

Problems for the Web

P4W11: Math Letters

Curriculum Area: Number Sense, Computation, Use of Calculators, Problem Solving, Language of Mathematics

Introduction:

This P4W involves two types of problems. In one, students assign given numerical values to letters of the alphabet to determine which mathematical terms are "worth the most". In the other, students determine mathematical terms that meet specific criteria, including their "value".

Even though the computation in most of these problems is within the range of most students, calculators should be available to make sure the focus is on problem solving.

In addition, students may find that calculators are not as useful as they had anticipated. It is worth discussing with students the various strategies they used in solving the problems.

For the Teacher:

P4W11 a): Number Words

For this activity you may want to review "vowel" and "consonant".

The problem involves simple addition but students should be allowed to use calculators to avoid getting bogged down in the computation.

Students need to know how to spell the various number names. For this reason, working in pairs or small groups is helpful.

If students do not keep their work reasonably neat, they may make errors by neglecting to count some letters or by neglecting to add all the numbers.

To determine which of 'ELEVEN' to 'NINETEEN' is worth the most or the least, some students may realize that most of these words contain the letters E, E, and N, so that their values can be ignored. Others may estimate an answer before calculating by separating the letters of each word into letters from the first part of the alphabet and letters occurring later in the alphabet.

P4W11 b): Math Words

This is a variation on Activity 1. Giving students a range of values makes the problems easier than giving a single value, but a fair bit of addition will still take place.

Discuss with students their strategies. For example, to find a word worth less than 10, one might think of very short words that use letters from the beginning of the alphabet.

Sample answers are:

1a. TRIANGLE (86)

1b. ANGLE (39)

2a or b. ADD (9)

3a. AREA (25)

3b. SIX (52)

4a or b. THREE (56)

P4W11c): Missing Letters

This activity involves more problem-solving. One way to approach it is to subtract the values of the given letters from the total as a first step. For example, for #1, $N = 14$; $34 - 14 = 20$; so we need two letters whose sum is 20 and that can be used to make a math word with 'N' in the middle. One pair totalling 20 is A + S, but these give the non-words ANS or SNA; another pair is K + I, giving KNI or INK(not a 'math' word); another is O + E, giving ONE (number word, and therefore a math word).

Answers are ONE, ZERO, TEN, TWO, ANGLE, TRIANGLE, RECTANGLE, PRISM, PYRAMID, MATHEMATICS.

Students may recognize that they can use the answer to #5 (ANGLE) to help them solve #6 and #7 (TRIANGLE, RECTANGLE).

P4W11 d): A Challenge

This variation uses multiplication and should definitely be done with a calculator. A word (in English) worth exactly 1 000 000 is not possible, but students should try to get as close as possible.

Discuss with students the various strategies they used. For example, some might make a list of numbers that can be multiplied together to get 1 000 000 and then look for letter combinations using those or near-by numbers -- e. g.

$$1\ 000\ 000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$$

$$\text{or } 10 \times 20 \times 25 \times 8 \times 5 \times 5 \times 5$$

For the Students:

P4W11: MATH LETTERS

You will probably want to use a calculator for these problems. Work with a partner.

P4W11 a): Number Words

For this problem, a vowel is worth 5 and a consonant is worth 2.

$$\text{For example, A R I T H M E T I C} = 5 + 2 + 5 + 2 + 2 + 2 + 5 + 2 + 5 + 2 = 32$$

Which of the number words from ELEVEN to NINETEEN is worth the most using these values? Which is worth the least?

Which of the 'tens' words (TWENTY, THIRTY, . . . , NINETY) is worth the most? Which is worth the least?

P4W11 b): Math Words

For this problem each letter of the alphabet has been given a number value. See the chart below.

$$\text{For example, G E O M E T R Y} = 7 + 5 + 15 + 13 + 5 + 20 + 18 + 25 = 108$$

Try to use a different word for each problem.

1. Find a math word that is worth (a) less than 100;

(b) less than 50.

2. Find a math word that is worth (a) less than 20;

(b) less than 10.

3. Find a math word that is worth (a) between 20 and 40;

(b) between 40 and 60.

4. Find a math word that (a) contains the letter **T** and is worth between 50 and 60;

(b) contains the letter **R** and is worth between 50 and 60.

Chart:

A = 1	B = 2	C = 3	D = 4	E = 5
F = 6	G = 7	H = 8	I = 9	J = 10
K = 11	L = 12	M = 13	N = 14	O = 15
P = 16	Q = 17	R = 18	S = 19	T = 20
U = 21	V = 22	W = 23	X = 24	Y = 25
Z = 26				

P4W11 c): Missing Letters

Here are some math words with missing letters. To help you determine the missing letters, each letter has been given a value (see chart) and the total value of all letters in a word is given.

For example, $_ + A + _ + _ = 42$.

This could be $M + A + T + H = 13 + 1 + 20 + 8 = 42$.

(You may be able to find a different answer.)

Use the values of the letters given to help you determine the missing letters. Use a calculator to help you.

1. $_ + N + _ = 34$

2. $_ + E + R + _ = 64$

3. $T + _ + _ = 39$

4. $T + _ + _ = 58$

5. $A + \underline{\quad} + G + \underline{\quad} + E = 39$

6. $T + \underline{\quad} + \underline{\quad} + A + \underline{\quad} + G + \underline{\quad} + E = 86$

7. $R + \underline{\quad} + \underline{\quad} + \underline{\quad} + A + \underline{\quad} + G + \underline{\quad} + E = 85$

8. $P + \underline{\quad} + I + \underline{\quad} + M = 75$

9. $P + \underline{\quad} + \underline{\quad} + \underline{\quad} + M + I + \underline{\quad} = 86$

10. $M + A + T + \underline{\quad} + \underline{\quad} + M + A + T + \underline{\quad} + \underline{\quad} + \underline{\quad} = 112$

11. Make one up. Give it to a friend to solve.

P4W11 d): A Challenge

Using the values of the letters given for P4W11(b), the word BIG is worth 14 if we multiply the values:

$$B \times I \times G = 2 \times 1 \times 7 = 14.$$

The word SMALL is worth 35 568:

$$S \times M \times A \times L \times L = 19 \times 13 \times 1 \times 12 \times 12 = 35\,568.$$

Use a calculator to find a word worth as close to 1 000 000 as you can.

It is not necessary to use a math word for this problem.