STARTER FOR 12 PHYSICS

Over the past 15 years new and expensive experiments have been taking place to help us understand the universe and the matter/energy that is contained within it. Two examples of these experiments are the Hubble Space telescope, which looks at galaxies and clusters of galaxies to help us explain how they are formed and behave, and the LHC (large Hadron Collider), which is trying to simulate conditions very soon after the Big Bang to help us better understand particles and how they interact with each other.

The Hubble Space

Images from the Hubble space Telescope

Your tasks:

1) Describe 3 discoveries that have been made using the Hubble Space Telescope
2) Describe three of the particle theories that the LHC has been built to test.

Challenge: The LHC is also being used in research for proton beam therapy. Proton beam therapy is an alternative to radiotherapy in the treatment of cancer.

1) Outline how proton therapy and radiotherapy combat tumours
2) Explain the advantages of proton beam therapy over radiotherapy
3) Summarise the challenges to using proton beam therapy in hospitals
4) University College London Hospital is building a new proton therapy clinic in Tottenham Court Road. This will cost around £250 million. Write an argument either for or against the building of this clinic, summarising the advantages and disadvantages and justifying your point of view.

But physics isn't just about big, expensive equipment, it is about the people that design these experiments or come up with theories using creative thinking and reasoning.

Your task:

1) Pick a physicist who has made an important contribution to physics in the last 100 years.

a) Describe what they discovered/invented
b) Explain why this was so important to the academic world
c) What impact has this discovery had on modern life
d) Also give a brief outline of their life

Possible examples: Dirac, Heisenberg, Hawking, Einstein, Pauli, Feynmann.

Skills	Gradient Equations

Complete the table below about graphs and gradients by rearranging each equation to make 'y' the subject

Equation	Graph	Rearrange Equation	Gradient	Intercept
$y = mx + c$	y plotted on the y axis x plotted on the x axis	$y = mx + c$	m	c
$V = IR$	y axis = V x axis = I	$V = RI$	R	0
$I = \frac{Q}{t}$	y axis = t x axis = Q			
$\rho = \frac{RA}{l}$	y axis = l x axis = R			
$\varepsilon = V + Ir$	y axis = V x axis = I			
$E = VIt$	y axis = E/t x axis = V			
$hf = \phi + E_K$	y axis = E_K x axis = f			
$\lambda = \frac{h}{mv}$	y axis = $1/v$ x axis = m			
$E_P = mgh$	y axis = mg x axis = E_P			
$E = \frac{1}{2}Fe$	y axis = e x axis = $1/F$			
$c = f\lambda$	y axis = $1/\lambda$ x axis = f			
$v = u + at$	y axis = a x axis = $1/t$			
$v^2 = u^2 + 2as$	y axis = v^2 x axis = s			
$s = \frac{(u+v)}{2}t$	y axis = v x axis = s			
$w = \frac{\lambda D}{s}$	y axis = λ x axis = w			