PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 1: KEY CONCEPTS IN BIOLOGY (PACK 1)

SCORE	PERCENTAGE
/59	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

DNA can code for the amino acids in the active site of an enzyme.

Explain the role of the active site of an enzyme.

(2)

.....

.....

.....

.....

.....

Q2.

A student mixed 10 cm^3 of starch solution with 5 cm^3 of amylase solution and kept the tube in a water bath at 25°C.

The student tested the solution for starch and for glucose every 30 seconds.

Figure 6 shows the results.

time in seconds	starch detected	glucose detected
0	Yes	No
30	Yes	No
60	Yes	Yes
90	Yes	Yes
120	Yes	Yes
150	No	Yes
180	No	Yes

Figure 6

(i) Give **one** reason for the result at 150 seconds.

(1)

.....

.....

.....

(ii) Another student repeated the investigation with the same volumes of solutions and at the same temperature of 25°C.

Give **two** other variables that would need to be controlled in the investigation.

(2)

1 .....

.....

2 .....

.....

(iii) Both students also included a tube containing 10 cm^3 of starch solution with 5 cm^3 of distilled water instead of 5 cm^3
of amylase solution.

They tested the solution for starch and for glucose every 30 seconds.

Give **one** reason why this tube was included in their investigations.

(1)

.....

.....

(Total for question = 4 marks)

Q3.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Birds are classified in the domain Eukarya.

(i) Why are the cells from birds described as eukaryotic?

(1)

☒ **A** they have membrane-bound organelles

☒ **B** they do not have nuclei

☒ **C** they have a rigid cell wall

☒ **D** they have a cell membrane

(ii) Give **one** reason why the three domain classification system was proposed.

(1)

.....

.....

.....

(Total for question = 2 marks)

Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Chymosin is an enzyme that causes milk to curdle.

When milk curdles the proteins in the milk clump together and become solid.

As part of an investigation, milk was heated in test tubes to different temperatures using a Bunsen burner.

Two drops of chymosin solution were added to each test tube and the time taken for the milk to curdle was recorded.

Figure 11 shows the results.

temperature of the milk in °C	time taken for milk to curdle in seconds
25	125
30	105
35	90
40	70
45	75

Figure 11

(i) Which variables need to be kept constant in this investigation?

(1)

☒ **A** the volume of milk and the time

☒ **B** the temperature and the time

☒ **C** the volume of milk and the concentration of chymosin

☒ **D** the temperature and the concentration of chymosin

(ii) Explain why the time taken for the milk to curdle decreases from 30°C to 40°C.

(2)

.....

.....

.....

.....

(iii) Explain what the expected result would be if two drops of chymosin were added to the milk at 70°C in the test tube.

(2)

.....

.....

.....

.....

(iv) As part of this investigation, test tubes containing only milk were heated to each temperature and no chymosin solution was added.

State why these test tubes containing only milk were used.

(1)

.....

.....

(v) Describe **two** improvements that could be made to the method of this investigation so that the optimum temperature for chymosin can be found.

(2)

1 .....

.....

2 .....

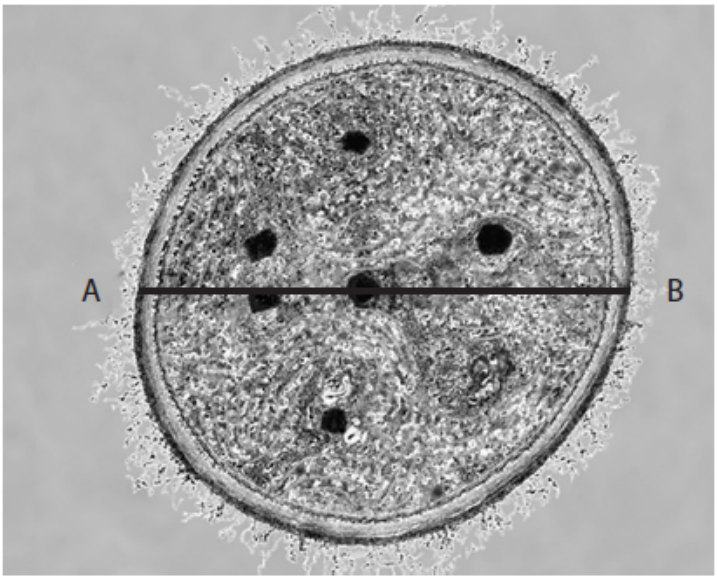
.....

(Total for question = 8 marks)

Q5.

Figure 7 shows a cyanobacterium magnified 50 000 times.

The line AB shows the diameter of the bacterial cell.



(Source: © The Christian Science Monitor)

Figure 7

(i) Calculate the actual diameter of the cyanobacterium.

Give your answer in micrometres (µm).

(3)

..... µm

(ii) Bacterial cells contain plasmids.

Describe **three** other features of a bacterial cell.

(3)

.....

.....

.....

.....

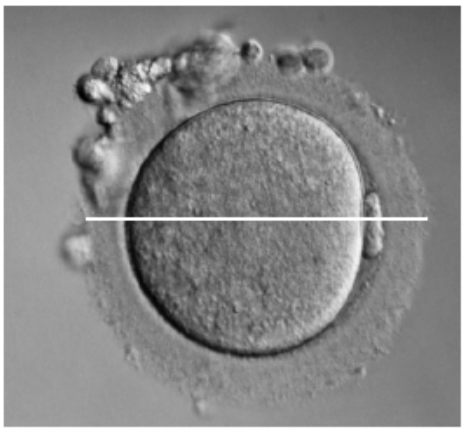
.....

.....

(Total for question = 6 marks)

Q6.

Figure 14 shows a human egg cell, magnified ×700.



(Source: © Pascal Goetgheluck / Science Photo Library)

Figure 14

Calculate the actual width of the region indicated by the line on Figure 14.

Give your answer in millimetres, in standard form.

(3)

..... mm

(Total for question = 3 marks)

Q7.

Figure 16 shows the number of neurones in the brain of different animals.

animal	number of neurones in the brain
lobster	1.0×10^5
frog	1.6×10^7
rat	2.0×10^8
human	8.6×10^{10}

Figure 16

(i) Calculate the difference between the number of neurones in the brain of the rat and the brain of the frog.

Give your answer in standard form.

(2)

..... neurones

(ii) Most neurones in the brain are unmyelinated whereas motor neurones are myelinated.

Explain why myelination is needed on motor neurones but not on neurones in the brain.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)

Q8.

Figure 1 is an electron micrograph showing a cross section through a neurone.

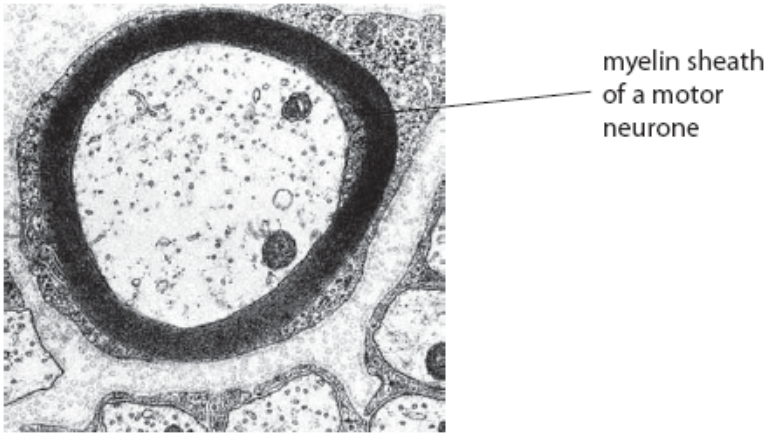


Figure 1

The myelin sheath of this neurone is 250 nm in thickness.

Calculate the magnification of this electron micrograph.

(3)

magnification .....

(Total for question = 3 marks)

Q9.

A scientist obtained a mass of 0.0062 nanograms of DNA from a diploid human cell.

Calculate the mass of DNA the scientist should obtain from a haploid human cell.

Give your answer in picograms.

(1 nanogram = 1000 picograms)

(2)

..... picograms

(Total for question = 2 marks)

Q10.

Factors affecting the rate of diffusion can be investigated using agar cubes.

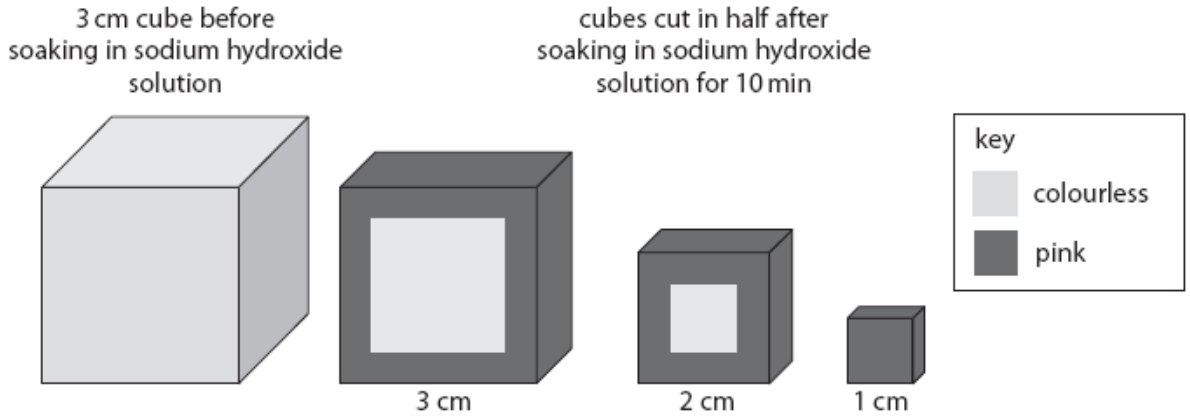
The agar cubes contain an indicator called phenolphthalein.

Phenolphthalein is colourless, but turns pink in the presence of an alkali, such as sodium hydroxide solution.

Cubes of agar, with sides 3 cm, 2 cm and 1 cm, are placed into sodium hydroxide solution for 10 minutes.

The cubes are then cut in half to see how far the sodium hydroxide solution has diffused into them.

Figure 5 shows the results.



cube side / cm	surface area of cube / cm^2	volume of cube / cm^3	surface area to volume ratio	distance into cube of diffusion / cm
1	6	1	6:1	0.5
2	24	8	3:1	0.5
3	54	27	?	0.5

Figure 5

(i) Calculate the surface area to volume ratio for the cube with side 3 cm.

(1)

.....

(ii) Calculate the rate of diffusion for the 10 minutes of the investigation.

(1)

..... cm per min

(iii) Describe the effect of the size of the cube on the rate of diffusion.

(1)

.....

.....

.....

.....

(iv) Explain why the sodium hydroxide diffuses into the cube.

(2)

.....

.....

.....

.....

(Total for question = 5 marks)

Q11.

Figure 5 shows two potato chips.

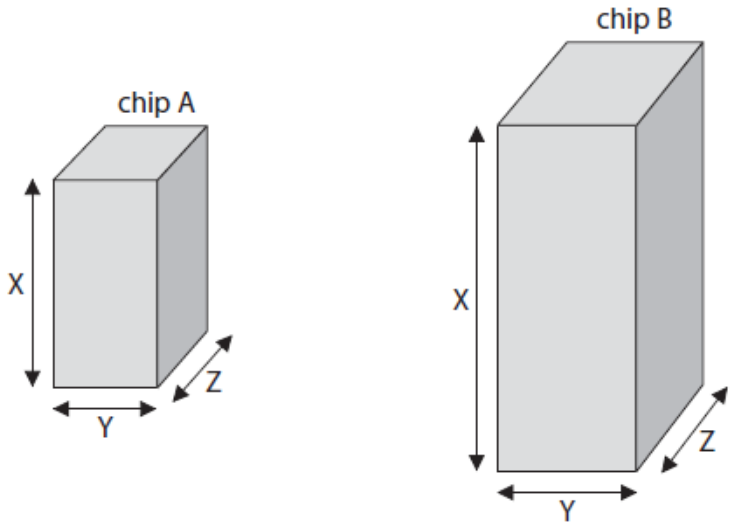


Figure 5

Figure 6 shows some information about each potato chip.

potato chip	length of X in cm	length of Y in cm	length of Z in cm	total surface area of four sides in cm^2	total surface area of top and bottom in cm^2	total surface area of chip in cm^2
A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 6

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

total surface area = ... cm^2

(ii) The potato chips were placed in distilled water for 20 minutes.

Figure 7 shows the increase in mass of each potato chip.

potato chip	increase in mass in grams
A	0.1
B	0.3

Figure 7

Explain why potato chip B has a greater increase in mass than potato chip A.

(2)

.....

.....

.....

.....

(iii) Potato chip A is transferred from the distilled water into a concentrated salt solution.

Explain what will happen to the cells in potato chip A.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 7 marks)

Q12.

Some students investigated the effect of sucrose concentration on the change in mass of beetroot chips.
A beetroot chip was weighed, immersed in water for 30 minutes and then reweighed.
This was repeated using five more beetroot chips and five different concentrations of sucrose solution.
The results are shown in Figure 8.

chip	concentration of sucrose solution mol per dm^{-3}	starting mass of beetroot chip in grams	end mass of beetroot chip in grams
1	0.0 (water)	2.56	3.89
2	0.2	2.47	2.88
3	0.4	1.99	2.00
4	0.6	2.30	2.12
5	0.8	2.15	1.84
6	1.0	2.22	1.62

Figure 8

(i) Calculate the percentage change in mass for chip 5.

Give your answer to an appropriate number of decimal places.

(3)

..... %

(ii) Explain the difference in the changes in mass of chip 5 and chip 2.

(3)

.....

.....

.....

.....

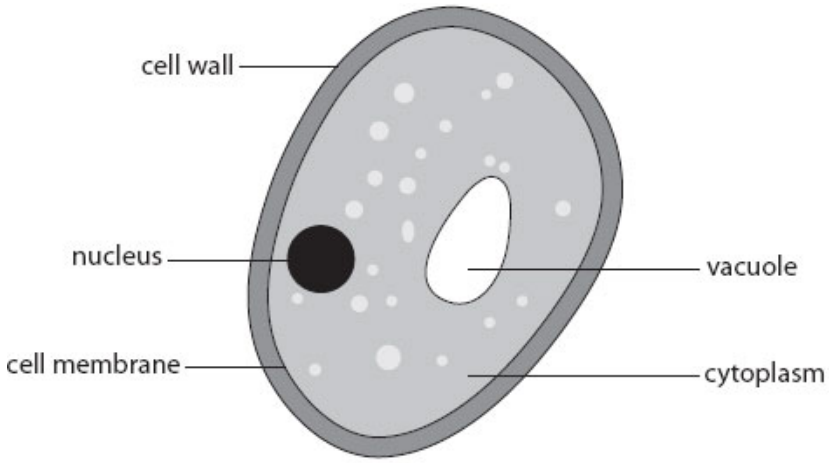
.....

(Total for question = 6 marks)

Q13.

Yeasts are microorganisms that are used in the brewing and baking industries.

The diagram shows a yeast cell.



(a) (i) State **two** ways in which the structure of this yeast cell differs from the structure of a bacterial cell.

(2)

1 .....

.....

2 .....

.....

(ii) Plant cells can produce glucose.

Suggest why yeast cells cannot produce glucose.

(1)

.....

.....

(b) The table shows the number of different components found in the blood of a healthy person and the blood of two other people.

	number of components per dm^3 of blood		
component of blood	healthy person	person A	person B
red blood cells	5×10^{12}	6×10^{12}	3×10^{12}
white blood cells	7×10^{9}	5×10^{10}	8×10^{10}
platelets	3×10^{11}	3×10^{11}	3×10^{11}

(i) Calculate the difference in the number of white blood cells per dm3 of blood between the healthy person and person A.

(2)

answer = ...

(ii) Describe the functions of white blood cells.

(2)

.....

.....

.....

.....

(iii) Person B has a low number of red blood cells compared to the healthy person.

Suggest an effect this may have on person B.

(1)

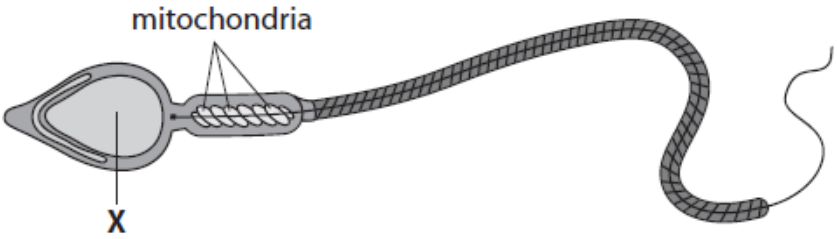
.....

.....

(Total for Question = 8 marks)

Q14.

The diagram shows a human sperm cell.



(a) (i) Structure **X** on the diagram contains DNA.

Name structure **X**.

(1)

.....

(ii) Which statement is true for DNA?

Place a cross (☒) in the box next to your answer.

(1)

☒ **A** DNA is made up of amino acids and bases.

☒ **B** DNA is made up of amino acids which give instructions to make proteins.

☒ **C** In DNA, the bases A and T are complementary.

☒ **D** Every gene in a DNA molecule contains only three bases.

(b) Sperm cells are involved in fertilisation.

Define fertilisation.

(2)

.....

.....

.....

.....

(c) (i) Describe the function of mitochondria.

(2)

.....

.....

.....

.....

(ii) Gene mutations in DNA can produce abnormal mitochondria.

Explain how a gene mutation can produce a different protein.

(2)

.....

.....

.....

.....

.....

.....

(Total for question = 8 marks)

Q15.

State why egg cells have a large amount of cytoplasm.

(1)

.....

.....

- ref to specific shape (1)