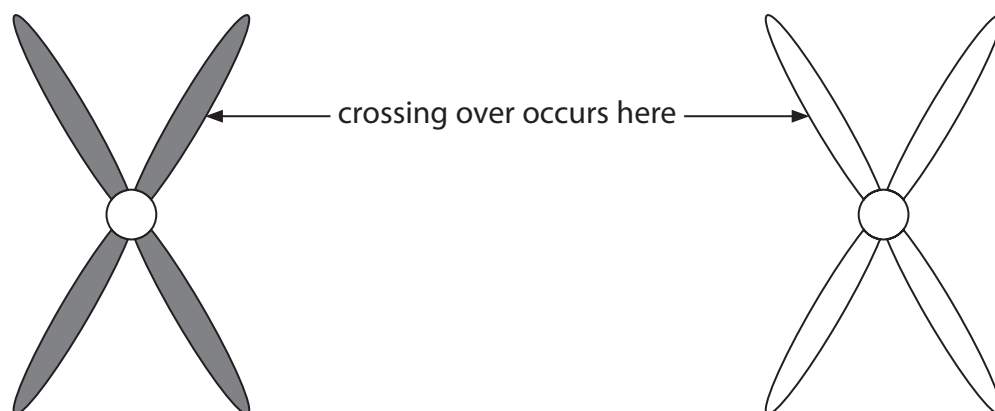


3 Meiosis and mitosis are involved in cell division.

(a) Meiosis produces gametes that are genetically different.

Crossing over is important to increase genetic variation.

The diagram shows one pair of homologous chromosomes during early meiosis.



Complete the diagram below to show these chromosomes after crossing over has occurred.

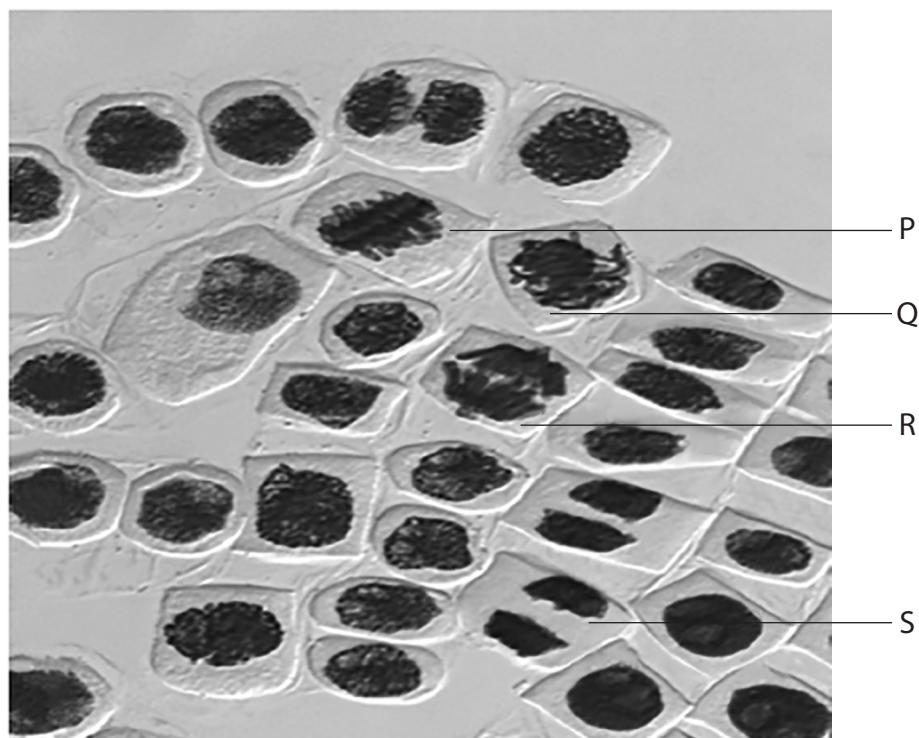
(2)



P 6 1 4 7 0 A 0 7 3 2

(b) The photograph shows some cells undergoing mitosis.

Each labelled cell is in a different stage of mitosis.



(i) Which cell is in prophase?

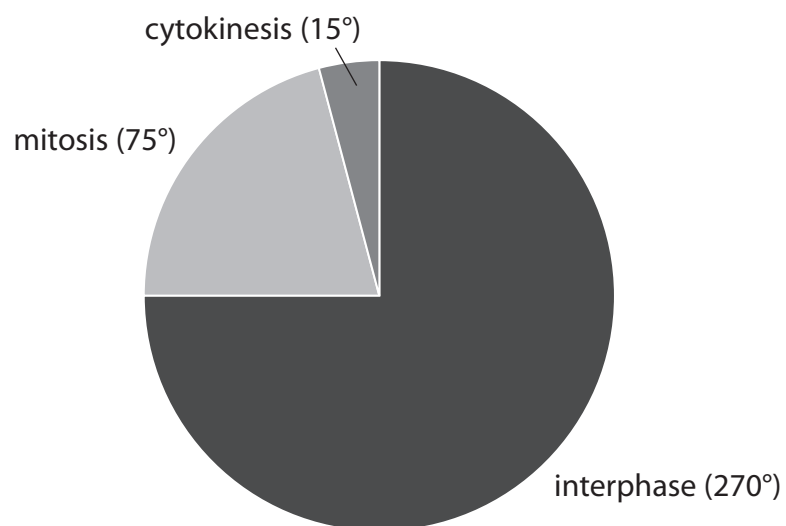
- ☐ A P
- ☐ B Q
- ☐ C R
- ☐ D S

(1)



- (ii) In some embryo cells, interphase can last an average of nine hours.

The diagram shows the relative proportions of time spent in each part of the cell cycle.



Calculate how long cytokinesis would take in these embryo cells.

(1)

Answer hours

- (iii) Calculate the total number of cells resulting from one cell dividing by mitosis eight times.

(1)

Answer

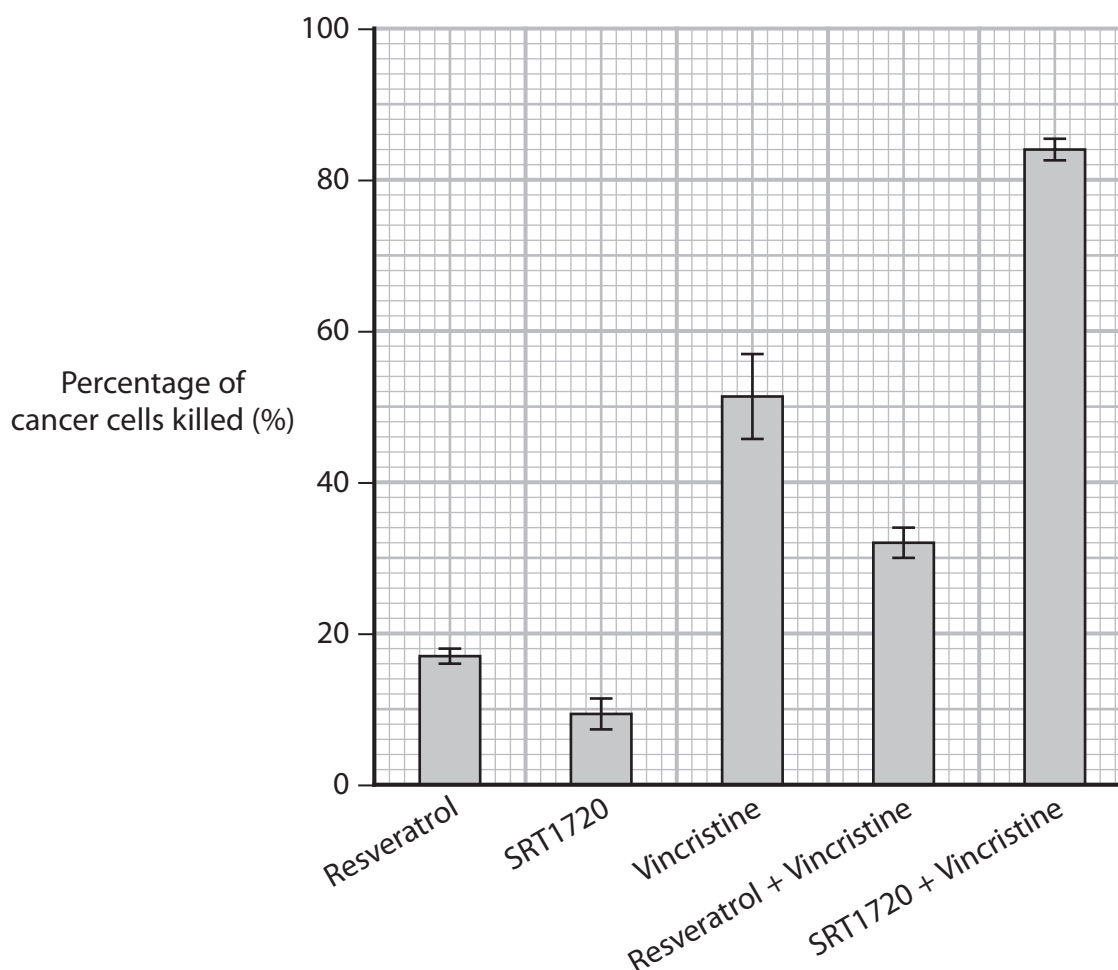


(c) Ewing's sarcoma is a type of cancer.

Resveratrol, SRT1720 and Vincristine are drugs used to kill cancer cells.

An investigation was carried out to determine the most effective treatment for patients with Ewing's sarcoma.

The graph shows the results of this investigation.



(i) Vincristine prevents spindle fibres from shortening during mitosis. This leads to the death of the cell.

At which stage of mitosis do the spindle fibres contract?

(1)

- ☐ A anaphase
- ☐ B metaphase
- ☐ C prophase
- ☐ D telophase



(ii) Evaluate the effectiveness of the three drugs used in this investigation.

Use the information in the graph to support your answer.

(4)

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(Total for Question 3 = 10 marks)

