Name:		Index Number:		Class:	

CATHOLIC HIGH SCHOOL
Term 2 Class Test
Year 4 (Integrated Programme)

PHYSICS

1. Physical Quantities, Units and Measurement
2. Kinematics
3. Dynamics
4. Mass, Weight and Density
5. Thermal Properties of Matter
6. Static Electricity
7. Current of Electricity
8. D.C. Circuits
9. Practical Electricity
10. Practical (Planning Skills)

3 May 2023
40 minutes

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black link.
You may use a HB pencil for any diagrams or graphs.
Do not use paper clips, glue or correction fluid.

Section A: Multiple Choice
There are **ten** questions in this section. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice **in the table** provided at the start of this section.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

Section B: Structured
You may use an HB pencil for any diagrams or graphs.

Answer **all** questions.

Candidates are reminded that **all** quantitative answers should include appropriate units.
The use of an approved scientific calculator is expected, where appropriate.
Candidates are advised to show all their working in a clear and orderly manner, as more marks are awarded for sound use of Physics than for correct answers.

The number of marks is given in brackets [ ] at the end of each question or part question.

For examiner's use only:

Section A	/ 10
Section B	/ 25
formula s.f.	□ □
Total	**/ 35**

Section A

Answer **all** the questions in this section.
Record your choice **in the table** provided below.

1		**2**		**3**		**4**		**5**	
6		**7**		**8**		**9**		**10**	

1 An object falls from rest through the air and the air resistance acting on it increases. The object reaches terminal velocity after some time.

Which quantity decreases until its terminal velocity is reached?

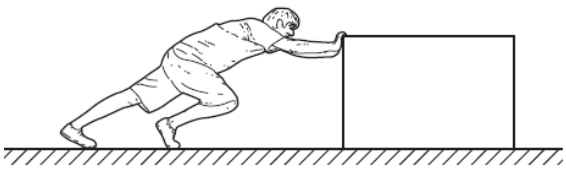
A acceleration
B gravitational field strength
C kinetic energy
D weight

2 A hard stone hits the ground and comes to rest almost immediately.

As the stone hits the ground, what is the direction and the size of the force acting on the ground?

A downwards and equal to the weight of the stone
B downwards and larger than the weight of the stone
C upwards and equal to the weight of the stone
D upwards and larger than the weight of the stone

3 A man pushes a heavy box along the ground.



A force acts between the man's hands and the box.

Another force acts between the man's feet and the floor.

In which direction do these forces act on the man?

	force on man's hands	force on man's feet
A	towards the left	towards the left
B	towards the left	towards the right
C	towards the right	towards the left
D	towards the right	towards the right

4 Four objects are situated in places with different gravitational field strengths.

Which object has the greatest weight?

	mass / kg	gravitational field strength / N / kg
A	3.0	10.4
B	3.5	9.5
C	4.0	10.2
D	4.5	9.0

5 A positively charged metal sphere is placed midway between two previously uncharged metal rods, one of which is connected to earth.

Which diagram shows the charges on the rods?

A

B

C

D

6 A piece of wire has a resistance of 16 Ω.

Another wire made from the same metal has four times the length and twice the cross-sectional area.

What is the resistance of the wire?

A 8 Ω **B** 32 Ω **C** 96 Ω **D** 128 Ω

7 Three identical cells are connected in parallel to a resistor.

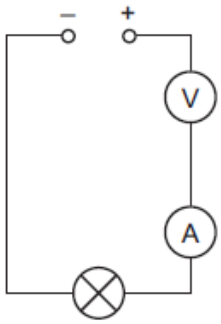
What is the advantage of using three cells in parallel, rather than using a single cell?

A Each cell produces more energy.
B Each cell supplies more charge.
C Each cell takes longer to deplete.
D The total electromotive force (e.m.f.) is larger.

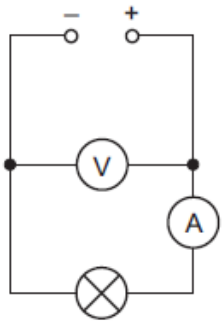
8 In a circuit, a voltmeter is used to measure the potential difference across a lamp. An ammeter is used to measure the current in the lamp.

Which diagram shows the circuit?

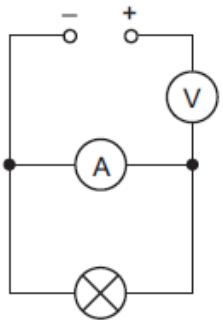
A



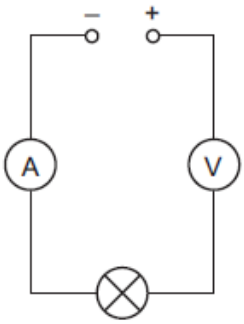
B



C



D



9 An electrical appliance is plugged into a socket in the wall using an electrical cable. The plug contains a fuse.

What is the main purpose of the fuse?

A to earth the appliance
B to earth the plug
C to protect the user from electric shock
D to protect the electrical cable from overheating

10 One kilowatt-hour of energy costs $0.24.

How much does it cost to run a 200 W heater for 180 minutes?

A $0.02 **B** $0.05 **C** $0.07 **D** $0.14

Section B

Answer **all** the questions in this section.

1 A microphone has a weight *W* of 6.0 N. It is suspended by wire X from the ceiling in a radio studio.

Fig. 1.1 shows the microphone held in a stationary position by a wire Y.

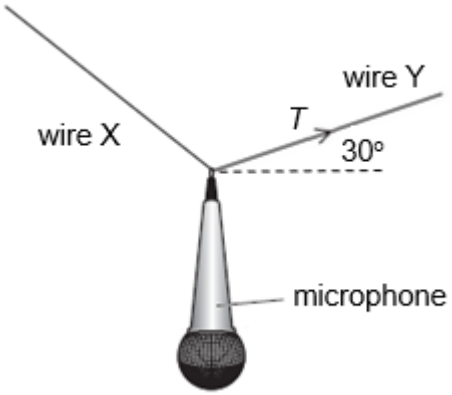


Fig. 1.1

The tension *T* in wire Y is 8.0 N.

Using a scale diagram, determine the magnitude and the direction of the resultant of *W* and *T.*

magnitude = ...

direction = ...

[4]

2 A parachutist jumps from an aircraft. Some time later, the parachute opens.

Fig. 2.1 is a graph of the vertical speed of the parachutist plotted against time *t*.

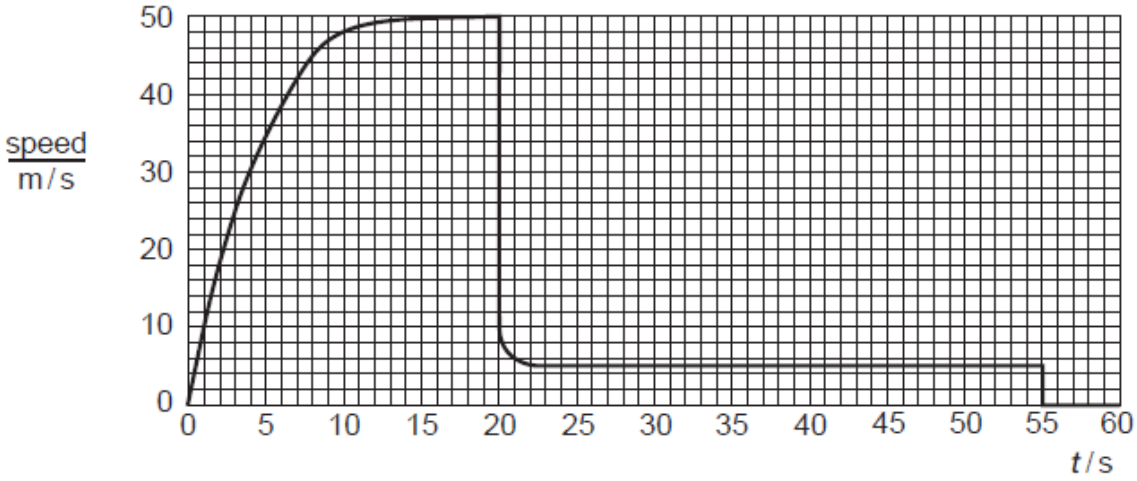


Fig. 2.1

(a) Describe the motion of the parachutist between *t* = 0 and *t* = 20 s.

_____

_____

_____ [2]

(b) A second parachutist, of **smaller** mass, falls out of the aircraft at the same time as the parachutist, using the same parachute.

On Fig. 2.1, using the same axes, sketch the speed-time graph of the second parachutist as it falls, **until *t* = 20 s**.

[1]

3 Water at a temperature of 16 °C enters an ice-making machine and emerges as ice cubes at a temperature of –5 °C. The melting point of ice is 0 °C.

The following data are provided:

- specific heat capacity of liquid water = 4.2×10^3 J / (kg °C)
- specific latent heat of fusion of water = 3.4×10^5 J / kg
- specific heat capacity of ice = 2.1×10^3 J / (kg °C)

(a) State the difference between *specific heat capacity* and *specific latent heat of fusion*.

[2]

(b) Calculate the total energy removed from 2.0 kg of water at 16 °C as it changes into ice at –5 °C.

energy = [3]

4 A hockey player trains on a nylon-fibre surface. As he runs around, his shoes rub against the surface, and he becomes positively charged.

(a) Explain, in terms of the charges involved, how he becomes positively charged.

_____

_____

_____ [2]

(b) At the end of the training session, the hockey player touches a metal gate and feels an electric shock.

(i) Explain how this shock is produced.

_____

_____ [1]

(ii) The shock lasts for 0.15 ms. During this time, the current has an average value of 1.6 mA.

Calculate the amount of charge on the hockey player just before he touches the gate.

charge = _____ [2]

5 Fig. 5.1 shows a resistance wire XY used as a potentiometer circuit by a student. The total resistance of the resistance wire XY is 4.8 kΩ.

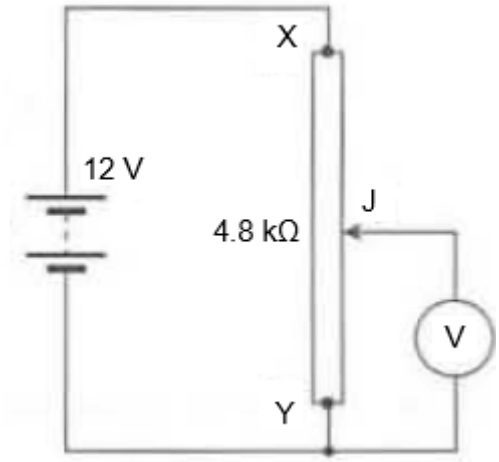


Fig. 5.1

(a) **(i)** State the reading on the voltmeter V when the student places jockey J at the mid-point between X and Y.

reading = ... [1]

(ii) Explain your answer in **(a)(i)**.

.....

.....

..... [2]

(b) The voltmeter is now replaced by an electric bell that switches on when the potential difference across it is at least 10 V.

State where the student should position jockey J on XY.

.....

..... [1]

(c) Plan

The student claims that the voltmeter reading V is directly proportional to the thickness of the resistance wire XY.

Plan an experiment to determine if this claim is true.

In your plan, you should:

- state the quantities you will keep constant
- describe how you will perform the experiment
- sketch the graph that the student should obtain if the suggested relationship is correct.

[4]