Practice Question Set For A-Level

**Subject: Physics** 

**Paper-2 Topic: Thermal Physics** 



ıx. Maı	'ks : 1	8 Marks	Time : 18 Minut
rock	s. The	ermal power station, water is pumped through pipes into an underground thermal energy of the rocks heats the water and turns it to steam at high a drives a turbine at the surface to produce electricity.	
(a)	Wates	er at 21°C is pumped into the hot rocks and steam at 100°C is produced at	a rate of 190 kg
	(i)	Show that the energy per second transferred from the hot rocks to the pathis process is at least 500 MW.	power station in
		specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ K}^{-1}$ specific latent heat of steam = $2.3 \times 10^6 \text{ J kg}^{-1}$	
	(ii)	The hot rocks are estimated to have a volume of $4.0 \times 10^6$ m <sup>3</sup> . Estimate temperature of these rocks in one day if thermal energy is removed from calculated in part (i) without any thermal energy gain from deeper under	them at the rate
		specific heat capacity of the rocks = $850 \text{ J kg}^{-1} \text{ K}^{-1}$ density of the rocks = $3200 \text{ kg m}^{-3}$	

(b) Geothermal energy originates as energy released in the radioactive decay of the

Calculate the mass of \$\frac{228}{92}\$ U that would release energy at a rate of 500 MW.  half-life of \$\frac{228}{92}\$ U = 4.5 \times 10^9 years  molar mass of \$\frac{228}{92}\$ U = 0.238 kg mol <sup>-1</sup> (Total 1)  Calculate the energy released when 1.5 kg of water at 18 °C cools to 0 °C and then freezes form ice, also at 0 °C.  specific heat capacity of water = 4200 J kg <sup>-1</sup> K <sup>-1</sup> specific latent heat of fusion of ice = 3.4 \times 10^5 J kg <sup>-1</sup> Explain why it is more effective to cool cans of drinks by placing them in a bucket full of meltice rather than in a bucket of water at an initial temperature of 0 °C.	Calculate the m	e <sup>92</sup> U dee	ep inside the E	arth. Each nucle	us that decays	releases 4.2 MeV.
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