

6. A cannonball has a mass of 13 kg and is fired vertically upwards from the surface of the Earth to a height of 27 m. (use $g = 9.8 \text{ N/kg}$ at the surface of Earth.)
- a. Calculate the cannonball's maximum gravitational potential energy



The cannonball is fired upwards such that it stores double the maximum gravitational potential energy.

- b. Calculate how high the ball is fired

7. An astronaut on the surface of the Moon has a mass of 75 kg. They pick up a rock which has a mass of 1.5 kg. (The value of g on the Moon = 1.6 N/kg .)
- a. Calculate the increase in gravitational potential energy of the astronaut holding the rock if they jump a height of 1.2 m



The astronaut throws the rock vertically upwards such that it stores the same maximum gravitational potential energy as the astronaut and rock combined in part (a.)

- b. Calculate the rock's increase in height

The astronaut picks up another rock and throws it vertically upwards. This rock reaches the same height as in (b.) but stores 35 J more gravitational potential energy than in (a.)

- c. Calculate this rock's mass

8. An alien bird flies at a height of 123 m above its home planet's surface. The bird has a mass of 12 kg and stores 790 J of gravitational potential energy. Calculate the value of g for this planet.

