Nucleotides and nucleic acids – 2021/20 GCE AS Biology A

1. Nov/2021/Paper-H020/01/No.7

Which of the stains, **A** to **D**, would be chosen to bind to the phosphate group of DNA to make chromosomes more visible when using a light microscope?

A carbolfuchsin – a non-polar dye

B nigrosin – a negatively charged dye

C methylene blue – a positively charged dye

D Sudan 111 – a lipid-soluble dye

Your answer ☐ **[1]**

2. Nov/2021/Paper-H020/01/No.21

Fig. 21 shows a molecule of ADP.

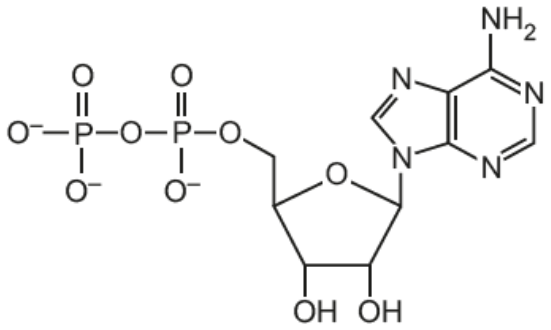

Fig. 21

(a) (i) **On Fig. 21**, draw a circle around the part of the ADP molecule that is a purine. **[1]**

(ii) State **two** differences between a molecule of ADP and a DNA nucleotide that contains adenine.

1 .....

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2 .....

.....

[2]

(iii) ADP binds with an inorganic phosphate (P_i) to make ATP.

Name this type of reaction.

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

(b) DNA is a polymer of nucleotides that contains the genetic code needed for a protein to be made. Tubulin is a protein that is found in all eukaryotes and some prokaryotes.

(i) Explain how the genetic code in the gene for tubulin codes for the protein tubulin.

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

(ii) Tubulin is a globular protein that can polymerise to form the cell cytoskeleton.

One example of this is the formation of microtubules, which form the spindle fibres to move chromatids during mitosis and meiosis.

Describe **three** other cellular functions of the cytoskeleton.

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

(iii) Suggest **two** ways tubulin is essential to protein synthesis and protein secretion in eukaryotic cells.

1 .....

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2 .....

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[2]

3. Nov/2020/Paper-H020/01/No.25

(a) Explain how the nucleotides in a DNA molecule are arranged as two polynucleotide strands.

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

(b) **(i)** The human genome contains 3.0×10^9 nucleotides. The replication of DNA takes six hours in some cells.

One eukaryotic enzyme complex can replicate DNA at a rate of 50 nucleotides added per second on each complementary strand.

Calculate the number of eukaryotic enzyme complexes needed to replicate the DNA in the human genome in six hours.

Give your answer in standard form.

number of enzyme complexes = ... **[3]**

(ii) Name **two** enzymes involved in DNA replication.

1 .....

2 .....

[2]

(iii) Explain why enzymes are essential to all organisms.

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