The Nervous System

Total marks:20

1.

Retinitis pigmentosa is a genetic condition that affects the eyes.

It is caused by a mutation to a gene. This mutation produces a recessive allele.

The condition causes rod cells in the retina to break down.

i. Two people who are heterozygous for retinitis pigmentosa are expecting a baby.

Draw a genetic diagram to calculate the probability that the baby will have the condition.

Use R for the normal allele and r for the allele for retinitis pigmentosa.

Answer = _____ [3]

ii. If the baby has retinitis pigmentosa, it will have normal colour vision but will not be able to see well in dim light.

Explain why.

_____

_____

_____

_____ [3]

2.

(a). Diagram A shows the girl's left eye on the beach.

A

B

Diagram **B** shows the girl's left eye after she enters the café.

Explain how you can tell this and how this change happens.

---[3]

(b). Look at the diagrams.

They show how light is focused in people with different eye defects.

Person **X**

Person **Y**

i. Name the eye defect in each person.

Person **X** ---

Person **Y** ---

[2]

ii. Identify the type of corrective lens needed by person **X** and **Y** and explain how the lenses work.

---[3]

3.

(a). This question is about coordination.

A nerve to a muscle contains many motor neurones.

Fig. 21.1 shows two motor neurones supplying a muscle that moves the fingers. **Fig. 21.2** shows the force of contraction of the muscle when the neurones are stimulated separately or both together.

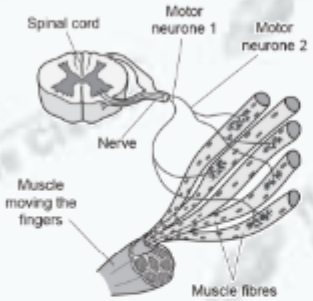

Fig. 21.1

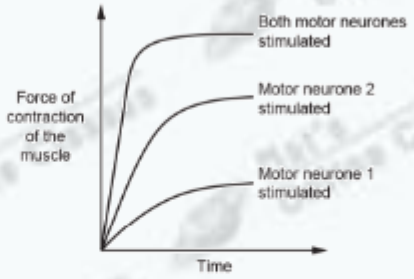

Fig. 21.2

i. Suggest how the brain can finely control the force of contraction in the muscles controlling the fingers.

---[2]

ii. **Fig. 21.3** shows a motor neurone supplying a muscle that moves the leg.

Fig. 21.3

Explain the reason for the difference in the neurone supplying this muscle compared to the neurones supplying the muscle that moves the fingers.

---[3]