

(c) During a lightning strike the average current flowing is 40 000 A and the amount of electric charge delivered is 5 C.

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7	

◀ L6WRFNSKRWR 7KLQNVWRFN

(i) Name the unit of electric charge. _____ [1]

(ii) Calculate the duration of the average strike.
You are advised to show clearly how you get your answer.

Duration = _____ s [4]

(iii) If the energy discharged is 700×10^6 J what is the voltage of the strike?

Voltage = _____ volts [3]

5 (a) The full symbol for a nucleus of carbon-14 is ${}^{14}_6\text{C}$

Complete the table below by naming the particles in a nucleus of carbon-14 and give the number of each in the nucleus of carbon-14.

Particle	Number in the nucleus

[4]

(b) Four unknown nuclei are labelled *W*, *X*, *Y* and *Z*.
Their full symbols are given below.



(i) Which, if any, of these nuclei are isotopes of the same element?

_____ [1]

(ii) Explain your answer.

_____ [1]

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- (c) A radioactive substance has a half-life of **12 years**.
Which of the following statements is/are true?
Write your answer in the space provided.

For a sample of this substance **after 12 years**:

Statement	True or False
Its activity will be half of what it was at the start.	
Its activity will be double what it was at the start.	
Its activity will be zero.	

For a sample of this substance **after 24 years**:

Statement	True or False
All of the radioactive nuclei will have decayed.	
Its activity will be zero.	
Its activity will be $\frac{1}{4}$ of what it was at the start.	

[3]

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(d) Fission and fusion are nuclear reactions which release large amounts of energy. The table below is intended to show a number of significant differences between the two reactions. Complete the table using the list of phrases/words below.

1. building of larger nuclei from small nuclei
2. the splitting up of large nuclei
3. nuclear power station
4. requires very high temperatures to start
5. the sun
6. hydrogen
7. uranium
8. will start at normal temperatures

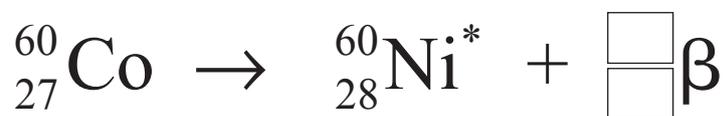
Write the number corresponding to the statement in the appropriate box in the table below.

Nuclear Reaction	Fusion	Fission
Where the process can be found happening		
Fuel used		
Description of the reaction		
Conditions required to start		

[4]

(e) Cobalt-60 is a beta emitter, which decays to nickel. The nickel produced decays by gamma (γ) emission.

(i) Complete the decay equations below.



↓



[4]

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