activity sheet

Name ______________________________

MATH FOR REAL: FIREWOOD BY THE CORD EXTENSION

While researching information on firewood measures, the author found a document titled “Firewood: 6 Questions to Ask before You Purchase” (Flett 2009). Is there a mathematical faux pas within that document? Question number 2 (Firewood Pricing: What Is a Fair Price?) below provides a mathematical process for determining the price per cord when wood is purchased in smaller amounts. The process is clearly described. However, the equation and the subsequent example should raise a few eyebrows.

2. Firewood Pricing: What is a Fair Price? Due to the large variation in quantities sold to firewood users, knowing how to calculate prices can be quite useful when purchasing different types of cords. Usually, vendors will classify a face cord as 4 ft. high by 8 ft. long and some varying depth. In this case, simply divide the depth of a normal cord (48 in.) by the depth of the face cord, rick, or stove cord (X) and multiply the size-factoring value (Y) by the price offered (P); this is the way to calculate price per cord from a smaller amount. The equation follows:

   $$48 \text{ in.} \div X \text{ in.} = Y \times P = \text{price per cord (in dollars)}$$

   For example: you are offered a “rick” of firewood stacked 4 ft. high, 8 ft. long, and 18 in. deep at the price of \$80 per rick. If a full cord sells for \$160, how much are you paying in comparison?

   $$48 \text{ in.} \div 18 \text{ in.} = 2.67 \times \$80 = \$213.60 \text{ per cord}$$

   In this case, you would be paying more than the market value per cord by buying a smaller amount of wood. Keep in mind, market prices for a cord of wood can be hard to locate and usually differ among regions.

1. Explain what you see as mathematically incorrect in these equations.

2. If you were the author of this information, how might you show the processes for each of the two equations differently?

math for real

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"when will I ever use this?"

Firewood by the Cord

SOLUTIONS

1. The volume is

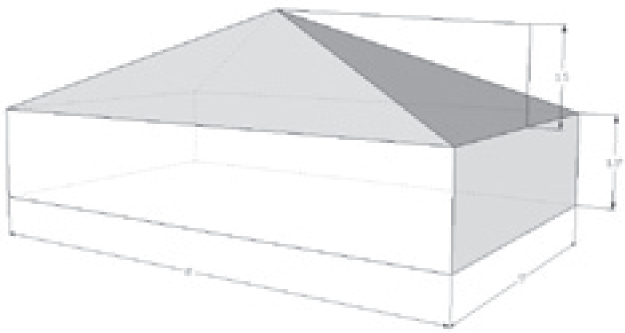
$$\frac{3}{4} \times 128 \text{ ft.}^3 = 96 \text{ ft.}^3.$$

2. The volume might be roughly approximated as a full pickup bed plus between 1/3 and 1/2 that amount more (above the pickup's bed). That implies that the volume would likely be between

$$(8 \text{ ft.} \times 5 \text{ ft.} \times 1.5 \text{ ft.}) + 1/3(8 \text{ ft.} \times 5 \text{ ft.} \times 1.5 \text{ ft.}) = 80 \text{ ft.}^3$$

and

$$(8 \text{ ft.} \times 5 \text{ ft.} \times 1.5 \text{ ft.}) + 1/2(8 \text{ ft.} \times 5 \text{ ft.} \times 1.5 \text{ ft.}) = 90 \text{ ft.}^3$$



3. The driver somewhat overestimated the amount of firewood that actually came in this pickup load.

4. Assuming that the pickup truckload is less than 90 cubic feet, the load is probably at most 1/2 cord from the calculation 90/175 ≈ 0.514.

5. The computation in question 2 does not account for the space created between the pieces of firewood. Hence, the volume of the actual wood in the pickup is less than the computed volume of the space it is occupying.

REFERENCE

Flett, Adam. 2009. "Firewood: 6 Questions to Answer before You Purchase." St. Paul: University of Minnesota Forest Resources Extension. http://www.myminnesotawoods.umn.edu/2008/12/firewood-6-questions-to-answer-before-you-purchase/.

EXTENSION SOLUTIONS

1. The three members (expressions) of the equation (essentially linked together with two equal signs) are not actually equal to one another. It is a common mistake to string along, or link, operations into incorrect equation "sentences." For instance,

$$48 \text{ in.} \div X \text{ in.} = Y,$$
$$\text{but } 48 \text{ in.} \div X \text{ in.} \neq Y \times P.$$

Likewise,

$$Y \times P = \text{price per cord},$$
$$\text{but } 48 \text{ in.} \div X \text{ in.} \neq \text{price per cord}$$

(which it should be, since all three members are stated to be equal). The same is true for the sample computation

$$48 \text{ in.} \div 18 \text{ in.} = 2.67 \times \$80 = \$213.60 \text{ per cord}.$$

We have a similar issue:

$$48 \text{ in.} \div 18 \text{ in.} \neq 2.67 \times \$80$$

Multiple steps in this process cannot simply be linked together with equal signs if all the members are not actually equal to one another.

2. We might just rely on the correct order of operations and express the formulas as follows:

$$48 \text{ in.} \div X \text{ in.} \times P = \text{price per cord (in dollars)}$$

$$\text{and } 48 \text{ in.} \div 18 \text{ in.} \times \$80 \approx \$213.33 \text{ per cord}$$

(notice the $0.27 difference in round-off error).

We could express them in two separate steps as well. For example:

- Step 1—48 in. ÷ 18 in. ≈ 2.67
- Step 2—2.67 × $80 = $213.60 per cord