1. C
2. A
3. B
4. B
5. A
6. A
7. D
8. D
9. A
10. A

11 (a).   The power per unit area incident on a surface.   (1)

  (b). $I \times d^2$: $134.0 \times (0.20)^2 = 5.4$

  $60.5 \times (0.30)^2 = 5.4$

  $33.6 \times (0.40)^2 = 5.4$

  $21.8 \times (0.50)^2 = 5.5$ (2)

  Therefore: $I \times d^2 = constant$ (1)

  (c). $I \times d^2 = constant = 5.4$ (1)

  $I \times (0.60)^2 = 5.4$ (1)

  $I = 15 \, Wm^{-2}$ (1)

  (d).   Use a smaller lamp.   (1)

  This will be more like a point source.   (1)

  OR

  Use a black cloth on the bench.

  This will reduce reflections of light from the bench.

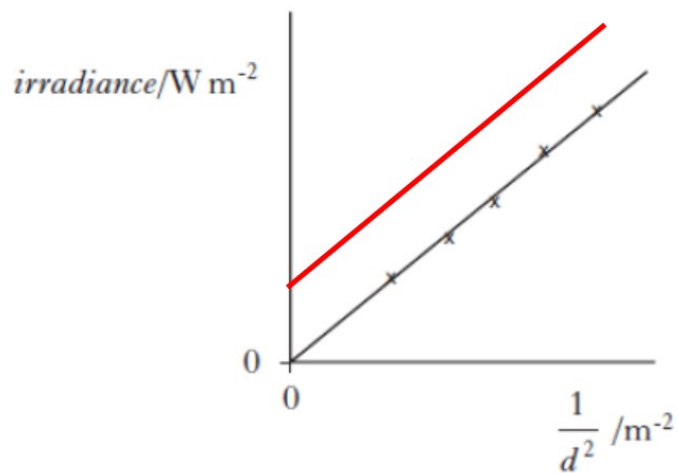 (e). $A_{sphere} = 4\pi r^2 = 4\pi \times (2)^2 = 50.265 \, m^2$ (1)

  $I = \dfrac{P}{A}$ (1)

  $= \dfrac{24}{50.265}$ (1)

  $= 0.48 \, Wm^{-2}$ (1)

12 (a). A straight line through the origin shows that $I \propto \dfrac{1}{d^2}$. (1)

(b).

Straight line parallel to first but above it (1)

(c). Systematic uncertainty (1)

13 (a). $P = 2 \times 1.0 \, mW = 2.0 \times 10^{-3} \, W$ (1)

$$I = \frac{P}{A}$$ (1)

$$= \frac{2.0 \times 10^{-3}}{8.0 \times 10^{-5}}$$ (1)

$$= 25 \, Wm^{-2}$$ (1)