education

Department of Education
FREE STATE PROVINCE

CONTROL TEST

GRADE 10

PHYSICAL SCIENCES

SEPTEMBER 2018

MARKS: 100

TIME: 2 HOURS

This paper consists of 11 pages, ONE data sheets

INSTRUCTIONS AND INFORMATION

1. Write your name and other information in the appropriate spaces on the ANSWER BOOK.

2. This question paper consists of FIVE questions. Answer ALL the questions in the ANSWER BOOK.

3. Start EACH question on a NEW page in the ANSWER BOOK.

4. Number the answers correctly according to the numbering system used in this question paper.

5. Leave one line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.

6. You may use a non-programmable pocket calculator.

7. You may use appropriate mathematical instruments.

8. You are advised to use the attached DATA SHEETS.

9. Show ALL formulae and substitutions in ALL calculations.

10. Round off your FINAL numerical answers to a minimum of TWO decimal places where applicable.

11. Give brief motivations, discussions, et cetera where required.

12. Write neatly and legibly.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write down only the letter A, B, C or D next to the question number (1.1 – 1.10) in the ANSWER BOOK.

1.1 Resistors connected in parallel are called … dividers.

A time

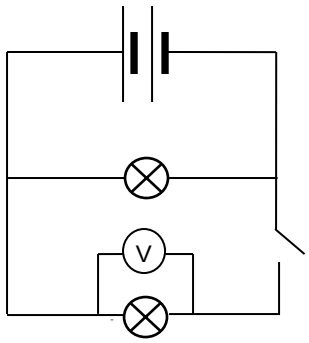
B charge

C current

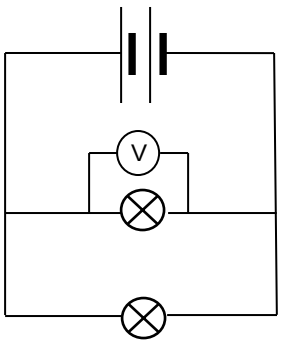
D potential difference (2)

1.2 Which ONE of the following circuits can be used to determine the EMF of the battery?

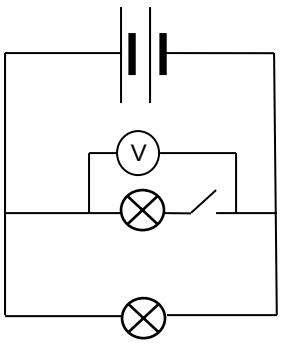
A



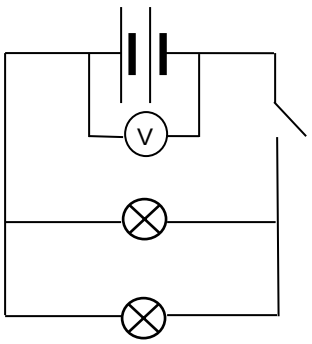
B



C



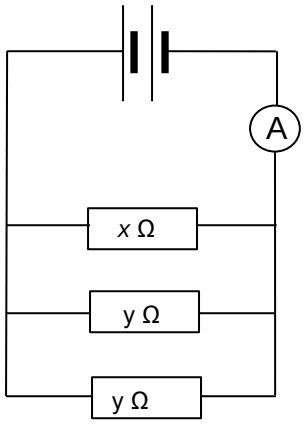
D



(2)

1.3 Three resistors of value ***x***, ***y*** and ***z*** ohms are connected in parallel.

No answer



The magnitude of the equivalent resistance will be …

A. $\frac{x+y+z}{yz}$

B. $\frac{x+y+z}{xyz}$

C. $\frac{x+y}{xz}$

D. $\frac{x+z}{xy}$ (2)

1.4 Which one of the following statements is TRUE?

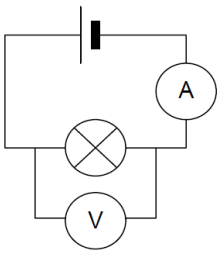
A. An ammeter has high resistance and gets connected in series.

B. An ammeter has low resistance and gets connected in series.

C. A voltmeter has high resistance and gets connected in series.

D. A voltmeter has low resistance and gets connected in parallel. (2)

1.5 Consider the circuit diagram given below.



What does the current strength of 0,2 A passing through a light bulb indicates?

A. 0,2 C of current gets converted per volt.

B. 0,2 J of energy passes through the light bulb per second.

C. 0,2 C of charge passes through the light bulb per second.

D. 0,2 V of current passes through the light bulb per second. (2)

1.6 Which ONE of the following physical quantities is a vector?

A Time.

B Speed.

C Distance.
D Displacement. (2)

1.7 James is busy removing crates of Coca-Cola from a truck to the truck storage room. The storage room is situated east of the truck.
He walks 50 m to the first shelf, and back to the truck, and then 40 m to the next shelf. Which of the following diagrams represents the resultant displacement of the worker relative to the truck?
The diagrams are not drawn to scale.

A

10 m

B

10 m

C

40 m

D

40 m

(2)

This question needs discussion.

1.8 If a vehicle travels at an acceleration of 3 m.s^{-2}, it indicates that …

A. the speed increases every second by 3 m.s^{-1} in a negative direction.

B. the speed decreases every second by 3 m.s^{-1} in a negative direction.

C. the speed decreases every second by 3 m.s^{-1} in a positive direction.

D. the speed increases every second by 3 m.s^{-2} in a positive direction. (2)

1.9 In the equation $\Delta x = v_i \Delta t + {}^1/_2\, a\Delta t^2$, this part of the equation ${}^1/_2\, a\Delta t^2$ represents the …

A displacement.

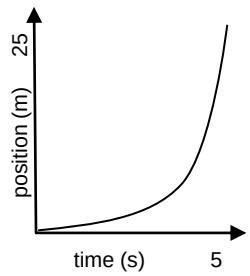
B acceleration.

C velocity.

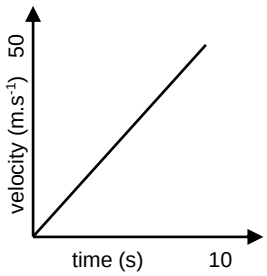
D time. (2)

1.10 Which ONE of the following graphs represents an acceleration of 5 m.s^{-2}?

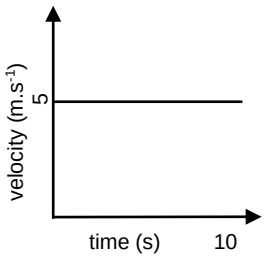
A



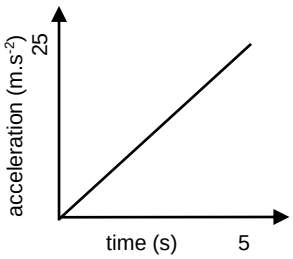
B



C



D



(2)

[20]

QUESTION 2

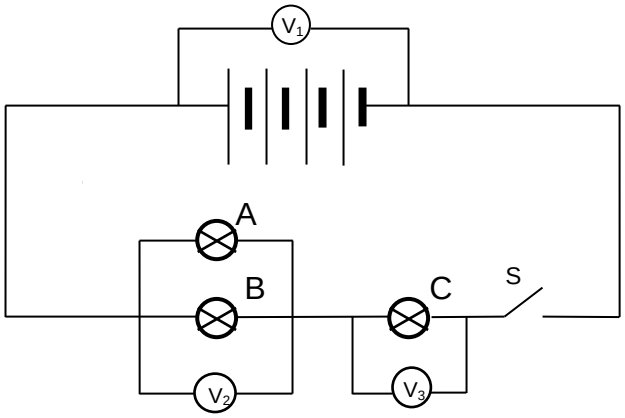
2.1 A charge of 2 C transfers 2000 J of electric potential energy in 2 minutes between two points in a circuit.

2.1.1 Define the potential difference across the ends of a conductor. (2)

2.1.2 Determine the potential difference between the two points. (3)

2.1.3 Determine the current strength between the two points. (3)

2.2 Learners set up a circuit diagram below. The emf of each cell is 1,5 V. Each bulb **A**, **B** and **C** have resistance of 3 Ω, 4Ω and 5Ω respectively.



2.2.1 Calculate the equivalent resistance. (4)

Switch **S** is now closed. Determine the reading on:

2.2.2 V_1 (2)

2.2.3 V_3 (4)

2.2.4 Calculate the energy transferred in bulb **C** if the current passing through the circuit is 2 A in 3 seconds. (5)

2.2.5 All the bulbs are now connected in parallel. How will the total current in the circuit be affected? Write only INCREASES, DECREASES or REMAINS THE SAME. Give a reason for your answer. (2)
[25]

QUESTION 3

Thabang and Motseki investigate the relationship between the potential difference and resistance. They built two circuit diagrams with 3 identical resistors connected in series and parallel. For each experiment, they recorded the reading on the voltmeter across each resistor.

DIAGRAM A

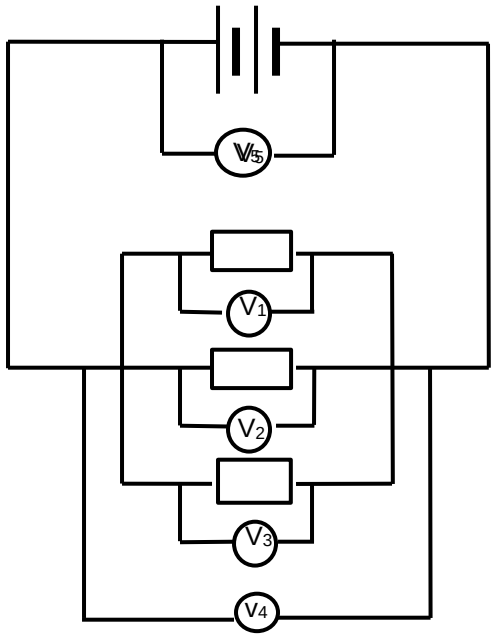
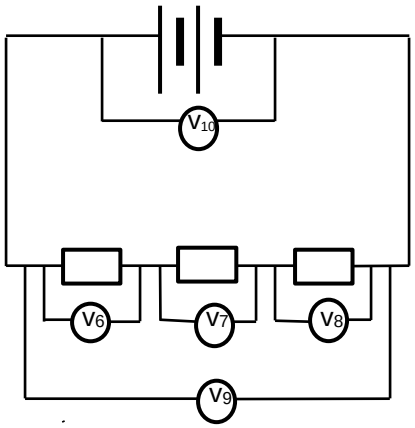


DIAGRAM B



3.1 Write down the investigative question for this investigation for this experiment? (2)

3.2 Write down the following:

3.2.1 controlled variable (1)

3.2.2 dependent variable (1)

3.2.3 independent variable (1)

3.3 What is the direction of the conventional current? (1)

3.4 The following results were obtained. Complete the table by writing down the numbers of questions 3.4.1 to 3.4.3 only, with the correct answer. (3)

TABLE 1: Voltmeter reading with resistors connected in **DIAGRAM A**

Resistors	Voltmeter reading across EACH resistor	Voltmeter reading across ALL resistors
1	1,4 V	**3.4.2**
2	1,4 V	
3	**3.4.1**	

TABLE 2: Voltmeter reading with resistors connected in **DIAGRAM B**

Resistors	Voltmeter reading across EACH resistor	Voltmeter reading across ALL resistors
6	1,4 V	**3.4.3**
7	1,4 V	
8	1,4 V	

3.5 Write down the following readings:

3.5.1 V_5 (1)

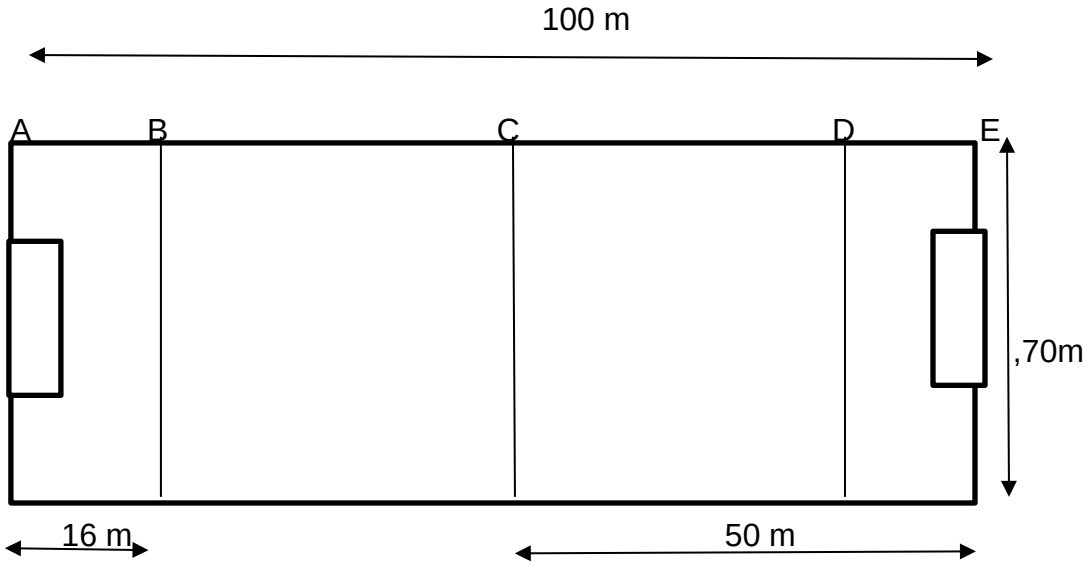
3.5.2 V_{10} (1)

3.6 From the above investigation Thando and John could draw the following conclusion.
Complete the statement by writing down the missing word(s) only:

Resistors connected in series are regarded as … (1)
[12]

QUESTION 4

The Brazilian soccer team members were busy warming up for their match against Switzerland during the World Soccer Cup played in Russia.
Below is a diagram that represents the measurements of the soccer field used by three players, Fred, Vieira and Neymar.



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4.1 Define the term distance. (1)

4.2 Fred started at position **A** and jogged to position **E** and back to A in 1 minute.

4.2.1 Determine the total distance covered by Fred. (1)

4.2.2 Determine Fred's total displacement. (1)

4.2.3 Calculate Fred's average speed. (3)

4.3 Neymar started warming up at position **C**. He jogged to position **E** and then ran to position **A** where he sat down.

4.3.1 Determine Neymar's displacement by means of a calculation. (3)

4.3.2 Verify your answer to Question 4.3.1 by means of a scale drawing. Use a scale of 10 mm = 20 m. (4)

4.4 Vieira ran from **C** to **D** and back to **C**, and then from **C** to **E** in 1,5 minutes.

4.4.1 Define the term average velocity. (2)

4.4.2 Calculate Vieira's velocity. (4)

4.4.3 Describe Vieira's displacement relative to the seated Neymar. (2)

[21]

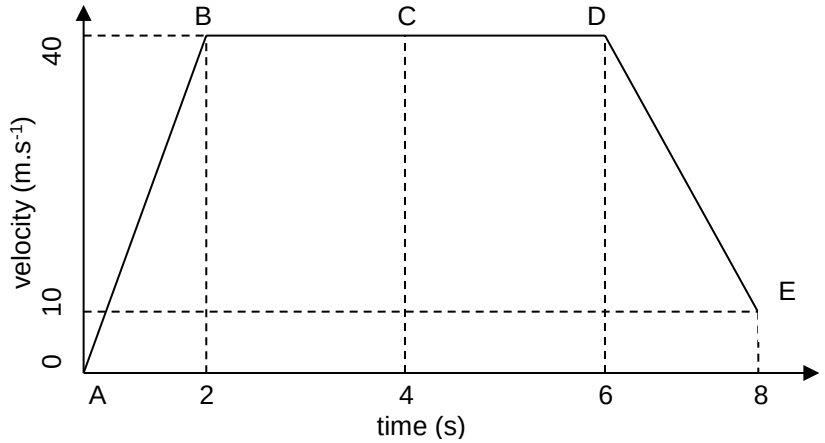
QUESTION 5

5.1 A truck starts from rest at a traffic light and accelerates at 1 $m.s^{-2}$ for 2 minutes in an easterly direction.

5.1.1 Determine the velocity of the truck after 2 minutes. (5)

5.1.2 Calculate the displacement of the truck after 2 minutes. (5)

5.2 The movement of a vehicle travelling north is represented by the graph below.



Use the graph to answer the following questions.

5.2.1 Describe the motion represented by section AB on the graph. (2)

5.2.2 Describe the motion represented by section CD on the graph. (2)

5.2.3 By making use of an equation of motion, calculate the acceleration during the last 2 seconds of the motion. (5)

5.3 South African drivers are fined when their speed exceeds 120 $km.h^{-1}$ while travelling on the national roads. By converting the speed of a driver travelling at 40 $m.s^{-1}$, to the corresponding value in $km.h^{-1}$, determine whether the driver of this vehicle will receive a penalty for speeding. (3)

[22]

GRAND TOTAL: 100

GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 10
VRAESTEL 1 (FISIKA)

TABLE 1: PHYSICAL CONSTANTS/*TABEL 1: FISIESE KONSTANTES*

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Acceleration due to gravity *Swaartekragversnelling*	g	9,8 $m \cdot s^{-2}$
Speed of light in a vacuum *Spoed van lig in 'n vakuum*	c	3,0 x 10^{8} $m \cdot s^{-1}$
Planck's constant *Planck se konstante*	h	6,63 x 10^{-34} $J \cdot s$
Charge on electron *Lading op elektron*	e	-1,6 x 10^{-19} C
Electron mass *Elektronmassa*	m_e	9,11 x 10^{-31} kg

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

MOTION/*BEWEGING*

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^{\,2} = v_i^{\,2} + 2a\Delta x$	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$

ELECTRIC CIRCUITS/*ELEKTRIESE STROOMBANE*

$Q = I\,\Delta t$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + ...$
$R_s = R_1 + R_2 + ...$	$V = \frac{W}{q}$