

# 18.1 ARMAGEDDON TIME?

In the 1998 film Armageddon, Bruce Willis and his team of oil drillers are asked to save the world from a massive asteroid impact by going to the asteroid, drilling down into the asteroid, and placing a nuclear weapon to blow it into two fragments that will miss the Earth.



In this lesson you will learn about asteroids and meteorites, calculate the kinetic energy of a previous Earth impact, and extend these ideas to establishing whether you think the premise of the movie is realistic or not.

## ACTIVITY 1: HOW BIG WAS THE BARRINGER IMPACTOR?

Kinetic energy = **2500kT TNT** (1kT TNT =  $4.3 \times 10^{12}$  J)

Entry velocity = **12.8 km/s**

Density of iron meteorite = **7g/cm<sup>3</sup> = 7000kg/m<sup>3</sup>**



$$KE = 2500 \times 4.3 \times 10^{12} = 1.075 \times 10^{16} \text{ J}$$

Find mass:  
 $KE = \frac{1}{2}mv^2$

$$\text{so } m = \frac{2 \times 1.075 \times 10^{16}}{(12.8 \times 10^3)^2}$$

$$m = 1.3 \times 10^8 \text{ kg}$$

$$p = m/V \text{ so } V = m/p$$

$$V = 1.3 \times 10^8 / 7000 = 1.86 \times 10^4 \text{ m}^3$$

Rearrange volume of a sphere equation and sub in:

$$\text{Impactor diameter} = \mathbf{32.8m}$$