



Additional Assessment Materials
Summer 2021

Pearson Edexcel GCSE in Biology (1BI0)
Foundation

Resource Set Topic 2: Cells and Control

Questions

(Public release version)

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General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

- 4 Figure 4 shows a picture seen through healthy eyes and the same picture seen through eyes affected by cataracts.



picture seen through healthy eyes



picture seen through eyes with cataracts

Figure 4

- (a) (i) In which part of the eye do cataracts form?

(1)

- A retina
- B iris
- C cornea
- D lens

- (ii) Explain why the picture seen through eyes with cataracts is less clear.

(2)

- lens became cloudy
- block light from passing through lens
- not all of light reaches retina

(b) Figure 5 shows the estimated number of people with cataracts in the world between 1980 and 2020.

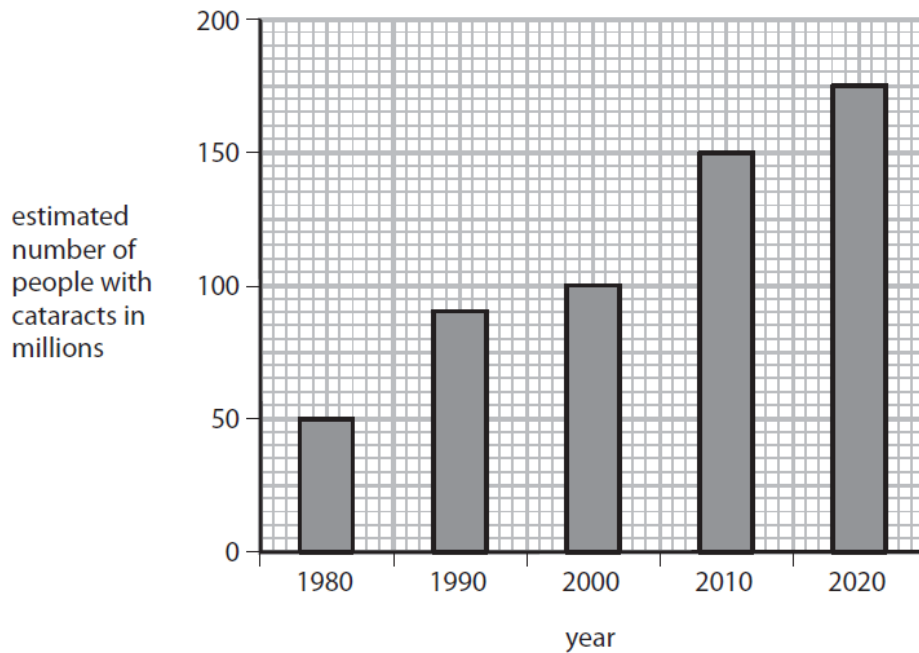


Figure 5

Describe the change in the estimated number of people with cataracts between 1980 and 2020.

(2)

- increase in the estimated number of people with cataracts rapidly from 1980 - 1990 then little from 1990 - 2000 then rapidly from 2000 - 2020
- increased by more than a triple, by 125 million

(c) (i) Explain how cataracts are currently treated.

(2)

- surgery
- replace cloudy lens inside eye with an artificial plastic one

(ii) Scientists are developing a new treatment using eye drops for cataracts.

Describe the advantages of using eye drops to treat cataracts rather than the current treatment.

(2)

- less risk of infection to eye
- less risk of permanent damage to eye
- less cost
- no recovery time needed

6 (a) A student cut a piece of onion and placed it on a microscope slide.

The student then placed this slide on the stage of a light microscope and looked through the eyepiece.

No cells could be seen in the piece of onion.

Explain **two** ways this method could be improved to see details of the onion cells.

(4)

1. Stain the cell with water or indicator to colour cells & their organelles to make them more visible / easily identified
2. Use a microscope lens of higher power to see a greater detail as might be too small to see cell, thus increasing magnification

(b) Figure 7 shows mitosis occurring in some plant cells.

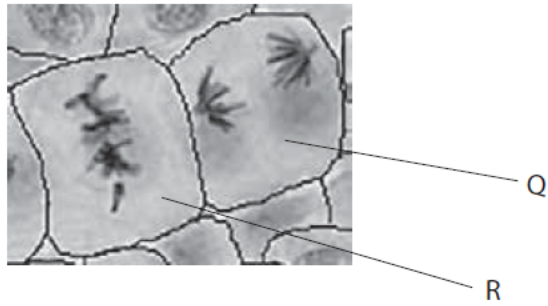


Figure 7

(i) The cells in Figure 7 were taken from a rapidly growing part of a plant.
Which part of a plant has rapidly dividing cells?

(1)

- A chloroplast
- B epithelium
- C meristem
- D vacuole

(ii) Which stage of mitosis is shown in cell R?

(1)

- A prophase
- B metaphase
- C anaphase
- D telophase

(iii) Describe **two** genetic similarities of the new cells that would be produced by cell Q in Figure 7.

(2)

1. diploid

2. same number of chromosomes

(iv) The cells in Figure 7 were heated in hydrochloric acid.

State **two** safety precautions that should be taken when heating hydrochloric acid. (2)

1. wear gloves as hydrochloric acid is corrosive
2. use water bath to heat acid

(c) Explain **one** advantage of using an electron microscope to observe plant cells. (2)

- shorter wavelength of electron beam
- gives greater detail of cells' structure
- as higher resolution

2 (a) A student investigated mitosis in the root tip of a garlic plant.

(i) Explain why the student used the tip of the root. (2)

- where cells undergo mitosis for growth
- make more cells so root extends
- able to see various stages of mitosis as nucleus condensed

(ii) The student squashed the root tip on a microscope slide to spread out the cells.

The slide was placed on the stage of a microscope.

Describe how to use the microscope to obtain a clear image of the cells.

(2)

- use lowest power microscope lens initially and briefly identify area of tissue to be seen in detail
- move to higher power of microscope lens and continually focus on the area of cells wanted
- use fine & coarse adjustment knob to move up & down the stage to help focusing the image

(iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible.

(1)

toluidene blue stain

(b) Figure 2 shows a root cell in a stage of mitosis.

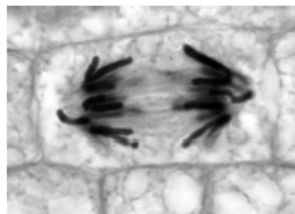


Figure 2

(i) Which stage of mitosis is shown in Figure 2?

(1)

- A prophase
- B metaphase
- C anaphase
- D telophase

(ii) Describe what is happening in Figure 2.

(3)

- spindle fibres attached to centromeres pull each chromatids to the opposite poles by contracting
- chromosome splits into 2 sister chromatids
- in a V-shaped form

6 (a) A karyogram is a picture of the chromosomes found in the nucleus of a single cell.

Figure 8 shows a human karyogram.

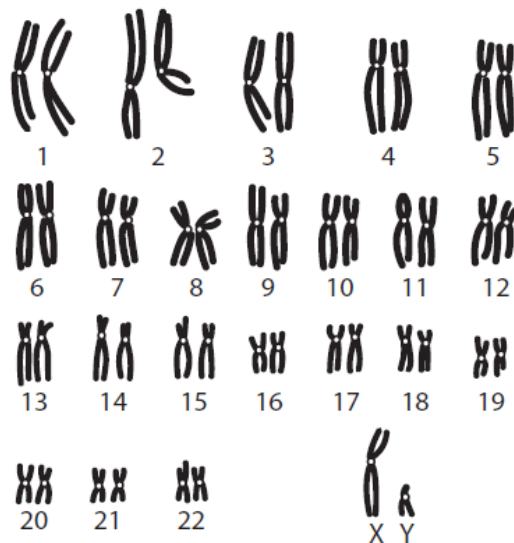


Figure 8

(i) State **two** reasons why this karyogram cannot be from a gamete (sex cell).

(2)

- 1 has 23 pairs of chromosomes thus 46 chromosomes in total
- 2 has a pair of chromosomes indicating the sex, XY, but gametes should only have one

10 (a) The effect of age on focusing distance was investigated.

Volunteers of different ages had their eyes tested.

Each volunteer was asked to read words from a book. The book was moved closer to their eyes.

When the words became out of focus, the distance was recorded.

Figure 16 shows the results.

age of volunteers	distance (mm)			mean distance (mm)
	person 1	person 2	person 3	
40	256	261	257	258
45	282	275	280	279
50	292	301	297	?
55	311	309	307	309

Figure 16

(i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.

(3)

$$\frac{292 + 301 + 297}{3} = 297$$

297 mm

(ii) Give **one** conclusion that can be made from the data in Figure 16.

(1)

mean distance increases as age increases

(iii) Give **two** improvements that are needed in this investigation before a valid conclusion can be made.

(2)

1 needs to be the same sex

2 the words should be of same font & style
thus use same book

(b) Which part of the eye detects coloured light?

(1)

- A iris
- B lens
- C cones
- D cornea

(c) Figure 17 shows light rays entering the eye of a person with normal vision.

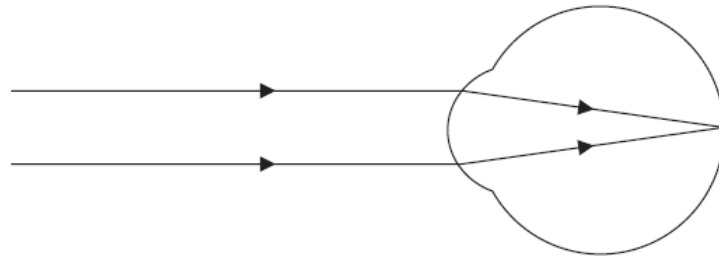


Figure 17

(i) Describe how light rays are focused to give normal vision.

(2)

- parallel light rays pass through cornea & lens and becomes refracted a lot
- light rays therefore changes direction and head towards retina where meets the fovea perfectly
- all light rays send impulses to optic nerve and to brain to form a picture

- (ii) Figure 18 shows light rays entering the eye of a person with an eye defect and two lenses that can be used to correct eye defects.

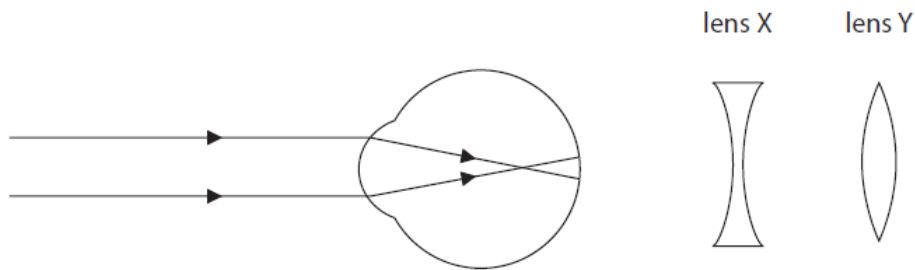


Figure 18

Explain which lens would correct the eye defect shown in Figure 18.

(2)

- lens X

- light rays are meeting / crossing earlier before reaching fovea after being refracted by a large degree

- lens X diverges parallel light rays so when refracted by large degree, would meet fovea

- 7 (a) (i) Which part of the eye carries impulses to the brain?

(1)

- A cornea
 B iris
 C lens
 D optic nerve

- (ii) Name the structure within the eye that controls the amount of light entering the eye.

(1)

iris

(b) Explain the functions of the two types of cell in the retina that detect light.

(4)

- rods :
 - highly sensitive to light, detects light at low intensity to trigger impulse (black & white)
 - many rods connect to 1 sensory neurone
 - low visual acuity (low resolution)
- cones :
 - low sensitivity to light, detects light at high intensity only to trigger impulse
 - each cone connect to 1 sensory neurone
 - 3 types sensitive to 3 range of wave lengths
 - high visual acuity (high resolution)

(c) The eye can be infected by bacteria.

State the type of drug used to treat infections caused by bacteria.

(1)

antibiotics

9 Figure 14 shows a banana plantation.



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Figure 14

After the bananas have been harvested, the old plants are cut down.

The suckers then develop into mature plants producing the next crop of bananas.

The tip of each sucker contains a group of cells called a meristem.

(a) (i) Describe the function of a meristem in the growth of a plant.

(2)

- where cells undergo mitosis to divide and replicate to make more cells to grow
- where cells divide to form other cells to replace other cells in injured tissues

(ii) A student took a sample of cells from a meristem to view under a light microscope.

Describe how the student would prepare a microscope slide using these cells.

(3)

- cut 2cm of meristem of a plant
- cut off 1mm of root tip and place on microscope slide
- cover with toluidene blue stain (few drops)
- slowly lower cover slip using mounted needle at an angle then put gentle finger pressure to squish & spread material (blot using filter paper)

TOTAL = 60 MARKS