

## Passage II

Plants from Species X can be tall or short, and they can have red, pink, or white flowers. Height in Species X plants is controlled by Gene T, which has 2 alleles, *T* and *t*. Flower color in Species X plants is controlled by Gene R, which also has 2 alleles, *R* and *r*. To determine how height and flower color are inherited in Species X, a student conducted the following crosses.

### Cross 1

Two tall Species X plants, each with the genotype *Tt*, were crossed. The numbers and phenotypes of the resulting offspring are shown in Table 1.

Table 1	
Number of offspring	Height phenotype
154	tall
46	short

### Cross 2

Two pink-flowered Species X plants, each with the genotype *Rr*, were crossed, and the numbers and phenotypes of the resulting offspring are shown in Table 2.

Table 2	
Number of offspring	Flower phenotype
46	red
102	pink
52	white

### Cross 3

Two Species X plants, each with the genotype *TtRr*, were crossed. The numbers, genotypes, and phenotypes of the resulting offspring are shown in Table 3.

Table 3			
Number of offspring	Genotype	Height phenotype	Flower phenotype
10	<i>TTRR</i>	tall	red
18	<i>TTRr</i>	tall	pink
11	<i>TTrr</i>	tall	white
19	<i>TtRR</i>	tall	red
41	<i>TtRr</i>	tall	pink
20	<i>Ttrr</i>	tall	white
12	<i>ttRR</i>	short	red
19	<i>ttRr</i>	short	pink
10	<i>ttrr</i>	short	white

6. The ratio of tall offspring to short offspring in Cross 1 is closest to which of the following?

F. 1:1  
G. 1:3  
H. 3:1  
J. 1:2:1

7. What was the genotype for Gene T in the offspring from Cross 2?

A. *TT* only  
B. *Tt* only  
C. *tt* only  
D. Cannot be determined from the given information

8. The percent of offspring from Cross 2 with pink flowers was closest to which of the following?

F. 0%  
G. 25%  
H. 50%  
J. 100%

9. Suppose a gardener wants to produce tall pink-flowered Species X plants. Based on the results of Cross 3, which of the following pairs of plants, if crossed, would produce offspring with this phenotype?

A. *TTRR* and *TTrr*  
B. *TTrr* and *Ttrr*  
C. *ttrr* and *ttRR*  
D. *ttrr* and *ttRr*

10. A student had hypothesized that the majority of the offspring from Cross 3 would be tall and have white flowers. Are the results shown in Table 3 consistent with this hypothesis?

F. Yes; 31 of the offspring from Cross 3 were tall with white flowers.  
G. Yes; 119 of the offspring from Cross 3 were tall with white flowers.  
H. No; only 11 of the offspring from Cross 3 were tall with white flowers.  
J. No; only 31 of the offspring from Cross 3 were tall with white flowers.

11. Suppose a short red-flowered Species X plant is crossed with a short pink-flowered Species X plant. The percent of the resulting offspring with the genotype *ttRr* will most likely be closest to which of the following?

A. 0%  
B. 25%  
C. 50%  
D. 100%