Figure 8 shows an image of a small section of DNA.
Figure 9 shows the structure of a small section of DNA.

Figure 8


Figure 9


| 0 | 7 | 1 | What is Part B? |
| :--- | :--- | :--- | :--- |

$\qquad$
$\qquad$

| 0 | 7 | 2 |
| :--- | :--- | :--- | In Figure 8 the structure of DNA shows four different bases.

There are four different bases and they always pair up in the same pairs.
Which bases pair up together?
$\qquad$

## Question 7 continues on the next page

Syndrome H is an inherited condition.
People with syndrome H do not produce the enzyme IDUA.

Figure 9 shows part of the gene coding for the enzyme IDUA.

Figure 9


Strand $\mathbf{K}$ shows a mutation in the DNA which has caused syndrome H .

| $\mathbf{0}$ | $\mathbf{7}$ | $\mathbf{3}$ The enzyme IDUA helps to break down a carbohydrate in the human body. |
| :--- | :--- | :--- | :--- | The enzyme IDUA produced from Strand $\mathbf{K}$ will not work.

Explain how the mutation could cause the enzyme not to work.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

| 0 | 7 | 4 |
| :--- | :--- | :--- |
| 4 | A recessive allele causes syndrome H. |  |

A heterozygous woman and a homozygous recessive man want to have a child.

Draw a Punnett square diagram to determine the probability of the child having syndrome H .

Identify any children with syndrome H .

Use the following symbols:
A = dominant allele
$\mathbf{a}=$ recessive allele
$\qquad$

## Question 7

| Question | Answers | Extra information | Mark | AO I <br> Spec. Ref. |
| :---: | :---: | :---: | :---: | :---: |
| 07.1 | phosphate | allow $\mathrm{PO}_{4}{ }^{3-}$ <br> do not allow $P$ | 1 | $\begin{aligned} & \text { AO1/1 } \\ & 4.6 .1 .5 \end{aligned}$ |
| 07.2 | A / adenine and T/ thymine and <br> C /cytosine and G / guanine | do not allow U / uracil | 1 | $\begin{aligned} & \text { AO1/1 } \\ & \text { 4.6.1.5 } \end{aligned}$ |
| 07.3 | (mutation) changes from C to T DNA code <br> or <br> there is a change in the three bases / triplet from CAG to TAG <br> (mutation) changes the amino acid <br> (this could) change the protein <br> (so it) forms a different shape / changed active site <br> (therefore) the enzyme no longer fits the substrate / carbohydrate | accept different tertiary structure | 1 <br> 1 <br> 1 <br> 1 <br> 1 | AO2/1 <br> 4.6.1.5 <br> AO1/1 <br> 4.6.1.5 <br> AO1/1 <br> 4.6.1.5 <br> AO1/1 <br> 4.6.1.5 <br> AO1/1 <br> 4.6.1.5 |

Question 7 continues on the next page

## Question 7 continued

| Question | Answers | Extra information | Mark | AO / Ref. <br> Spec. Re |
| :--- | :--- | :--- | :--- | :--- |


| 07.4 | mother / woman's gametes correct: A a |  | 1 | $\begin{aligned} & \mathrm{AO} 2 / 2 \\ & 4.6 .1 .6 \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | father / man's gametes correct: <br> a a |  | 1 | $\begin{aligned} & \mathrm{AO} 2 / 2 \\ & 4.6 .1 .6 \end{aligned}$ |
|  | correct derivation of offspring | ecf | 1 | $\begin{aligned} & \mathrm{AO} 2 / 2 \\ & 4.6 .1 .6 \end{aligned}$ |
|  | identification of child with syndrome H or genotype aa |  | 1 | $\begin{aligned} & \text { AO2/2 } \\ & \text { 4.6.1.6 } \end{aligned}$ |
|  | 0.5 | ecf <br> allow 50\% / 1/2 / 1 in 2 / 1:1 <br> do not accept 1:2 | 1 | $\begin{gathered} \text { AO3/2b } \\ 4.6 .1 .6 \end{gathered}$ |

Total

