

Answer **all** the questions.

1 Organisms require energy in order to carry out essential metabolism. Organisms are able to release energy by carrying out both aerobic and anaerobic respiration.

(a) Complete the table to compare **anaerobic** respiration in mammals and yeast.

	mammal	yeast
name of hydrogen acceptor after glycolysis		
is CO ₂ produced?		
name of final product		

[3]

(b) Suggest **one** benefit of anaerobic respiration to an organism.

.....

[1]

[Total: 4]

Turn over

- (iv) A feature of synapses is that they allow transmission in only one direction.

State how this is achieved.

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

- (b) The chemical nature of synaptic transmission makes it susceptible to disruption by toxins.

- (i) Atropine is a toxin produced by the deadly nightshade plant, *Atropa belladonna*.

Atropine is a similar shape to acetylcholine. The presence of atropine prevents the initiation of an action potential in the post-synaptic neurone.

Explain how the presence of atropine in the synapse will prevent the initiation of an action potential.

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..... [3]

- (ii) Nerve gases have been used as chemical weapons. Some nerve gases act by inhibiting acetylcholinesterase, prolonging the effect of acetylcholine.

Suggest how atropine could act as an antidote to nerve gas.

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..... [2]

[Total: 12]

Turn over

3 Fig. 3.1 represents some of the reactions that take place in a leaf cell of a flowering plant.

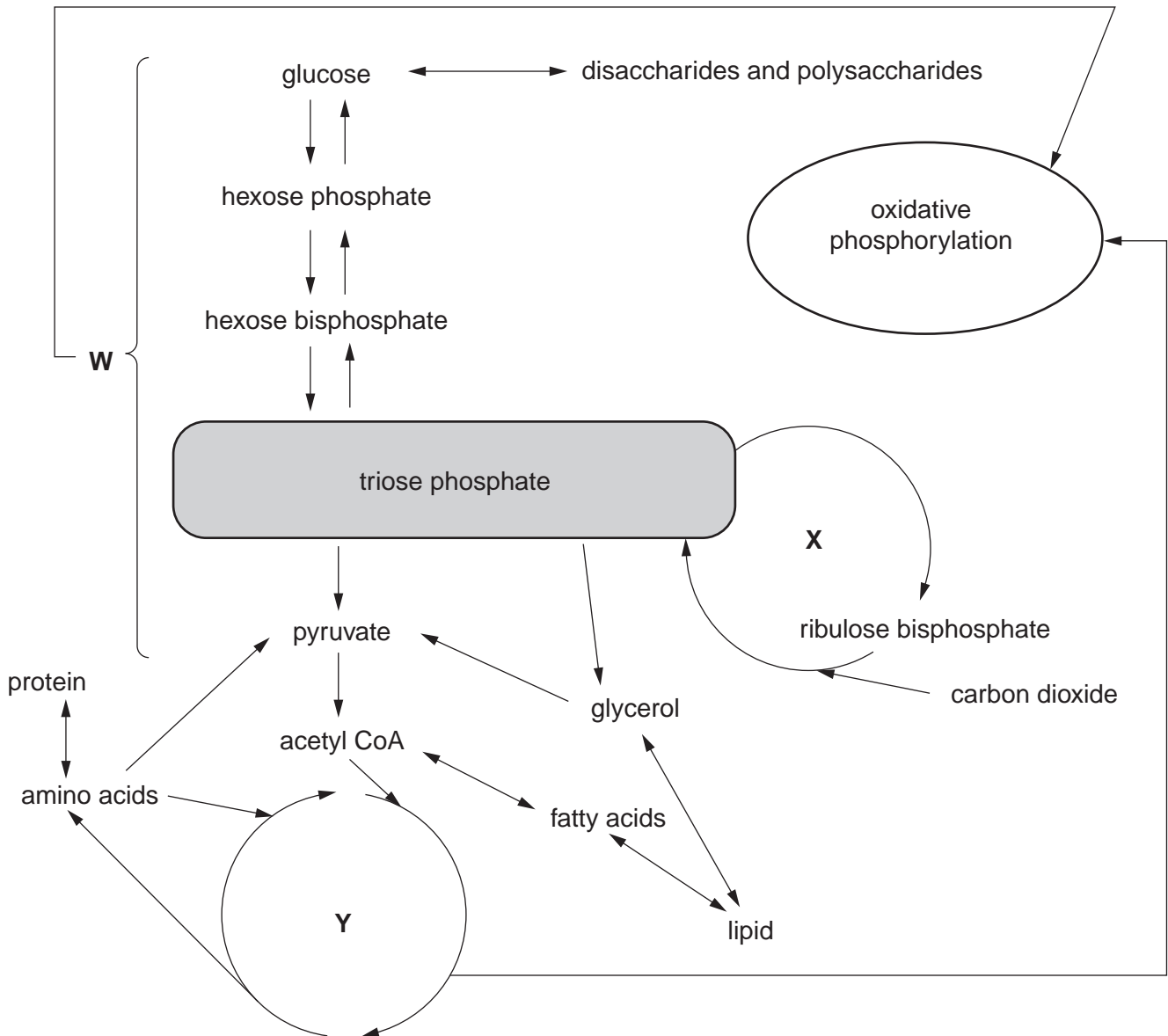


Fig. 3.1

(a) (i) Name the reaction pathways indicated by the letters **W**, **X** and **Y**.

W

X

Y [3]

4 Osmoregulation is a key feature of homeostasis and maintains the water potential of the blood within certain limits. This is achieved by the action of anti-diuretic hormone (ADH).

(a) Explain the likely effect on the blood cells if the water potential of the plasma was allowed to increase significantly.

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..... [2]

Fig. 4.1 is a simplified diagram of the structure of ADH.

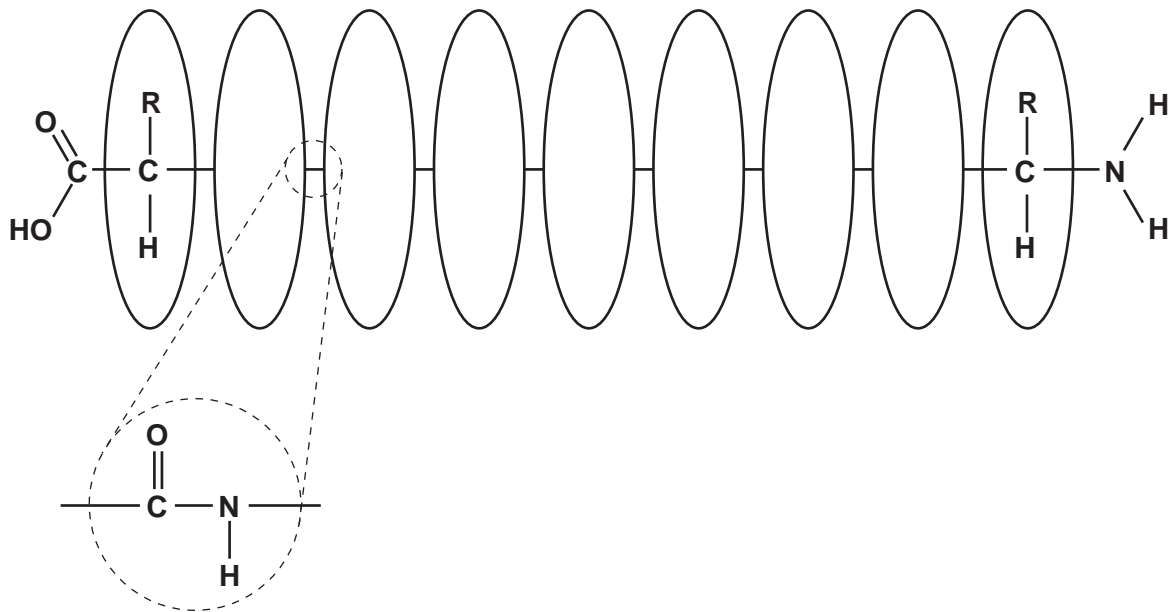


Fig. 4.1

(b) Name the type of monomer that makes up a molecule of ADH and the bond that joins the monomers together.

type of monomer.....

name of bond..... [2]

(c) Complete the following passage, using the **most suitable** term in each case:

ADH is a hormone that is produced by specialised nerve cells known as
..... cells. These cells detect changes in the water
potential of the blood flowing through the If the water
potential of the blood is too low then ADH is released.

ADH is not secreted immediately into the blood but passes along the
..... of the specialised nerve cells to the
..... gland, from where it is
released into the blood.

ADH acts on the cells of the

The ADH molecule attaches to receptors on the of these
cells and causes protein channels known as to insert
themselves into the membrane. Water passes through these channels by
..... and a smaller volume of more concentrated urine is produced.

[8]

(d) ADH does not stay in the blood indefinitely.

Suggest where ADH is removed from the blood **and** describe what then happens to the ADH molecule.

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..... [3]

[Total: 15]

Turn over

- 5 (a) Fig. 5.1 represents the sequence of events that takes place when adrenaline reaches a liver cell.

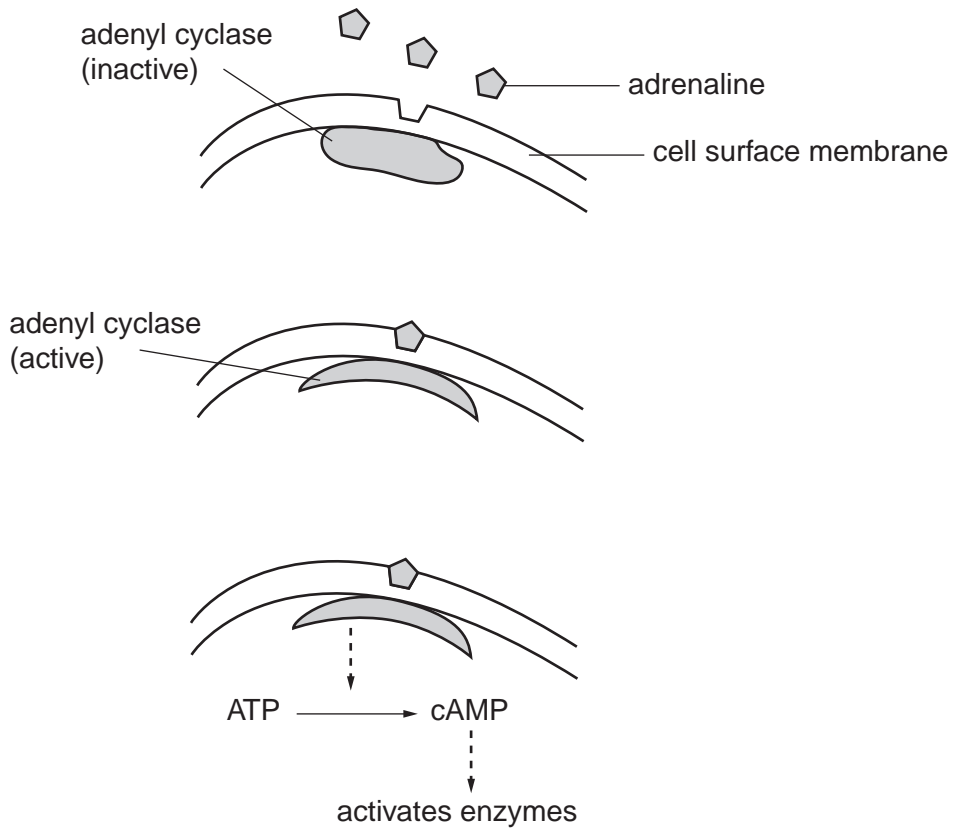


Fig. 5.1

- (i) In terms of cell signalling, name the compound in Fig. 5.1 that is acting as:
 the second messenger.....
 the first messenger..... [2]

- (ii) Suggest what happens to polysaccharides in the liver cell as a result of the events shown in Fig. 5.1.

.....

 [1]

- 6 The leaves of flowering plants have the ability to develop differently, depending on environmental conditions such as the amount of sun or shade a leaf receives.

A student carried out an investigation into sun and shade leaves from different parts of the same plant. Her observations and results are shown in Table 6.1.

Table 6.1

type of leaf	number of leaves studied	mean no. of stomata per mm ² on lower surface	mean thickness of leaf (µm)	cuticle
sun	55	170	208	thick
shade	8	92	93	thin

- (a) Calculate the percentage difference in the **mean thickness** of the sun leaves compared to the shade leaves.

Show your working.

Answer = [2]

- (b) Suggest **and** explain one benefit of the greater **mean number** of stomata per mm² on the lower surfaces of the sun leaves.

.....

 [2]

- (c) Describe **two** ways in which the student could improve her investigation.

.....

 [2]

[Total: 6]

END OF QUESTION PAPER