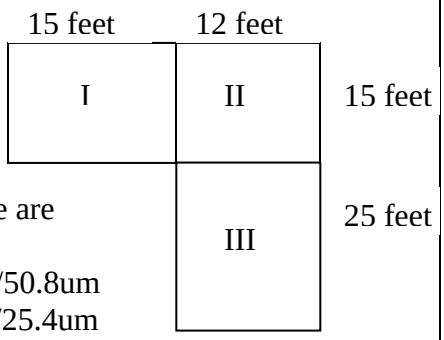
M^2=Math Mediator Lesson 4: Expressions & Exponents

***NOTE: This lesson requires some prep and materials: See the second and next to last items.**

Total Recall (Warm-up) (5 minutes approx.)	Total Recall: 3 exercises from yesterday's lesson 1. How long would it take to download a 1.2 GB movie at 1 MB per second? A: 1200 seconds or 20 minutes (assuming B is same for both, bits or bytes) 2. What property does this equation demonstrate: 24(x + 3) = 24x + 72? A: Distributive 3. What property does this equation demonstrate: 3 + 405 + 27 = 3 + 27 + 405? A: Commutative **Check homework to see if they did it, stamp it or check them off somehow.
Direct Instruction (20 minutes approx.) **Review**	Expressions and Exponents: The driveway shown is divided into 3 sections and needs to be covered with a plastic tarp while the cement hardens. You are sent to the store to buy the tarp, or plastic sheet to cover the given area. You find that there are three options: 1. Tarp A: Cut to size; \$0.06/sq.ft.; 2 mil/50.8um 2. Tarp B: Cut to size; \$0.05/sq.ft.; 1 mil/25.4um 3. Tarp C: Pre-cut, in bag; 1200 sq.ft.; 20 ft wide; \$20.00; 0.8mil/20.3um Which choice will you make? (Give students a minute to think about this). What is the tarp used for? To keep the rain and falling leaves off the wet cement. What are your choices? Price and thickness and #3 is size. Price: Calculate the costs for the three options and make a table shown below. (You should add two feet on the sides for overlap and anchoring. Therefore, the dimensions would be 19^2 + (19X16) + (29X16) = 1129 sq. ft. watch order of operations! If the parenthesis were removed, would the result change? No. Then take this and multiply by the unit costs given. The answers are in the table below.). Driveway alone is 705 sq. ft. Thickness: Which thickness(es) are suitable for outdoor use? How would you find out if you do not know (Ask an employee. How do you do this? What does mil/um mean? The unit 'mil' is one thousandths of inch, the unit 'um' is micro-meter, or one thousandths of meter. The conversion is 1 mil equals 25.4 um). Fit: Obviously you can get tarps A and B cut to exact size, allowing two feet extra on each side to secure the tarp. Tarp C has to be broken down into cut lengths, and you will find that you have 60 feet of length, but the total length needed is over 60: (29 + 16 + 19 = 64).



TARP	COST	THICKNESS	OUTDOOR (Y/N)	FIT
A	67.74	2 mil	Yes	Yes
B	56.45	1 mil	No	Yes
C	20.00	0.8 mil	No	No

Practice (5 minutes approx.)	U-DO: Simplify the following: a) 5^3 (A: 125); b) -2^4 (A: -16 exponent first, then sign); c) $(-2)^4$ (A: 16); d) 3 X (x + 4) for x = 3 (A: 3X7=21); e) $(x - 4)^3$ for x = 7 (A: 27)
Direct Instruction and Practice (15 minutes approx.)	Introducing variables into the driveway problem from above: Mr. Louis does not know for sure what the dimensions are that he will need for the driveway and would like to compare costs if the original 15 feet dimensions would change to 16 feet or 14 feet. In order to compare, we will make an equation: (students work on equation for driveway only). sq. ft. = $x^2 + 12x + (25X12)$ ** identify and explain variables (x) and coefficients (12). substitute and solve: (have students solve each). for x = 14: driveway alone is 664 sq.ft. for x = 15; driveway alone is 705 sq. ft. for x = 16; driveway alone is 748 sq.ft. ** Tarp costs are negligible compared to concrete costs; which is cubic yards, so no need to add extra widths and calculate tarp size yet. For cubic yards, you would need to add depth and convert everything to yards. 27 cubic feet equals one cubic yard (3ft x 3ft x 3ft = 1yd x 1yd x 1yd). Q. Can you combine the x^2 term and the 12x term? No. because they are not like terms. Only like terms can be combined: $12x + 3x = 15x$; $2x^2 - x^2 = x^2$.
Practice and assessment: (5 minutes approx.)	U-DO: Identify terms, coefficients, like terms and constants or constant terms and variables or variable terms and simplify: 1. $7x + 5x$ (A: 2 terms, both variable terms with coefficients; 12x) 2. $3m^2 + 12m + 3m - 2m^2$ (A: 4 terms, all variable with coefficients; $m^2 + 15m$). 3. $2(p - 2) - 3(p + 2)$ (A: 4 terms; mixed constant/var; -p – 10). 4. $3 + 4y - 2y^2 - 2y + 2$ (A: 5 terms; mixed; $5 + 2y - 2y^2$). *** Have students do these on board if some are stuggling, or have students help other students. Prepare a couple extra if needed.
Wrap-up (5 minutes approx.)	Wrap up closing comments and housekeeping. a. today we reviewed exponents, expressions and terms from algebra 1. b. we also reviewed unit analysis and applied it to mils and um. c. Tomorrow I will present Linear Equations.