

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®  
EXAMINATION

18 JANUARY 2021 (p.m.)



FILL IN ALL THE INFORMATION REQUESTED CLEARLY IN CAPITAL LETTERS.

TEST CODE

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SUBJECT

PHYSICS – Paper 032

PROFICIENCY

GENERAL

REGISTRATION NUMBER

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SCHOOL/CENTRE NUMBER

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NAME OF SCHOOL/CENTRE


CANDIDATE'S FULL NAME (FIRST, MIDDLE, LAST)


DATE OF BIRTH

DD	MM	YY	YY	YY	YY	YY	YY
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SIGNATURE

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FORM TP 2021026



TEST CODE **01238032**

JANUARY 2021

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®  
EXAMINATION

PHYSICS

Paper 032 – General Proficiency

Alternative to School-Based Assessment

*2 hours 10 minutes*

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of THREE questions. Answer ALL questions.
2. Write your answers in the spaces provided in this booklet.
3. Do NOT write in the margins.
4. Where appropriate, ALL WORKING MUST BE SHOWN in this booklet.
5. You may use a silent, non-programmable calculator to answer questions, but you should note that the use of an inappropriate number of figures in answers will be penalized.
6. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra lined page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
7. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**

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**NOTHING HAS BEEN OMITTED.**

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Answer ALL questions.

1. You are required to determine the resistance,  $R$ , of a carbon resistor.

**Apparatus and Materials**

- 1.5 V dry cell
- Ammeter (0–1A)
- Alligator clip
- Six identical  $2\ \Omega$  carbon resistors (string)
- Connecting wires

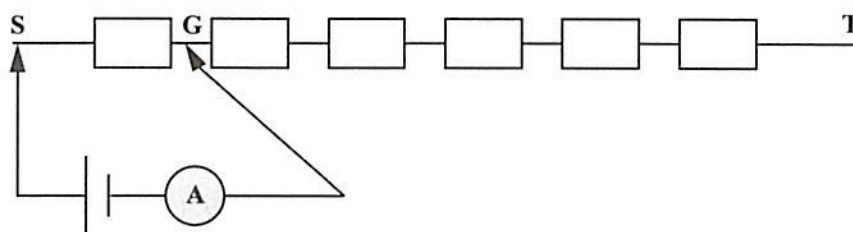


Figure 1. Set-up of apparatus

**Procedure**

1. Set up the circuit as shown in Figure 1, where ST is the string of six identical carbon resistors and G the alligator clip.
2. Measure and record the value of  $I$ , the current through the ammeter with one resistor ( $n = 1$ ), in Table 1 on page 6.
3. Repeat Step 2 for the resistors  $n = 2, 3, 4, 5$  and 6, in the circuit between S and T. **(DO NOT CONNECT the alligator clip to any point before the first resistor, point S.)**



- (a) Complete Column 2 and Column 3 of Table 1.

**TABLE 1: NUMBER OF CLIPS AND ASSOCIATED CURRENT**

$n$	$I(\text{A})$	$1/I (\text{A}^{-1})$
1		
2		
3		
4		
5		
6		

(4 marks)

- (b) On Figure 2 provided on page 7, plot a graph of  $1/I, (\text{A}^{-1})$  against  $n$ .

(8 marks)



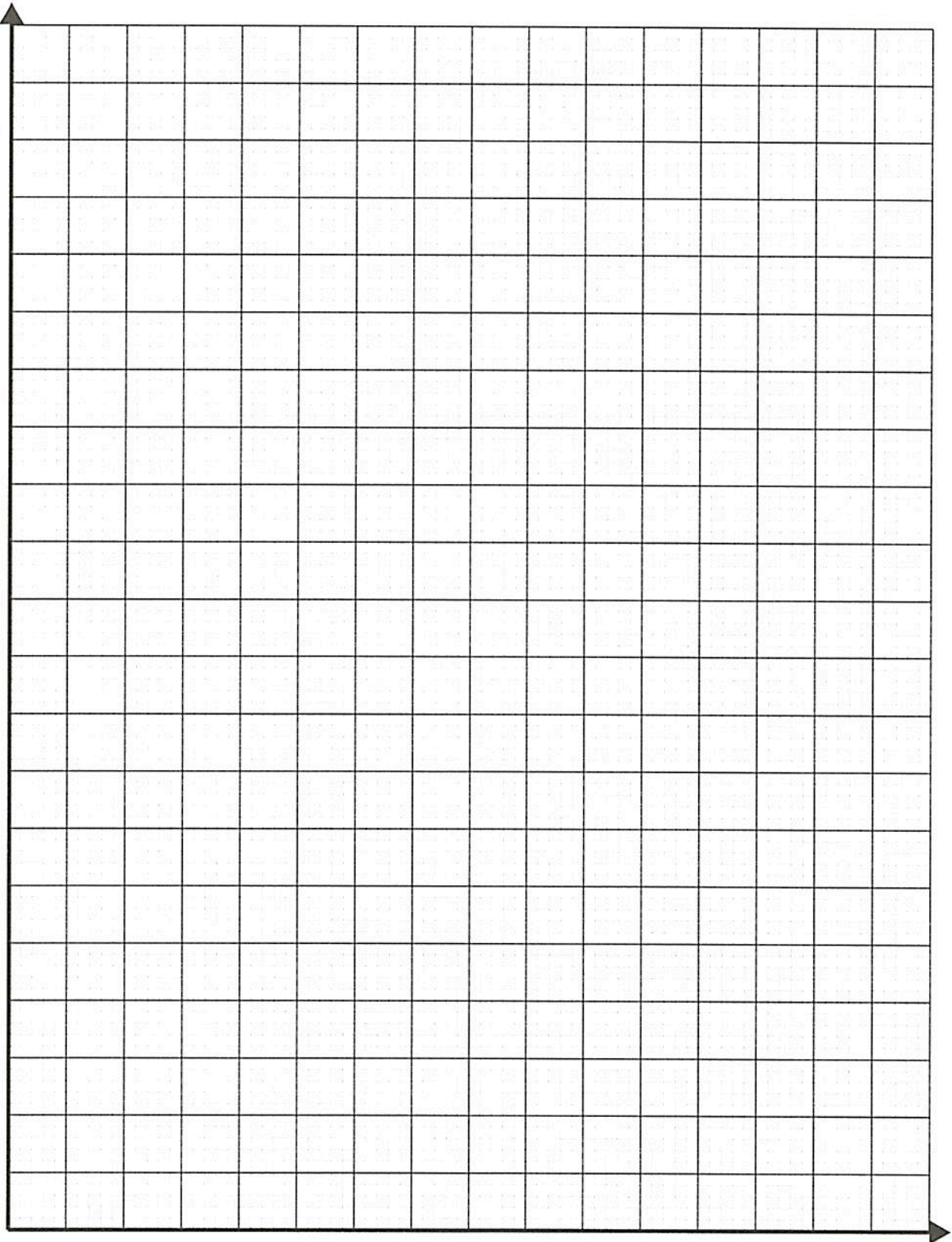


Figure 2. Graph of  $1/I, (A^{-1})$  against  $n$

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- (c) Determine the gradient,  $G$ , of the graph.

(5 marks)

- (d) Calculate the value of  $R$ , given that  $G = R/E$ , where  $E = 1.5 \text{ V}$ .

(3 marks)

- (e) State ONE precaution, other than the one mentioned in the procedure, that should have been taken in this experiment.

.....  
.....  
.....

(1 mark)

**Total 21 marks**

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2. In performing an experiment to determine the specific heat capacity of a solid, an electrical heater was used to heat a 2.0 kg block of metal, which was well lagged.

Several readings of temperature ( $\theta/^\circ\text{C}$ ) and time ( $t/\text{s}$ ) were recorded and a graph of temperature against time was plotted, as shown in Figure 3 on page 10.

- (a) Draw a well-labelled diagram of the arrangement of the apparatus used to perform this experiment. Your diagram should include a power supply, an ammeter and a voltmeter.

(5 marks)

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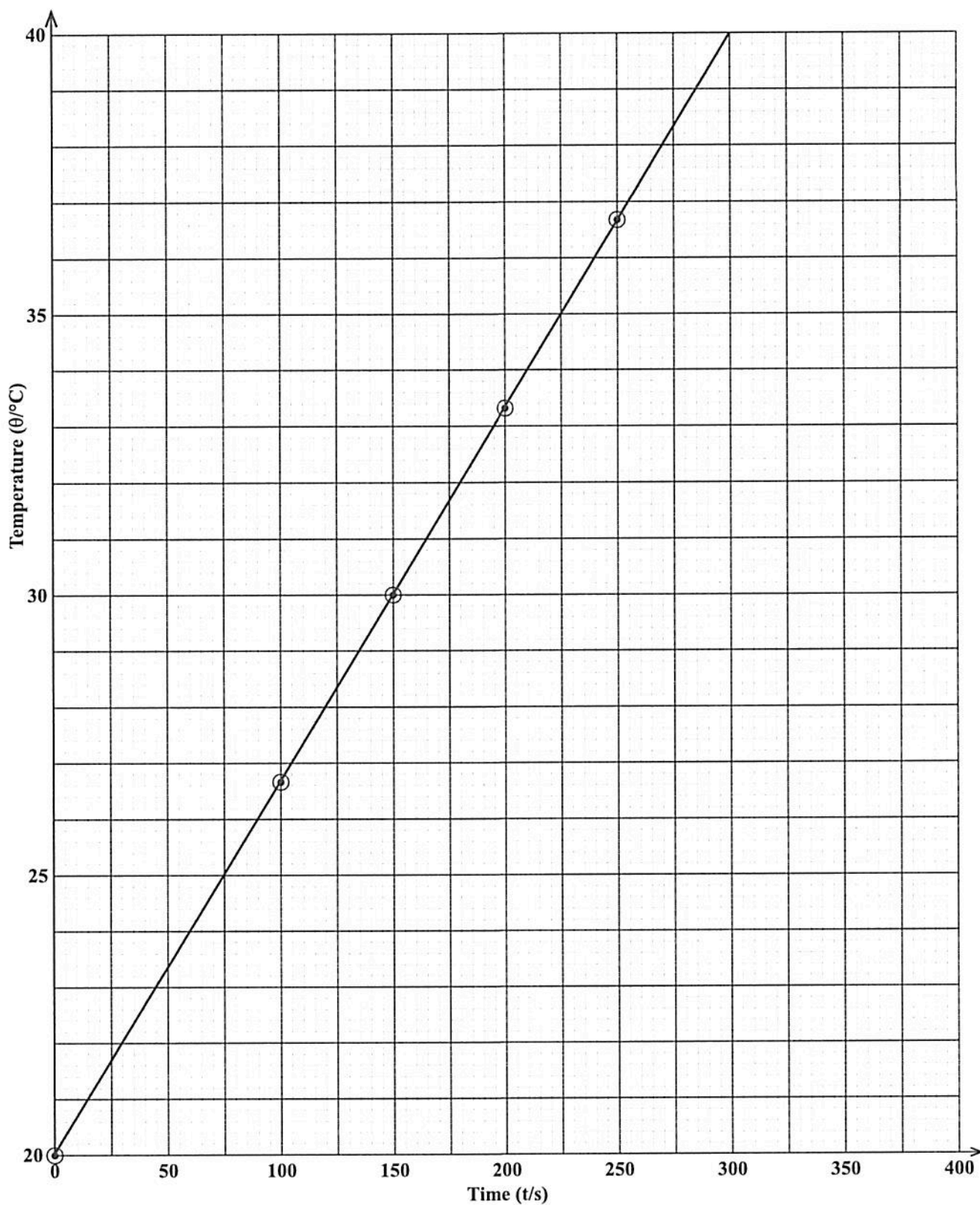


Figure 3. Graph of temperature ( $\theta/^\circ\text{C}$ ) against time (t/s)

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- (b) Use the graph in Figure 3 on page 10 to complete Table 2.

**TABLE 2: TEMPERATURE ( $\theta/^{\circ}\text{C}$ ) AND TIME ( $t/\text{s}$ )**

Time ( $t/\text{s}$ )	Temperature $\theta/^{\circ}\text{C}$
0	20.0
75	
100	
150	
200	
	35
250	
300	40.0

(6 marks)

- (c) Hence, by using appropriate values obtained from the graph, calculate the gradient S.

(3 marks)

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- (d) The gradient ( $S$ ) of the graph is related to the specific heat capacity ( $c$ ) of the metal by the equation  $S = \frac{P}{mc}$ , where  $P$  = power of the heater and  $m$  = mass of the metal block.

Calculate the specific heat capacity of the metal if the power rating of the heater is 48 W.

**(3 marks)**

**Total 17 marks**



3. A secondary school student wondered if the thickness of the string on a simple pendulum would affect the period of the pendulum.

Plan and design an experiment to test this using the following guidelines.

- (a) Apparatus

.....

.....

.....

.....

.....

(3 marks)

- (b) Labelled diagram of a simple pendulum

(2 marks)

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## CANDIDATE'S RECEIPT

### INSTRUCTIONS TO CANDIDATE:

1. Fill in all the information requested clearly in capital letters.

TEST CODE: 

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SUBJECT: PHYSICS – Paper 032

PROFICIENCY: GENERAL

REGISTRATION NUMBER: 

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FULL NAME: \_\_\_\_\_  
(BLOCK LETTERS)

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

2. Ensure that this slip is detached by the Supervisor or Invigilator and given to you when you hand in this booklet.
3. Keep it in a safe place until you have received your results.

### INSTRUCTION TO SUPERVISOR/INVIGILATOR:

Sign the declaration below, detach this slip and hand it to the candidate as his/her receipt for this booklet collected by you.

I hereby acknowledge receipt of the candidate's booklet for the examination stated above.

Signature: \_\_\_\_\_  
Supervisor/Invigilator

Date: \_\_\_\_\_

