NAME: _____ **FORM 4** _____

ST. MARYS SECONDARY SCHOOL

2021 MALAWI SCHOOL CERTIFICATE OF EDUCATION

MOCK EXAMINATIONS

PHYSICS

Subject Number: M164/I

Time Allowed: 2 hours

8:00 – 10:00 am

Thursday, 5th August 2021.

PAPER I
(100 marks)

Instructions:

1. **This paper contains 13 pages. Please check.**

2. Fill in your **Full Name** at the top of each page.

3. This paper contains **two** sections **A** and **B**. In **section A** there are **nine** short answer questions while in **section B** there are **three** are short answer and restricted essay questions.

4. Answer **all** the **twelve** questions in the spaces provided.

5. Use of electronic calculators is allowed.

6. The maximum number of marks for each answer is indicated against each question.

7. In the table provided on this page, **tick** against the question number you have answered.

Question number	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

SECTION A (70 marks)

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

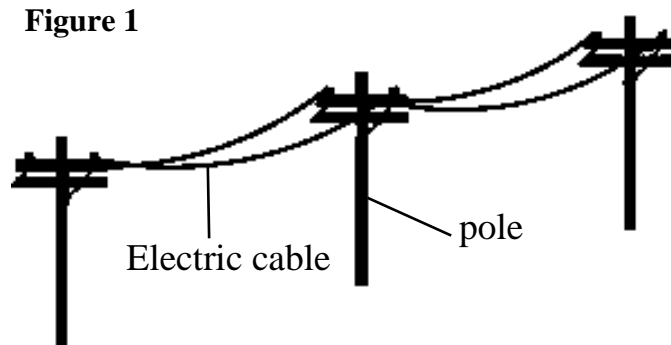1. (a) State Charles' law of gases.

_____

_____

(1 mark)

(b) A gas occupies 100cm^3 of space in the morning when the temperature is 15°C. Assuming pressure remains constant, what volume does the gas occupy in the afternoon when the temperature is 38°C?

(4 marks)

2. **(a) Figure 1** below shows electric cables held loose between poles.

Figure 1

Electric cable   pole

Explain why the electric cables are loosely held between the poles.

_____

_____

(2 marks)

(b) At what angle to each other should two plane mirrors be held so that they produce 7 images of a mango fruit placed between them?

(4 marks)

3. (a) Mention any **two** ways of safely handling radioactive substances.

i. _____
_____

ii. _____
_____

(2 marks)

(b) Explain how beta particles are produced in the nucleus of a radioactive element.

_____
_____
_____

(2 marks)

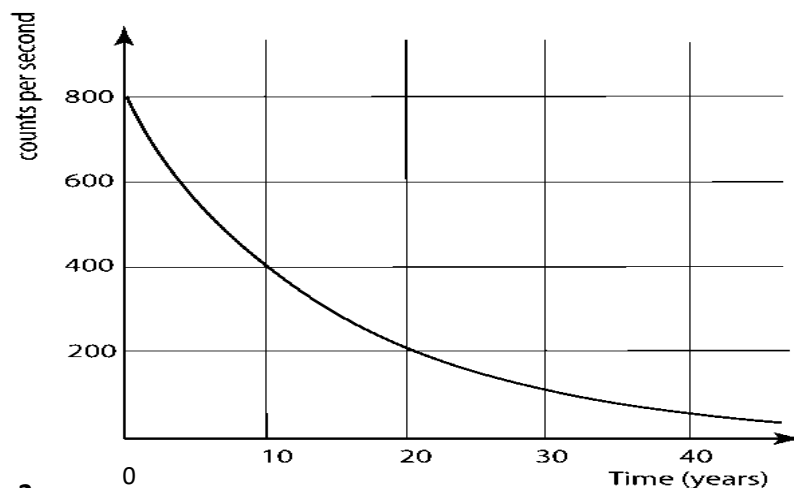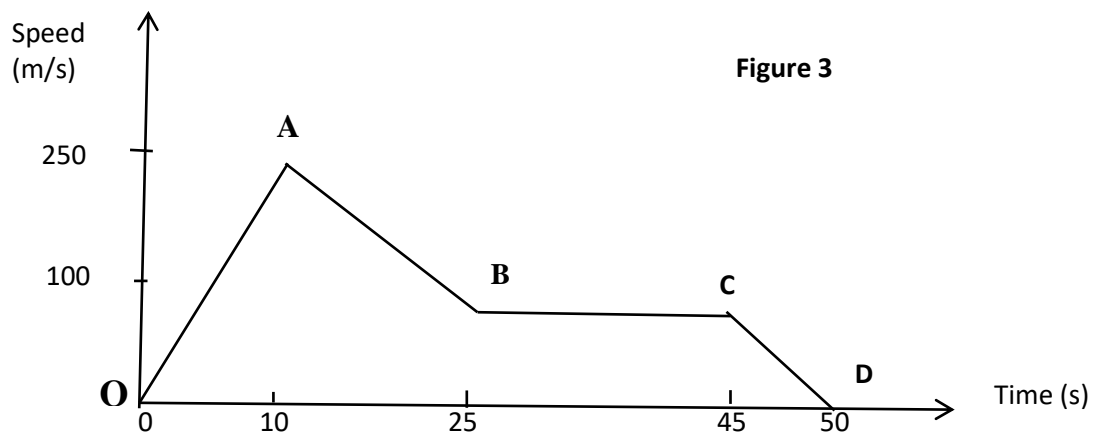**(c) Figure 2** below is a graph showing activity of a radioactive source.

Figure 2

Find the half-life of the radioactive source.

(2 marks)

4. (a) Explain the difference between distance and displacement.

_____

_____

_____

(1 mark)

(b) **Figure 3** is a speed-time graph for a cyclist.

Figure 3

i.   Describe the motion of the cyclist in the region **OA** and **BC**.

Region **OA**:

_____

_____

(1 mark)

Region **BC**:

_____

_____

(1 mark)

ii. Determine the distance moved by the cyclist in the whole journey.

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(5 marks)

6. (a) Define the term 'work' as used in physics.

_____

_____

(1 mark)

(b) **Figure 4** below shows a force of 100N applied at an angle of 30° to the horizontal in order to move a 5kg object.
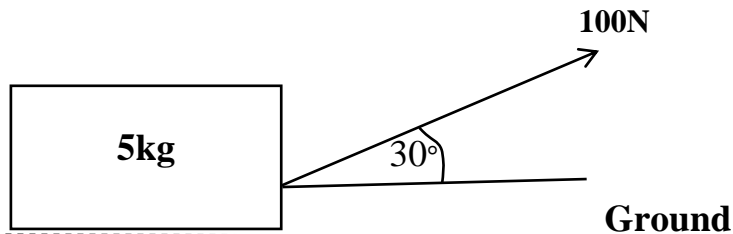
100N

5kg   30°   **Figure 4**

Ground

Calculate the work done on the object if it is moved through a distance of 10m.

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(4 marks)

5. (a) State **one** difference between a virtual and real image.
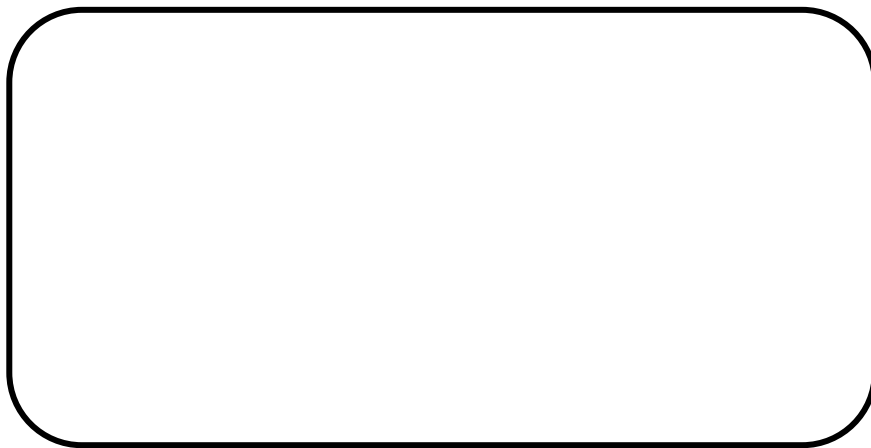
_____
_____

(1 mark)

(b) State any **two** ways of determining the focal length of a lens.

_____
_____

(2 marks)

(c) An object 15cm high is placed in front of a converging lens of focal length 20cm and a virtual image is formed 30cm away from the lens. Using the lens formula calculate:
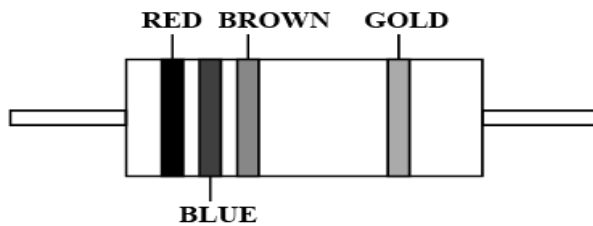
   i.   object distance.

(4 marks)

   ii.   height of the image

(3 marks)

6. (a) Work out the value of resistance of the resistor below

RED BROWN GOLD

BLUE

Colour	Code	Colour	Tolerance (%)
brown	1	gold	±5
red	2	silver	±10
blue	6	No colour	±20

(2 marks)

(b) Explain how overloading a cable with electrical appliances is dangerous.

_____
_____
_____
_____
_____

(3 marks)

7. (a) State the law of moments

_____
_____

(1 marks)

(b) Figure 5 below shows weights on a weightless meter ruler balanced at the pivot.
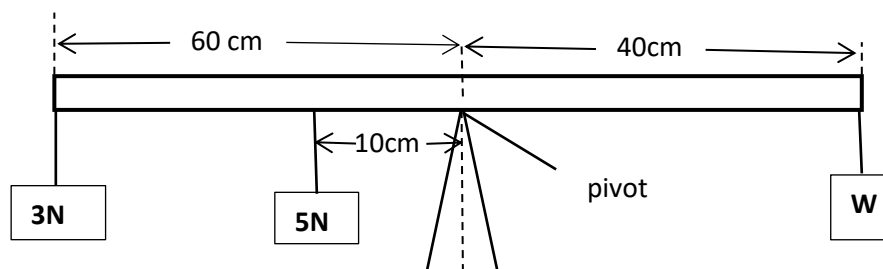

Figure 5

Determine the value of weight labeled **W**.

┌───┐
│   │
│   │
│   │
│   │
│   │
│   │
│   │
└───┘

(4 marks)

8. **Figure 6** below is a pressure cooker.

Figure 6

   i.   Briefly explain how the pressure cooker works.

_____
_____
_____
_____
_____
_____

(4 marks)

   ii.   Why is the pressure cooker fitted with a tight lid?

_____
_____

(2 mark)

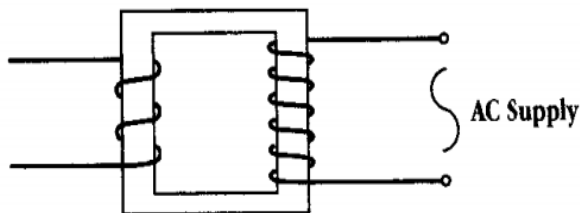(b) Explain why tyres of a vehicle become more inflated when the vehicle is moving.

_____
_____
_____

(2 marks)

9. (a) Explain how moving a coil faster in a magnetic field affects current produced in the coil.

_____
_____
_____

(3 marks)

(b) **Figure 7** below is a transformer. Use it to answer the questions that follow

Figure 7

i. Name the type of transformer.

_____

(1 mark)

ii. Give a reason for your answer to question 8b (ii).

_____
_____

(2 mark)

iii. Calculate the output voltage if input voltage is 240V, number of turns in the primary coil is 200 and number of turns in the secondary coil is 20.

(4 marks)

(c) Mention any **two** reasons why Electricity Generation Company (Egenco) of Malawi prefers generating alternating current (ac) over direct current (dc).

i. _____
_____

ii. _____
_____

(2 marks)

SECTION B (30 marks)

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

10. (a) Explain how stroking method is done so as to magnetise a piece of steel.

_____
_____
_____
_____
_____
_____
_____
_____

(4 marks)

(b) **Figure 8** below is a thermos flask. Study and use it to answer the questions that follow.
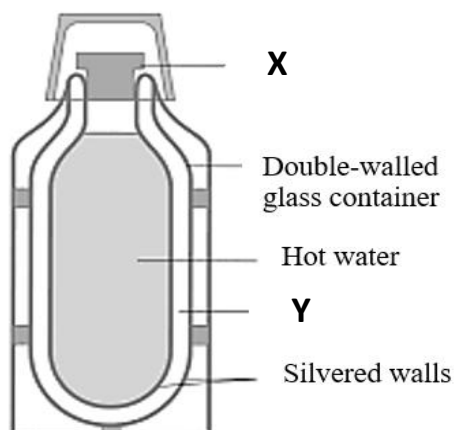

Figure 8

i. Name parts labelled **X** and **Y**.

X: _____

Y: _____

(2 marks)

ii. Explain how the thermos flask keeps the hot water hot for some time.

_____

_____

_____

_____

_____

_____

_____

(4 marks)

11. (a) Explain how a sea breeze occurs.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5 marks)

(b) Describe an experiment that can be carried out to show that pressure in liquids depends on the density of the liquid.

_____

_____

_____

_____

_____

_____

_____

_____

(5 marks)

12. (a) Describe an experiment that be carried out to show that salt affects the boiling point of pure water.

_____

_____

_____

_____

_____

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_____
_____
_____
_____

(6 marks)

(b) Explain how Newton's third law of motion is used when a person is swimming.

_____
_____
_____
_____
_____
_____
_____
_____

(4 marks)

END OF QUESTION PAPER