



Unit 4 • Heredity: genetics and genetic technology

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 33

1 Key words

[3]

Match each word in column A with its meaning in column B. Write the letter in the box. One meaning in column B is not needed. Each pair carries 0.5 mark.

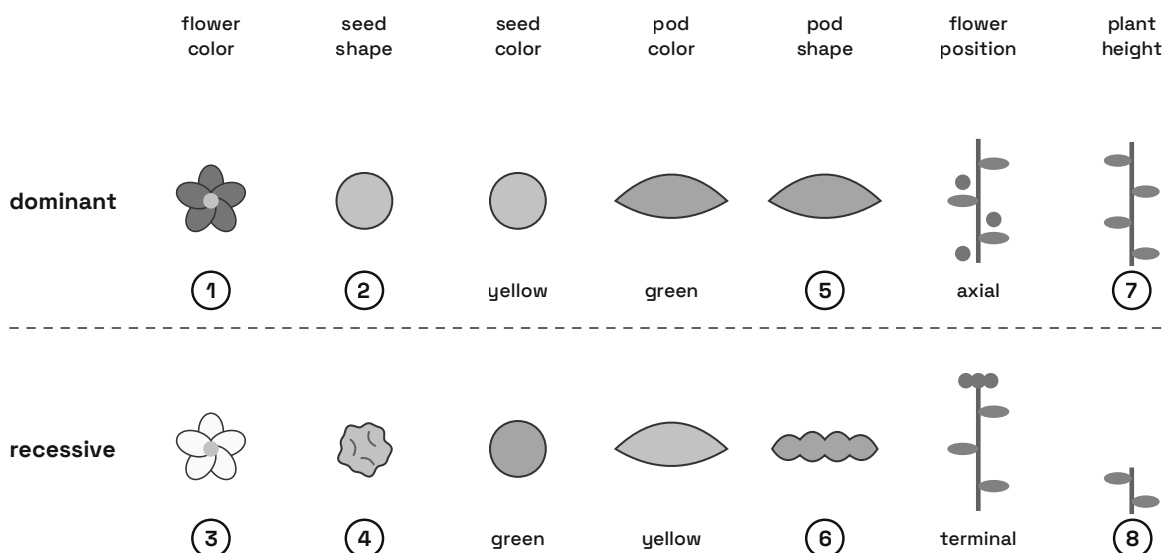
Column A**Column B**

- | | | |
|--------------|----------------------|---|
| 1. allele | <input type="text"/> | a. a cross between two pure plants differing in two pairs of characters |
| 2. hybrid | <input type="text"/> | b. the study of genes, heredity and variation |
| 3. recessive | <input type="text"/> | c. one of the two forms of a gene, such as T or t |
| 4. phenotype | <input type="text"/> | d. a character that shows only when both alleles are for it |
| 5. genotype | <input type="text"/> | e. the character you can see, such as tall or dwarf |
| 6. genetics | <input type="text"/> | f. the genetic make-up, such as TT, Tt or tt |
| | | g. an organism with two different alleles of a gene, such as Tt |

2 Label the diagram

[4]

The diagram shows the seven pairs of contrasting characters Mendel studied in peas, the dominant forms in the top row. Name the forms numbered 1 to 8. Each carries 0.5 mark.



- | | |
|----------|----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |
| 5. _____ | 6. _____ |
| 7. _____ | 8. _____ |



[5]

Choose the correct option for each of the following questions.

- i. Which plant did Mendel use for his experiments? [1]
 - a. pea
 - b. gram
 - c. maize
 - d. bean
- ii. What is the genotypic ratio of a monohybrid cross in F_2 ? [1]
 - a. 1 : 3
 - b. 3 : 1
 - c. 1 : 2 : 1
 - d. 9 : 3 : 3 : 1
- iii. A light-skinned child is born to dark-skinned parents. What is the reason? (Treat skin color here as one gene with dark dominant.) [1]
 - a. The parents were hybrid.
 - b. Both the father and the mother were pure dark.
 - c. Light color is dominant.
 - d. Dark color is recessive.
- iv. Ramit produced a new plant by crossing an orange plant with a lemon plant. What kind of plant is it? [1]
 - a. an improved variety
 - b. a pure plant
 - c. a hybrid plant
 - d. an artificial plant
- v. Roshani lives in the Himalayan region. Her family keeps a mule to carry goods. The mule is getting old, and her family is thinking of getting a new one. Roshani asked her father how a mule gives birth. Which answer did her father give? [1]
 - a. Mules produce offspring naturally.
 - b. Mules are inbred.
 - c. Mules can't produce offspring naturally.
 - d. Mules produce offspring by AI.

[3]

Write very short answers to the following questions.

- What is a monohybrid cross? [1]

- In Mendel's dihybrid cross, what is the phenotypic ratio of the F₂ generation? [1]

- Which technique did the district animal development office use to make many cows pregnant at once at a camp? [1]



5 Short answers

[8]

Write short answers to the following questions.

- a. Write any two differences between phenotype and genotype.

[2]

- b. Give a reason: when pure tall and dwarf pea plants are cross-pollinated, tall plants are produced in F_1 .

[2]

- c. Give a reason: DNA testing is a reliable technique for criminal investigation.

[2]

- d. Give a reason: offspring produced by crossing two different species, such as the mule, may be sterile.

[2]

6 Long answer

[4]

Write a long answer to the following question.

What is a monohybrid cross? Show in a filial chart the result of first cross-pollinating, and then self-pollinating, a pure red-flowered and a pure white-flowered pea plant (red is dominant).



7 Problem

[4]

Study the Punnett square and answer the questions.

A pure round-seeded and a pure wrinkled-seeded pea plant were cross-pollinated, and their offspring were then self-pollinated. The F_2 generation is shown below.

	R	r
R	RR	Rr
r	Rr	rr

- What is the ratio of plants showing the dominant and recessive characters? (1)
- Write the genotypic ratio of this generation. (1)
- If 400 seeds are produced, about how many will be wrinkled? (1)
- Which plants are pure round-seeded, and why? (1)

8 Think

[2]

Think, then answer.

A black guinea pig was crossed with a white guinea pig, and all the F_1 offspring were black. Explain why no white guinea pigs appeared in this generation.

9 Activity: Hybrids you know (Activity 4.7)

(not marked)

List animals and plants made by selective breeding or crossbreeding that you have seen or heard of near your home, and fill in the table.

Animal or plant	Its parents (breeds or species)	Why people breed it

