GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

STUDENT EDUCATION NUMBER									

Samoa National Junior Secondary Certificate

PHYSICS

2022

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS

1. You have 10 minutes to read **before** you start the exam.
2. Write your **Student Education Number (SEN)** in the space provided on the top right-hand corner of this page.
3. **Answer ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more paper to write your answers, ask the supervisor. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets at the appropriate places in this booklet.
5. **All the formulas required are provided on page 21.**

STRANDS		Pages	Time (min)	Weighting
STRAND 1	ENERGY	2-5	45	25
STRAND 2	ELECTRICITY	6-10	45	25
STRAND 3	MAGNETISM	11-14	45	25
STRAND 4	FORCES AND MOTION	15-20	45	25
TOTAL			**180**	**100**

Check that this booklet contains pages 2-22 in the correct order and that none of these pages are blank.

HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

STRAND 1:	ENERGY	WEIGHTING 25

For Questions 1 – 3, write the letter of your BEST answer in the box provided.

1. When heat is transfer from Sun to Earth through space by electromagnetic wave, it is referred to as heat transfer by:

   A. Conduction.
   B. Convection.
   C. Radiation.
   D. Conduction and convection.
   E. Conduction and Radiation.

	SL 1

2. _____ is a distance between two successive corresponding positions of a wave and it is measured in meters.

   A. Wavelength
   B. Period
   C. Amplitude
   D. Trough
   E. Crest

	SL 1

3. What happens to the speed of sound when it travels from less dense to a denser medium?

   A. Remains the same.
   B. Increases.
   C. Stops moving.
   D. Decreases.
   E. Doubles the speed of the first medium.

	SL 1

4. Calculate the amount of heat that boils water in a beaker if the mass of the water itself is 1.20 kg.
Given the mass of water (m) = 1.20 kg, specific heat capacity of water (c) = 4200 J/kg^{0}C, final temperature = 100°C and the initial Temperature = 27°C.

SL 3

5. You were given two beakers of water with different temperatures. Beaker A has 27^0 C and Beaker B has 28^0 C. Identify which beaker has the greater amount of kinetic energy of its water molecules and state the reason for your answer.

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SL 2

6. Describe how the amount of time affects the rate of heat transfer through liquids.

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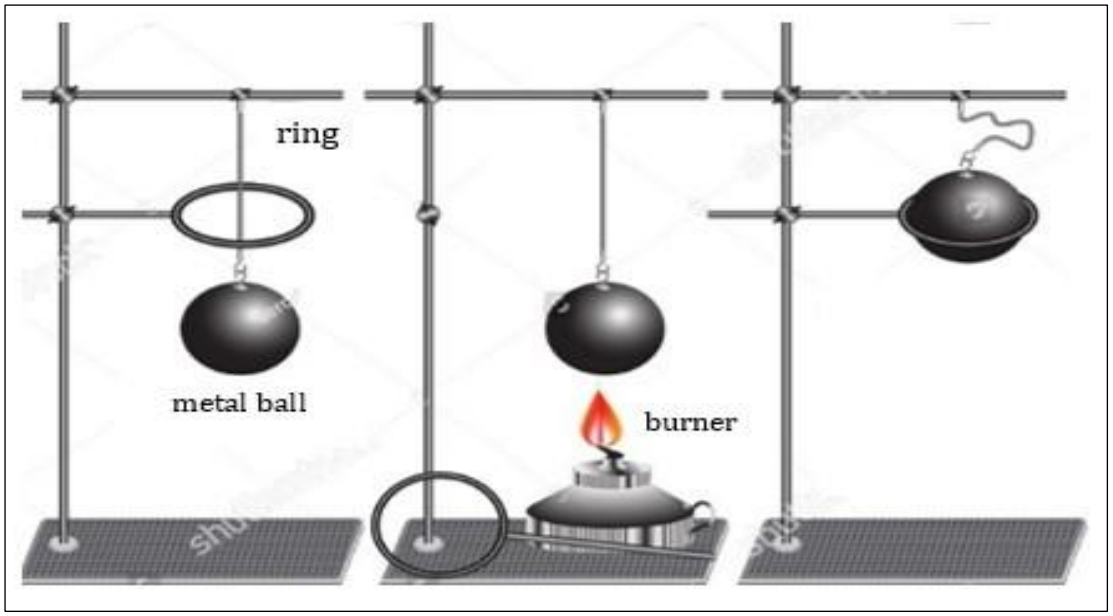
SL 2

The diagram below shows an experiment done by Tulia to investigate the Expansion of Metals.



7. Discuss the results and observations of the above experiment.

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SL 4

8. Choose the right words from the list below to fill in the blanks of the statement below:

(move, expanding, energy, water, volume)

If liquid is heated, the particles gain more _____ and move faster and

faster _____ the liquid.

SL 2

9. Calculate the wavelength of a sound wave having a frequency of 8700 Hz, and a speed of 352 m/s in a given medium.

SL 3

10. Compare and contrast the nature of light and sound waves in terms of speed, type of wave and need for a medium to travel.

Properties/Behaviour	Sound Wave	Light Wave
Speed value in air		$3.00 \times 10^8\ m/s$
Type of Waves (Longitudinal/Transverse)	Longitudinal	
Need a medium to travel (Yes/No)		

SL 4

11. What happens to the speed and the frequency of a sound wave when it travels from air into water?

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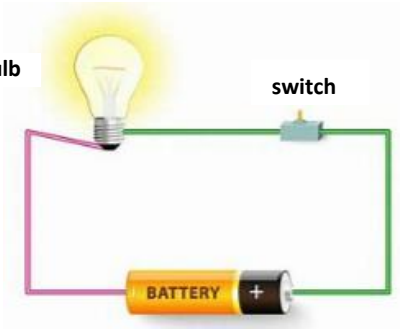
SL 2

STRAND 2:	ELECTRICITY	WEIGHTING 25

For Questions 12 – 14, write the letter of your BEST answer in the box provided.

Use the diagram below to answer Question 12.

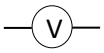


12. What is the symbol for lamp/bulb component in the circuit above?.

A. 

B. 

C. 

D. 

E. 

	SL 1

13. The light bulb/lamp is used to convert electrical energy into which form of energy?

A. Sound energy.

B. Chemical energy.

C. Light energy.

D. Potential energy.

E. Kinetic energy.

	SL 1

14. Which of the following is **NOT** a conductor?

A. Rubber band.

B. Ionized water.

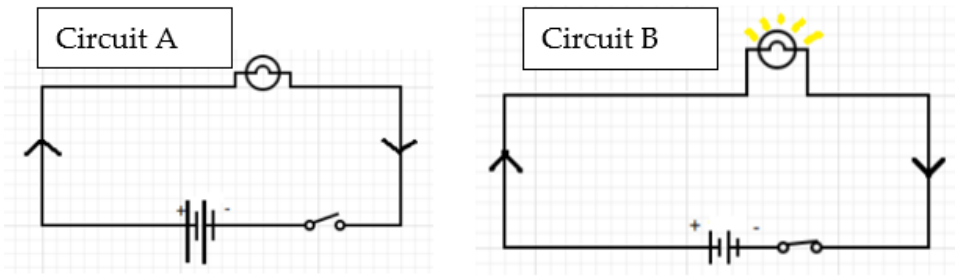
C. Aluminum.

D. Metal.

E. Copper.

SL 1

Use the diagram below to answer Question 15.



15. Identify which of the above circuits is a closed circuit and state a reason for your answer.

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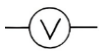
SL 2

16. Name the **TWO** electrical symbols below:

A.  _____

B.  _____

SL 2

17. Describe what a parallel circuit is and why it is more reliable as a common method than a series circuit to wire houses.

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SL 2

18. Differentiate between conductors and insulators and give one example for each.

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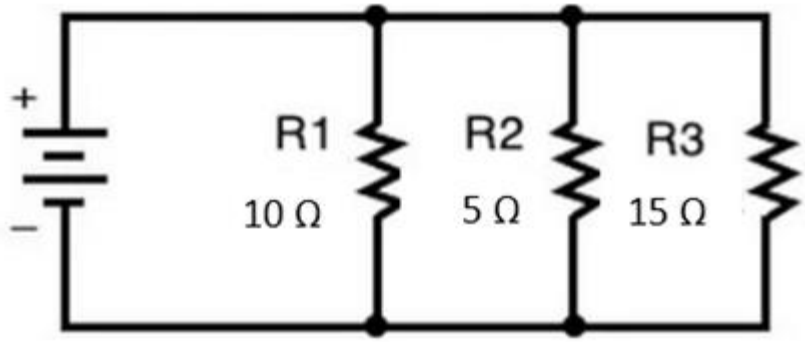
SL 3

19. Construct a parallel circuit using symbols of the components listed below.

(2 lamps/bulbs, 1 battery/cell, 1 ammeter)

SL 3

Use the diagram below to answer Question 20.

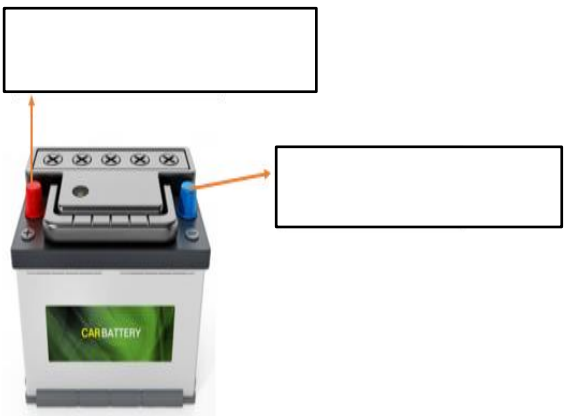


20. Calculate the total current in the circuit if the total voltage is 10 V.

(Hints: Find the total resistance first)

SL 4

21. The diagram below is a lead-acid cell for a car or vehicle. Label the parts marked on the diagram and state their function.



Function:

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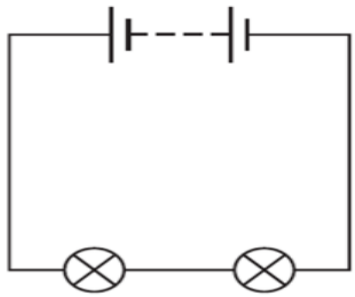
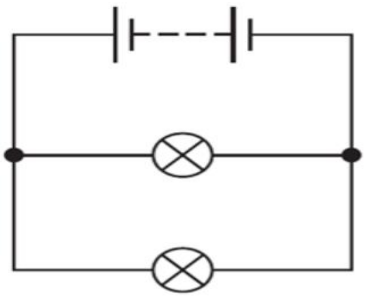
SL 3

Use the information below to answer Question 22.



Two lamps/bulbs of different resistors connect in Series



Two lamps/bulbs of different resistors connect in parallel circuit.

22. Describe what happens to the voltage and the current of the two bulbs connecting in series and parallel.

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SL 3

STRAND 3:	MAGNETISM	WEIGHTING 25

For Questions 23 – 25, write the letter of your BEST answer in the box provided.

23. Which of the following statements is **TRUE** about the Law of Magnets?

A. South Pole repel North Pole.
B. North Pole repel South Pole.
C. Like poles repel unlike poles attract.
D. Like poles attract unlike poles repel.
E. Magnet like Poles.

	SL 1

24. A magnet generated from electricity (electric field) is also known as:

A. Magnetic field.
B. Permanent magnet.
C. Temporary magnet.
D. Electromagnet.
E. Power magnet.

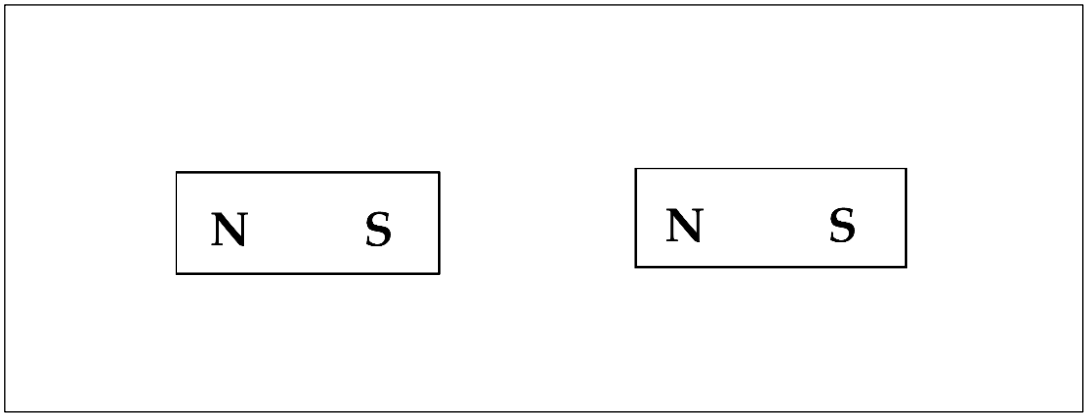
	SL 1

25. The magnetic field of the Earth is not always parallel to its surface because of its:

A. Shape.
B. Mass.
C. Weight.
D. Speed.
E. Position.

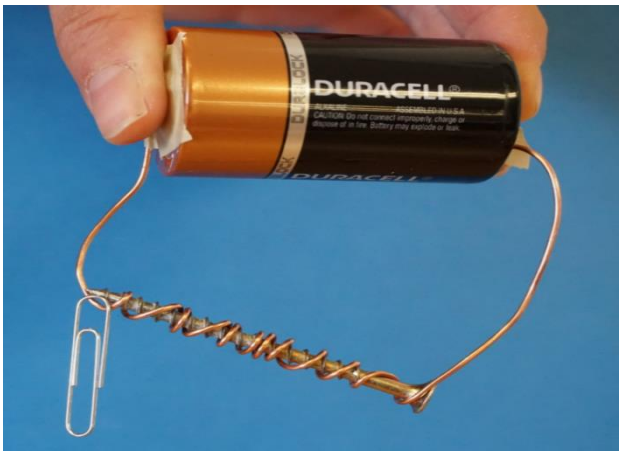
	SL 1

26. Draw magnetic field lines around the two-bar magnets positioned close to each other. Demonstrate in the diagram whether the two bar magnets attract or repel.



SL 2

Use the diagram below to answer Question 27.



27. To make a simple Electromagnet, Tulia used a copper wire, nail and a battery of 2.5 V. Arrange the list of procedures/steps below in order for Tulia to carry out his experiment successfully. (Step #4 has been done for you).

Procedures:

A. Test the electromagnet by positioning the tip of the nail to some paper clips.
B. Wrap the copper wire tightly around the nail.
C. Gather the relevant materials.
D. Connect the two ends of the copper wire to the battery.

SL 3

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: ___A____

28. Define hard magnetic materials and give one example.

_____

_____

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SL 2

29. Describe how the two factors below affect the strength of an electromagnet.

Factor 1: number of times wire is wrapped around the nail.

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SL 4

Factor 2: length of the nail

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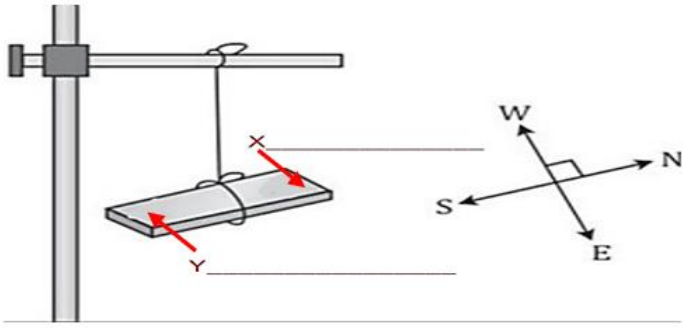
The diagram below shows a freely suspended bar magnet.
Use this information to answer Question 30.



30. Identify the **TWO** poles of the bar magnet label X and Y and state a reason for your answer.

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SL 3

31. Describe how stroking method works.

SL 3

32. List at least **THREE** uses of permanent magnets in everyday life.

SL 3

33. State any **TWO** ways to prevent magnets from being demagnetized.

SL 2

For Questions 34 – 36, write the letter of your BEST answer in the box provided.

34. Vector quantities require both magnitude (size) and direction.
Which of the following is a vector quantity?.

A. Speed.
B. Distance.
C. Time.
D. Velocity.
E. Mass.

	SL 1

35. Which of the following is Newton's First Law of Motion?

A. $F_{net} = 0\ N$
B. $F_A = F_B$
C. $F = ma$
D. $F = mv$
E. $F = Fa$

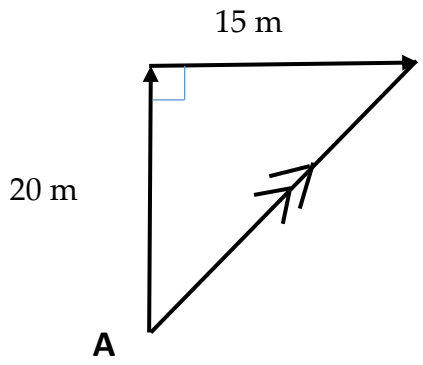
	SL 1

36. The buoyant force acting on a floating body is:

A. Vertically downwards.
B. Vertically upwards.
C. Horizontally on both sides.
D. Both horizontal and vertical.
E. Vertically on both sides.

	SL 1

37. Tulia starts walking from point A, at the distance of 20m due North, and then 15m due East. Calculate his final displacement.



SL 3

38. Differentiate between displacement and distance.

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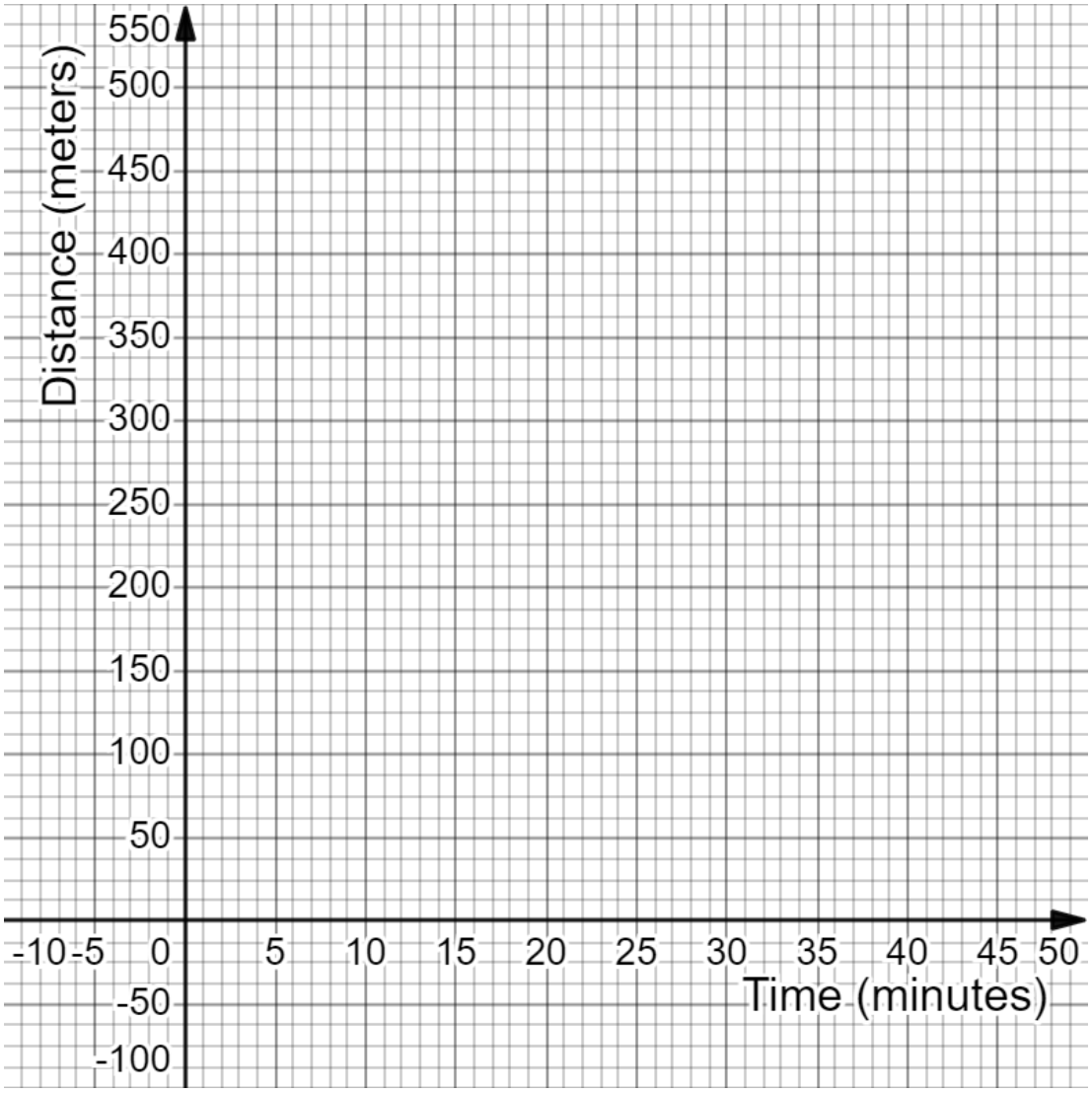
SL 2

The data below shows a journey of a boat leaving the harbour.

Distance (meters)	0	50	100	150	200	300	400
Time (minutes)	0	5	10	15	20	25	30

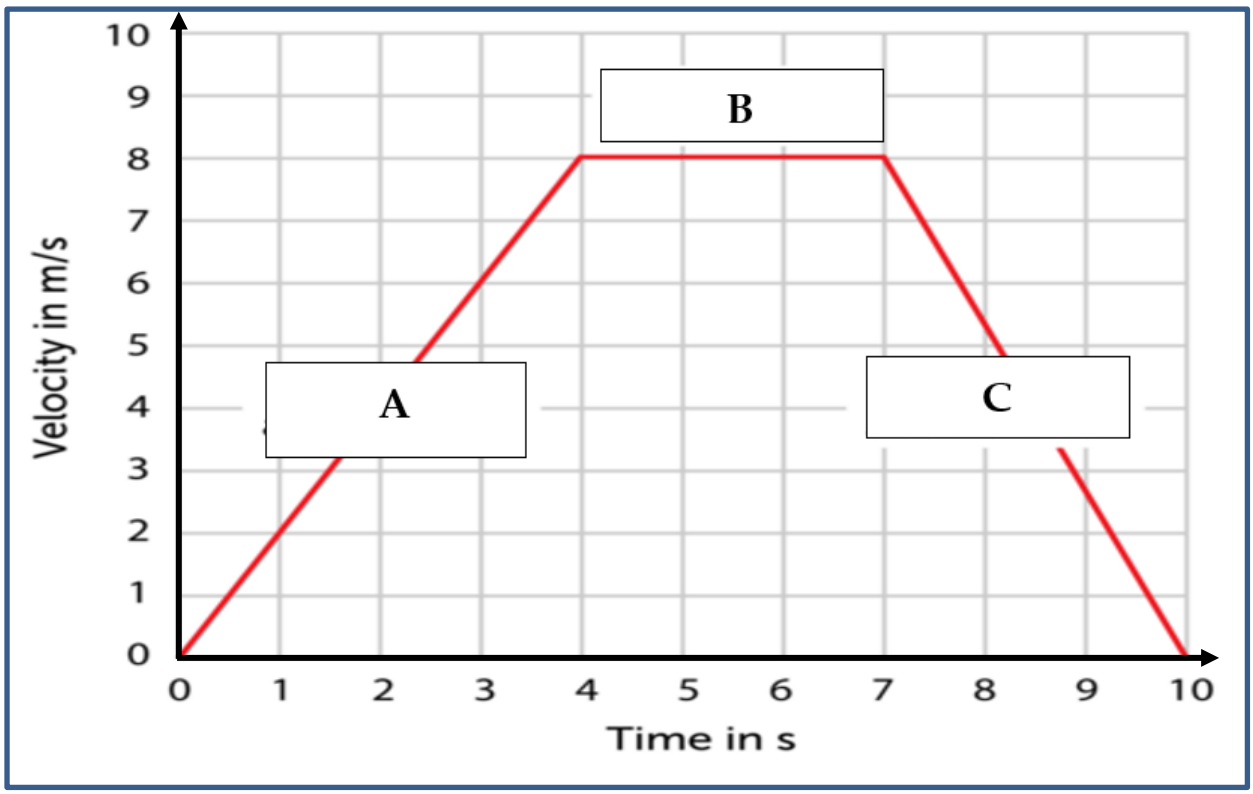
39. Plot the data above on the grid below to show the distance covered by the boat in 12 minutes.

Distance vs time Graph of the above data



SL 4

The diagram below is a VELOCITY vs TIME GRAPH.



40. Describe what happens to the acceleration indicated by the slopes **A**, **B** and **C**.

A. _____

_____

B. _____

_____

C. _____

_____

SL 3

41. Match the type of forces with the correct examples.

Type of Forces	Examples
Contact Forces	Friction force
Non-Contact forces	Magnetic force

SL 2

42. If your weight is 170N and the total area of the soles of your feet is 0.25m^2, what pressure would you exert on the ground.

SL 2

43. Using a straw for drinking is an application of atmospheric Pressure. Use the list of words below to fill in the gaps of Tulia's conclusion after his experiment shown in Figure below.

vacuum, pressure, outside, air, inside

Air particles inside the straw.

Air particles removed from the straw.

Conclusion:

A straw works because when you suck the _____ out of the straw, it creates a _____. This causes a decrease in air _____ on the inside of the straw. Since the atmospheric pressure is greater on the _____ of the straw, liquid is forced into, up the straw, and into your mouth.

SL 4

44. A block of copper has a volume of $0.003m^3$. The density of copper is 8.96 x 10^3 kg/m^3. Calculate the mass of the copper block.

SL 2

FORMULAE SHEET

Wave (Energy)

$Q = mc\Delta T$

$f = \frac{1}{T}$

$T = \frac{1}{f}$

$v = f\lambda$

Electricity

$V = IR$

$R_T = R_1 + R_2 + R_n$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_n}$

Forces and Motion

$v = \frac{d}{t}$

$a = \frac{\Delta v}{\Delta t}$

$v = u + at$

$v^2 = u^2 + 2as$

$s = ut + \frac{1}{2}at^2$

$s = \left(\frac{v + u}{2}\right)t$

$F = ma$

$Pressure = F/A$

$Density = m/V$

$Weight = mg$

$F_b = \rho gV$

Constants

$c_w = 4200\, J/kg^0C$

$g = 10\, ms^{-2}$

STUDENT EDUCATION NUMBER									

PHYSICS

2022

(For Scorers only)

STRANDS		Weighting	Scores	Check Scorer	AED check
STRAND 1	ENERGY	25			
STRAND 2	ELECTRICITY	25			
STRAND 3	MAGNETISM	25			
STRAND 4	FORCES AND MOTION	25			
TOTAL		**100**			