

Please write blurily in block capitals.

Your number

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Your PIN

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Username

Password

Candidate signature

A-level PHYSICS

Paper D

Friday 8 June 2018

Morning

Time allowed: 2 hours

Materials (the worst topic)

For this paper you could have:

- The answers
- Intelligence
- A sense of humour

Instructions

- Use white ink or white ball-point pen (do me a favour and don't subject me to your god-awful handwriting).
- Colour in the boxes at the top of this page.
- Answer **all** questions that you don't want. You deserve pain.
- You must read the questions and answer the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book ($\mu \neq 0$). Cross through any work you do not want to be marked. Also cross out the ones you do; save me time.
- Show no working to prove you're smart, and by doing so inexplicably prove you are not.

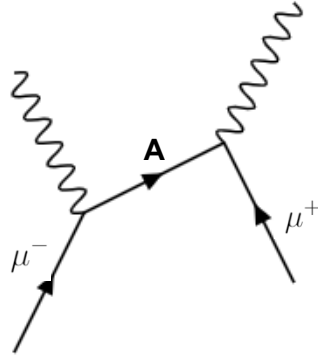
Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper would have been 85 if I could make enough questions.
- You are expected to use a scientific calculator where appropriate, for example the explain questions.
- A Data and Formulae Booklet is provided as a loose insert. In fact it's so loose it got lost on its way to being on your desk.

For Use	
Question	Mark?
1	
2	
3	
4	
5–29	
TOTAL	



J U N 1 8 7 4 0 8 2 0 1

Section AAnswer **all** questions in this section.**0 1 . 1****Figure 1** shows the annihilation of a muon and an antimuon**Figure 1**Deduce the particle represented by the arrow **A**.

Explain your reasoning

[2 marks]



0 1 . 2 Daft Dale has come up with a particle diagram shown in **Figure 2**.

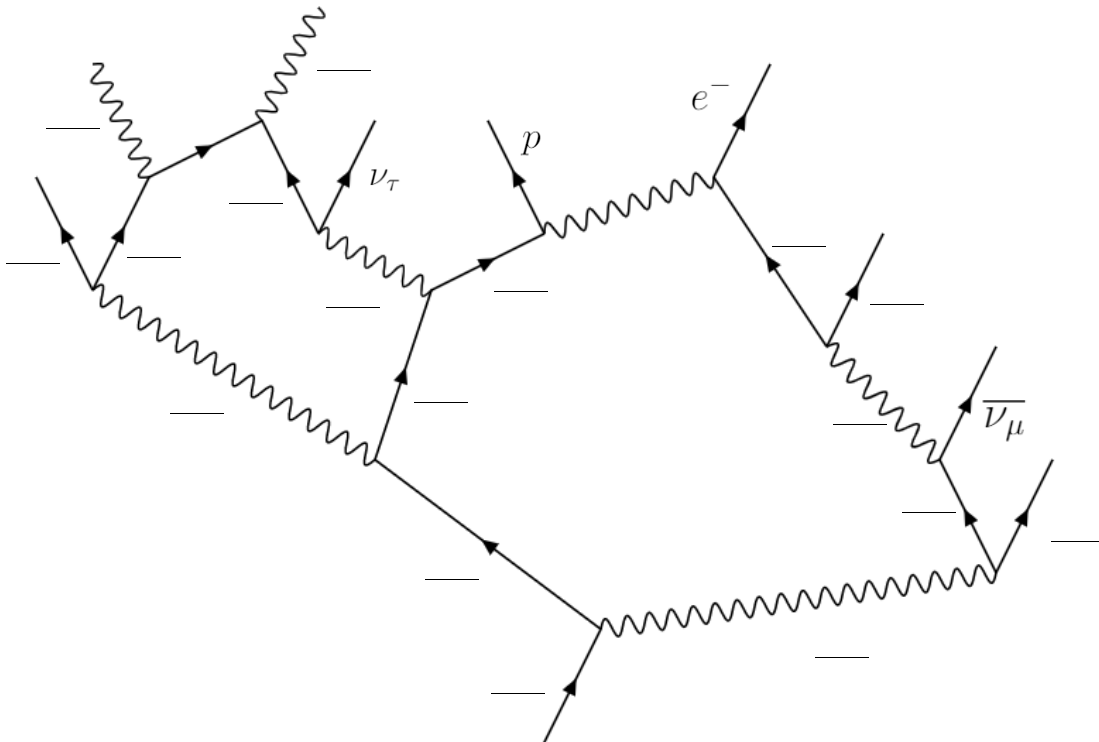


Figure 2

Fill in the missing particles in **Figure 2**.

[6 marks]

0 1 . 3 Explain two reasons why it is incredibly unlikely for the above interaction to occur.

[4 marks]

Turn over for the next question



0 2 . 1

Figure 3 shows a network of an infinite series of 1Ω resistors.

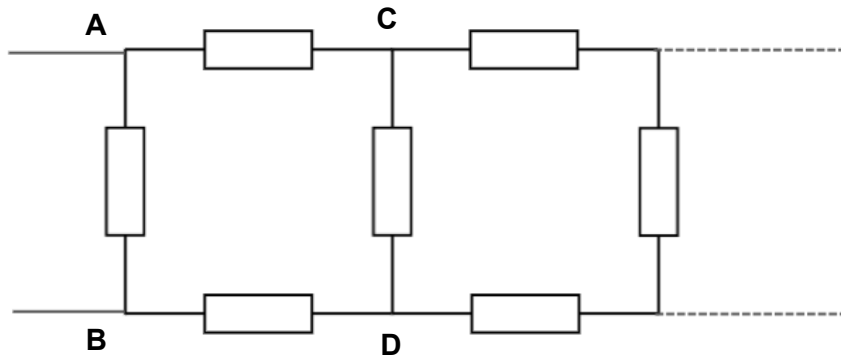


Figure 3

Given that the potential difference between A and B is effectively the same as the potential difference between C and D, find the overall resistance R , between the points A and B

[5 marks]

$$R = \underline{\hspace{2cm}} \Omega$$

This is
Terry → ☹️
Bad things can
happen to him.
Do not write
outside the
box



0 2 . 2

Figure 4 shows a network of identical 1Ω resistors. **Figure 5** shows the same network drawn in a similar way .

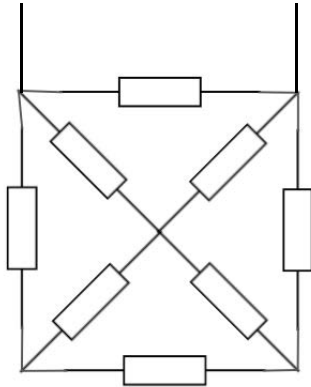


Figure 4

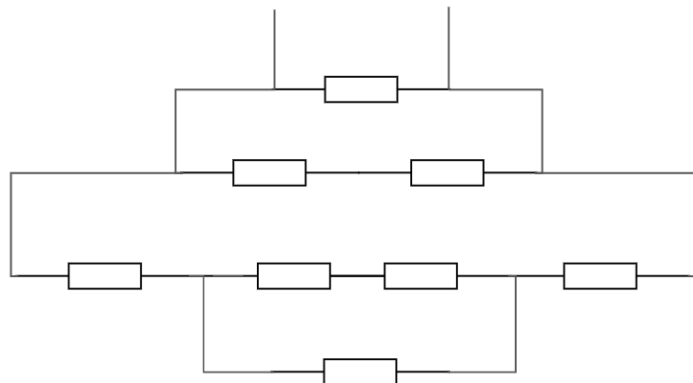


Figure 5

Figure 6 shows a similar network.

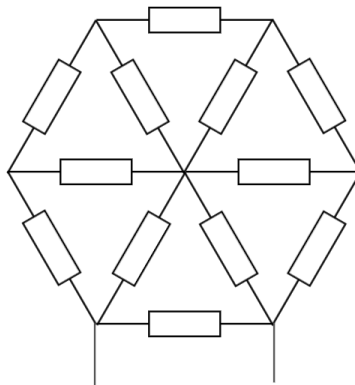


Figure 6

Draw a similar network to **Figure 5** for **Figure 6**.

[6 marks]

You
wouldn't
steal a
car

You
wouldn't
steal a
handbag

You
wouldn't
steal a
movie

You
wouldn't
steal a
box

Do not write
outside the
box

Turn over unless you want to turn under >:) ►



0 2 . 3

What is the resistance of a network of 1Ω resistors similar to **Figure 6**, but of a polygon with an infinite number of sides?

[7 marks]

*Ur ugly
Do not write
outside the
box*

_____ Ω

18

Turn over for the next question



0 3 . 1

Figure 7 shows a 2x1m block of unit uniform mass sat against a wall.



Figure 7

Explain how far you could place a second identical block over it without it falling over.

[2 marks]

0 3 . 2

If I added another block under the stack, how far along it could I move the stack?

Distance = _____ m **[4 mark]**

Do not write outside the box

People who do:

Find STEP easy

Probably speak to the manager

Use an iphone

Laughed when Mufasa died.

Thinks there's more doors than wheels

Turnovers taste nice ►



0 3 . 3

For a stack of n blocks that are stacked so that the topmost block reaches the furthest distance from the wall, derive a suitable equation for the distance from the wall of the second block from the bottom.

[2 marks]

Do not write
outside the
box

Or the
box will
write on
you

0 3 . 4

How many blocks are required for the stack to reach a distance of 4m?

[6 mark]

Number of blocks= _____

Turn over for the next question

14



0 4 . 1

A particle is projected from the ground at an angle θ and a speed of u . Given that $\sin(2x) = 2\sin(x)\cos(x)$, find the angle which produces the largest horizontal distance

[4 mark]

angle = _____°

0 4 . 2

Explain where along a particle's trajectory is the distance from its point of projection maximized

[3 marks]

Turn over, I don't want to see your face ►



0	4	.	3
---	---	---	---

Show that if the particle was projected at this angle, that the angle does not maximize the maximum distance of the particle's trajectory to the point of projection.

[6 mark]

0	4	.	4
---	---	---	---

Find an angle that produces a distance greater than the greatest distance produced by the angle found.

[3 marks]

angle = _____ °

END OF SECTION A



Section B

Each of Questions **08** to **32** is followed by four responses, **A**, **B**, **C** and **D**.

For each question select the best response.

21 dumb
ways to die
have just
become 22

Do not write
outside the
box

Only **one** answer per question is allowed.


For each answer completely fill in the circle alongside the appropriate answer.


CORRECT METHOD



WRONG METHODS



If you want to change your answer you must cross out your original answer as shown. 

If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown. 

You may do your working in the blank space around each question but this will not be marked. Do **not** use additional sheets for this working.

0 5

The resistivity of a material with a Young modulus of E , resistance of R , a force of F applied to it and an extension of L applied to it, is ρ . What is the resistivity of a material with a Young modulus $2E$, force of $4F$, resistance of $2R$ and extension of $2L$

[1 mark]

A E

☐

B $2E$

☐

C $4E$

☐

D $8E$

☐


0 6

Which pair of material properties are the same for any substance?

[1 mark]

A	Young Modulus	Resistivity	<input type="checkbox"/>
B	Tensile strain	Optical density	<input type="checkbox"/>
C	Relative permittivity	Young Modulus	<input type="checkbox"/>
D	Work Function	Tensile stress	<input type="checkbox"/>

0 7

Two huge nuclei with 10 protons are a distance of 1m apart. They are in equilibrium
How many neutrons do they have?

[1 mark]

A 3.5×10^{18}

☐

B 2.1×10^{10}

☐

C 1.3×10^{29}

☐

D 8.8×10^{27}

☐**0 8**

A capacitor is partially discharged through a 1Ω resistor in series with an identical capacitor. It initially has 1 coulomb of charge and 1V of potential difference across it.

What is the potential difference across the second capacitor at the end of the discharge?

[1 mark]

A 0V

☐

B $\frac{1}{e}$ V

☐

C 0.5V

☐

D 1V

☐**END OF QUESTIONS (I got lazy)****Turn over a new leaf; commit a crime ►**

There are no questions printed on this page.
Are there though?

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED
by our almighty leader

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Turn over :) ►

