Do not write outside the box

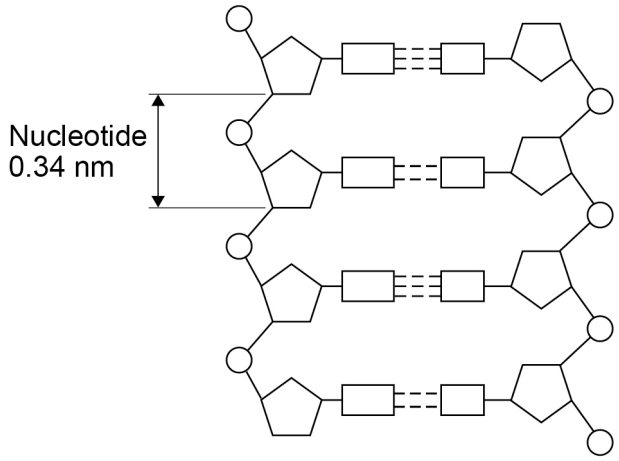
0 4 DNA is a polymer of nucleotides.

0 4 . 1 Why is DNA described as a polymer?

[1 mark]

Figure 5 shows part of a DNA molecule.

Figure 5



0 4 . 2 Describe the structure of a nucleotide.

[4 marks]

Do not write outside the box

0 4 . 3 The length of a DNA double helix increases by 0.34 nm for every pair of nucleotides.

The total number of nucleotides in a human body cell is 1.2×10^{10}.

Calculate the total length of double helix in a human body cell.

Give your answer in metres. Use information from **Figure 5**.

[5 marks]

Total length = _____ m

0 4 . 4 Some parts of DNA do **not** code for proteins.

Describe how non-coding parts of DNA can affect the expression of genes.

[1 mark]

11

Turn over for the next question

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	many (joined) nucleotides **or** monomers	allow (long) molecule / chain made of repeating units	1	AO1 4.6.1.4 4.6.1.5
04.2	phosphate	ignore phosphorus	1	AO1 4.6.1.5
	(phosphate attached to a) sugar	allow deoxyribose / pentose	1	
	(which has 1 of 4) base(s) (attached to sugar)	allow **2** marks if position of sugar / phosphate / base is incorrect	1	
	(bases) are A, C, G **and** T	allow bases are adenine, cytosine, guanine **and** thymine do **not** accept thiamine / adenosine allow description of a pair of nucleotides	1	
04.3		an incorrect answer for one step does not prevent allocation of marks for subsequent steps		AO2 4.6.1.4 4.6.1.5
	$0.34 \times 12\,000\,000\,000$		1	
	$4\,080\,000\,000$		1	
	$\frac{4\,080\,000\,000}{1\,000\,000\,000}$	allow conversion from nm to m at any point in the calculation	1	
	4.08 (m)		1	
	2.04 (m) (divided by 2 due to base pairs)	allow division by 2 at any point in the calculation	1	
04.4	(non-coding parts) can switch genes on / off		1	AO1 4.6.1.5
Total			**11**	