

**Q1.** In the eye, rods and cones are used to detect light incident on the retina.

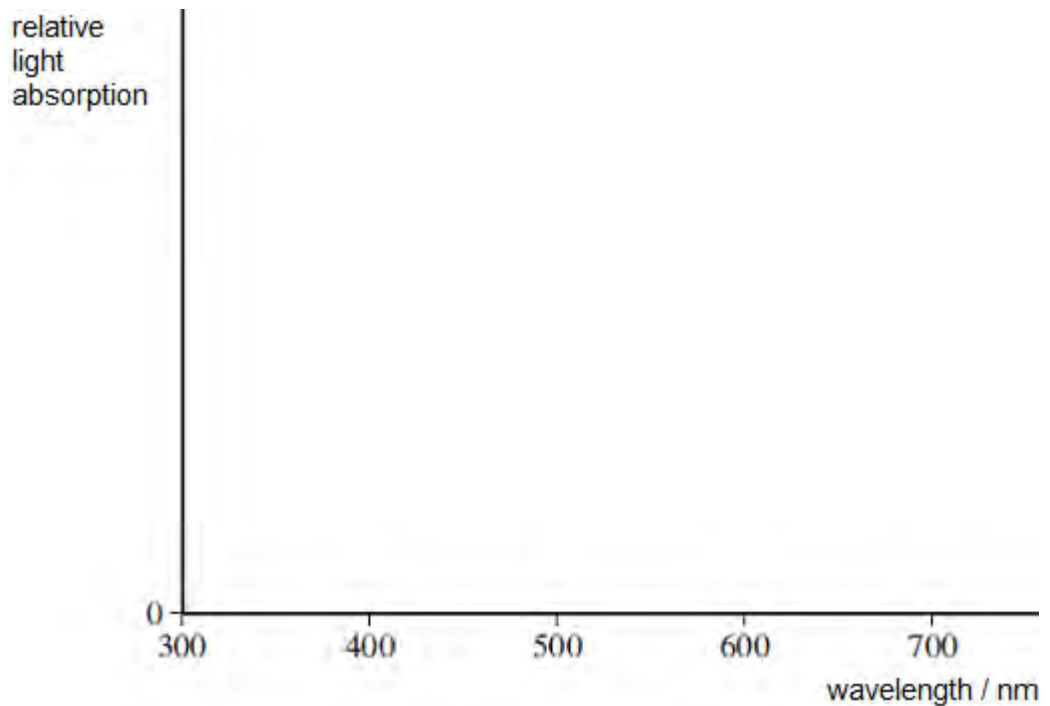
- (a) Describe how the rods and cones are distributed over the surface of the retina.

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(2)

- (b) On the axes below sketch **three** curves to show how the response of each of the three types of cone found in the retina varies with the wavelength of light.

Label each of the three curves with the cone colour to which it refers.



(3)

- (c) State the condition that must be satisfied for two objects to be resolved as individual images on the retina.

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(1)

- (d) Explain how the resolution of the image of an object seen in very dim white light compares to that of the image of the same object seen in bright white light.

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(2)  
(Total 8 marks)

**Q2.** (a) State the changes which occur in a normal eye when

- (i) the eye changes from focussing on a distant object to focussing on a near object, both objects being viewed in bright light

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(2)

- (ii) the eye changes from viewing an object in very dim light to viewing the same object in bright light.

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(2)

(b) State **two** differences in the perceived image of a coloured object viewed in bright white light compared to the perceived image of the same object viewed in very dim white light.

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**(2)**

(c) (i) A patient's eye is astigmatic. State the effect of astigmatism on the image produced by the defective eye.

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**(1)**

(ii) State the usual cause of astigmatism.

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**(1)**

(iii) State the shape of lens used to correct astigmatism.

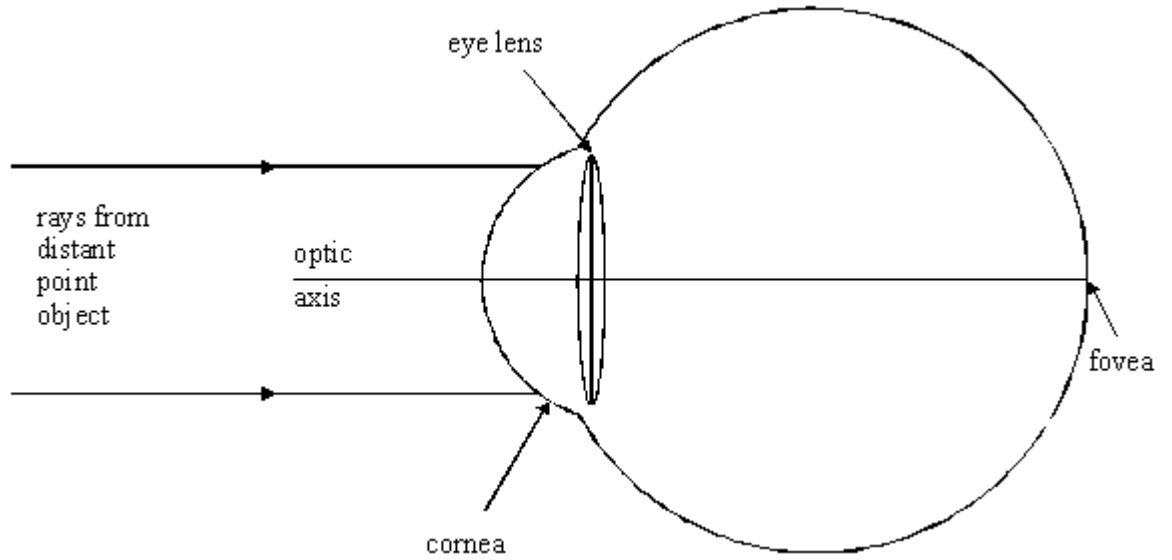
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**(1)**

**(Total 9 marks)**

**Q3.** (a) The diagram represents a simplified version of a normal eye, with no sight defects, looking at a distant point object.

Complete the paths of the two rays.



(2)

(b) Describe the distribution of receptors over the retina.

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(2)

(c) (i) State the purpose of the iris.

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(ii) Describe how this purpose is achieved when the eye is exposed to bright light.

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(2)

(d) (i) State what is meant by *accommodation*.

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(ii) Describe how accommodation is achieved.

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(2)  
(Total 8 marks)

**Q4.(a)** Sketch, on the axes below, the response curves for the colour cones of the eye. Label the wavelength axis with a scale appropriate for your curves.



(4)

(b) In terms of receptors,

(i) give the condition for two different images to be resolved by the eye,

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(ii) explain why finer detail can be seen in bright light than in dim light.

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(3)

(c) (i) State what is meant by *persistence of vision*.

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(ii) Give an example of a practical situation where persistence of vision is used to advantage.

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(2)

(Total 9 marks)