Question	Answer
Approximately how long does a human cell take to complete one cell cycle?	About 24 hours.
Can individual chromosomes be seen clearly during telophase?	No, they cannot be seen as discrete elements.
Can plants show mitotic division in both haploid and diploid cells?	Yes.
Does cell division stop after formation of a mature organism?	No, it continues throughout life.
During which stage are chromosomes moved to the spindle equator?	Metaphase.
During which stage of the cell cycle does DNA synthesis occur?	During one specific stage of the cell cycle.
From where was insulin extracted earlier?	Pancreas of slaughtered cattle and pigs.
Give an example of a nutritionally improved GM crop.	Golden rice enriched with Vitamin A.
How are sister chromatids attached during metaphase?	Each chromatid is connected by its kinetochore to spindle fibres from opposite poles.
How do GM crops reduce dependence on chemical pesticides?	By developing pest-resistant varieties.
How has biotechnology benefited humans?	By producing useful products using microbes, plants, animals, and their metabolic machinery.
How has man exploited Cry proteins?	By introducing Bt toxin genes into crop plants to develop pest resistance.
How has recombinant DNA technology impacted healthcare?	It enabled mass production of safe and effective therapeutic drugs.
How many haploid cells are formed at the end of meiosis II?	Four haploid cells.
In which form does Bt toxin exist in Bacillus thuringiensis?	Inactive protoxin form.
Into which phases is interphase subdivided?	G1, S, and G2 phases.
Is C-peptide present in mature insulin?	No, it is removed during maturation.
Name the five stages of prophase I.	Leptotene, Zygotene, Pachytene, Diplotene, and Diakinesis.
Name the four stages of mitosis.	Prophase, Metaphase, Anaphase, and Telophase.
Name two lepidopteran insects affected by Bt toxin.	Tobacco budworm and armyworm.

Question	Answer
Name two treatments for ADA deficiency mentioned in the text.	Bone marrow transplantation and enzyme replacement therapy.
On which principle is ELISA based?	Antigen-antibody interaction.
PCR is routinely used to detect which disease?	AIDS caused by HIV.
To what do spindle microtubules attach in metaphase II?	Kinetochores of sister chromatids.
To which cells is mitosis usually restricted?	Diploid cells.
What are homologous chromosomes?	Paired chromosomes during synapsis.
What are nucleases?	Enzymes that digest nucleic acids.
What are the two important characteristics of cells mentioned in the chapter?	Growth and reproduction.
What becomes distinct during pachytene?	The four chromatids of each bivalent chromosome.
What can be the source of complementary RNA in RNAi?	RNA viruses or mobile genetic elements (transposons).
What characterises metaphase?	Alignment of chromosomes at the equatorial plate.
What components are required in a nutrient medium for tissue culture?	Carbon source (sucrose), inorganic salts, vitamins, amino acids, auxins, and cytokinins.
What concern has arisen due to manipulation of microbes, plants, and animals?	Serious ethical questions regarding their use and impact.
What follows telophase I?	Cytokinesis.
What forms the mitotic apparatus?	Two asters together with spindle fibres.
What happens during meiosis I?	Homologous chromosomes pair to form bivalents and undergo crossing over.
What happens during metaphase I?	Bivalent chromosomes align on the equatorial plate.
What happens to chromatin during prophase?	It condenses and becomes untangled.
What happens to chromosomes during telophase II?	They get enclosed by a nuclear envelope.
What happens to DNA content (C) during S phase?	It doubles.
What happens to the DNA content during S phase?	It doubles from 2C to 4C.
What is a bivalent?	A pair of synapsed homologous chromosomes.
What is a metaphase chromosome made up of?	Two sister chromatids held together by the centromere.

Question	Answer
What is another important significance of meiosis?	It increases genetic variability in populations.
What is biopiracy?	Use of bio-resources by multinational companies or organisations without proper authorisation or compensatory payment.
What is cytokinesis?	Division of the cytoplasm into two daughter cells.
What is cytokinesis?	Division of the cytoplasm.
What is gene therapy?	A collection of methods used to correct a gene defect diagnosed in a child or embryo.
What is one important contribution of mitosis?	Cell repair.
What is the advantage of toxicity testing in transgenic animals?	Results can be obtained in less time.
What is the condition of cells in G0 stage?	They remain metabolically active but no longer proliferate unless required.
What is the condition of newly formed DNA molecules before prophase?	They are not distinct but intertwined.
What is the main difference between anaphase of mitosis and anaphase I of meiosis?	In mitosis sister chromatids separate, while in meiosis I homologous chromosomes separate.
What is the name of the Bt toxin gene controlling cotton bollworms?	cryIAc and cryIIAb.
What is the precursor formed during cytokinesis in plant cells?	Cell plate.
What is the quiescent stage of the cell cycle called?	G0 stage.
What is the result of crossing over?	Recombination of genetic material.
What marks diakinesis?	Terminalisation of chiasmata.
What process does mitosis accomplish before cytokinesis?	Segregation of duplicated chromosomes into daughter nuclei (karyokinesis).
What reappears during telophase I?	Nuclear membrane and nucleolus.
What restores the diploid phase in sexually reproducing organisms?	Fertilisation.
What was the major achievement of the Green Revolution?	It succeeded in tripling the food supply.
When is meiosis II initiated?	Immediately after cytokinesis.
Which bacterium is commonly used for cloning and expressing human genes?	E. coli.

Question	Answer
Which bacterium is commonly used for cloning and expressing human genes?	E. coli.
Which disease was first treated using gene therapy?	Adenosine deaminase (ADA) deficiency.
Which human protein produced by transgenic animals is used to treat emphysema?	α-1-antitrypsin.
Which part of the chromosome leads during movement in anaphase?	The centromere.
Which phase is considered the most dramatic period of the cell cycle?	M Phase.
Why are recombinant therapeutics considered safer?	They are identical to human proteins and do not induce unwanted immune responses.
Why are transgenic animals produced?	To study gene regulation, disease development, biological products, vaccine safety, and chemical safety testing.
Why is early diagnosis important in disease treatment?	For effective treatment and understanding of pathophysiology.
Why is meristem used for producing virus-free plants?	Because meristem is free of viruses even in infected plants.
Why is mitosis called equational division?	Because chromosome number is conserved in daughter cells.
Why was pomato not commercially successful?	It did not have all the desired combination of characteristics.