

Biology Paper 2: Higher

Practice Questions - Set 1

Name: _____

Class: _____

Date: _____

Time: **43 minutes**

Marks: **42 marks**

Comments:

Q1.

(a) In sexual reproduction, cells divide by meiosis to form gametes.

Which **two** statements are true for cell division by meiosis?

Tick (✓) **two** boxes.

Daughter cells have two sets of chromosomes.

Four daughter cells are formed.

The daughter cells are genetically identical.

The DNA replicates twice.

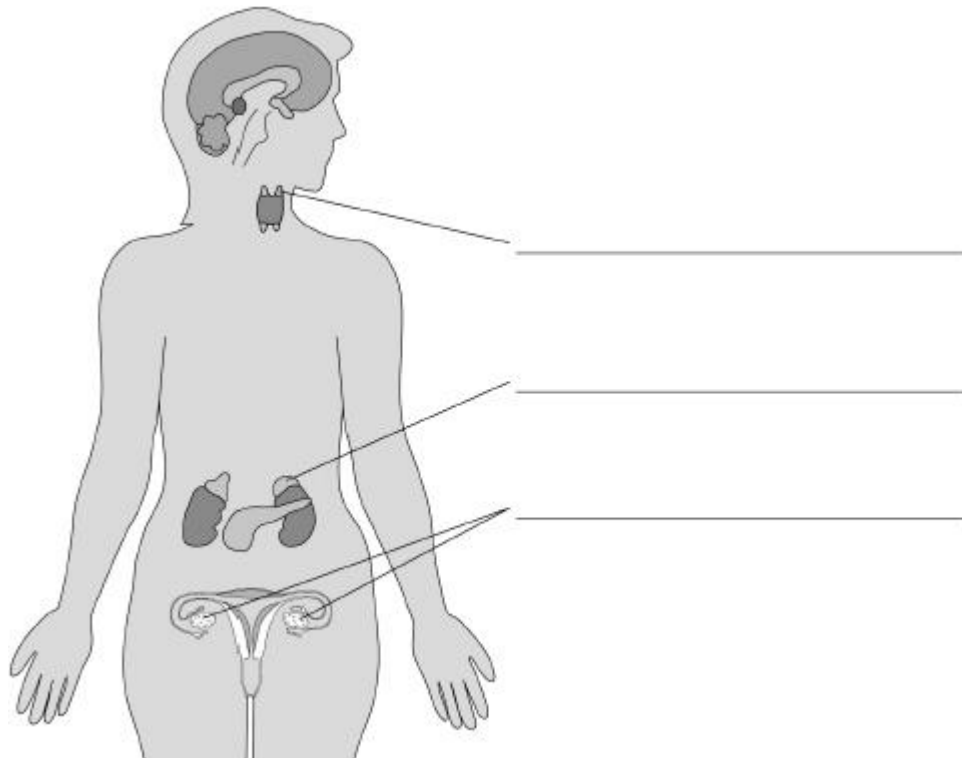
The parent cell divides twice.

(2)

Hormones are released from endocrine glands.

Each hormone travels in the bloodstream to a target organ.

The diagram below shows the position of endocrine glands in a female.



(b) Label the endocrine glands on the diagram above.

(c) Complete the table below.

Hormone	Name of gland which releases hormone	Target organ of hormone
Luteinising hormone (LH)	Pituitary gland	
	Adrenal gland	
Glucagon		

Millions of geranium plants are sold each year in garden centres.

Geraniums can be reproduced asexually or sexually.

The image below shows a potted geranium plant.



Garden centres usually grow new geranium plants by asexual reproduction.

(d) Suggest **two** advantages for garden centres of growing geraniums by asexual reproduction compared with sexual reproduction.

1. _____

2. _____

(e) Suggest **two** disadvantages for garden centres of growing geraniums by asexual reproduction compared with sexual reproduction.

1. _____

2. _____

(2)
(Total 12 marks)

Q2.

Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A**, **B**, **C** and **insulin**, used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain Increased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain Increased risk of lung damage

- (a) Which drug, **A**, **B**, **C** or **insulin**, is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug _____

Explanation

(2)

- (b) (i) Drugs **A**, **B** and **C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

(1)

(ii) Other than using drugs, give **two** methods of treating diabetes.

1. _____

2. _____

(2)

(Total 5 marks)

Q3.

Some genetic disorders are caused by alleles inherited from the parents.

(a) What are **alleles**?

(1)

(b) Polydactyly is a genetic disorder that leads to extra fingers or toes.

Polydactyly is caused by a dominant allele, **D**.

The photograph shows the hand of a person with polydactyly.



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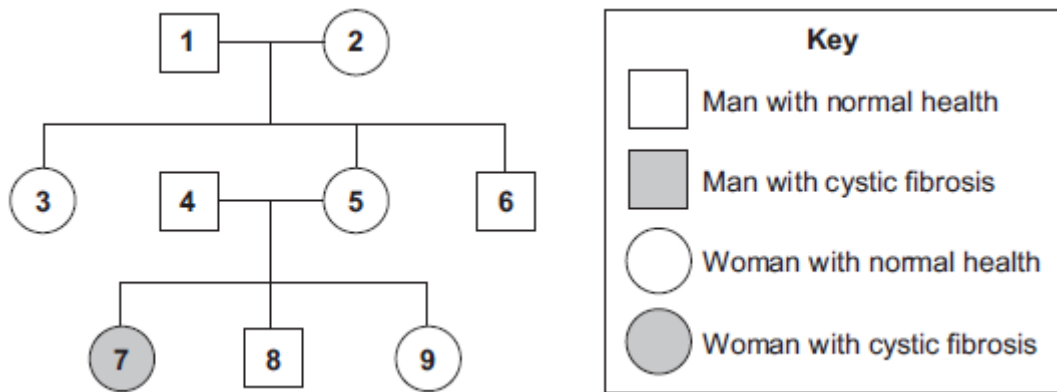
A man has polydactyly. His wife does not have polydactyly.

This couple's children have a 50% chance of having polydactyly.

Draw a genetic diagram to explain why.

(3)

- (c) Cystic fibrosis is another genetic disorder. It is caused by a recessive allele. The diagram shows the inheritance of cystic fibrosis in one family.



Woman **5** is pregnant with her fourth child.

What is the probability that this child will have cystic fibrosis?

Draw a genetic diagram to explain your answer.

Use the following symbols.

N = allele for normal health

n = allele for cystic fibrosis

Q4.

Scientists have removed microorganisms from inside rocks in caves in Mexico.

The microorganisms have been trapped there for between 10 000 and 50 000 years.

The caves are dark, very hot, humid and acidic.

(a) Why are these microorganisms called extremophiles?

Tick **two** boxes.

They are thousands of years old

They survive in high humidity

They survive in high temperatures

They survive in the dark

They survive inside rocks

They survive where it is acidic

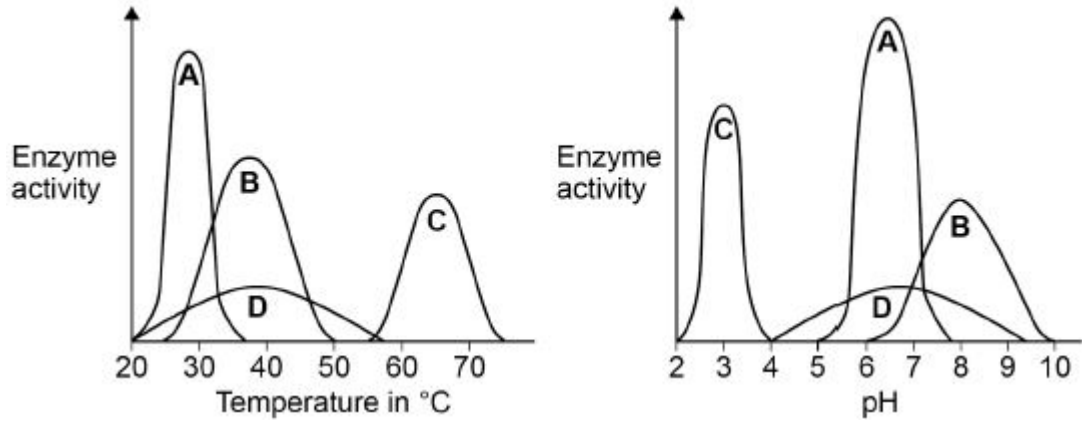
(2)

The microorganisms have been inactive for thousands of years but the scientists have reactivated them.

The diagram below shows the results of enzyme analysis on four enzymes, **A**, **B**, **C** and **D**.

Three of the enzymes were from microorganisms found in the soil near the caves.

One of the enzymes was from a reactivated microorganism from the caves.



(b) Which enzyme comes from the microorganism from the caves?

Tick **one** box.

A B C D

(1)

(c) Give the reasons for your answer to part (b)

(1)

(d) Carl Woese developed the 'three-domain system' of classification.

Describe the 'three-domain system' of classification.

(3)

(e) Most of the microorganisms from the caves were classified as belonging to the Archaea domain of the 'three-domain system'.

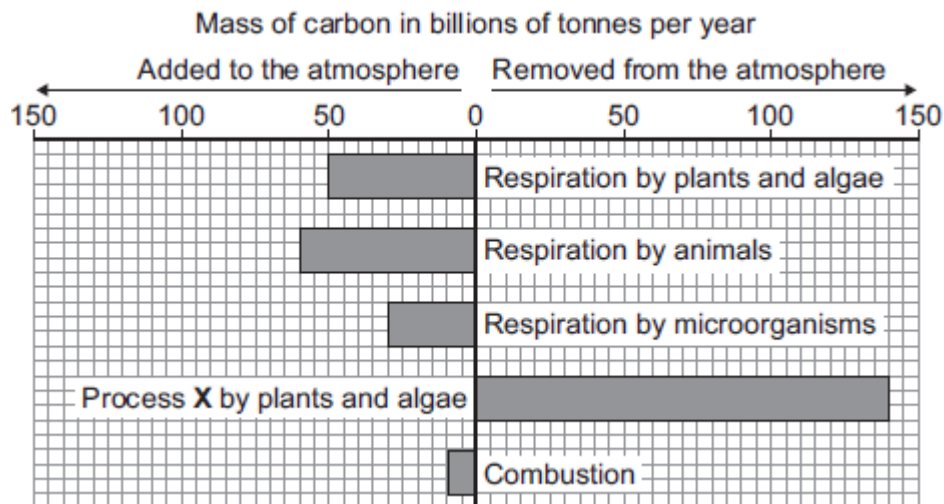
Suggest why.

(1)

Q5.

This question is about carbon.

The graph shows the mass of carbon added to and removed from the atmosphere each year.



(a) Name process **X**.

_____ (1)

(b) (i) Calculate the mass of carbon added to the atmosphere by respiration per year.

Answer = _____ billion tonnes (1)

(ii) Some scientists are concerned that the mass of carbon in the atmosphere is changing.

How does the data in the graph support this idea?

(1)
(Total 3 marks)

Q6.

The UK contains large areas of peat bogs that have been present for thousands of years.

(a) Peat is removed from peat bogs.

The peat can be mixed with air and added to garden compost.

The release of carbon dioxide from peat is a problem.

Give **two other** reasons why gardeners should use less peat-based compost in the future.

1. _____

2. _____

(2)

(b) Explain why mixing peat with air leads to the release of carbon dioxide.

(4)

(Total 6 marks)

Mark schemes

Q1.

- (a) four daughter cells are formed

1

the parent cell divides twice

1

- (b) thyroid (gland)

in this order only

1

adrenal (gland)

1

ovary / ovaries

1

- (c)

Hormone	Name of gland which releases hormone	Target organ of hormone
Luteinising hormone (LH)	Pituitary gland	Ovary
Adrenaline	Adrenal gland	Heart / lungs / liver
Glucagon	Pancreas	Liver / muscle

1

1

1

- (d) only need 1 parent plant

1

will produce (many genetically) identical plants

allow for 1 mark it is a faster process

allow for 1 mark will produce a large number of plants at one time

ignore clones unqualified

1

- (e) any **two** from:

- genetically identical so will all be susceptible to same diseases / pathogens
- no genetic variety for new colours / characteristics to offer customers
- no genetic variety leads to weaker / unhealthy plants (due to lack of evolution)

2

[12]

Q2.

(a) B

1

less / no insulin (produced) **or** insulin produced in pancreas
allow pancreas can't monitor (blood) sugar (level)
ignore pancreas can't control (blood) sugar (level)
allow increased glucagon production
allow A as liver stores less glucose / sugar for 2 marks only

1

(b) (i) (it / protein / insulin) digested / broken down
if ref to specific enzyme must be correct (protease / pepsin)
ignore denatured
*do **not** accept digested in mouth / other incorrect organs*

1

(ii) any **two** from:
ignore injections

- (attention to) diet
*accept examples, eg eat less sugar(y food) **or** eat small regular meals*
allow eat less carbohydrate / control diet
ignore cholesterol or balanced / healthy diet
- exercise
ignore keep fit / healthy
- (pancreas) transplant / stem cells / genetic engineering

2

[5]

Q3.

(a) (different / alternative) forms of a gene
*do **not** accept types of genes*

1

(b) genotypes of parents and gametes correct (Man **D** and **d**, Wife **d** and **d**)
*allow half-size genetic diagram with only one **d** from wife*

1

offspring genotypes correct ($\frac{1}{2}$ = **Dd** and $\frac{1}{2}$ = **dd**)
allow ecf if parental genotypes are wrong

1

offspring phenotypes correctly assigned to genotypes

1

(c) genotypes of parents and gametes correct (**N** and **n**)
allow ecf if parental genotypes are wrong

1

offspring genotypes correct (**NN**, 2 × **Nn**, and **nn**)

offspring phenotypes correctly assigned to genotypes;

1

correct probability = 0.25 / ¼ / 25% / 1 in 4 / 1:3, only;
do not allow '3:1' / '1:4'

1

1

[8]

Q4.

(a) they survive in high temperatures

1

they survive where it is acidic

1

(b) C

1

(c) because it has (high / optimum) activity at high temperature or 65 °C **and / or** low pH or pH 3 or high acidity

*allow it is the only enzyme that is active between
55 °C and 75 °C **and / or** below pH4*

1

mark dependent on C correct for part (b)

(d) any **three** from:

- based on DNA / chemical evidence

(the three domains are)

- (Archaea) – primitive / simple bacteria
- Prokaryota / Bacteria – true / modern bacteria
- Eukaryota – includes (protists, fungi,) plants and animals

*allow Eukaryota – includes organisms with cells
having a nucleus*

*if no other mark awarded allow for 1 mark
mention of Archaea, Prokaryota / Bacteria and
Eukaryota*

or
three correct descriptions

3

(e) (these microorganisms) live in extreme conditions

allow (most Archaea) are extremophiles

1

[8]

Q5.

(a) photosynthesis

1

(b) (i) 140

1

(ii) (10 billion tonnes) more added (to atmosphere) than removed
allow ecf from part (b)(i)

1

[3]

Q6.

(a) reduces biodiversity

1

peat is being used faster than it forms
allow peat is non-renewable

1

(b) decay / decomposition / rotting of peat

1

by microorganisms / bacteria / microbes / fungi / decomposers introduced when peat
is mixed with air

1

that respire using substances in peat as reactant

1

and using oxygen that is introduced when peat is mixed with air

1

[6]