death.

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 2f (2 marks)

State and **justify** one safety precaution you must take if this disease has spread in your community.

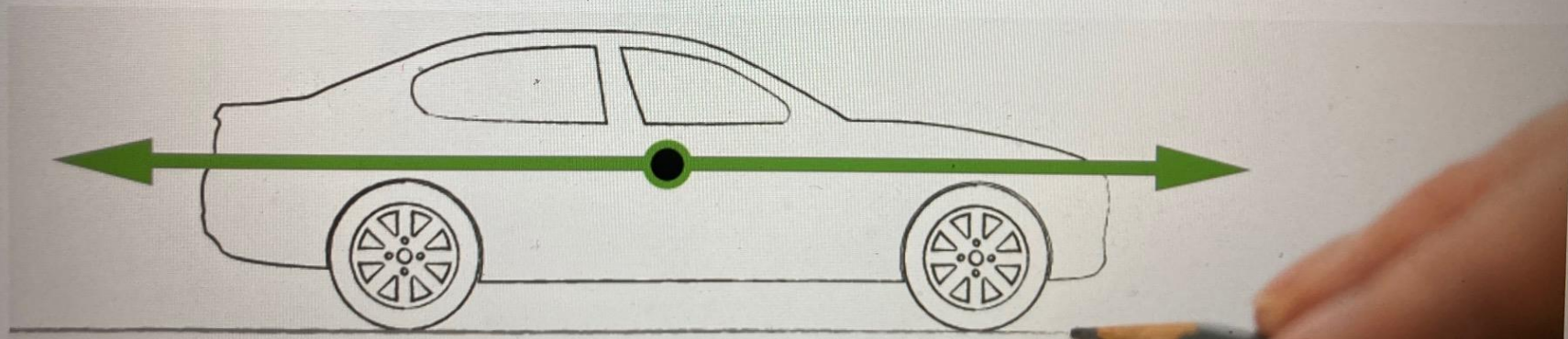
Styles

Question 3 (9 marks)

The motion of an object can be changed when a force is applied.

Question 3a (2 marks)

A teacher has asked a student to sketch a diagram showing the horizontal forces acting on an accelerating car.



Scroll down to continue

©

Outline why the student's sketch is incorrect.

B I U x_2 x^2 Ω Σ Styles

Question 3b (3 marks)

Scientists and engineers are working on new types of vehicles to prevent pollution. For example, AEV (all-electric vehicles), vehicles that do not need any type of fossil fuel to work, were designed to prevent emission of pollutants to the atmosphere.

Scroll down to continue

Question 3b (3 marks)

Scientists and engineers are working on new types of vehicles to prevent pollution. For example, AEV (all-electric vehicles), vehicles that do not need any type of fossil fuel to work, were designed to prevent emission of pollutants to the atmosphere.

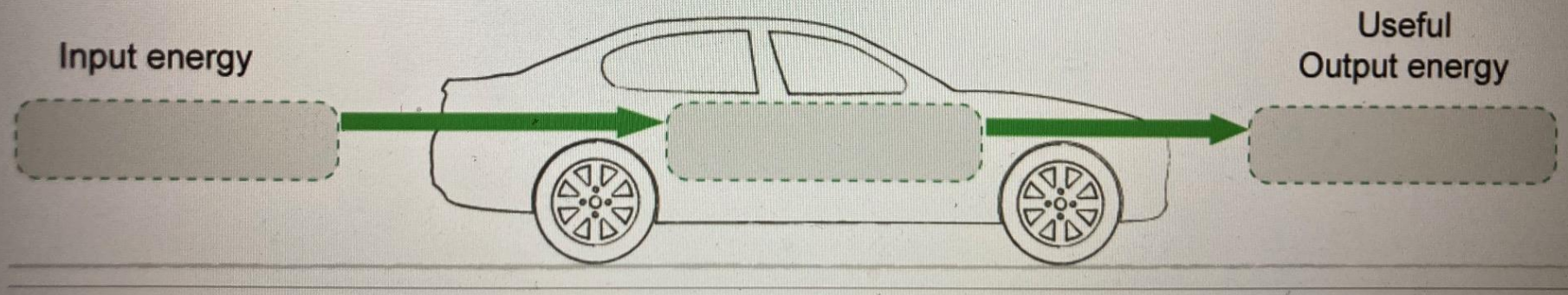
Scroll down to continue

The most important part of an AEV is the battery. This battery should be a powerful enough device to run all accessories and long-lasting enough to take the driver to the desired place.

Select the correct energy type to complete the diagram showing energy transformations.

Draggable items:

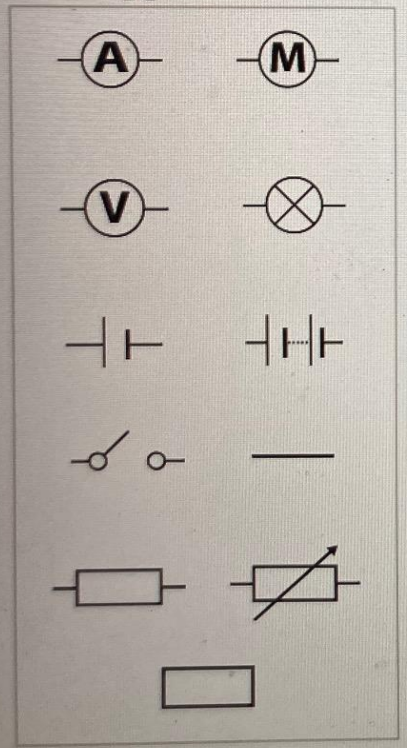
Kinetic Sound Chemical Electrical Nuclear Gravitational

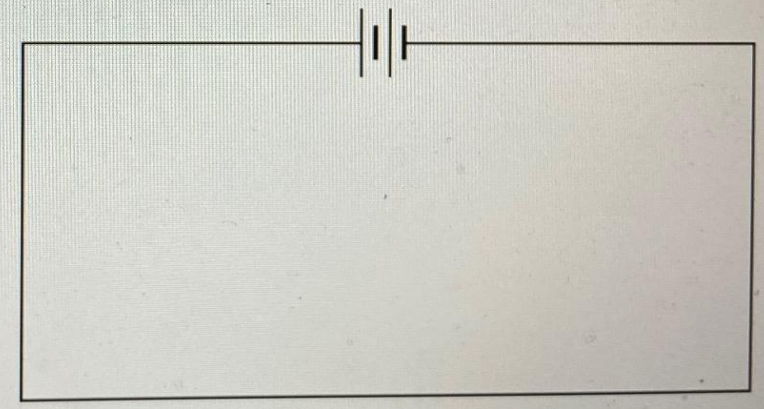


Question 3c (2 marks)

Lights are an important part of a car and are needed for signalling and driving at night. Use the tool to **construct** a parallel circuit with two light bulbs that could be used in a car.

Draggable items:





Scroll down to continue

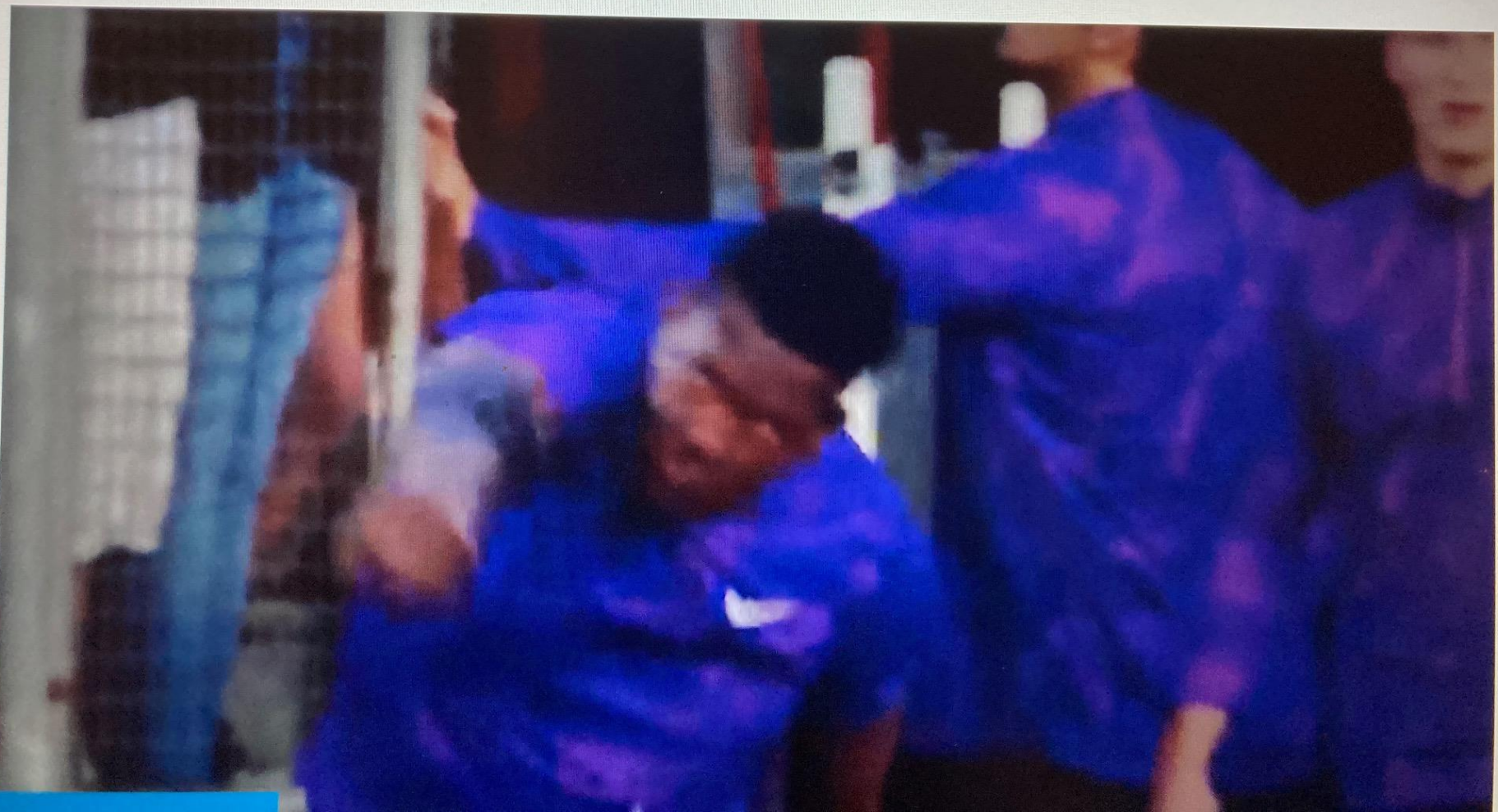
Question 3d (2 marks)

State two advantages of using a parallel circuit.

B I U x_2 x^2 Ω Σ Styles

Many systems work based on the laws of physics. Javelin throwing is one sport that depends on understanding the motion of an object.

The video below shows an athlete throwing a javelin in a competition.



Question 4a (2 marks)

The two main factors that affect the horizontal distance the javelin travels (the range) are:

- the speed at which the javelin is thrown
- the angle at which it's thrown.

A student decides to study one of the factors that affects the motion of a javelin.

State the student's research question.

B I U x_2 x^2 Ω Σ Styles

Question 4b (2 marks)

Scroll down to continue

Question 4b (2 marks)

Suggest two variables that the student must control.

Control variable 1

B I U x_2 x^2 Ω Σ Styles

Control variable 2

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 4c (2 marks)

The student decided to use darts as shown below to model the motion of a javelin. This model is only partially valid. **Suggest** two reasons why the model is only partially valid.

Scroll down to continue

Reason 1

B I U x_2 x^2 Ω Σ Styles

Reason 2

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 4d (1 mark)

Suggest one reason why a student might choose to use a model to study the motion of a javelin instead of using the javelin itself.

B I U x_2 x^2 Ω Σ Styles

Question 4e (7 marks)

In order to investigate the motion of a javelin, a student decided to use the simulation below in order to determine the maximum range (horizontal distance) the javelin can travel if released ial speed. In all of his experiments, he used a simplified model in which the air

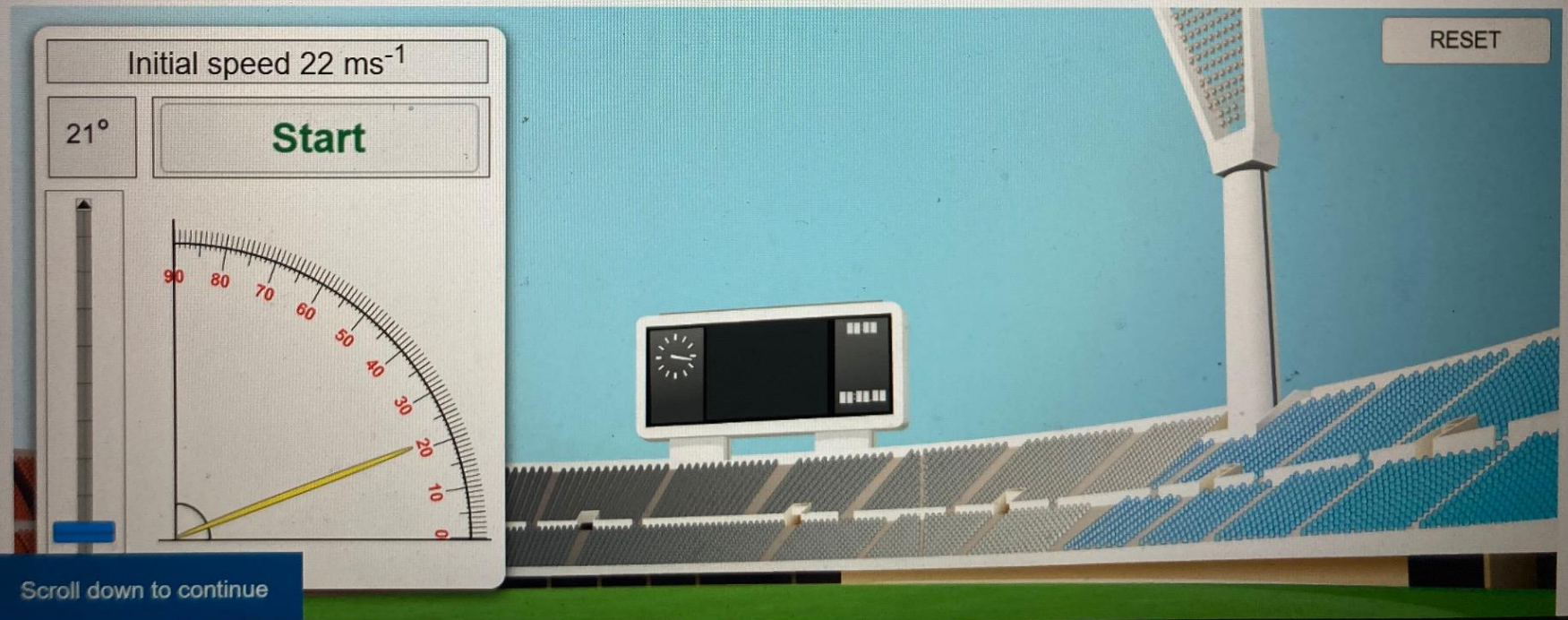
Scroll down to continue

Question 4e (7 marks)

In order to investigate the motion of a javelin, a student decided to use the simulation below in order to determine the maximum range (horizontal distance) the javelin can travel if released with the same initial speed. In all of his experiments, he used a simplified model in which the air resistance and the height of the thrower were ignored.

Use the slider to change the angle of the javelin and click start to throw it.

This media is interactive



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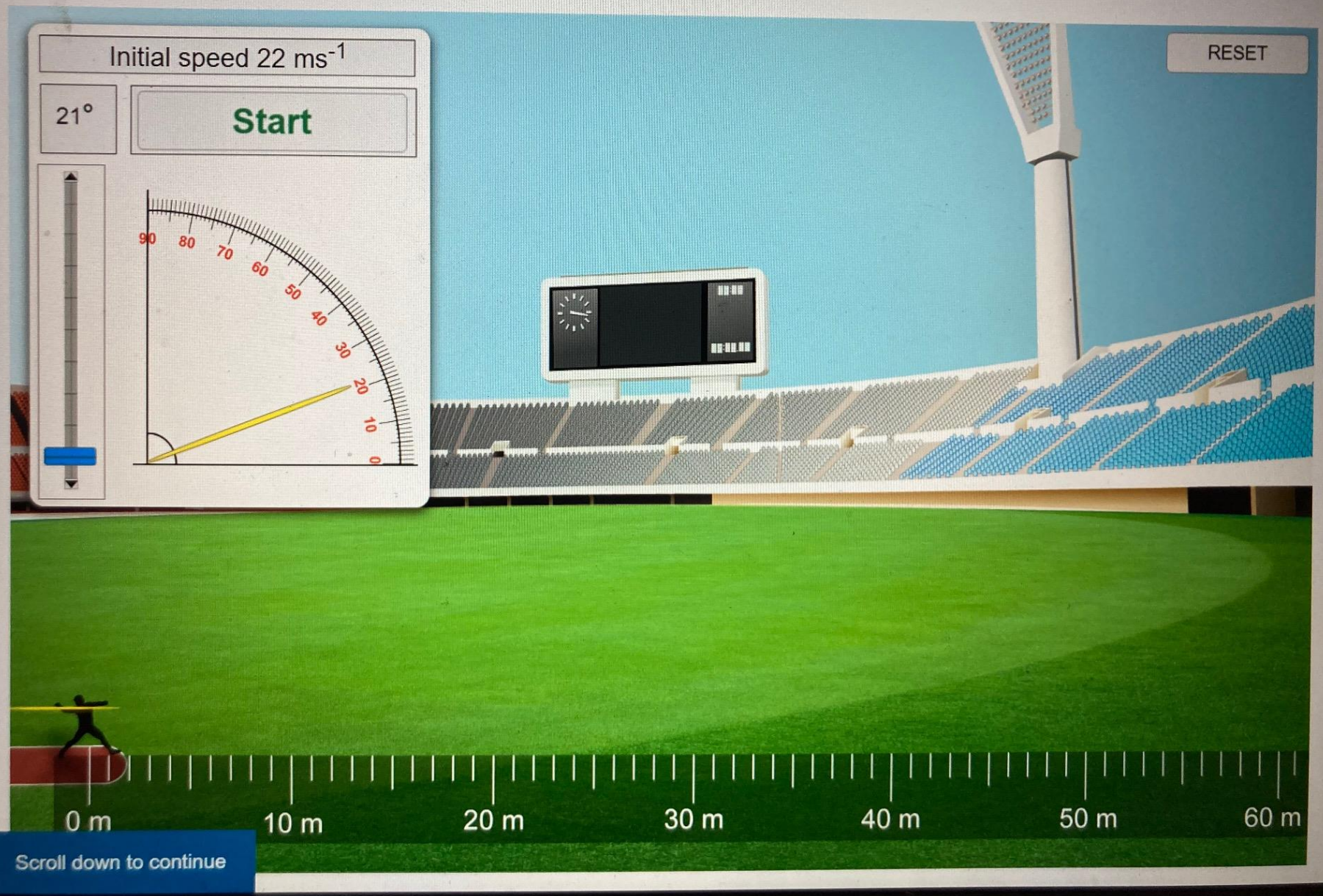
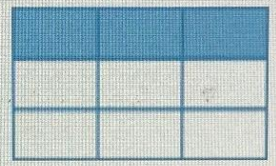
This media is interactive



Scroll down to continue

Design a table to record sufficient data for a single trial. Use the simulation to collect data and **present** this data in your table.

Create New Table



Reset

Question 4f (1 mark)

A javelin used in male sports events has a mass of 800 g. **State** the mass of this javelin in kilograms.

Styles

Scroll down to continue

Question 4f (1 mark)

A javelin used in male sports events has a mass of 800 g. **State** the mass of this javelin in kilograms.

B I U x_2 x^2 Ω Σ Styles

Question 4g (4 marks)

An athlete threw a javelin at a speed of 22 ms^{-1}. Use information from the formula sheet to **calculate** the kinetic energy of the javelin. Give your answer to three significant figures.

Scroll down to continue

x_2 x^2 Ω Σ Styles

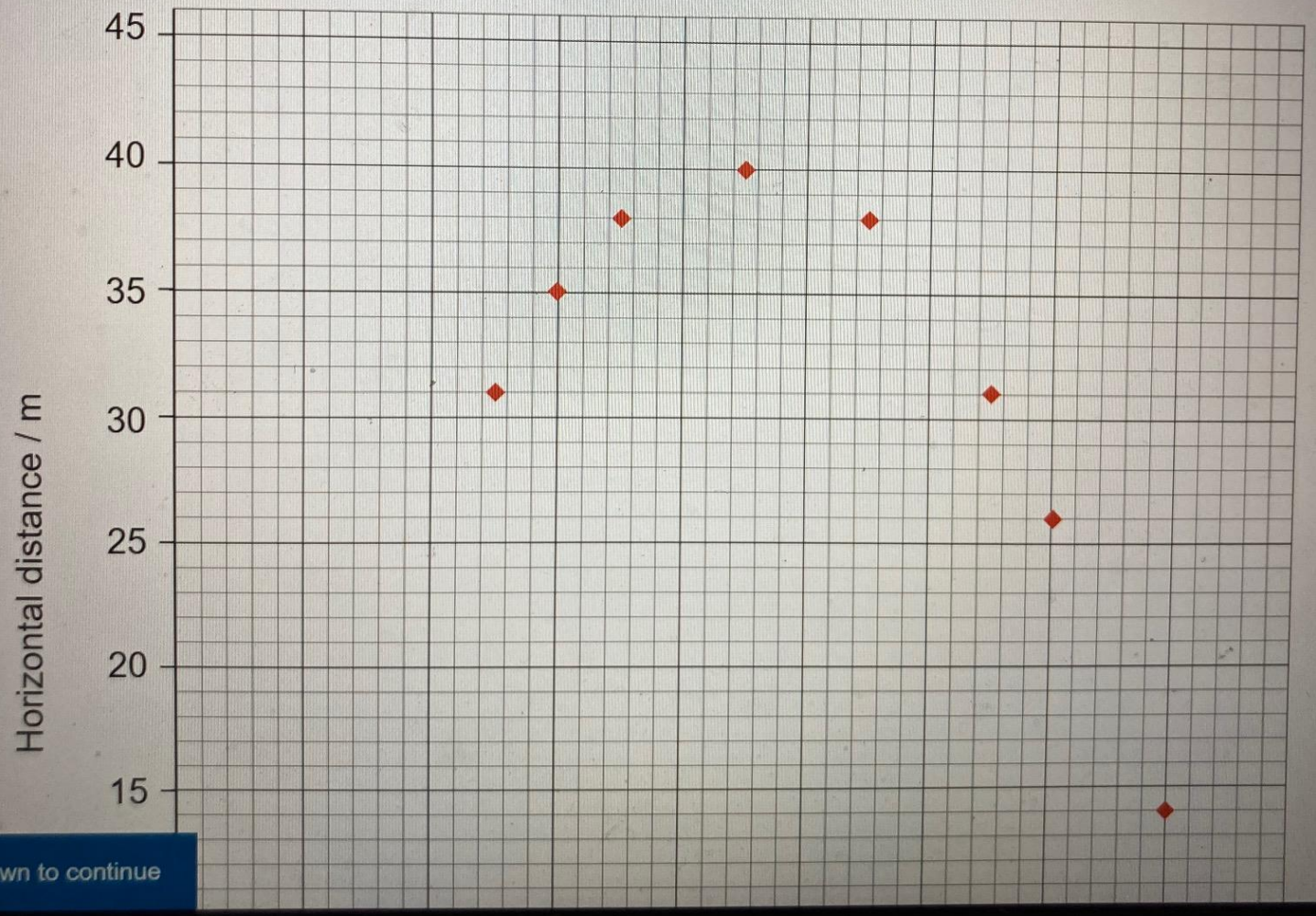
Question 4g (4 marks)

An athlete threw a javelin at a speed of 22 ms^{-1}. Use information from the formula sheet to **calculate** the kinetic energy of the javelin. Give your answer to three significant figures.

Scroll down to continue

Question 5 (7 marks)

Another student is doing a similar investigation but experimenting with a greater range of angles. He collected the data and plotted the graph below.



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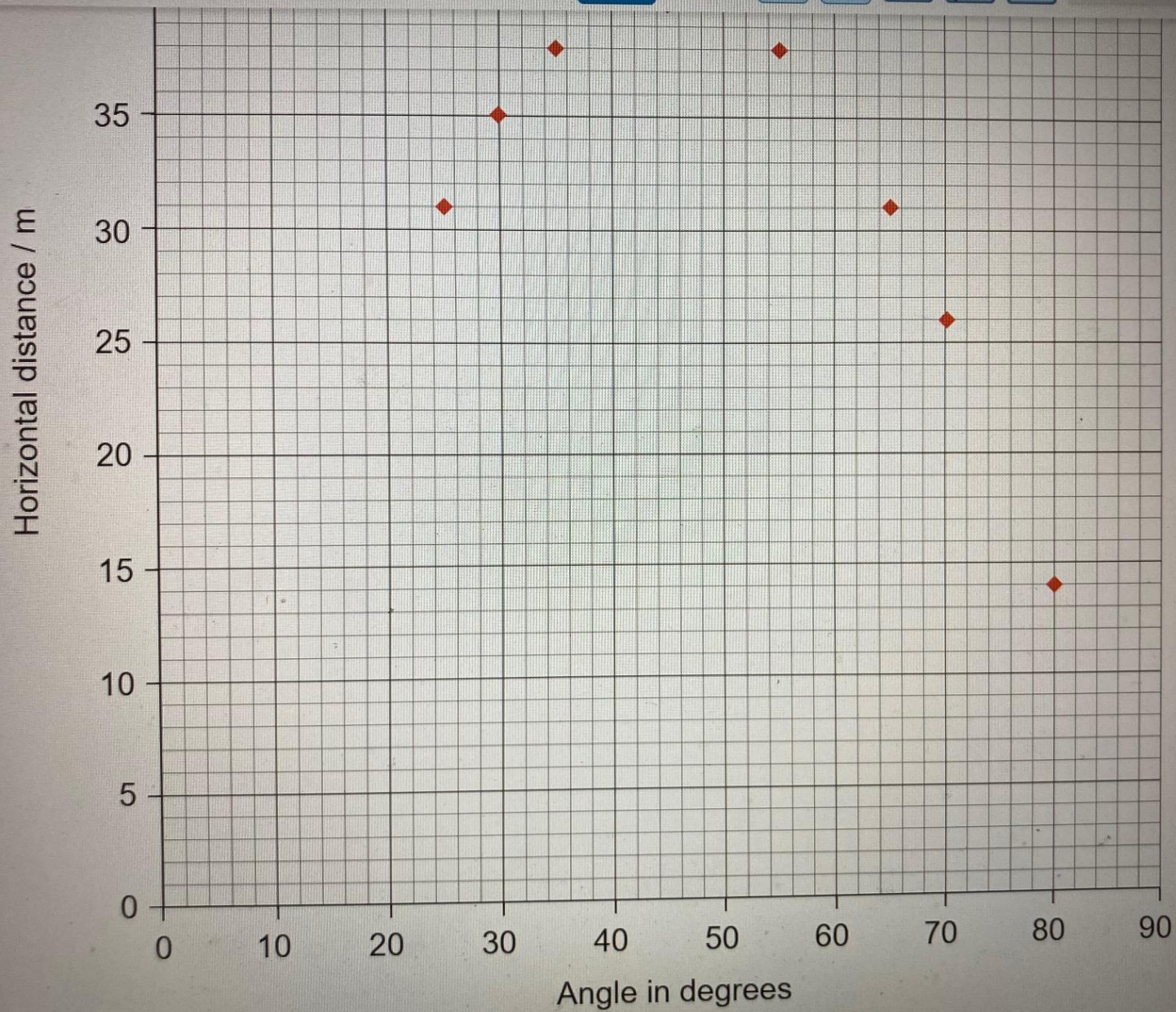

Horizontal distance / m
0
5
10
15
20
25
30
35
0
10
20
30
40
50
60
70
80
90
Angle in degrees

Question 5a (1 mark)

Suggest a suitable title for the graph.

B I U x_2 x^2 Ω Σ Styles

Question 5b (2 marks)

Use the graph to **state** the maximum distance the javelin travelled.

B I U x_2 x^2 Ω Σ Styles

Question 5b (2 marks)

Use the graph to **state** the maximum distance the javelin travelled.

B I U x_2 x^2 Ω Σ Styles

Question 5c (3 marks)

Use the graph above to **analyse** the student's results. You should use data to support your answer.

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 5c (3 marks)

Use the graph above to **analyse** the student's results. You should use data to support your answer.

B I U x_2 x^2 Ω Σ Styles

Question 5d (1 mark)

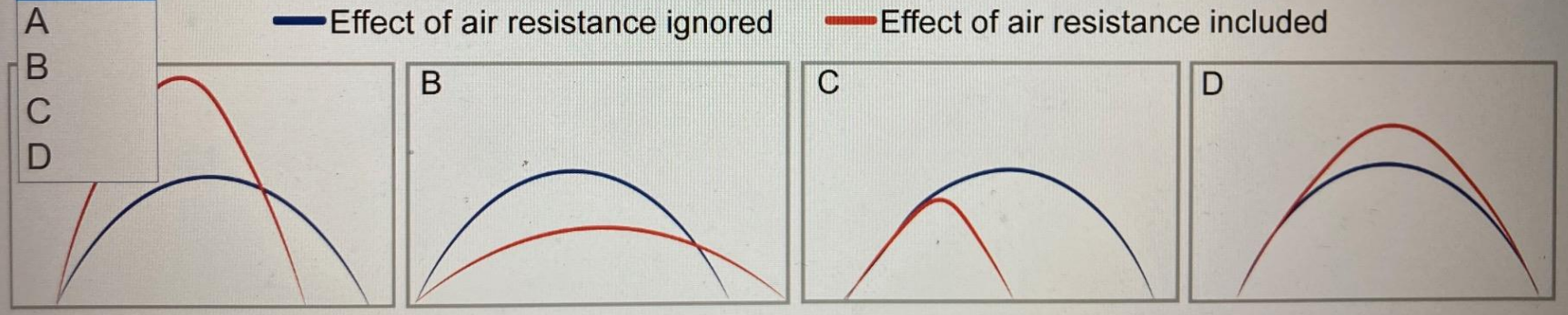
In his previous investigation, the student ignored the effect of air resistance on the javelin. you predict would show the path of the javelin if the effect of air resistance is

Scroll down to continue

Question 5d (1 mark)

In his previous investigation, the student ignored the effect of air resistance on the javelin.
Select the image you predict would show the path of the javelin if the effect of air resistance is included.

Select ▾
Select
A
B
C
D



Question 6 (23 marks)

Whether throwing a javelin, a dart or using a bow and arrow, energy is required.

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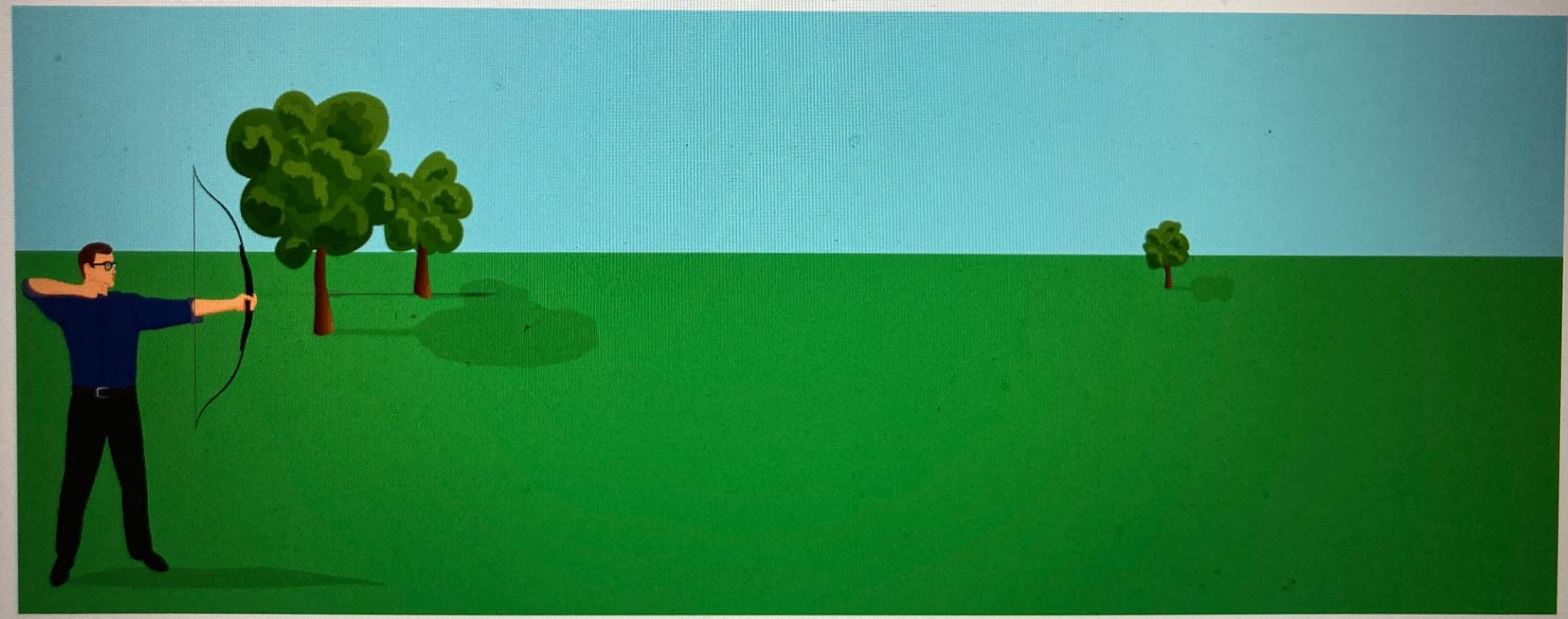

Scroll down to continue

Question 6a (1 mark)

State the name of the process used to provide energy to muscles.

B I U x_2 x^2 Ω Σ Styles

Question 6b (2 marks)

The table below shows the energy lost in a bow and arrow system.

Type of energy lost	Percentage of energy lost / %
Kinetic energy in vibrating bow and string	17
	11

Question 6b (2 marks)

The table below shows the energy lost in a bow and arrow system.

Type of energy lost	Percentage of energy lost / %
Kinetic energy in vibrating bow and string	17
Heat energy from friction	11
Sound energy	6

Calculate the percentage of useful energy output.

Scroll down to continue

Question 6c (4 marks)

Another student is interested in studying the relationship between the range travelled by an arrow and the initial amount of energy provided. He uses a bow and arrow in his investigation. The student assumes that the amount of energy provided is proportional to the distance the string is pulled back, known as the draw length.

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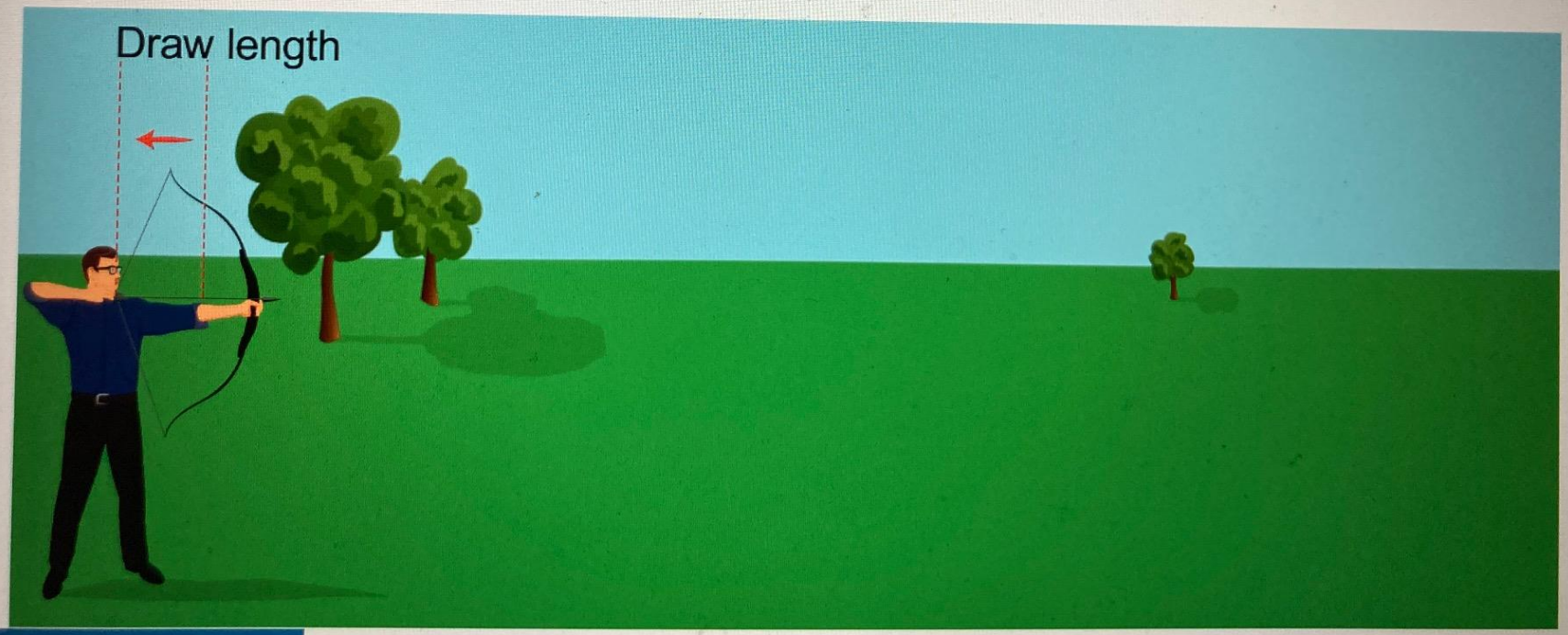


Scroll down to continue

Identify the variables in the student's investigation.

Independent variable

Dependent variable

Control variable 1

B I U x_2 x^2 Ω Σ Styles

Control variable 2

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Question 6d (14 marks)

A student was given a bow and arrow, a measuring tape and a ruler.

Design an experiment that the student can use to study the effect of initial energy on the range travelled by an arrow. In your response, you should include:

- details of any additional equipment needed
- a hypothesis for your experiment
- how you will manipulate the variables
- details of the method you will use to collect sufficient data
- how you will make sure your method is safe.

Scroll down to continue

Question 6e (2 marks)

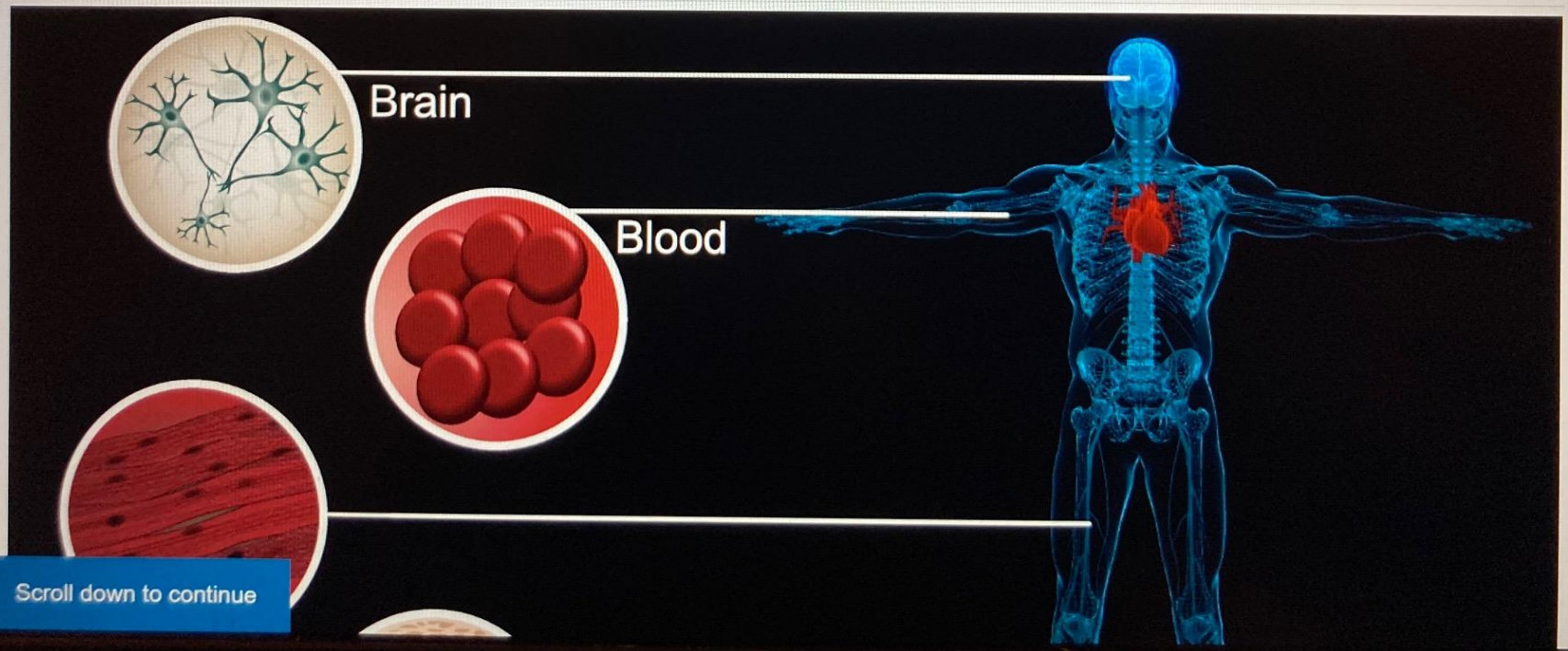
Suggest two extensions for this investigation.

B I U x_2 x^2 Ω Σ Styles

Question 7 (22 marks)

Research into cells has been advancing with the development of technology in order to provide a greater understanding of how organisms develop. Stem cells offer promising potential to treat diseases due to their ability to become specialized cells.

Video | Transcript



Scroll down to continue

Video | Transcript

Stem cells are unspecialized cells that have not yet developed a specific function. They are used to create some specialized cell types such as brain, blood, muscle and skin. These cells can then be used for study or medical treatment.

Stem cells can be taken from embryos or from a person's own bone marrow or skin. Stem cells taken from embryos can develop into any specialized cell type.

Stem cells taken from bone marrow or skin are limited to developing into cell types of their own tissues.

Stem cells have the ability to divide rapidly.

In the laboratory, scientists modify the cells to make them specialized.

Stem cells have the potential to treat a range of medical conditions. From treating patients with diabetes, replacing lost brain cells in Parkinson's disease, growing new organs, or replacing damaged body parts.

Skin transplant is one of the methods used to treat severe burns covering a large area of the body. Surgeons would take healthy skin from another part of the body and use it to repair the burn. After many weeks and even months of recovery the skin would heal leaving scar tissue that limits

body parts.

Skin transplant is one of the methods used to treat severe burns covering a large area of the body. Surgeons would take healthy skin from another part of the body and use it to repair the burn. After many weeks and even months of recovery the skin would heal leaving scar tissue that limits movement.

A new application of stem cells is being developed by an Australian surgeon. Her team has developed a solution of stem cells which is sprayed onto the burn. Using the patient's own skin stem cells, fully functioning skin can be grown to heal burn wounds. The recovery time is shorter than for skin transplant and leaves less scar tissue.

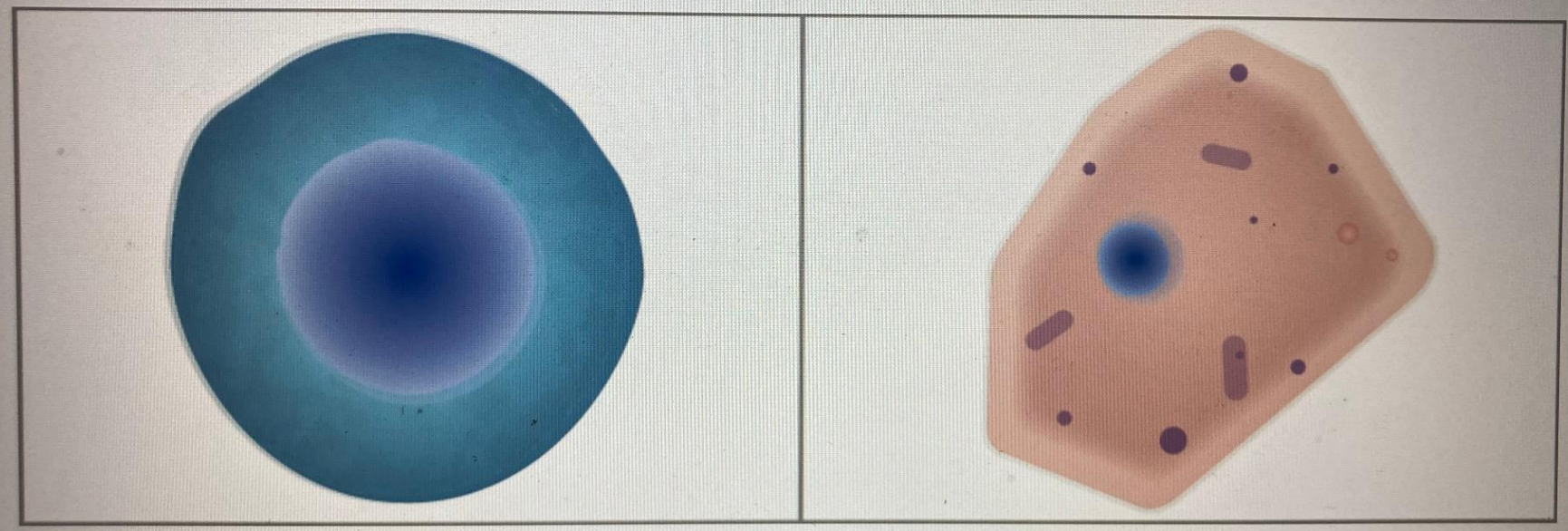
Question 7a (1 mark)

The image on the left is a stem cell and the image on the right is a specialized skin cell.

Scroll down to continue

Question 7a (1 mark)

The image on the left is a stem cell and the image on the right is a specialized skin cell.



©

State one structure the stem cell and the skin cell have in common.

B I U x_2 x^2 Ω Σ Styles

Scroll down to continue

Skin cells divide by mitosis. **Select** the correct statements which apply to skin stem cell division and drag to the table below.

Draggable labels:

- *Daughter cells are identical to parent cells*
- *One parent cell creates two daughter cells*
- *Used in growth and repair*
- *One parent cell creates four daughter cells*
- *Used in sexual reproduction*
- *Used to create normal body cells*
- *Used to create sex cells*
- *Daughter cells are different from parent cells*
- *Can lead to variation in a population*

Scroll down to continue

Question 7c (3 marks)

Skin is the largest organ in the body. It is important for skin burns to be treated as soon as possible to return normal function to the skin. **Suggest** three functions of the skin.

B I U x_2 x^2 Ω Σ Styles

Question 7d (4 marks)

Use information from the video to **organize** the stages for treating burns with skin stem cells.

Scroll down to continue

Stage 1

Use information from the video to **organize** the stages for treating burns with skin stem cells.

Draggable labels:

- Skin stem cells are placed into solution
- Stem cells are obtained from an embryo
- Stem cells are placed on a Petri dish to multiply
- Stem cells are made to specialize into bone cells
- Skin stem cells are sprayed onto damaged skin
- Skin stem cells are injected into the burn
- Skin stem cells are obtained from skin

Stage 1

Stage 2

Stage 3

Stage 4

Question 7e (12 marks)

Stem cells can be taken from embryos or from a patient's own bone marrow or skin cells. **Discuss** and **evaluate** the implications of using stem cells to treat medical conditions.

In this extended piece of writing you should include:

- a comparison of stem cells taken from embryos and a patient's own stem cells
- ethical considerations around the use of stem cells
- economic considerations around the use of stem cells
- a concluding appraisal giving your opinion about the use of stem cells to treat medical conditions.

Scroll down to continue