Topic 1.4 Assessment

Check Your Understanding Answers

Understanding Key Ideas

1. Flowcharts and diagrams should accurately represent the process as shown in Figure 1.38.
2. Producing insulin through transgenic plants is less expensive.
3. a) Sample answer: The Canadian government should consider the benefits of the transgenic carrots over regular carrots: Are the worms and insects a significant crop risk? Will it cause more economic success? Where did the genes come from? Are the genes naturally occurring in the area? Will pesticide eliminate desirable bugs as well? Might the pesticide genes cross over to other plants? Are there any possible health risks to those who eat the carrots?

   b) Sample answer: The biggest advantage is that crops will be larger and of a better quality. Other advantages may be that fewer pesticides are needed, and that pesticides are delivered at the site of concern and in the smallest possible amounts, reducing toxic runoff. Disadvantages might include a higher seed cost, resulting in higher market prices and fewer sales. The public may also be reluctant to buy transgenic food.

   c) Answers should show an understanding of the arguments mentioned under the heading "Concerns about GMOs."

4. First, a woman's eggs are retrieved and a man's sperm is retrieved. The two are combined in a laboratory, and some eggs are fertilized. Next, the fertilized egg or eggs are implanted in the woman's uterus.

5. Regardless of the type of organizer chosen, it should include the following points.

   • A healthy version of the gene is obtained and placed in some type of carrier—usually a virus that has had its own DNA removed.
   • The person with the genetic disease is exposed to the modified virus in a way that it will reach the cells in which the new gene is needed.

   • The new DNA is incorporated into the genes of the person's own cells.

   • The new DNA directs the production of good protein.

6.

Application	Benefits	Risks/Concerns
Cloning	Can produce medications, such as insulin	Practical and ethical obstacles are too great
GMOs	Can produce more robust crops; can produce hormones, drugs, etc., to treat diseases	GMOs might out-compete natural organisms; “unknowns” might be harmful
Gene Therapy	Treat or cure as yet untreatable genetic diseases	Current treatments can cause harm; techniques need much more improvement before they are practical

7. Students may choose examples such as transgenic animals like goats, which are designed to produce medical protein products like HGH in their milk, or pigs that can act as organ donors.

Connecting Ideas

8. Students may agree or disagree. If they agree, arguments might include that it will save lives (prevent deadly allergic reactions). If they disagree, arguments might include that there are more pressing issues than creating a peanut that doesn’t cause an allergic reaction, or that the causes of

allergies are more complex than a simple allergen–reaction relationship, and that other solutions are possible.

Making New Connections

9. This shows an example of gene therapy. A genetic mutation is causing the light-sensing cells in the retina to die. The retina is lifted so normal genes, probably carried by a modified virus, can be injected adjacent to the light-sensing cells. If the genes are incorporated into the light-sensing cells, a missing protein will be produced that prevents the death of the cells.