FORMULAE	Subject Second	Leave blank
You may find the following formulae useful	PRAFT PCCCC editatio	
charge = current × time	$Q = I \times t$	
potential difference = current × resistance	$V = I \times R$	
electrical power = current × potential difference	$P = I \times V$	
energy transferred = current × potential difference × time	$E = I \times V \times t$	
speed = $\frac{\text{distance}}{\text{time}}$		
acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{(v-u)}{t}$	
force = mass × acceleration	$F = m \times a$	
weight = mass x gravitational field strength	$W = m \ge g$	
momentum = mass x velocity		
work done = force \times distance moved in the direction of the force	$E = F \times d$	
power = $\frac{\text{work done}}{\text{time taken}}$	$P = \frac{E}{t}$	
gravitational potential energy =mass \times gravitational field strength \times ve	ertical height GPE = $m \times g \times h$	
kinetic energy = $\frac{1}{2} \times \text{mass} \times \text{velocity}^2$	$\mathrm{KE} = \frac{1}{2} \times m \times v^2$	

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Static electricity

1. (a) Ellie slides down a plastic tube.

Her hair becomes charged.



- (i) Ellie's hair is charged by the transfer of
 - $\mathbf{A} \boxtimes \operatorname{atoms}$
 - \mathbf{B} \boxtimes electrons
 - $C \boxtimes$ neutrons
 - \mathbf{D} \boxtimes protons
- (ii) Strands of Ellie's hair repel each other.

This is because they have

- $A \boxtimes$ the same electric charge
- $\mathbf{B} \boxtimes$ a different electric charge
- $C \boxtimes$ the same magnetic charge
- $\mathbf{D}\ oxmin \ \mathbf{D}\ oxmin \ \mathbf{D}$ a different magnetic charge

(1)

(1)

Leave blank (b) The photograph shows an aircraft being refuelled. Subjec ditat ununununun plastic fuel pipe The aircraft is refuelled using a plastic fuel pipe. (i) The plastic pipe can become charged with static electricity. Give the reason for this. (1) (ii) Explain how static electricity could cause an explosion during refuelling. (2) (iii) A metal safety cable is used during refuelling. Explain how this cable reduces the risk of an explosion. (2) (Total for Question 1 = 7 marks)







(b) Describe what happens to the energy of the car as it moves from L to M.	Leave blank
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editation	
(2)	
(c) The weight of the car is 6000 N	
Calculate the work done on the car when it is raised from the start to L.	
work done =	
(d) The motor does 300 000 J of work in a time of 100 s.	
Calculate the power of the motor.	
power =	
(2)	
(e) At one part of the ride the car has a velocity of 10 m/s. The mass of the car is 600 kg.	
What is the kinetic energy of the car?	
kinetic energy =J (2)	
(Total for Question 3 = 10 marks)	





(d) The photograph shows a skydiver a few seconds after beginning his jump.	Leave blank
The is raining at a steady speed and has not yet opened ins parachite.	
Photo: Shutterstock	
 (i) Gravity is one force acting on the skydiver in the photograph. Give one other force acting on the skydiver. 	
(1)	
(ii) Explain why the skydiver is falling at a steady speed.	
(3)	
(Total for Question 4 = 11 marks)	



		Leave
(c)	The UK government plans to build ten new nuclear power stations to help meet the ubject	
	UK's future energy needs.	6
	Discuss the benefits and drawbacks of nuclear power stations.	J •/
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	- Trace	
	(6)	
(Ŋ)	Scientists are developing a different nuclear reactor	
(u	This type of reactor uses nuclear fusion with hydrogen as the fuel.	
	Describe what happens in the nuclear fusion of hydrogen	
	Describe what happens in the nuclear fusion of hydrogen.	
	(2)	
	(Total for Question 5 = 12 marks)	



(ii) Draw a line of best (iii) What is the current	fit through the plotted poin in the wire when the voltag	ts. e across it is 5.0 V?	Subject BRAFT Proceeditation
(iv) What is the power of	leveloped in the wire when	current = the voltage across it is 4	A (1) V?
		power =	W (2)

