Breast Cancer: When Good DNA Goes Bad

Name _____

Student Activity

Class _____

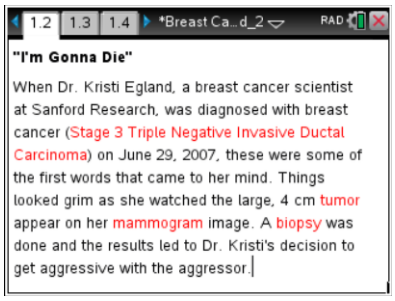
Open the TI-Nspire document *When_Good_DNA_Goes_Bad.tns.*

You've probably heard about **cancer** before and you may have a loved one with some form of the disease. There are many types of cancer but they all share some common characteristics. In this lesson, we'll learn about what makes a healthy cell turn into a cancer cell. We'll also learn about the work that **Sanford Research** is doing to learn about cancer in order to find better treatments and techniques for fighting the disease. Throughout this lesson, you'll learn about Dr. Kristi Egland, a mom, a scientist, and a breast cancer survivor.

Move to pages 1.2—1.4.

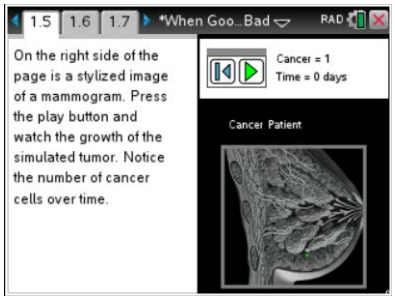
1. Pages 1.2 through 1.4 introduce you to Dr. Kristi Egland's story. She is both a breast cancer researcher at Sanford Research in Sioux Falls, South Dakota and a breast cancer survivor.

2. Read through these pages to become familiar with Dr. Egland's story and background on cancer.



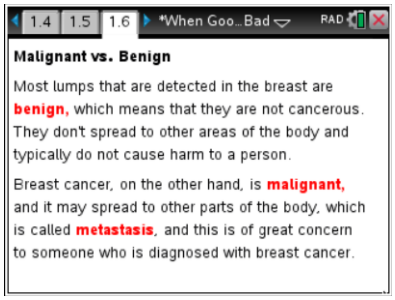
Move to page 1.5.

3. On page 1.5, press the play button to see a simulated tumor form within the image of the breast. Pay attention to how the number of cells changes over time.



Move to page 1.6

4. Page 1.6 explains the differences between malignant and benign tumors.

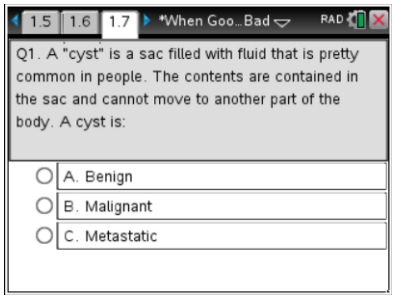


Move to page 1.7.

Answer the question here and/or in the .tns file.

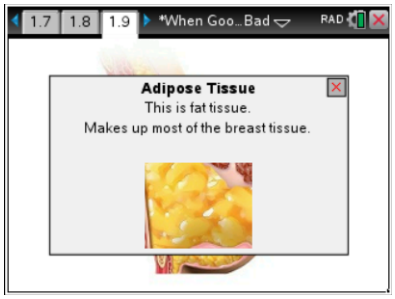
Q1. A “cyst” is a sac filled with fluid that is pretty common in people. The contents are contained in the sac and cannot move to another part of the body. A cyst is:

A. Benign
B. Malignant
C. Metastatic



Move to pages 1.8--1.9.

5. Pages 1.8 and 1.9 allow you to explore the different parts of a breast and the possible places where cancer can happen.

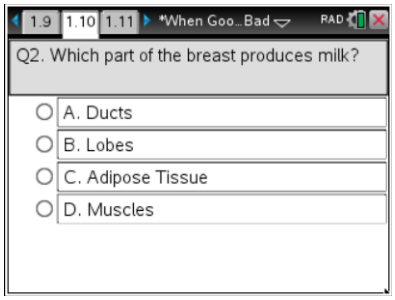


Move to pages 1.10—1.11.

Answer the questions here and/or in the .tns file.

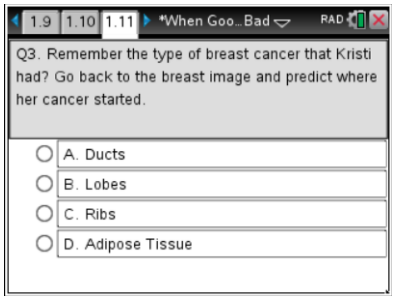
Q2. Which part of the breast produces milk?

A. Ducts
B. Lobes
C. Adipose Tissue
D. Muscles



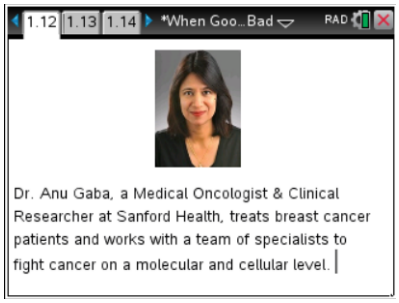
Q3. Remember the type of breast cancer that Kristi had? Go back to the breast image and predict where her cancer started.

A. Ducts
B. Lobes
C. Ribs
D. Adipose Tissue



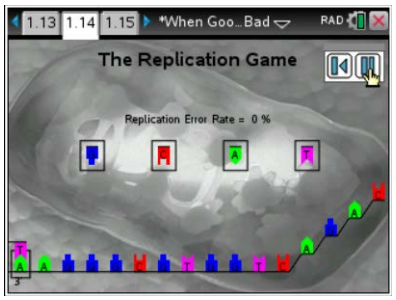
Move to pages 1.12—1.13.

6. Pages 1.12 and 1.13 introduce Dr. Anu Gaba, a medical oncologist and clinical researcher at Sanford Health. Dr. Gaba and Dr. Egland work with teams to understand cancer and how to treat it.



Move to pages 1.14—1.15.

7. Go to page 1.14 to play the Replication Game. Try it at different speeds to see how many mistakes you make while replicating a strand of DNA. Understand that the purpose of this game is to show that mistakes can happen when DNA replicates and sometimes these mistakes lead to healthy cells becoming cancer cells.

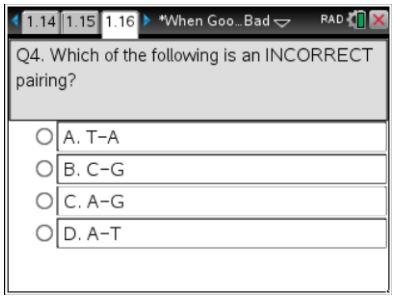


Move to pages 1.16—1.18.

Answer questions here and/or in the .tns file.

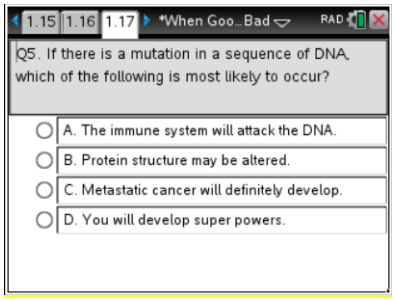
Q4. Which of the following is an INCORRECT pairing?

A. T--A
B. C--G
C. A--G
D. A--T

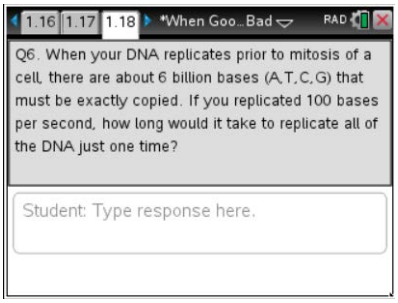


Q5. If there is a mutation in a sequence of DNA, which of the following is most likely to occur?

A. The immune system will attack the DNA.
B. Protein structure may be altered.
C. Metastatic cancer will definitely develop.
D. You will develop super powers.

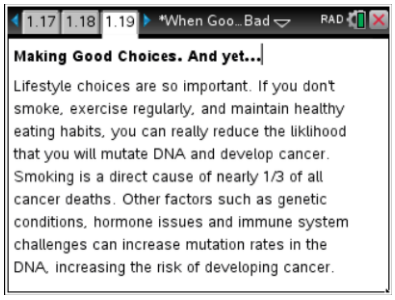


Q6. When your DNA replicates prior to mitosis of a cell, there are about 6 billion bases (A,T,C,G) that must be exactly copied. If you replicated 100 bases per second, how long would it take to replicate all of the DNA just one time?



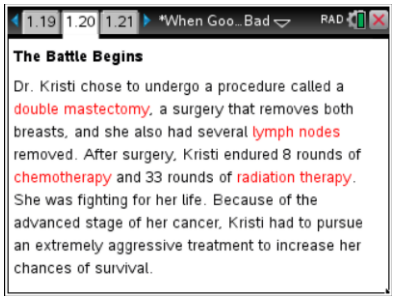
Move to page 1.19.

8. Page 1.19 discusses how certain lifestyle choices can increase the chance of getting cancer. Although you can reduce your chances of getting cancer by making good choices, cancer can happen to anyone at anytime.

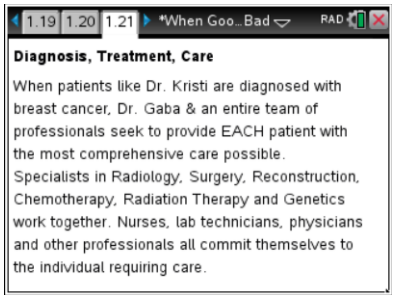


Move to pages 1.20—1.21.

9. These pages talk about Dr. Egland's double mastectomy and subsequent chemotherapy and radiation therapy.



10. Dr. Gaba and a whole team of researchers are involved in identifying the specific elements to an individual patient's cancer. Cancer is specific to the person and requires a team of specialists to understand and accurately treat it.

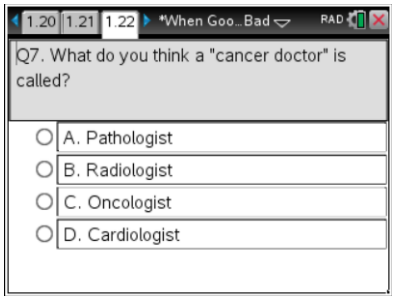


Move to page 1.22.

Answer question here or in the .tns file.

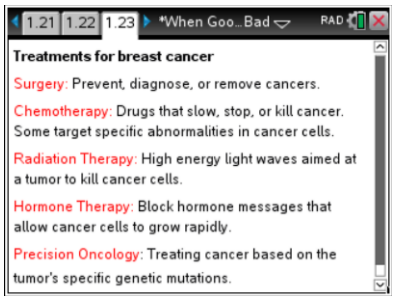
Q7. What do you think a “cancer doctor” is called?

A. Pathologist
B. Radiologist
C. Oncologist
D. Cardiologist



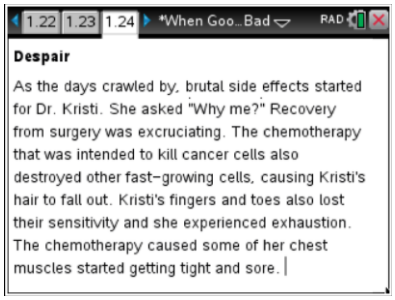
Move to page 1.23.

11. Page 1.23 documents various treatment options for breast cancer. Read through these treatments and think about the possible benefits and drawbacks of each.



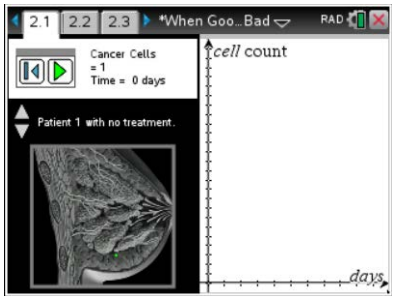
Move to page 1.24.

12. Read through page 1.24 to get a sense of the side-effects of some of the therapy Dr. Egland had to go through. Treating cancer can be tough on the body.

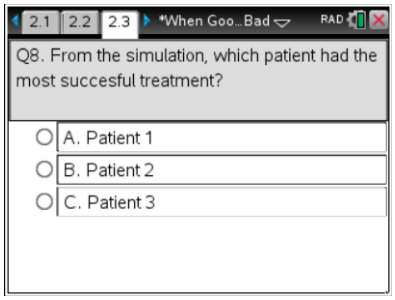


Move to pages 2.1–2.2.

13. Explore the simulation on page 2.1. Click on the play button to see how cancer cells multiply over time. Click the up/down arrows to select different patients and see what happens with each of them. Think about which patients had treatment and which did not.



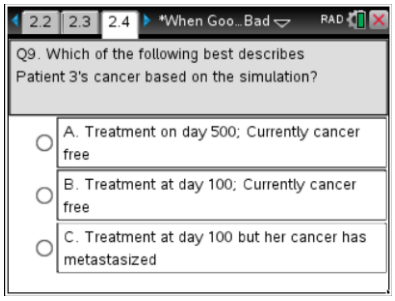
Move to pages 2.3–2.4.



Answer questions here or in the .tns file.

Q8. From the simulation, which patient had the most successful treatment?

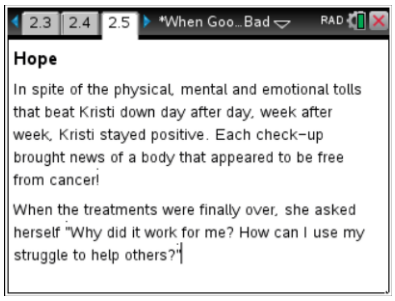
A. Patient 1
B. Patient 2
C. Patient 3



Q9. Which of the following best describes Patient 3's cancer based on the simulation?

A. Had treatment on day 500; currently disease free.
B. Had treatment at day 100; currently disease free.
C. Had treatment at day 100, but her cancer has metastasized.

Move to page 2.5–2.7.



14. Pages 2.5 through 2.6 conclude the lesson with news that Dr. Kristi Egland is cancer-free. Pages 2.5 and 2.6 talk about the future of breast cancer research and treatment through innovative studies, such as the ELSA Clinical Study.