

# ***SPINOFFS***

Spinoffs are relatively short learning modules inspired by the LTAs. They can be easily implemented to support student learning in courses ranging from prealgebra through calculus. The Spinoffs typically give students an opportunity to use mathematics in a real world context.

LTA - SPINOFF 12A

Finding the Rate of Return for  
Energy Saving Investment

LTA - SPINOFF 12B

Fitting a Sine or Cosine Curve to  
NASA Energy Use Data

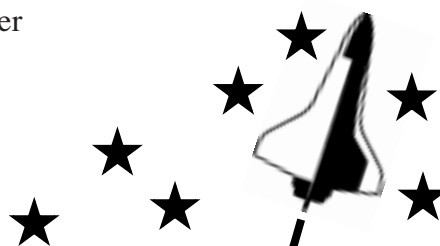
LTA - SPINOFF 12C

Rocket Spies: Codes and Rockets  
in the 1950's and 1960's

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## SPINOFF 12C

### Rocket Spies: Codes and Rockets in the 1950's and 1960's

Have you ever seen old-fashioned price tags in retail stores that showed a set of letters followed by the sale price? For example, "UEBB \$79.99" and "LEEE \$35.99." In this store code, L, B, U and E represent 2, 5, 6, and 9 respectively. That is, UEBB represents \$69.55 and LEEE represents \$29.99. The letters and the numbers give two different pieces of information about the item for sale. The numbers give the sale price. The letters give the original cost of the item to the storeowner. The original cost of the item marked "UEBB \$79.99" is \$69.55, but the item is being sold for \$79.99 resulting in a \$10.44 profit.

#### Exercise 1

The item marked "PTTT \$45.99" is being sold for \$45.99. What is the original cost of this item to the storeowner? What is the profit for this item? To answer this question, read the next paragraph to find more information about the code.

In old-fashioned store codes, such as this, a ten-letter word is used to encode the ten digits 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0. The ten-letter word used to encode the examples above is the word "SLOPBUCKET". The four-letter code for an item that has an original cost of \$14.50 would be "SPBT", and the sale price would be identified in numerals. By reading the tag, a storeowner knows the cost and the potential profit for each item. This information enables the storeowner to make decisions about reducing a price if approached by a customer without the customer ever knowing the original cost of the item.

#### Exercise 2

What should the sale price of the item marked "SPBT" be if the storeowner is willing to settle for a \$3.15 profit?

#### Exercise 3

Use the word SLOPBUCKET to label three items of your choice. These are items invented by you in order to practice the ideas. For each of the three items, identify the original cost, the sale price, and the profit made when the item is sold. Discuss your examples with your classmates and check your logic. Next, invent your own ten-letter word and encode price information for your three invented items. Be careful that your ten-letter word is not offensive and that it has no repeating letters. Why is it important to have no repeating letters in the ten-letter word used to encode prices?

In the 1950's and 1960's, American rocket scientists wanted to keep secret the number of rockets they had on hand. At the same time, they needed to paint a number on each rocket that could be read at any time. They came up with a code that might have stumped the communists in the USSR at the time, but could have been easily broken by any retail storeowner familiar with the merchandise cost code system described in the preceding paragraphs.

You can see the codes in their historical context by visiting the Air Force Space and Missile Museum at the Cape Canaveral Air Station in Florida. Rocket UE is on display. Rocket UE is Rocket 29 based on the ten-letter word used to encode rockets. The first rocket was named Rocket XH. Rocket 45 was named Rocket TS. Rocket 78 was IL.

#### **Exercise 4**

Pause in your reading at this point to see how much you can decode from the information provided so far. When you are ready, continue to read for more hints about a possible ten-letter word used to encode the rockets.

The people designing the codes were rocket scientists. Early rocket science in the United States received a boost when Werner Von Braun came from Germany after World War II. Von Braun and his colleagues were located at Huntsville, Alabama at what is now the site of NASA's Marshall Space Flight Center and Space Camp for "kids of all ages" (children grades 4 to 12, parents and children, and adults). Space Camps are also located at the Kennedy Space Center (adjacent to the Cape Canaveral Air Station) in Florida and at NASA's Ames Research Center in Moffett Field, California.

When you have an opportunity to visit the Kennedy Space Center, be sure to include a tour of the original rocket launching facilities and the Air Force Museum at the Cape Canaveral Air Station. Tickets for commercial bus tours of both locations are available at the Kennedy Space Center Visitor Complex. For information, go to [www.kscvisitor.com](http://www.kscvisitor.com) on the web.

Visitors are usually surprised by the "I Dream of Jeannie" exhibit just inside the Air Force Museum entrance. This 1960's television program featured Barbara Eden and Larry Hagman (later of Dallas fame). Hagman's character was an astronaut stationed at Cape Canaveral.

#### **Exercise 5**

Another museum display mentions the ten-letter code word used to number the rockets. The code word could not repeat any letters, so the scientist deleted the second L in the original word and added an X at the end of the word for the tenth letter. Find the resulting ten-letter word used to encode the rockets.

By the way, during World War II, the Germans had labeled their tanks with serial numbers. US personnel were able to crack the code and thereby accurately determine how many tanks the Germans had in their armed forces rather than relying on possibly misleading reports from the German leaders. This information contributed to better wartime planning and strategizing by US officials. The lessons learned had not been forgotten when the method of encoding rockets was decided on. Using typical serial numbers as the rockets were produced was not an acceptable option. The ten-letter word code was selected. If you have not figured out the word yet, reread the whole Spinoff for clues you might have missed during your first reading. Look for ten-letter words as you read.