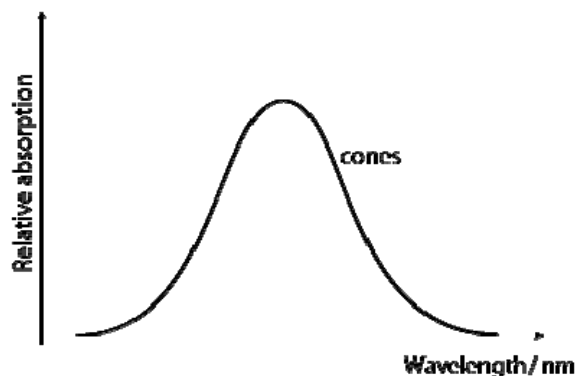


## Extended worksheet – Option A, Worksheet 1

**Option A students must also see the questions in Topic 11**

- 1 The graph shows the overall sensitivity of the cone cells.



On the same axes, draw a sketch graph to show the variation with wavelength of the sensitivity of rod cells.

[2]

- 2 Draw graphs to show the variation with wavelength of the sensitivity of the three types of cone cells.

[3]

- 3 An object is viewed in white light. State and explain the differences in what is seen when the intensity of light is

a very low

[2]

b high

[2]

- 4 The diagram below shows red text on a green background.



By reference to the variation with wavelength of the sensitivity of red and green cone cells, explain why the text is not clearly legible.

[2]

- 5 By reference to the variation with wavelength of the sensitivity of cone cells explain the observation that the red colour of roses 'fades' in twilight more than the green colour of the leaves.

[3]

- 6 Two objects are 12 mm apart and at a distance of 35 m from the eye of an observer. The diameter of the pupil of the eye is 2.0 mm and the wavelength of light emitted by the two objects is 560 nm.

a Using the Rayleigh criterion, show that the eye can just resolve these two objects.

[3]

b The fovea is located at the centre of the retina at a distance of about 20 mm from the eye lens. Two objects can be resolved if their images are more than twice the diameter of a cone cell in the fovea. Using the answer to a estimate the maximum possible value of the diameter of a cone cell.

[2]