



Index Number:

NATIONAL CERTIFICATE OF EDUCATION

March / April 2021

PHYSICS (N530)

TIME: 45 MINUTES

Candidates answer on the Question Paper.

Additional Materials: Mathematical set

READ THESE INSTRUCTIONS FIRST

1. Write your index number in the space provided above.
2. Write in dark blue or black ink. Do not use correction fluid.
3. You may use a soft pencil for any diagram, graph or rough working.
4. Diagrams are not drawn to scale unless otherwise specified.
5. Any rough working should be done in this booklet.
6. Answer **ALL** questions.
7. This document consists of **6** questions printed on **16** pages.
8. The number of marks is given in brackets [] at the end of each question or part question.
9. The total number of marks for this paper is **50**.

For Examiner's use								
Question	Marker		T. Leader		Q. Controller		CE/ACE	
1								
2								
3								
4								
5								
6								
Total								
Signature								

Question 1 (10 marks)

Marks

Circle the correct answer.

(a) Which one of the following is a **physical quantity**?

A Kelvin

B Kilogram

C Metre

D Volume

(b) What is the SI unit of **work**?

A joule (J)

B newton (N)

C second (s)

D watt (W)

(c) Fig. 1.1 shows a simple electric circuit.

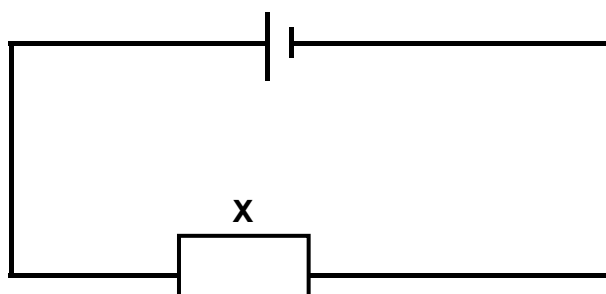


Fig 1.1

What does symbol **X** represent?

A A battery

B A bulb

C A cell

D A resistor

(d) Which one of the following is a **vector quantity**?

- A Distance
- B Displacement
- C Speed
- D Time

(e) Fig. 1.2 shows a stretched rubber band.



Fig. 1.2

What is the **form** of energy stored in the rubber band?

- A Chemical energy
- B Heat energy
- C Kinetic energy
- D Potential energy

(f) Which of the following are **non-luminous** bodies?

- A Clouds
- B Stars
- C Glowing fireflies
- D Lighted candles

- (g) Fig. 1.3 shows a laboratory thermometer.

Marks

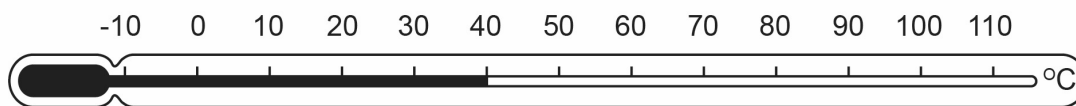


Fig. 1.3

What is the range of temperatures that can be measured using the thermometer?

- A** from -10 °C to 100 °C
 - B** from -10 °C to 110 °C
 - C** from 0 °C to 110 °C
 - D** from 0 °C to 100 °C
- (h) Fig. 1.4 shows the speed-time graph of a car moving in a straight line.

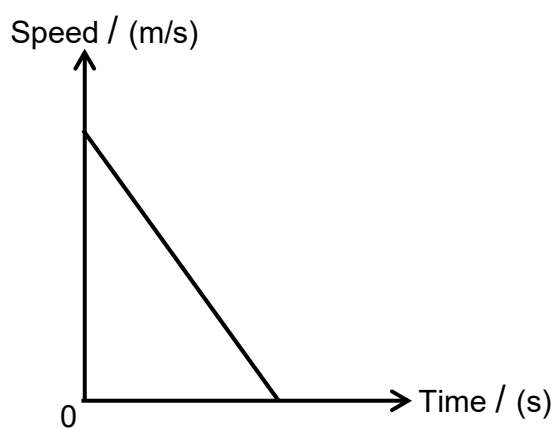


Fig. 1.4

Which statement about the motion of the car is **correct**?

- A** It is moving with increasing speed.
- B** It is moving with decreasing speed.
- C** It is moving with increasing acceleration.
- D** It is moving with decreasing acceleration.

- (i) Fig. 1.5 shows a pencil in a glass of water.

Marks



Fig. 1.5

Why does the pencil appear broken?

- A** Because of the reflection of light
 - B** Because of the absorption of light
 - C** Because of the refraction of light
 - D** Because of the convergence of light
- (j) A kettle is switched on for 2 minutes.
The current flowing in the circuit is 10 A.

What is the amount of charge that flows through a given point in the circuit?

- A** 1200 C
- B** 20 C
- C** 5 C
- D** 0.2 C

Question 2 (8 marks)

Marks

Fig. 2.1 shows a man looking at himself in a plane mirror.

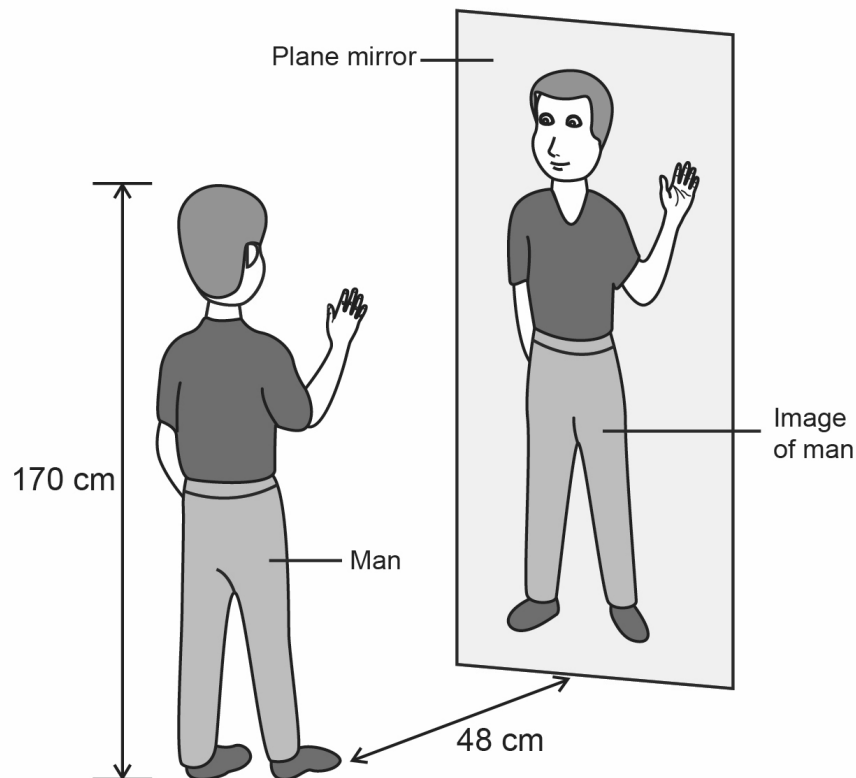


Fig. 2.1

(a) Complete the following sentences by using the words in the list given below.

upright virtual right lateral real

i) When the man raises his right hand, his left hand appears raised in the plane mirror.

This characteristic of the image is known as _____ inversion. [1]

ii) The image of the man cannot be projected on a screen.

The image is said to be _____. [1]

iii) The image of the man is also said to be _____ as the head appears at the top and the feet appear at the bottom. [1]

- (b) i) How does the **height** of the man in Fig. 2.1 compare to the height of his image in the plane mirror?

Tick (✓) the correct answer.

The height of his image is

☐ **greater** than 170 cm.

☐ **equal** to 170 cm.

☐ **less** than 170 cm.

[1]

- ii) What is the **distance** between the man and his image in Fig. 2.1?

Tick (✓) the correct answer.

☐ 24 cm

☐ 48 cm

☐ 96 cm

[1]

- (c) Fig. 2.2. shows a ray of light travelling from water into air.
Label parts A, B and C of the ray diagram using the terms given below.

incident ray angle of refraction normal angle of incidence refracted ray

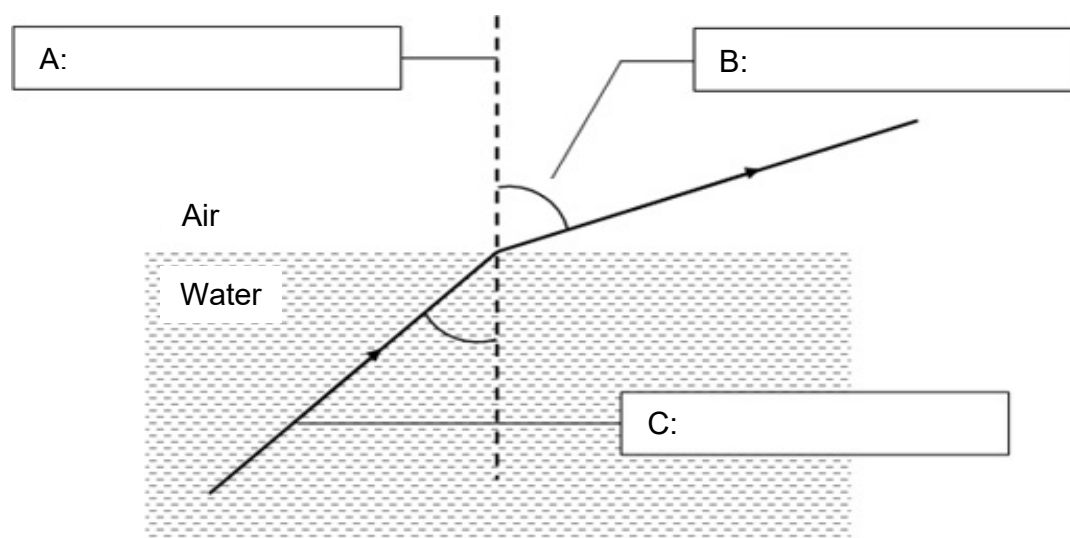


Fig. 2.2

[3]

Question 3 (7 marks)

Marks

(a) i) Table 1 lists different energy sources.

Complete Table 1 to indicate whether the energy sources listed are polluting or non-polluting.

An example is given.

Energy sources	Polluting	Non-polluting
Example: Sunlight		✓
Fossil fuels		
Charcoal		
Wind		

Table 1

[3]

ii) Give one **disadvantage** of producing electricity in hydro-electric power stations.

[1]

- (b) A student measures the diameter of a coin using the arrangement shown in Fig. 3.1.

Marks

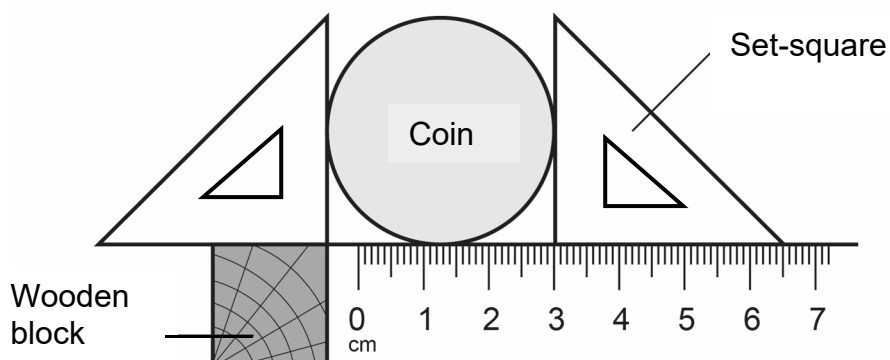


Fig. 3.1

- i) The arrangement used by the student is faulty.

What type of error is shown in Fig. 3.1?

[1]

- ii) What can the student do to avoid this error?

Tick (✓) the correct answer.

☐

Measure the diameter of 10 coins instead

☐

Place his eyes opposite to the mark being read

☐

Fix the coin between two clearly visible divisions

[1]

- iii) Name an instrument that could be used to measure the diameter of the coin more **accurately**.

[1]

Question 4 (11 marks)

Marks

- (a) Kevin sets up an electric circuit consisting of a 12 V battery, a switch and 2 bulbs, **X** and **Y**.

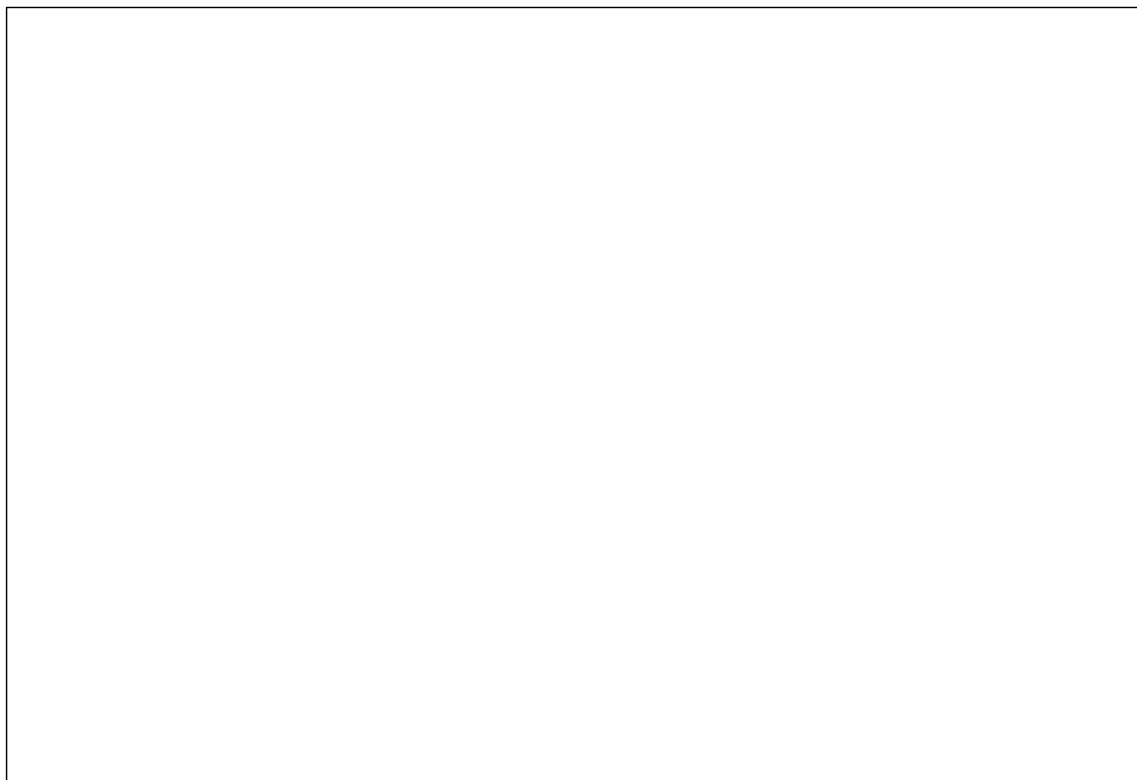
He connects the two bulbs in series.

Bulb **X** has a resistance of 6 Ω .

Bulb **Y** has a resistance of 2 Ω .

In the space provided below, draw the circuit diagram representing Kevin's electric circuit.

Label your diagram clearly.



[4]

(b) i) What is electrical resistance?

Marks

[1]

ii) Calculate the combined resistance, **R**, of bulbs **X** and **Y**.

R = _____ Ω [2]

- (c) A bimetallic strip is used in the internal circuit of an electric iron.

Fig. 4.1 A shows the bimetallic strip at room temperature.

Fig. 4.1 B shows the same bimetallic strip after the iron is switched on.

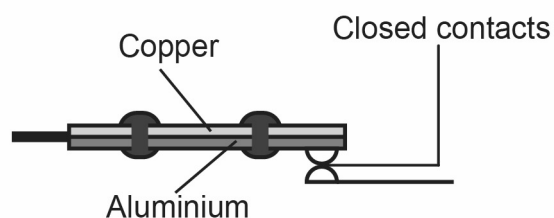


Fig. 4.1A

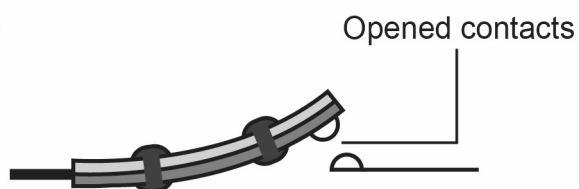


Fig. 4.1B

- (i) The sentences below describe how the bimetallic strip functions.

The sentences are **not** in the correct order.

Read the sentences carefully.

A: The bimetallic strip cools causing the contacts to come together.

B: The bimetallic strip curves upwards.

C: The bimetallic strip is heated.

D: The temperature decreases gradually.

E: The aluminium strip expands more than the copper strip.

F: The contacts move apart.

Write the correct order of the sentences in the boxes below.

Marks

C

A

[3]

(ii) Give another example of an appliance which makes use of a bimetallic strip.

[1]

Question 5 (10 marks)

Marks

- (a) A car moving with constant speed along a straight line covers a distance of 200 m in 10 s.

Calculate the **speed** of the car.

Speed = _____ m/s

[2]

- (b) After 10 s, the car accelerates uniformly to a speed of 44 m/s in 8 s.

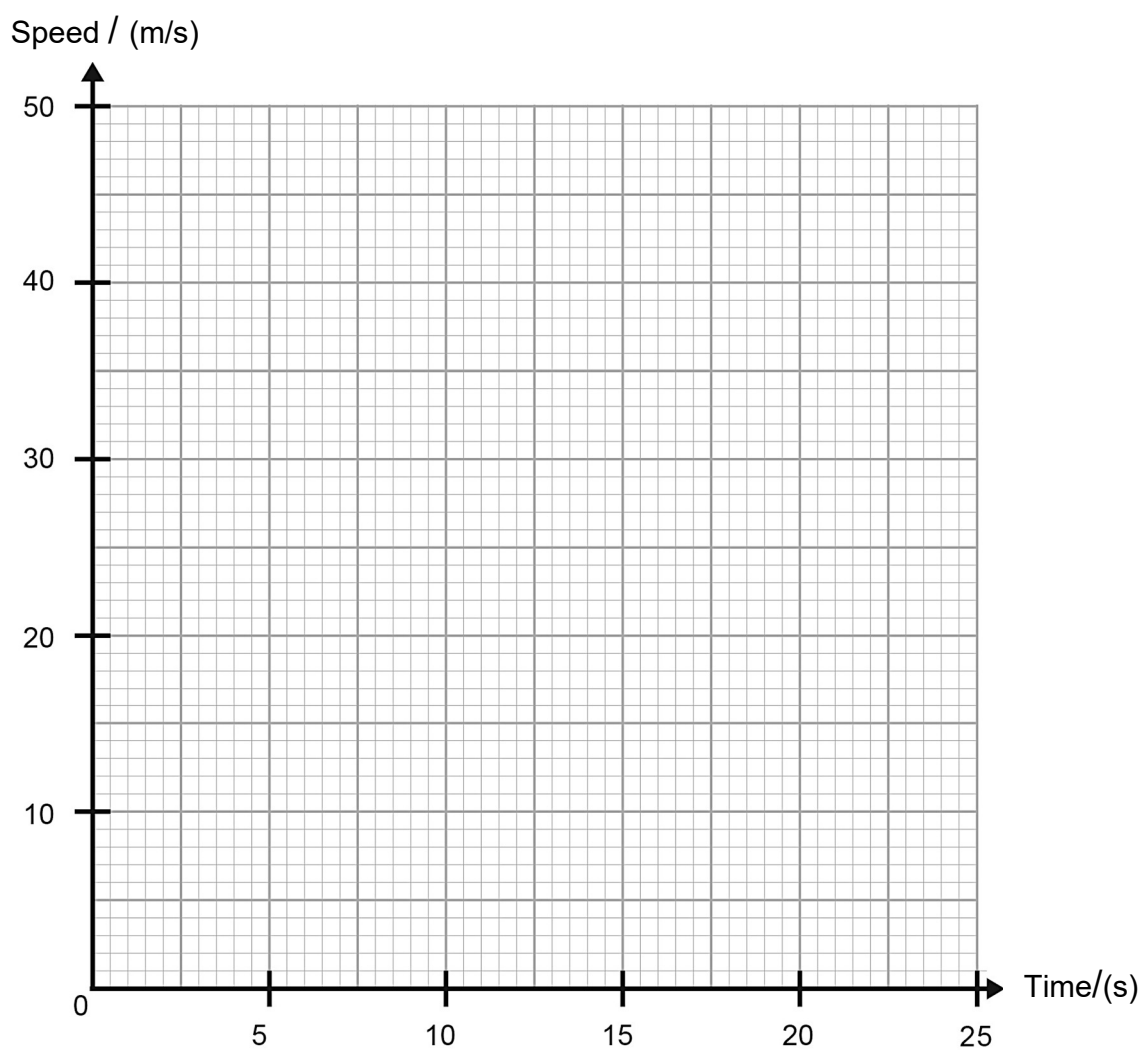
Calculate the **acceleration** of the car.

Acceleration = _____ m/s²

[3]

- (c) On the graph given below, plot a speed-time graph to show the motion of the car.

Marks



[3]

- (d) Calculate the distance travelled by the car during the time it **accelerates**.

Distance = _____ m

[2]

Question 6 (4 marks)

Marks

Tina sets up an experiment to determine the time period of a simple pendulum as shown in Fig 6.1 below.

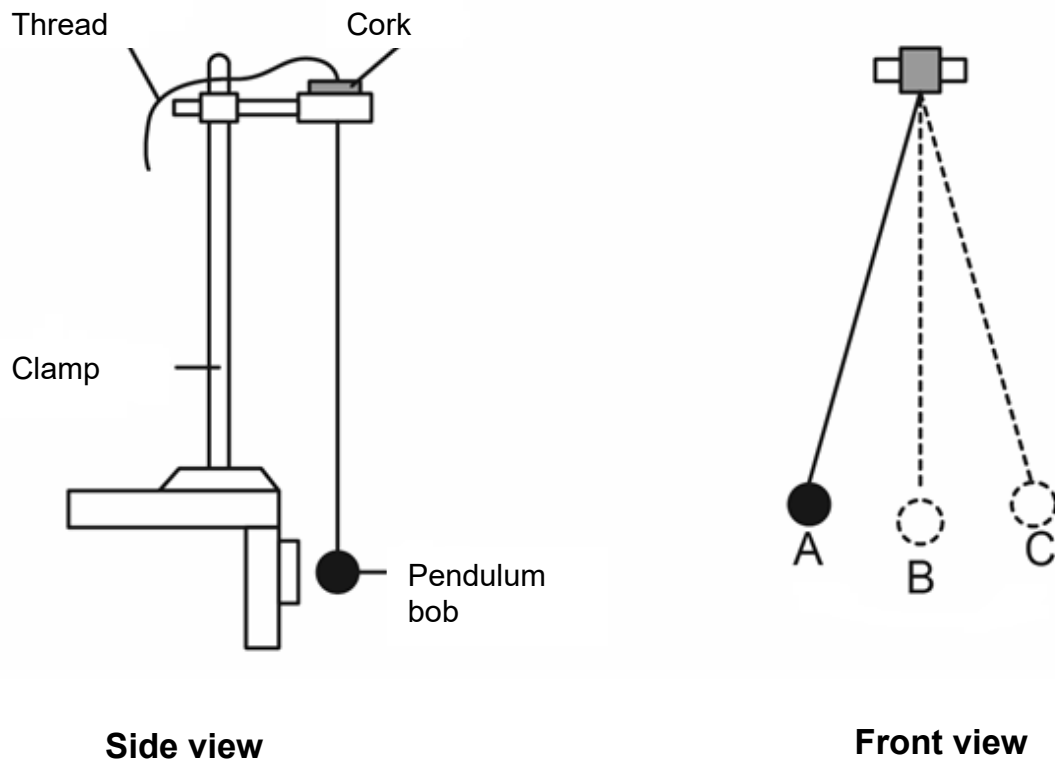


Fig. 6.1

- (a) Tina releases the bob from point **A**.

When the bob passes point **B**, she starts the stopwatch and records the time for the bob to complete **one oscillation**.

Describe the path travelled by the bob in completing one oscillation.

[1]

- (b) i) Give one way how Tina could use the set-up to measure the time period more **accurately**.

_____ [1]

- ii) Explain how your answer to part (b) i) improves the accuracy of the measured time period.

_____ [1]

- (c) What will happen to the time period if the length of the pendulum was **increased**?

_____ [1]

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