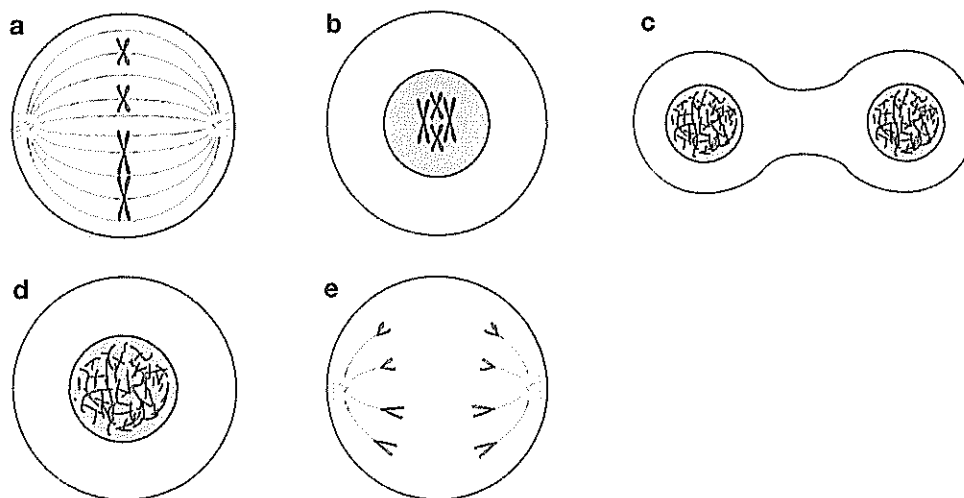


## Science understanding

## Visual/Spatial

The diagram represents five stages of mitosis. However, they are not in the correct order.



The following captions A–E are descriptions of the five stages of mitosis shown. The descriptions are not in the correct order.

- A The chromatids separate. The spindle fibres contract, pulling the chromosomes to opposite poles of the cell.
- B Separate chromosomes become visible. Each chromosome comprises two chromatids.
- C In the period between cell divisions, the DNA replicates.
- D The nuclear membrane re-forms, enclosing the chromosomes into a new nucleus at each pole. Division of the nucleus is now complete. The cytoplasm then divides, resulting in two identical daughter cells.
- E The membrane surrounding the nucleus breaks down. The spindle appears, extending from the poles of the cell to each chromosome. The chromosomes line up across the equator of the cell.

- 1 (a) In the table below, redraw each stage of the diagram shown to **demonstrate** their correct order.

- (b) **Identify** the letter of the correct caption for each stage.

First stage	Second stage	Third stage	Fourth stage	Fifth stage
Caption:	Caption:	Caption:	Caption:	Caption:

## Science understanding

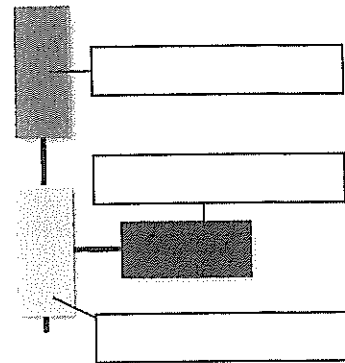
 Visual/Spatial  Logical/Mathematical

## DNA building blocks

The building blocks of the DNA molecule are nucleotides. Each nucleotide has three parts:

- phosphate group
- sugar
- nitrogen-rich base.

- 1 Use these three terms to label the nucleotide shown right.



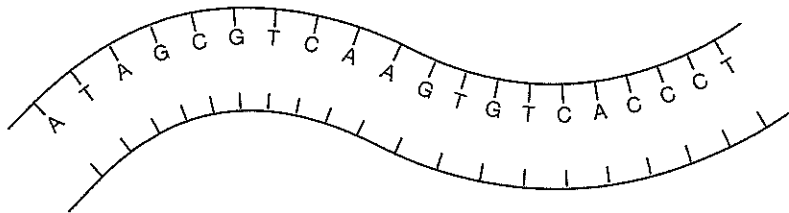
## DNA structure

The nitrogen-rich bases can be one of four types:

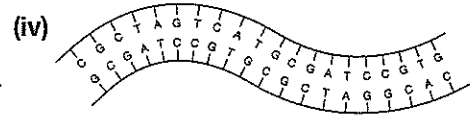
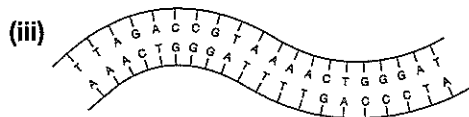
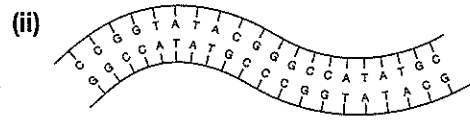
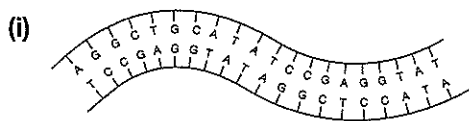
- adenine (A) • thymine (T)
- cytosine (C) • guanine (G).

In a double-stranded DNA molecule, A and T always form a pair and C and G always form a pair.

- 2 The sequence of bases below represents a section of a single strand of DNA. **Propose** the base sequence in the complementary strand of DNA.



- 3 (a) **Identify** which of the following figures represents a possible base sequence in a molecule of DNA. \_\_\_\_\_



- (b) **Justify** your decision for each molecule.

(i) \_\_\_\_\_

(ii) \_\_\_\_\_

(iii) \_\_\_\_\_

(iv) \_\_\_\_\_