The best test of whether or not you really understand a concept is trying to teach (explain) it to someone else.

    Teaching also forces you to communicate your thoughts clearly and precisely. As our society becomes ever more interlocked and interdependent, cooperation becomes more and more important. This cooperation requires communication; however, being heard is not enough. You must also be understood. ***Your ideas will never be more effective than your ability to make others comprehend them****.* Teaching helps you develop the extremely important skill of describing your ideas well enough for others to use them.

                      (The Art of Problem Solving)

Communication Rubric

Standard 2: Communicates mathematical thinking clearly and concisely.

4	3	2	1
Consistently uses appropriate forms of representation; Work is consistently and clearly organized; Accurately uses math vocabulary; Uses relevant and concise reasoning to support all ideas.	Uses appropriate forms of representation; Most work is clearly organized; Accurately uses some math vocabulary; Uses relevant reasoning to support most ideas.	Inconsistently uses appropriate forms of representation; Clear organization is lacking; Accurately uses limited math vocabulary; Support for a number of ideas is incomplete or contains errors in reasoning.	Rarely uses appropriate forms of representation; Work is unorganized; Math vocabulary is used inaccurately or is missing; Most ideas are unsupported or supported using irrelevant reasoning.

SO C⁴ Checklist

SO	Organized Supported *Is there a clear path of steps and reasons?*	Check that: • The flow is logical. • You give the reader clear signposts to show where you are going. • You have backed up all claims.
C⁴	Correct Complete *Is the math right?*	Check for any mistakes in: • your reasoning • your calculations • your representations • your mathematical language Check that you have included all necessary parts.
	Clear Concise *Have you included enough but not too much?*	Ask yourself: • Will the reader understand? • Have I included appropriate mathematical language and representations (diagrams, tables, equations, graphs)? • Do I keep my focus and stick to the info that is really helpful?

Solving Equations

Step one:

$$200 = 5x - (100 + 2x)$$

$$200 = 5x + -1(100 + 2x)$$

Use the definition of subtraction (subtraction is the same as adding the opposite) to change the negative sign to a negative one.

Step two:

$$200 = 5x + (-1)(100 + 2x)$$

Use the distributive property and multiply negative one by each term in the parenthesis

Step three:

$$200 = 5x - 100 - 2x$$

$$200 = 3x - 100$$

then combine like terms to simplify the equation

Step four:

$$200 = 3x - 100$$
$$+100 \qquad +100$$

You would then add the inverse operation to cancel out the number next to the variable.

Step five:

$$\frac{300}{3} = \frac{3x}{3}$$

then divide by the co-efficient to get the variable by itself

> Answer: $x = 100$

Writing Equivalent Expressions:
Comparing Two Assignments

Assignment #1

Directions: Use the difference of squares formula: $a^2 - b^2 = (a - b)(a + b)$ to write an equivalent expression for each binomial.

Factor each completely.

1) $9x^2 - 1$

2) $4n^2 - 49$

3) $36k^2 - 1$
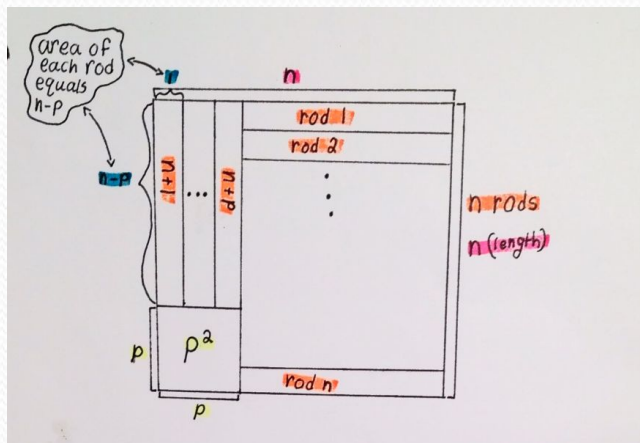
4) $p^2 - 36$

5) $2x^2 - 18$
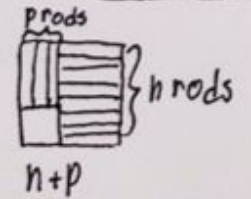
6) $196n^2 - 144$

7) $180m^2 - 5$

8) $294r^2 - 150$

Assignment #2

Directions: Using models and words, explain how and why the difference of squares formula works.

area of each rod equals n-p

rod 1
rod 2
.
.
.
rod n

n rods
n (length)

p^2

n+p equals the number of rods because the length of the whole square is n, and the width of each rod is one, so there would be n rods going down horizontally. Also, the width of the area where the rods are vertical is p, and again, the width of each rod is one, so there are p rods that are in the square vertically.

p rods
n rods
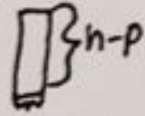n+p

Equation: $(n-p)(n+p) = n^2 - p^2$

n^2: total area
n+p: number of rods
n-p: area of rods
p^2: left over area

The equation represents the same thing on both sides because $(n-p)(n+p)$ represents the area of each rod multiplied by the number of total rods that would fit in the square, which equals the area covered by rods. $n^2 - p^2$ represents the total area of the square minus the area not covered by rods, which equals the area covered by rods.

p^2 is the area left over once the square is filled with rods, because the length of each rod is n-p. So, the vertical rods will leave a gap of p from the bottom of the rods to the bottom of the square, and the horizontal rods will also leave a gap of p from the end of the rods to the side of the square.

n^2 equals the total area because the length and width of the square is n.

n-p is the area of each rod because n-p is their length, and one is their width.

Solving Word Problems

Road Trip to Susquehanna

1) Chuck plans to drive to Susquehanna to visit his friend Sherman. If Susquehanna is 652 mi from Chuck's home in Chattanooga, and he travels at an average rate of 60 mi/h, how many hours will he drive to make the trip? Express your answer to the nearest tenth.

2) Chuck, instead, decided to go a little out of his way and stop and visit his friend Phil in Punxsutawney on his way to Susquehanna to visit Sherman. Chuck traveled at an average rate of 60 mi/h from Chattanooga to Punxsutawney to visit Phil. He then traveled at an average rate of 45 mi/h from Punxsutawney to Susquehanna to visit Sherman. If the distance Chuck traveled from Punxsutawney to Susquehanna was 1/3 the distance he traveled from Chattanooga to Punxsutawney, what was Chuck's average rate of travel for the entire trip? Express your answer to the nearest tenth.

3) In actuality, Chuck spent 4 hours 48 minutes driving from Punxsutawney to Susquehanna. Using the information from the previous problem, how many miles did Chuck travel from Chattanooga to Punxsutawney?

Student Work – Video

1) Create diagram
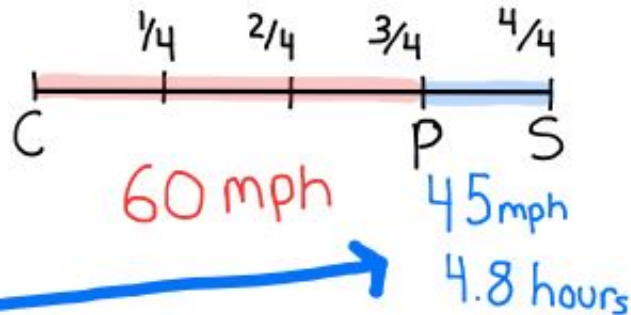
The diagram shows that the trip is broken into 4 equal parts.

It also shows the average speed Chuck traveled in each part.

$\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$

C

P S

60 mph 45 mph
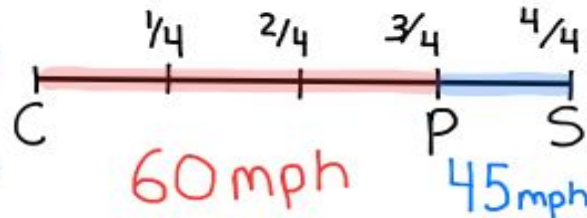
2) Add given information

Part 3 says that it took Chuck 4 hours and 48 minutes to travel from Punxsutawney (P) to Susquehanna (S)".

$\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$

C

P S

60 mph 45 mph

4.8 hours

4 hours 48 min = 4.8 hours

$$\frac{48}{60} = \frac{8}{10} = 0.8$$

3) Find the distance from P⟶S

Use the equation distance=rate*time
Substitute 4.8 for time and 45 for rate. Simplify the equation.

$$d = r \times t$$
$$d = 45 \times 4.8$$
$$d = 216$$

4) Find the distance from C → P

Because we know that the distance from Punxsutawney to Susquehanna is 1/3 of the distance from Chattanooga to Punxsutawney, the answer can be solved by multiplying the distance between Punxsutawney to Susquehanna by 3.

C   P   S

¼   ²/₄   ¾   ⁴/₄

C   P   S

216   216   216   216

$$216 + 216 + 216 = 648$$