

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
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**BIOLOGY**

**9700/22**

Paper 2 Structured Questions AS

**May/June 2016**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **15** printed pages and **1** blank page.

Answer **all** the questions.

1 Statements **A** to **E** are about the structure and functioning of enzymes.

State the correct term to match each of the statements **A** to **E**.

**A** The energy level, lowered by enzyme action, that needs to be overcome by reactants in order for products to be formed.

.....

**B** The mechanism of enzyme action that relies on the active site being partially flexible and changing shape in order to bind the substrate.

.....

**C** The term to describe a protein, such as an enzyme, with a tertiary or quaternary structure that results in an approximately spherical shape.

.....

**D** The term for enzymes that function outside cells.

.....

**E** The concentration of substrate that enables an enzyme to achieve half the maximum rate of reaction.

.....

[5]

[Total: 5]

- 2 Marram grass, *Ammophila arenaria*, is an important plant of sand dunes. Leaves of marram grass are well adapted to reduce water loss by transpiration.

Fig. 2.1 is a photomicrograph of a section through the leaf of marram grass.

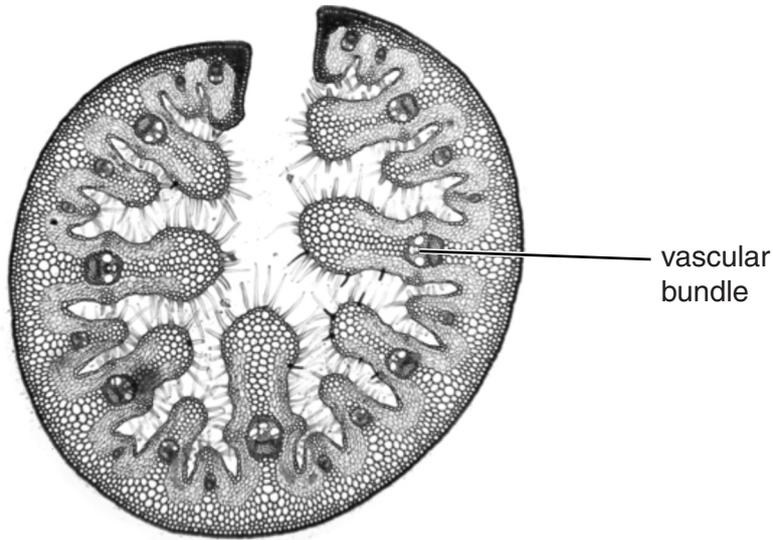


Fig. 2.1

- (a) Examples of adaptations to reduce water loss by transpiration include a thick cuticle and no stomata on the outer surface, and stomata in pits on the inner surface.

- (i) State **one** other adaptation, visible in Fig. 2.1, which reduces water loss by transpiration.

.....[1]

- (ii) Explain how this adaptation reduces water loss.

.....  
.....  
.....  
.....  
.....  
.....  
.....[2]

- (b) State the term used to describe a plant type that has adaptations to reduce water loss by transpiration.

.....[1]

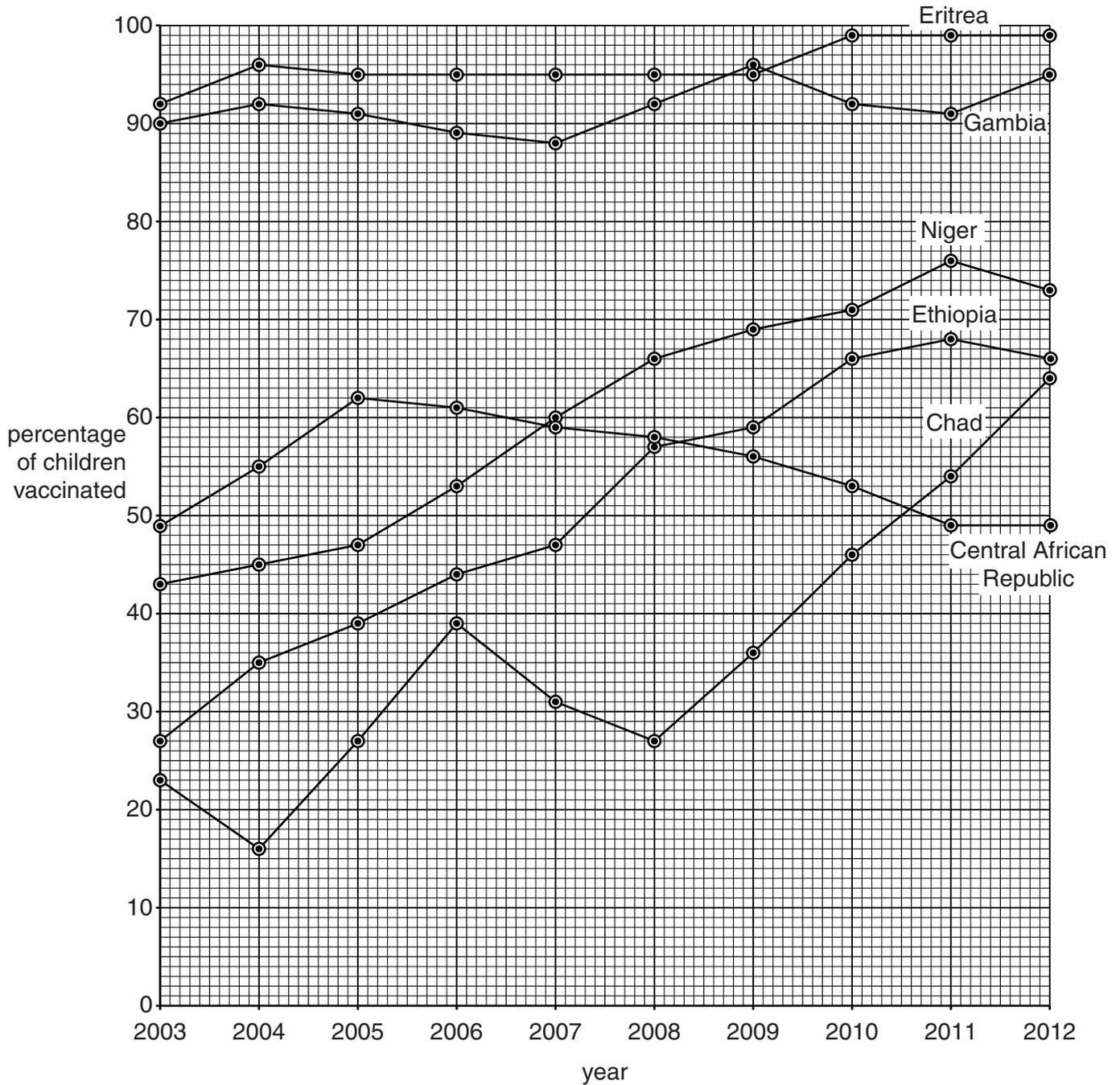
[Total: 4]



**Question 3 continues on page 6**

Fig. 3.1 shows the percentage of children vaccinated against measles over a ten year period from 2003 to 2012.

- The percentage vaccinated represents children under one year of age who have been given at least one dose of the vaccine against measles in the given year.
- The data are for the six African countries shown in Table 3.1.



**Fig. 3.1**



- (e) Planning the prevention and control of measles using a vaccination programme means that financial costs must be considered.

State two examples of these costs.

1 .....

.....

.....

2 .....

.....

.....[2]

[Total: 14]

- 4 Fig. 4.1 is a simplified diagram of the circulatory system of a mammal. Some of the lymph system is also shown.

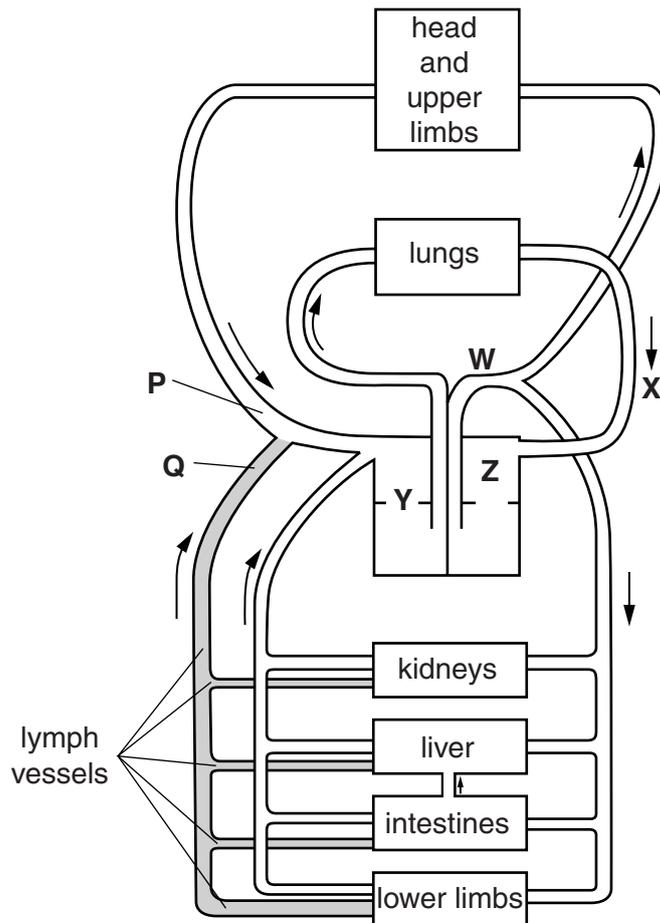


Fig. 4.1





**Question 5 starts on page 12**

5 Fig. 5.1 shows plant cells in stages of mitosis.



**Fig. 5.1**

(a) Individual chromosomes cannot be seen in the cell at the start of prophase. Changes to the chromatin occur so that by late prophase chromosomes are clearly visible.

(i) Outline what occurs during early prophase so that chromosomes become visible in late prophase.

.....  
.....  
.....[1]

(ii) Describe the structure of the chromosome in late prophase.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(b) State **two** differences between the chromosome at metaphase and the chromosome at late anaphase.

.....  
.....  
.....  
.....  
.....  
.....  
.....[2]

(c) One of the functions of a plant hormone known as cytokinin is to act as a cell signalling molecule and promote cytokinesis.

Suggest how cytokinin acts as a cell signalling molecule.

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.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

[Total: 9]

6 One of the enzymes involved in glycogen synthesis is glycogen synthase. The monomer of the glycogen polymer is  $\alpha$ -glucose.

(a) (i) Draw the ring form of  $\alpha$ -glucose in the space provided.

[2]

(ii) Glycogen synthase catalyses the formation of a covalent bond between two  $\alpha$ -glucose molecules during glycogen synthesis.

Name the type of bond formed.

.....[1]

(iii) Glycogen branching enzyme is another enzyme that is required for glycogen synthesis.

Suggest why glycogen branching enzyme is needed in addition to glycogen synthase.

.....  
.....  
.....  
.....[1]

(b) The gene coding for glycogen synthase in muscle cells is known as *GYS1*.

(i) Explain what is meant by a *gene*.

.....  
.....  
.....  
.....  
.....[2]



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