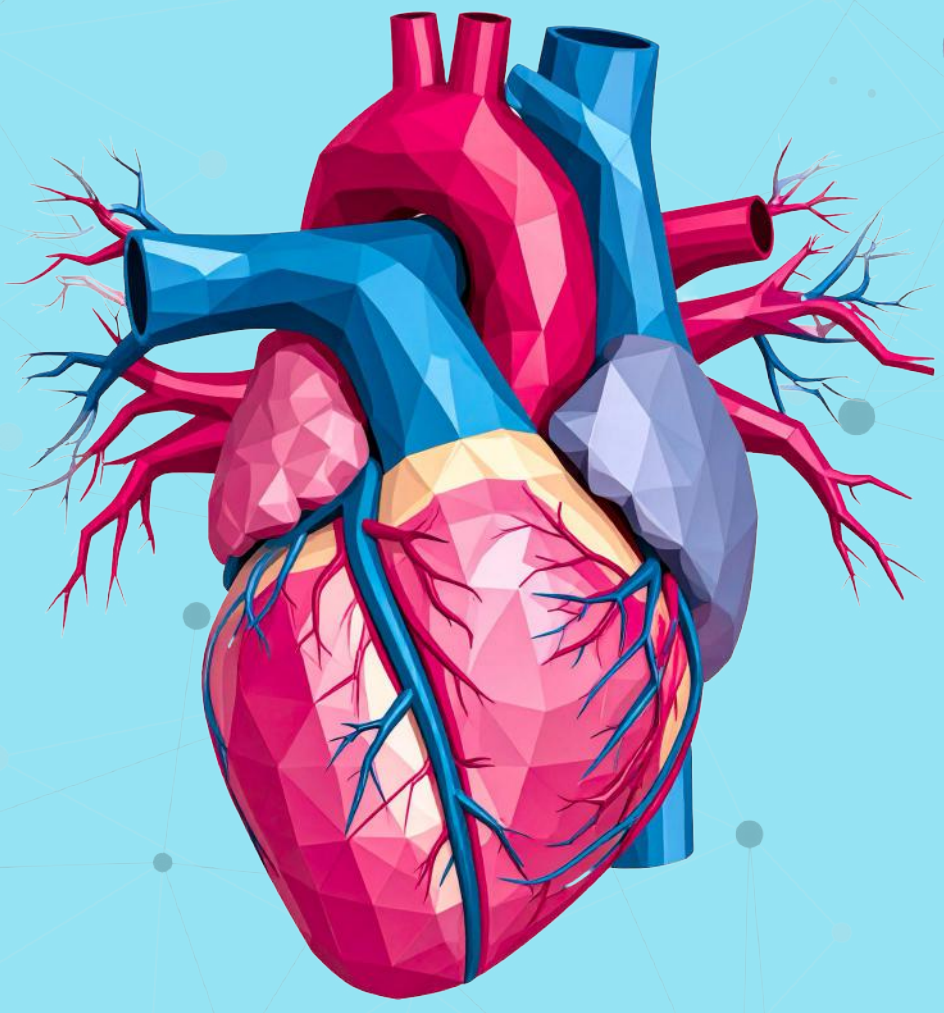
edexcel

AS Biology

LATEST SYLLABUS



Unit 2
2019 – 2025
Classified Questions

SCAN ME

7 Suggest why neither meiosis nor mitosis take place in prokaryotic organisms.

(2)

because they do not have a nucleus

and because they do not have linear chromosomes

meiosis in particular doesn't happen because they don't produce gametes

(d) The table below shows some features of prokaryotic cells and eukaryotic cells.

For each feature, put **one** cross ☒ in the appropriate box, in each row, to show whether the feature is found in prokaryotic cells and eukaryotic cells, prokaryotic cells only, eukaryotic cells only or not found in either.

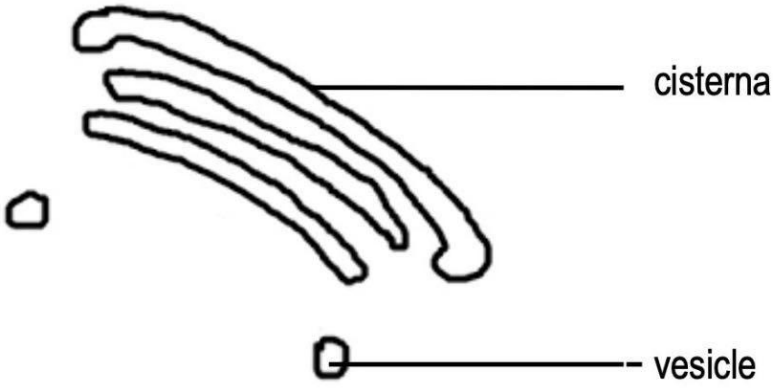
(2)

Feature	Prokaryotic cells and eukaryotic cells	Prokaryotic cells only	Eukaryotic cells only	Not found in either prokaryotic cells or eukaryotic cells
cell membrane	X	☒	☒	☒
ribosomes	X	☒	☒	☒

(e) The Golgi apparatus is found in eukaryotic cells only.

In the space below, draw and label a diagram to show the structure of the Golgi apparatus.

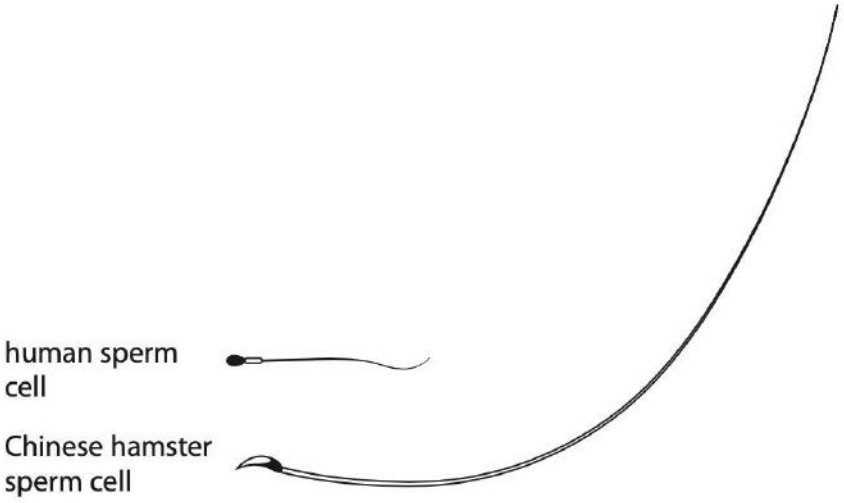
(3)



(Total for Question 7 = 10 marks)

(b) The photograph shows a Chinese hamster.

A female Chinese hamster mates with many males in a short period of time.
The diagram shows the relative size of a Chinese hamster sperm cell compared with a human sperm cell.



Suggest why the Chinese hamster sperm cell has such a long flagellum.

(3)

the sperm with longer flagellum will swim faster to the egg cell

this will ensure that the sperm will compete with sperms from other males

so there is an increased chance of fertilising the egg cell

(c) Explain the role of the cortical reaction in the process of fertilisation in mammals.

(3)

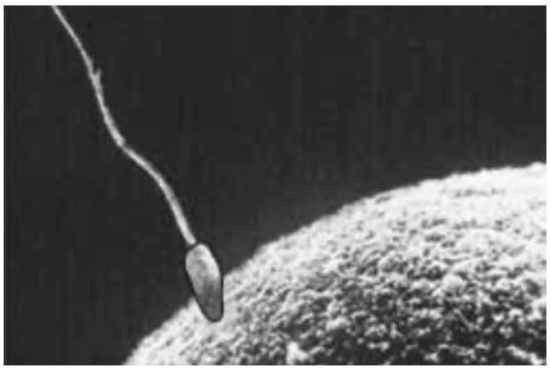
cortical granules fuse with the egg cell surface membrane and release enzymes

this makes the zona pellucida hardens to prevent polyspermy

/ to ensure that the nucleus is diploid

(Total for Question 2 = 11 marks)

12 The photograph below shows a human sperm cell fusing with a human female gamete.



Magnification ×2000

(a) The diameter of a human female gamete is about 30 times bigger than the length of the head of a human sperm cell.

(i) Measure the length of the head of the sperm in the photograph.

(1)

Answer **range of 9-10 mm**

(ii) Use your measurement to calculate the actual diameter of the female gamete. Show your working.

(2)

10 / 2000 x 30 = 0.15 mm

Answer .....

(b) Give **two** differences, other than size, between the structure of a sperm cell and the structure of a female gamete.

(2)

1 **Only the sperm has a flagellum**

sperm has an acrosome

no cortical granules in a sperm

2 **no food store in a sperm**

no zona pellucida in a sperm

4 Type 1 diabetes occurs when beta cells in the pancreas do not produce insulin.

Stem cells produced from skin cells can be used to replace these beta cells in mice. The skin cells can be stimulated to become pluripotent stem cells.

(i) Place a cross ☒ in the box next to the correct definition to complete the following statement.

Pluripotent stem cells are

(1)

☒ **A** specialised cells that can differentiate to give rise to almost any type of cell in the body, including totipotent cells

☒ **B** specialised cells that can differentiate to give rise to any type of cell in the body, excluding totipotent cells

☒ **C** unspecialised cells that can differentiate to give rise to almost any type of cell in the body, excluding totipotent cells

☒ **D** unspecialised cells that can differentiate to give rise to any type of cell in the body, including totipotent cells

The table below shows some features of two types of stem cell. If the feature applies to the stem cell place a tick (✓) in the box and if it does not apply, place a cross (✖) in the box.

(2)

Features	Totipotent stem cell	Pluripotent stem cell
Can give rise to totipotent stem cells	✓	
Can give rise to differentiated cells	✓	✓

(ii) The pluripotent stem cells were injected into the mice. After eight weeks, these cells had developed into insulin-secreting beta cells.

Describe how these pluripotent stem cells became specialised beta cells.

(4)

1. Chemical stimulus
2. causes some genes are to be activated (switched on)
3. Activated genes get transcribed (mRNA produced)
4. mRNA is gets translated to produce protein
5. this protein permanently modifies cell and determines cell structure and function

(Total for Question 4 = 7 marks)

4. GENE EXPRESSION & STEM CELLS

*(b) Using the information in the diagram and the table, explain how the four different cell types are formed from the stem cells.

(6)

Mitosis increases the number of cells

Under a certain chemical stimulus differential gene expression takes place

The gene for the production of insulin is switched on in pancreatic cells

While the same gene is switched off in nerve cells or heart cell for instance

Once the gene is switched on transcription of it occurs and mRNA is made

Proteins are produced from the mRNA by translation

These proteins permanently modify the cell
/ as they determine the structure and function of the cell

(c) Discuss how regulatory authorities control the use of embryonic stem cells in research.

(3)

These authorities will issue license for stem cell research

They'll monitor the research and ensure that it's done for necessary reasons

They will monitor the sources of stem cells

And they will ensure that only early-stage embryo are used as the stem cells source

They will also prevent any an ethical use of stem cells

(Total for Question 7 = 11 marks)

6 Crohn's disease is an irritable bowel disease (IBD). It is a medical condition that affects the digestive system.

Approximately 15% of people with Crohn's disease have a close relative who also has this disease.

If one identical twin has Crohn's disease, there is a 70% probability that the other twin will also have this disease.

(a) Explain how this information demonstrates that the causes of Crohn's disease are only partially genetic.

(3)

The percentage would be higher if only genetic

And if it was only genetic then an identical twin would have 100% probability of having Crohn's if their twin had it

85% of people with Crohn's do not have a relative with the disease

Environmental factors must influence the development of the disease

(b) In some people, several genes at different locations in the genome contribute to Crohn's disease.

Put a cross ☒ in the box next to the correct word to complete each of the following statements.

(i) The term that refers to the pattern of inheritance where a single characteristic is determined by more than one gene is

(1)

☐ **A** monogenic

☐ **B** monohybrid

☒ **C** polygenic

☐ **D** polyhybrid

10 Sloths are mammals that live high up in trees and eat leaves. The photograph below shows a pygmy three-toed sloth.

www.ourendangeredworld.com

Magnification ×0.2

These sloths live on a small island off the coast of Panama. Other species of sloth, including the brown-throated sloth, are found on the mainland.

(a) Using the sloth as an example, explain what is meant by the term **niche**.

(2)

the role of an organism in its habitat

sloths are herbivores / they provide food for carnivores

(b) Pygmy three-toed sloths range from 48 cm to 53 cm in length.

Brown-throated sloths are 15% longer than pygmy sloths.

Calculate the range in length of brown-throated sloths.

Show your working.

(2)

48 x 15 ÷ 100 + 48 = 55.2

53 x 15 ÷ 100 + 53 = 60.95

55.2 - 60.95 cm

(v) The organelles that are surrounded by double membranes are

(1)

- ☒ **A** chloroplasts, lysosomes and nuclei
- ☒ **B** chloroplasts, mitochondria and nuclei
- ☒ **C** lysosomes, mitochondria and nuclei
- ☒ **D** mitochondria, nuclei and vacuoles

(b) Compare the structure of the rough endoplasmic reticulum with the structure of the smooth endoplasmic reticulum.

(2)

Both consist of membrane bound sacs called cisternae
in both organelles, the cisternae are interconnected
rER has 80s ribosomes while sER does not

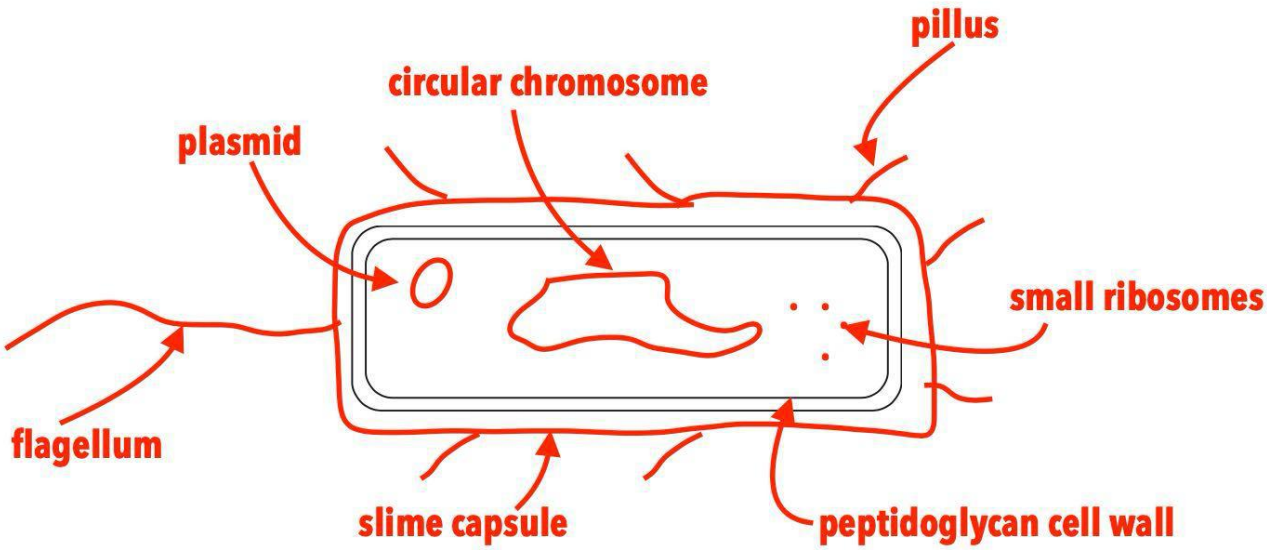
(c) Organisms can be classified into one of three taxonomic groups called domains.

The Archaea and Bacteria are two of these domains. Organisms belonging to these two domains have prokaryotic cells.

(a) The diagram below shows the outline of a typical rod-shaped bacterial cell.

Draw and label **three** features on this diagram that may be found in a prokaryotic cell, but **not** in a plant cell.

(3)



The Complete Course for IAL AS Biology

Videos that cover the entire syllabus

Exam-expert solved past papers

Test your knowledge on each topic.

JOIN NOW

CHEM-BIO.INFO

WHATSAPP

51375709

50144115

chem_bio.info