Applying Knowledge

Mutations concept map

Page 64

radiation, cigarette smoke, pesticides

mutations

negative, positive, neutral

curved red blood cells, gene that protects plants from disease (or protein that prevents HIV from infecting a person)

Comprehension

Gene mutation

Page 65

1. A gene mutation is a change in the genetic material of a gene.
2. negative, positive, neutral
3. positive
4. curved red blood cell (Other answers may be acceptable.)
5. neutral
6. Mutagens are factors in the environment that cause mutations.
7. Answers will vary, but could include cigarette smoke, radiation from X rays, radiation from UV rays, pollutants, pesticides, and household chemicals.
8. Researchers are replacing a mutated gene with a healthy copy of the gene.

Cloze Activity

The effects of mutations

Page 66

1. gene mutation
2. proteins
3. mutagens
4. mutagens
5. negative mutations
6. positive mutations
7. neutral mutations
8. gene therapy, mutated gene, healthy gene

Assessment

Mutation

Page 67

1. D **2.** A **3.** G **4.** C **5.** B **6.** E **7.** C **8.** C **9.** A **10.** B

11. A **12.** D

Chapter 5 Mitosis is the basis of asexual reproduction.

Section 5.1 The Cell Cycle and Mitosis

Reading Checks

Pages 68–69

1. interphase, mitosis, cytokinesis
2. uncontrolled cell division

Comprehension

Getting to know the cell cycle

Page 70

1. three
2. interphase, DNA
3. mitosis
4. cytokinesis, two
5. four
6. prophase, nucleolus
7. metaphase, duplicated chromosomes
8. anaphase, duplicated chromosomes
9. telophase, nucleolus

Interpreting Illustrations

Identifying stages of the cell cycle

Page 71

1. growth and cell activity
2. DNA is copied
3. continued growth and preparation for mitosis
4. mitosis
5. cytokinesis
6. interphase

   Description

   1. Cells grow and carry out their life functions.
   2. The nucleus makes a copy of its DNA.
   3. There is continued growth and preparation for mitosis.
   4. The nucleus of the cell divides into two equal and identical parts.
   5. The two equal, identical parts of the cell separate.
   6. Cells grow and carry out their life functions.

Illustrating Concepts

Mitosis

Page 72

PHASE	WHAT IS HAPPENING TO THE CELL?	LABELLED DIAGRAM
prophase	• – The duplicated chromosomes form an X and the nucleolus disappears. – Spindle fibres, which are tiny tube-like structures made of protein, begin to form in plant and animal cells.	
metaphase	• – The duplicated chromosomes line up across the middle of the cell.	
anaphase	• – The duplicated chromosomes move apart to opposite ends of the cell.	
telophase	• – A nucleolus forms around the chromosomes at the opposite ends of the dividing cell.	

Assessment

The cell cycle and mitosis

Page 73

1. E **2.** F **3.** A **4.** D **5.** B **6.** A **7.** A **8.** B **9.** C **10.** A **11.** D

Section 5.2 Asexual Reproduction

Reading Checks

Page 75

1. Any of: can out-compete other organisms, reproduce quickly, and can survive if predators increase.

2. cells that usually divide to form one of many different types of cells

Cloze Activity

Types of asexual reproduction

Page 76

1. clone

2. asexual reproduction

3. binary fission

4. budding

5. fragmentation

6. vegetative reproduction

7. binary fission

8. DNA

9. stem cells

Illustrating Concepts

What are the five different types of asexual reproduction?

Page 77

Answers can be in any order.

- binary fission: bacteria or amoeba; splitting of a single parent cell into two equal parts that have the same copies of genetic material
- budding; hydra, sponge, or yeast; a group of rapidly dividing cells develops on an organism and breaks away to become a new organism independent of its parent
- fragmentation: plants such as moss or animals such as sea star or coral; a small piece of an organism breaks away from it and develops into a new individual
- spores: fungi or algae; reproductive cells develop into a new individual by repeated mitosis
- vegetative reproduction: plant; special cells, usually in the stems and roots of plants, divide repeatedly to form structures that develop into a plant that is identical to the parent

Comprehension

True or false?

Page 78

1. False. Asexual reproduction is the formation of a new individual that has **the same** genetic information as its parent.

2. False. Asexual reproduction occurs in **one-celled** organisms such as bacteria and in **multicellular** organisms such as plants.

3. True

4. True

5. False. Growing new plants from the cut ends of **stems and roots** is one way that humans make clones of plants.

6. False. Making clones of animals involves taking the nucleus from one type of cell and putting it in the **egg cell that has had its nucleus removed.**

Assessment

Asexual reproduction

Page 79

1. G **2.** D **3.** B **4.** E **5.** C **6.** A **7.** H **8.** A **9.** C **10.** C

11. B **12.** B **13.** D

Chapter 6 Meiosis is the basis of sexual reproduction.

Section 6.1 Meiosis

Reading Checks

Pages 80–81

1. 46 (arranged in 23 pairs)

2. four

Applying Knowledge

The role of gametes

Page 82

1.

ORGANISM	DIPLOID NUMBER (2n)	HAPLOID NUMBER (n)
human	46	23
fruit fly	8	4
black bear	76	38
peanut	20	10
chimpanzee	48	24

2. (Male-female and sperm-egg can be reversed.)

Top row of boxes: diploid, male parent, female parent, diploid

Second row: haploid, sperm cell, egg cell, haploid

Third row: fertilization

Bottom box: diploid

Cloze Activity

What happens in meiosis?

Page 83

1. gametes, gametes, gametes

2. fertilization, zygote

3. mitosis, embryo

4. 23

5. 23, haploid

6. chromosome

7. meiosis I

8. meiosis II

9. diploid, 4

Interpreting Illustrations

Comparing meiosis and mitosis

Page 84

Answers may vary slightly. Sample answers:

1. In both, chromosomes line up along the equator.

2. In meiosis I, each pair of chromosomes includes one chromosome from each parent.

3. In both, chromosomes are pulled to opposite poles.

4. In meiosis II, there are half as many chromosomes as in mitosis.

Assessment

Meiosis

Page 85

1. C **2.** E **3.** B **4.** J **5.** H **6.** I **7.** A **8.** D **9.** F **10.** C **11.** C

12. C **13.** A **14.** A

Section 6.2 Sexual Reproduction

Reading Checks

Pages 86–87

1. during the first eight weeks after fertilization

2. organs and parts of the body continue to develop

Cloze Activity

Embryonic and fetal development

Page 88

1. mating

2. external, fish

3. internal, birds

4. embryo

5. blastula, embryonic stem cells

6. ectoderm, mesoderm, endoderm

7. differentiation

8. fetus

Illustrating Concepts

Types of sexual reproduction

Page 89

Students' definitions and examples may vary.

	EXTERNAL FERTILIZATION	INTERNAL FERTILIZATION
Definition	A sperm cell and egg cell unite outside the bodies of the parents.	Sperm cells are deposited inside the female's body where they meet an egg cell.
Examples of organisms	Animals that live in water Sea urchins Fish (salmon) Mosses Ferns	Water-dwelling orcas Most land dwelling animals Mountain goats Humans Most plants