***Life: The Science of Biology,* Sixth Edition**
Chapter 10: Genetics: Mendel and Beyond

Answers to End-of-Chapter Genetics Problems

1. Each of the eight boxes in the Punnett squares should contain the genotype *Tt*, regardless of which parent was tall and which dwarf.

2. Yellow parent = $s^Y s^b$; offspring 3 yellow (s^Y–): 1 black ($s^b s^b$). Black parent = $s^b s^b$; offspring all black ($s^b s^b$). Orange parent = $s^O s^b$; offspring 3 orange (s^O–): 1 black ($s^b s^b$). Both s^O and s^Y are dominant to s^b.

3. See Figure 10.4, page 181.

4. The trait is autosomal. Mother *dp dp*, father *Dp dp*. If the trait were sex-linked, all daughters would be wild-type and sons would be *dumpy*.

5. All females wild-type; all males spotted.

6. F_1 all wild-type, *PpSwsw*; F_2 9:3:3:1 in phenotypes. See Figure 10.7, page 183, for analogous genotypes.

7*a*. Ratio of phenotypes in F_2 is 3:1 (double dominant to double recessive).
7*b*. The F_1 are *Pby* pB^Y; they produce just two kinds of gametes (*Pby* and *pBy*). Combine them carefully and see the 1:2:1 phenotypic ratio fall out in the F_2.
7*c*. Pink-blistery.
7*d*. See Figures 9.14 and 9.16 (pages 168–170). Crossing over took place in the F_1 generation.

8. The genotypes are:

PpSwsw
Ppswsw
ppSwsw
ppswsw

Ratio: 1:1:1:1

The phenotypes are:

wild eye, long wing
pink eye, long wing
wild eye, short wing
pink eye, short wing

Ratio: 1:1:1:1

9*a*. 1 black:2 blue:1 splashed white

9*b*. Always cross black with splashed white.

10*a*. $w^+ > w^e > w$

10*b*. Parents $w^e w$ and $w^+ Y$. Progeny $w{+}w^e$, $w{+}w$, $w^e Y$, and wY.

11. All will have normal vision because they inherit Dad's wild-type X chromosome, but half of them will be carriers.

12. Agouti parent *AaBb*. Albino offspring *aaBb* and *aabb*; black offspring *Aabb*; agouti offspring *AaBb*.

13. Because the gene is carried on mitochondrial DNA, it is passed through the mother only. Thus if the woman does not have the disease but her husband does, their child will not be affected. On the other hand, if the woman has the disease but her husband does not, their child *will* have the disease.