55. What should be the closest approximate radius of a celestial body twice as massive as the sun so that the escape speed from the celestial body is equal to the speed of light? (The mass of sun is 2×10^{30} Kg, speed of light is 3×10^8 m/s, and universal gravitational constant $G = 7 \times 10^{-11}$ N m^2/Kg^2.)

$M_{sun} = 2 \times 10^{30}$

A 300 km B 90 km C 6 km D 1 km

$M_{body} = 2 \times M_{sun}$

$$V_e = \sqrt{2gR} = \sqrt{2\frac{GM}{R^2}R} = \sqrt{\frac{2GM}{R}}$$

$V_e = 3 \times 10^8$ m/s $= c$.

On squaring,

$$9 \times 10^{16} = \frac{2 \times 7 \times 10^{-11} \times 4 \times 10^{30}}{R}$$

$$\therefore R = \frac{14 \times 4 \times 10^3}{9}$$

$$\therefore R = \frac{56}{9} \times 10^3 \approx 6 \times 10^3 \text{ m}$$