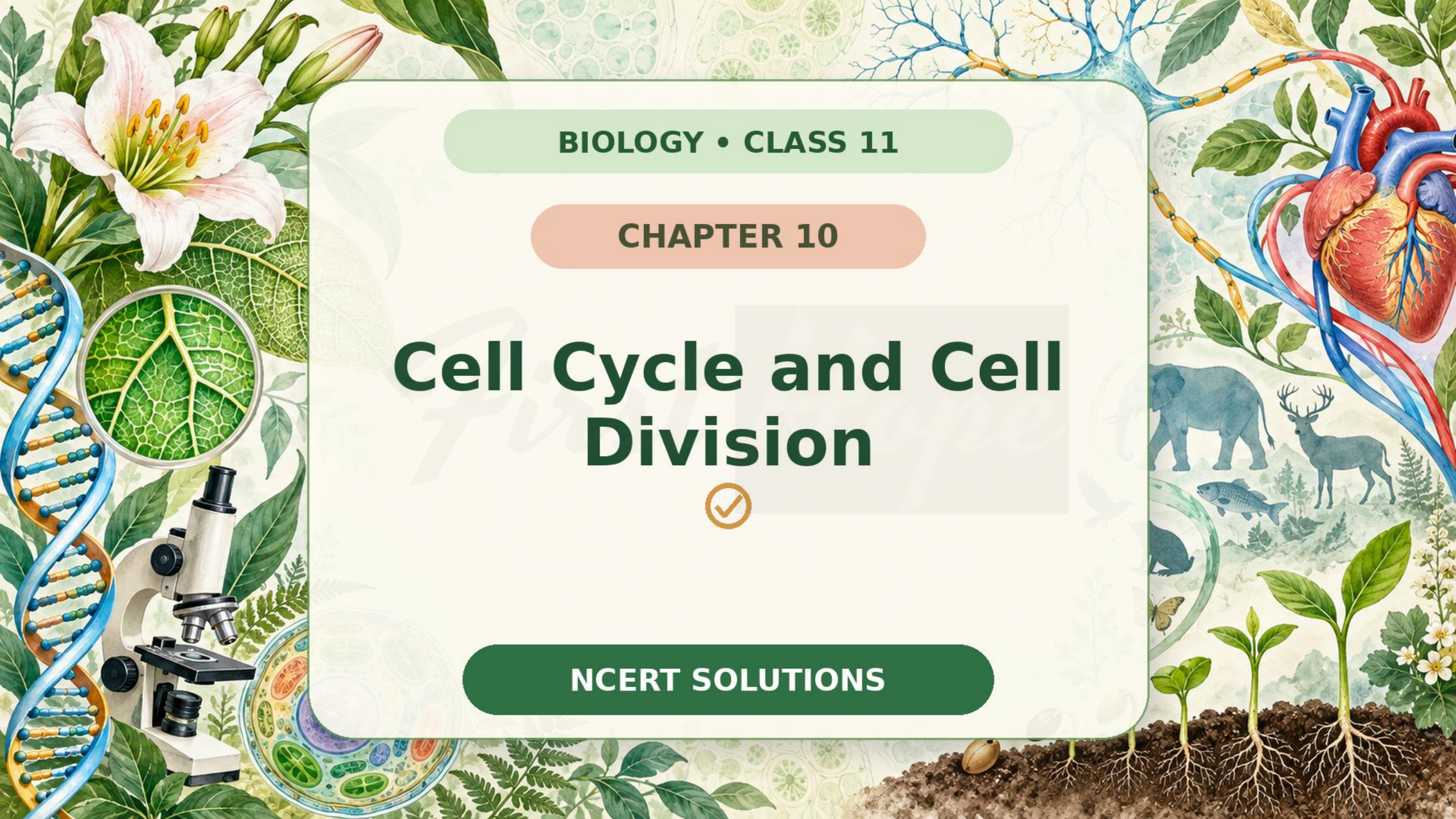


A vibrant collage of biological illustrations. On the left, a pink lily flower is in bloom, with green buds and leaves. Below it, a blue and orange DNA double helix is visible. A magnifying glass focuses on a green leaf's vein structure. A microscope is positioned in the lower-left corner. The background is filled with various green leaves and ferns. On the right side, a detailed illustration of a human heart with red and blue blood vessels is shown. Below the heart, there are silhouettes of an elephant, a deer, and a fish. At the bottom, a small green plant with roots is growing out of a mound of brown soil.

BIOLOGY • CLASS 11

CHAPTER 10

Cell Cycle and Cell Division



NCERT SOLUTIONS

EXERCISE SOLUTIONS: QUESTIONS 1-4

1. What is the average cell-cycle span for a mammalian cell?

Answer: About 24 hours for a typical human cell in culture; the duration varies with cell type and conditions.

2. Distinguish cytokinesis from karyokinesis.

Answer: Karyokinesis—division of the nucleus and chromosomes.

Cytokinesis—division of the cytoplasm, usually after karyokinesis, producing separate daughter cells.

3. Describe the events taking place during interphase.

Answer: G_1 : cell growth, normal metabolism, RNA/protein synthesis and organelle duplication →
S: DNA replication and centriole duplication; DNA doubles but chromosome number does not →
 G_2 : further growth, protein synthesis and preparation for mitosis.

4. What is G_0 (quiescent phase) of the cell cycle?

Answer: G_0 is a non-dividing state entered from G_1 . Cells remain metabolically active but do not prepare for division. Some can re-enter the cycle after stimulation; others remain permanently differentiated.

EXERCISE SOLUTIONS: QUESTIONS 5-6

5. Why is mitosis called equational division?

Answer: During mitosis, sister chromatids separate equally so each daughter nucleus receives the same number and kinds of chromosomes as the parent nucleus. Therefore chromosome number is maintained.

$2N$ parent $\longrightarrow$ two $2N$ daughter cells

6. Name the stage of the cell cycle at which each event occurs.

Answer:

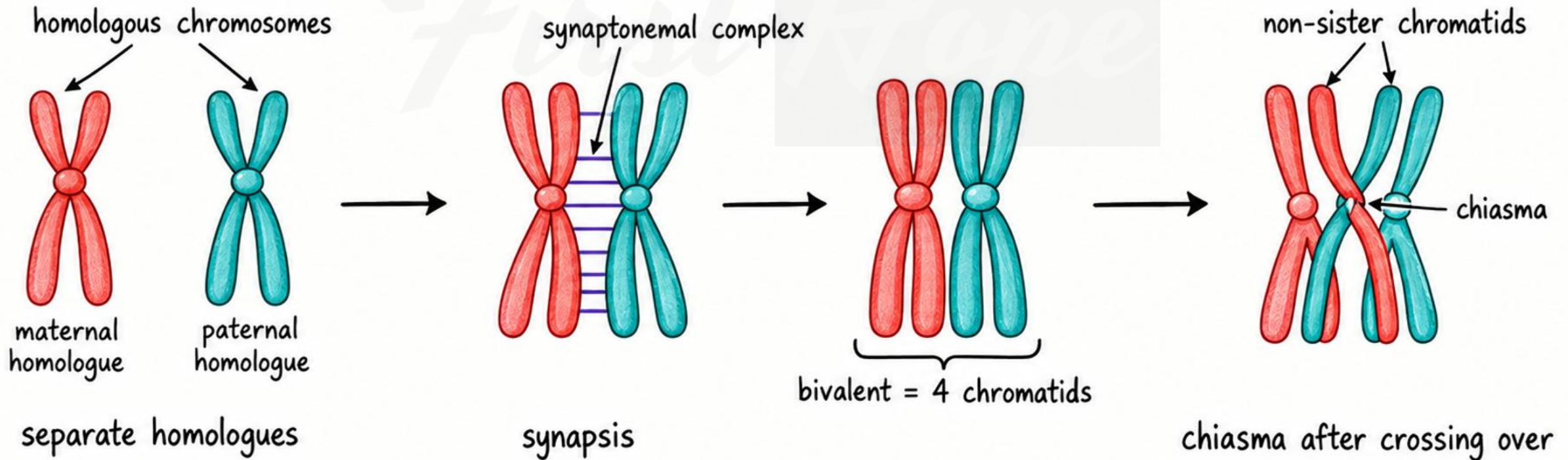
S. No.	Event	Stage of cell cycle
(i)	Chromosomes move to the spindle equator.	Metaphase of mitosis.
(ii)	Centromeres split and chromatids separate.	Anaphase of mitosis.
(iii)	Homologous chromosomes pair.	Zygotene of prophase I.
(iv)	Crossing over occurs between homologous chromosomes.	Pachytene of prophase I.

Chiasmata become clearly visible later, during diplotene.

EXERCISE SOLUTION: QUESTION 7

7. Describe (a) synapsis, (b) bivalent and (c) chiasmata. Draw a diagram.

- Answer:** (a) Synapsis is the close pairing of homologous chromosomes during zygotene of prophase I.
(b) A bivalent is the paired homologous-chromosome unit. Because each homologue has two sister chromatids, it contains four chromatids and is also called a tetrad.
(c) Chiasmata are X-shaped points seen during diplotene where non-sister chromatids remain attached after crossing over.

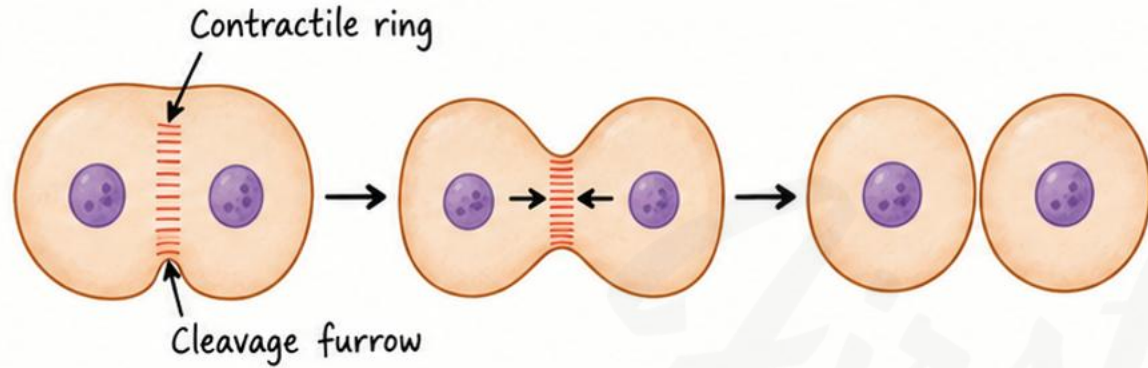


EXERCISE SOLUTIONS: QUESTIONS 8-9

8. How does cytokinesis in plant cells differ from that in animal cells?

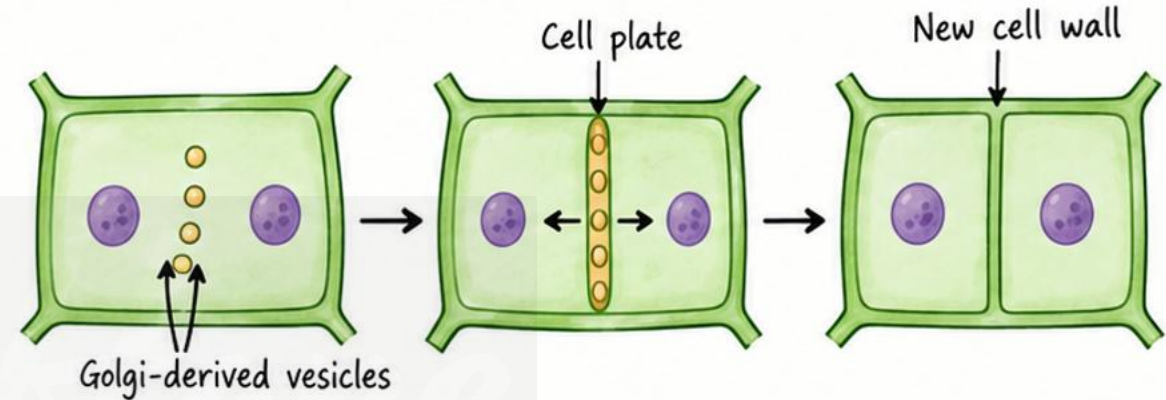
Answer:

Animal cell (centripetal cytokinesis)



A contractile ring forms a cleavage furrow that deepens from the outside inward — centripetal cytokinesis.

Plant cell (centrifugal cytokinesis)

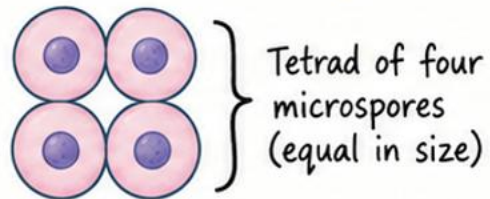


Golgi-derived vesicles fuse at the centre to form a cell plate that grows outward and joins the parental wall — centrifugal cytokinesis.

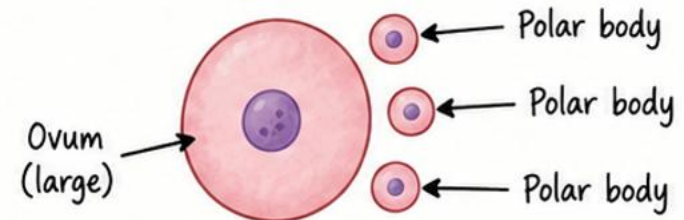
9. Give examples where the four daughter cells from meiosis are equal in size and where they are unequal in size.

Answer:

Equal in size: Spermatogenesis usually forms four similar spermatids; microsporogenesis in an anther commonly forms a tetrad of four similar microspores.



Unequal in size: Oogenesis forms one large ovum and small polar bodies because cytoplasm divides unequally.



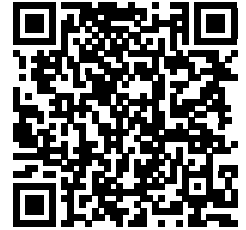


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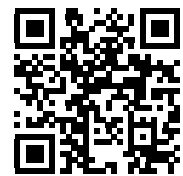


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