Checking a Filter at Two Detector Distances

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A display tests a lamp and a light filter. The detector can sit 1 m or 2 m from the lamp. Without the filter, the beam spreads over a larger area at the greater distance. The filter is assumed to pass a fixed fraction of the light that would otherwise reach the detector at that distance.

Detector distance	Reading without filter	Reading with filter
1 m	80	40
2 m	20	10

1 Which pair should be compared to calculate filter transmission at 2 m?

(1) 80 and 40

(2) 80 and 10

(3) 20 and 40

(4) 20 and 10

2 Calculate the fraction passed by the filter at each distance. [1]

Answer and work

3 A student says the 10 reading at 2 m proves the filter passes less of the light there than at 1 m. Evaluate the claim. [1]

Answer and work

A third position gives a reading of 18 with the filter. The class has not made an open reading there.

4 Predict the open reading at that position if the filter continues to pass the same fraction. Explain how to check the prediction. [1]

Answer and work