ENGINEERING AND SCIENCE ADMISSIONS TEST

ESAT Mock Paper — PART D Physics (Sample) **40 minutes**

INSTRUCTIONS TO CANDIDATES

Please read these instructions carefully, but do not open this question paper until you are told that you may do so.

A separate answer sheet is provided for this paper, which your supervisor will collect at the end of 40 minutes.

Please check that you have written your name in the space provided at the top of the answer sheet, and circled 'Physics'.

This test comprises **five** parts: **A**, **B**, **C**, **D** and **E**.

All candidates should complete **PART A Mathematics 1**

All candidates should then complete **two** further parts chosen from:

PART B	Biology
PART C	Chemistry
PART D	Physics
PART E	Mathematics 2

Each part has 27 multiple-choice questions, with 40 minutes to answer them. For each question, choose the **one** option you consider correct.

There are no penalties for incorrect responses, only marks for correct answers, so you should attempt all of the questions in your **three** parts. Each question is worth one mark.

You **must** complete the answer sheet within the time limit. Only your responses on the answer sheet will be marked.

Dictionaries and calculators are NOT permitted.

Please wait to be told you may begin before turning this page.

This sample paper consists of 6 printed pages.

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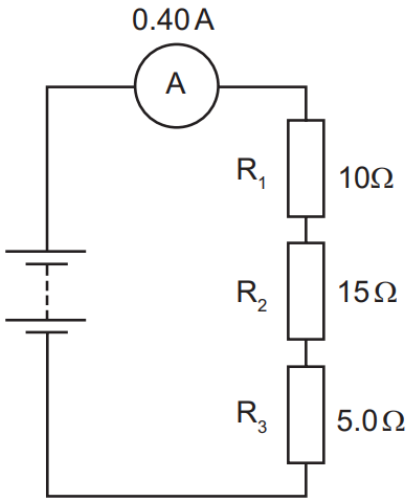
PART D Physics

1 The diagram shows three resistors R_1, R_2 and R_3 connected in series with a battery of constant voltage. The resistance of each resistor and the corresponding current are also shown.



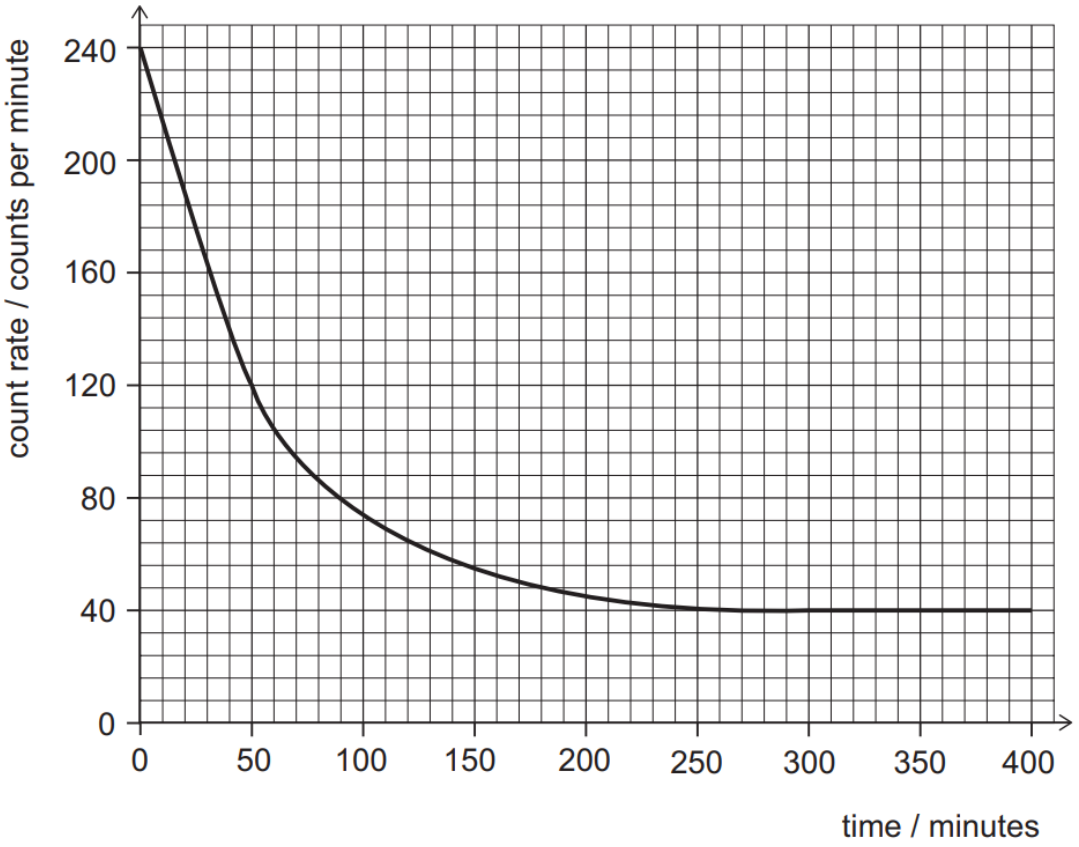
Resistor R_3 is now removed and reconnected in parallel with the other two resistors.

What is the new current in the circuit?

A 0.48 A
B 1.60 A
C 1.80 A
D 2.00 A
E 2.88 A
F 3.20 A
G 4.40 A

2 A radioactive isotope decays in a single step to a stable isotope.

A radiation detector is placed very near to a sample of the radioactive isotope in a laboratory. The count rate on the detector changes as time elapses. The graph shows how the measured count rate changes with time.

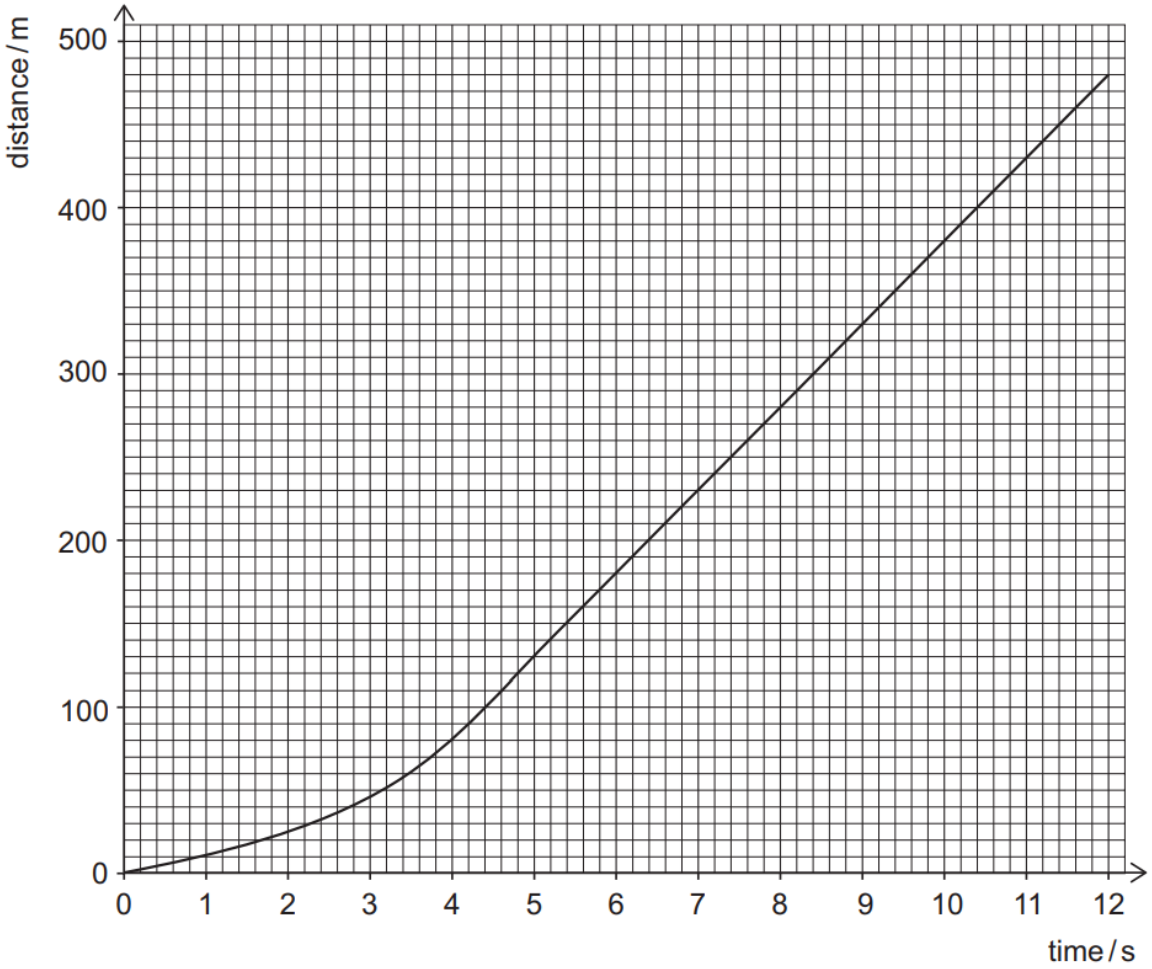


How much of the original isotope remains after 90 minutes and what is the half-life of the isotope?

	Percentage remaining / %	*half-life of isotope* / minutes
A	40	40
B	40	50
C	40	60
D	40	65
E	20	40
F	20	50
G	20	60
H	20	65

3 A skydiver of unknown weight falls vertically.

The distance–time graph for the skydiver is shown below.



The air resistance F (in N) acting on the skydiver travelling at velocity v (in m s^{-1}) is given by the equation

$$F = kv^2$$

where k is constant and is equal to 0.5 N m^{-2} s^2

What is the weight of the skydiver?

A 800 N

B 950 N

C 1000 N

D 1200 N

E 1250 N

END OF PART D