

10 (a) State what is meant by contrast in an X-ray image.

.....
 [1]

(b) X-rays of intensity I_0 are incident normally on a structure, as shown in Fig. 10.1.

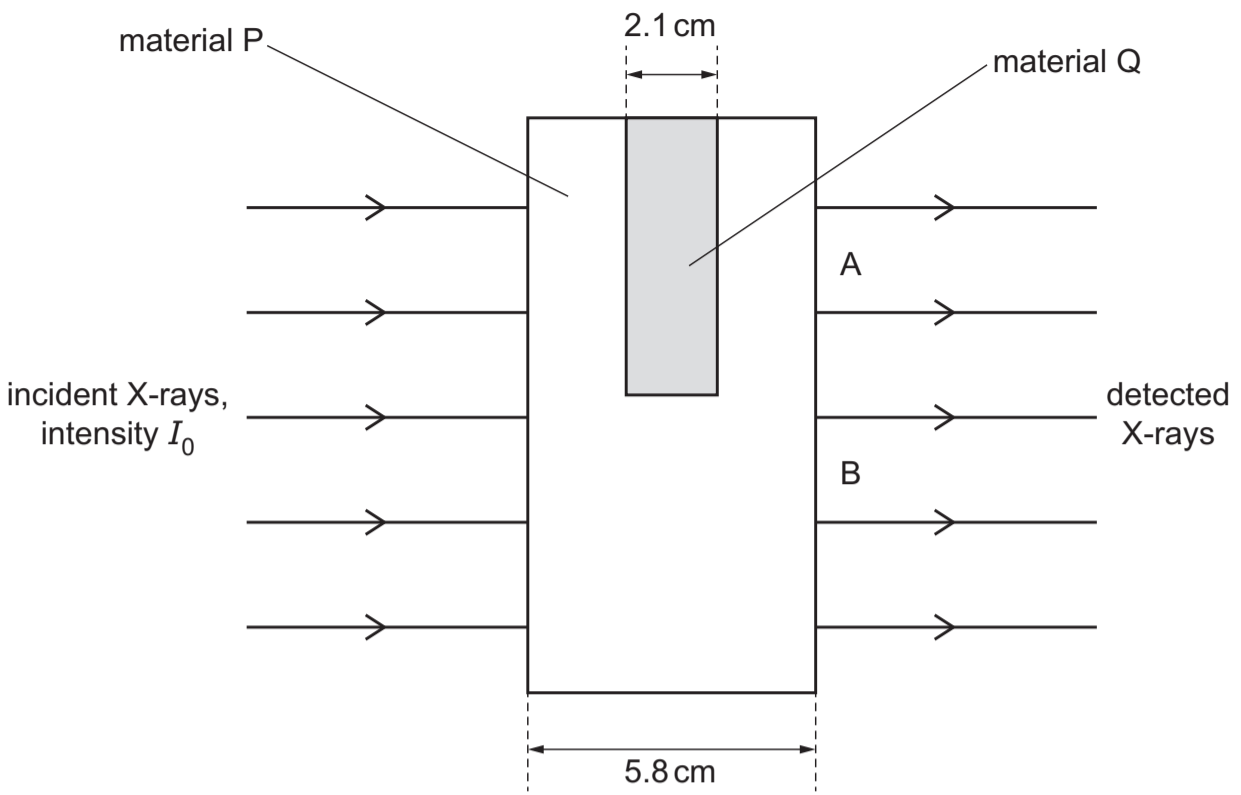


Fig. 10.1

Material P has a linear attenuation coefficient of 0.35 cm^{-1} .
 The X-rays emerging from the structure in region A have an intensity of $0.053I_0$.

(i) Show that the intensity of the X-rays emerging in region B is $0.13I_0$.

[1]

(ii) Determine the linear attenuation coefficient μ of material Q.

$\mu = \dots\dots\dots \text{ cm}^{-1}$ [3]

(iii) Use the information in (b)(i) to suggest why the X-rays emerging from the structure form an image that has poor contrast.

.....

 [1]

(c) Explain how X-rays are used in computed tomography (CT) scanning to produce a three-dimensional image of an internal structure.

.....

 [3]