1. Two masses, each of mass m, have gravitational force F between t
What is the gravitational force between two masses, each of charg

A $\frac{F}{3}$ **B** $3F$ **C** $9F$

2. One of the moons of Mars is call[illegible] Deimos.
   - mass of Deimos = [illegible] kg
   - mass of Mar[illegible] 10^{23} kg
   - an[illegible] from the centre of Mars to the centre of Deimo
   C[illegible] the mean force holding Deimos in orbit.

3. The gravitational potential, V, at the surface of Earth is -9.81 J kg
   (a) Sketch a graph of how V varies with increasing distance, r, fr
   (b) Describe how to calculate the work done in raising a 1 kg mas
   away from Earth.

4. The relationship between the time period, T, and the radius, r, of a
   (a) State the factor by which the time period changes when the ra
   (b) State the factor by which the radius must change in order to q

5. Some information about the Sun and Earth is provided:
   - mass of the Sun = 5.97×10^{24} kg
   - radius of the Sun = 6.37×10^{6} m
   - time period for Earth orbit = [illegible] s
   - time for Earth to spin [illegible] its axis = 8.64×10^{4} s

   The equati[illegible] escape velocity, v is $\sqrt{\frac{2GM}{R}}$
   C[illegible] the escape velocity from the surface of Earth.
   You may not have to use all of the information given above.

6. Outline the stages that a massive star passes through when hydrog
in its core.

7. Explain why stars can emit radiation, such as infrared.

8. Use Stefan's law to predict what would happen to the luminosity i
separately, in a star.
   (a) The surface temperature is doubled.
   (b) The radius is halved.

9. One parsec is 3.1×10^{16} m
Use this value to d[illegible] nin[illegible] he value of 1 astronomical unit (AU)

10. W[illegible] e Andromeda galaxy is observed from Earth, the spectrum
sh[illegible] a blue shift. Explain what causes this blue shift **and** state w

11. Describe what is meant by *dark energy*.

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