TREE MATH PROBLEMS

Part 1 – PROBLEMS: WOOD FOR BURNING

Many people in Interior Alaska burn wood to keep their houses warm. Often they cut the wood themselves, but sometimes they buy it. Wood usually is sold by the cord, but sometimes it is sold by the sled load or truck load.

A CORD of wood is defined as 8' x 4' x 4'. You need to know how to use math to be sure you get or pay the right amount.

1) If a cord of wood is 8'x4'x4', what is its volume in cubic feet?

To find the Volume in cubic feet multiply 8x4x4 - V= l w h

ANSWER _____

2) Sometimes we can't stack wood in exactly those dimensions. If my woodshed is 12' wide, 8' deep and 6' high, how many cords can it hold?

Multiply 12x8x6 to get the capacity in cubic feet and then divide by the number of cubic feet in a cord.

ANSWER_____

3) If wood is selling for $275 a cord, how much will I have to pay to fill my woodshed?

Multiply the number of cords necessary to fill the woodshed by the cost per cord.

ANSWER _____

4) Sleds are different sizes and can hold various lengths of wood.

a) If I have to cut my wood 6ft. long to fit sideways in the sled, what would be the other dimensions of a cord of that wood if the sled is 8' long?

ANSWER _____

b) If I can haul 10 ft. logs on my sled, what would be the other dimensions of a cord of that wood if the sled is 4' long?

ANSWER _____

5) If I am buying wood by the sled load and the load is 10'x2'x3' what would be a fair price for that load of wood if a cord is $275.00?

(NOTE that it won't come out exactly!)

ANSWER: Circle the closest one $100 $125 $200

MATH relating to TREES

Part 2 – PROBLEMS: BUILDING WITH WOOD

Most of our houses in Interior Alaska are built of wood, sometimes logs from the area or lumber locally milled, sometimes imported lumber, or frequently a combination.
Here are some problems dealing with wood to be used in building.

1) Calculating the cost of lumber by the board foot:
(A board foot is the volume of a one-foot length of a board one foot wide and one inch thick.)

- How many board feet in each of the following

- How much would each cost if the cost of lumber is $1.20/bf.

a) a 2"x4"x8'? _____

b) a 2"x6"x8'? _____

c) a 2"x8"x8'? _____

d) a 2"x10"x8'? _____

2a) Joe needs to order some lumber for his new house and he is trying to figure out the cost of shipping to his village.

He has calculated the number of board feet he needs in lumber of different sizes and figured out it will weigh a total of 5780 lbs.

He has also found the freight rates to his village are as follows:
Under 5000 lbs. costs $1.35 per lb; over 5000 lb. costs $1.11 per lb.

Calculate how much the shipping will cost him if he gets all his lumber in one shipment.

_____

Calculate how much shipping will cost him if he needs to have lumber sent in two shipments – one of 2737 lbs. plus one of 3043 lbs.

_____ plus _____

Total shipping cost _____

2b) Now find out the freight rates for your own location.

What is the freight rate on loads under 5000 lbs.? _____

What is the freight rate on loads over 5000 lbs.? _____

What would be the cost of shipping the 5780 lbs. given the freight rates you found. Use the same process as was used in 2a.

Calculate how much the shipping will cost you if you get all your lumber in one shipment.

_____

Calculate how much shipping will cost you if you need to have lumber sent in two shipments – one of 2737 lbs plus one of 3043 lbs.

_____ plus _____

Total shipping cost _____

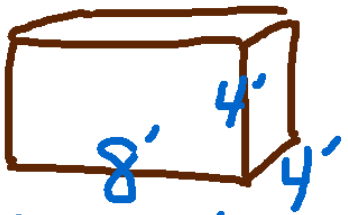
Part 3 - Miscellaneous

1) One tree is 2' in diameter and gains 1" growth in 5 years. Another smaller tree is 6" in diameter and gains 1" growth in 5 years. Which one gained more area in it's cross section during those 5 years. This problem begins to address the time of harvesting trees for lumber.

TREE MATH

SOLUTION – Part 1 #1

Problem #1



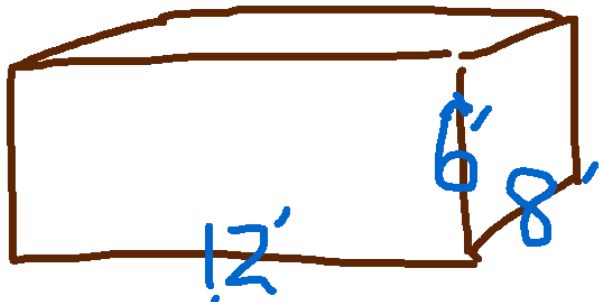
$V = L \times w \times h$

$V = 8' \times 4' \times 4'$

$V = 128$ cuft

TREE MATH

SOLUTION – Part 1 #2



$V = l \times w \times h$

$V = 12' \times 8' \times 6'$

$V = 576$ cu ft

TREE MATH

SOLUTION – Part 1 #3

#3) One cord = 128 cu ft

Woodshed = 576 cu ft

$$\frac{1 \text{ cord}}{128 \text{ cu ft}} \cdot \frac{576 \text{ cu ft}}{1} = 4.5 \text{ cords (in woodshed)}$$

$$\frac{4.5 \text{ cords}}{1} \cdot \frac{\$275}{\text{cord}} = \$1,237.50$$

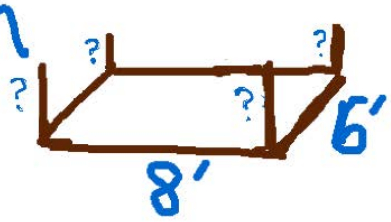
TREE MATH

SOLUTION– Part 1 #4a

#4a

$V = l \times w \times h$ $V_{cord} = 128$ cu ft

How high will the wood be stacked?



$128 \text{ cu ft} = 8 \times 6 \times h$

$128 \text{ cu ft} = 48h$

$\frac{128}{48} = \frac{48}{48} h$

$2.6' = h$ $1' = 12''$

or

$\pm 30'' = h$

TREE MATH

SOLUTION – Part 1 #4b

4b

$V = l \times w \times h$

$V = 10 \times 4 \times h$

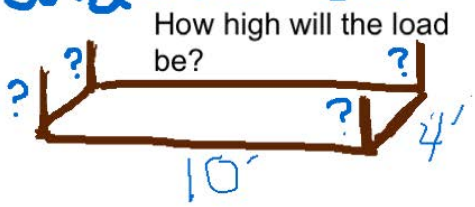
$128 \text{ cuFt} = 40h$

$\frac{128}{40} = \frac{40}{40} h$

$3.2' = h$

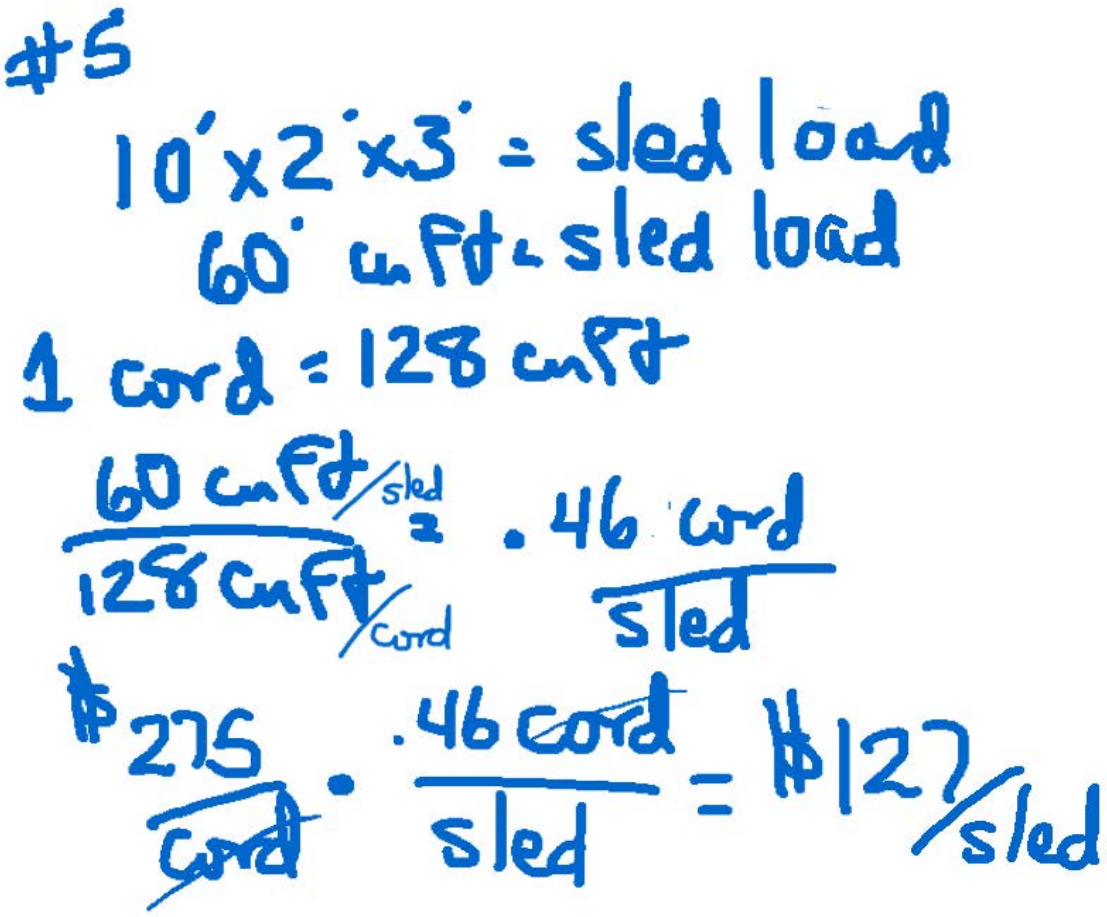
$\pm 39'' = h$

1 cord = 128 cuFt



TREE MATH

SOLUTION – Part 1 #5



TREE MATH

SOLUTION – Part 2 #1

A 2x4 is the same as a 1x8
A 1x8 has $\frac{8}{12}$ or $\frac{2}{3}$ board Feet (BF) For every linear foot
A 2"x4"x8' has $\frac{2}{3} \times 8$ BF or 5.3 BF each
IF lumber is 1.20/BF then the 2x4x8 cost. $5.3 \times 1.2 = \$6.36$

A 2x6 is the same as a 1x12
A 1x12 has 1 BF for every linear foot.
A 2x6x8 has 8 BF each
IF lumber is 1.20/BF then the 2x6x8 cost $8 \times \$1.2 = \$9.60$

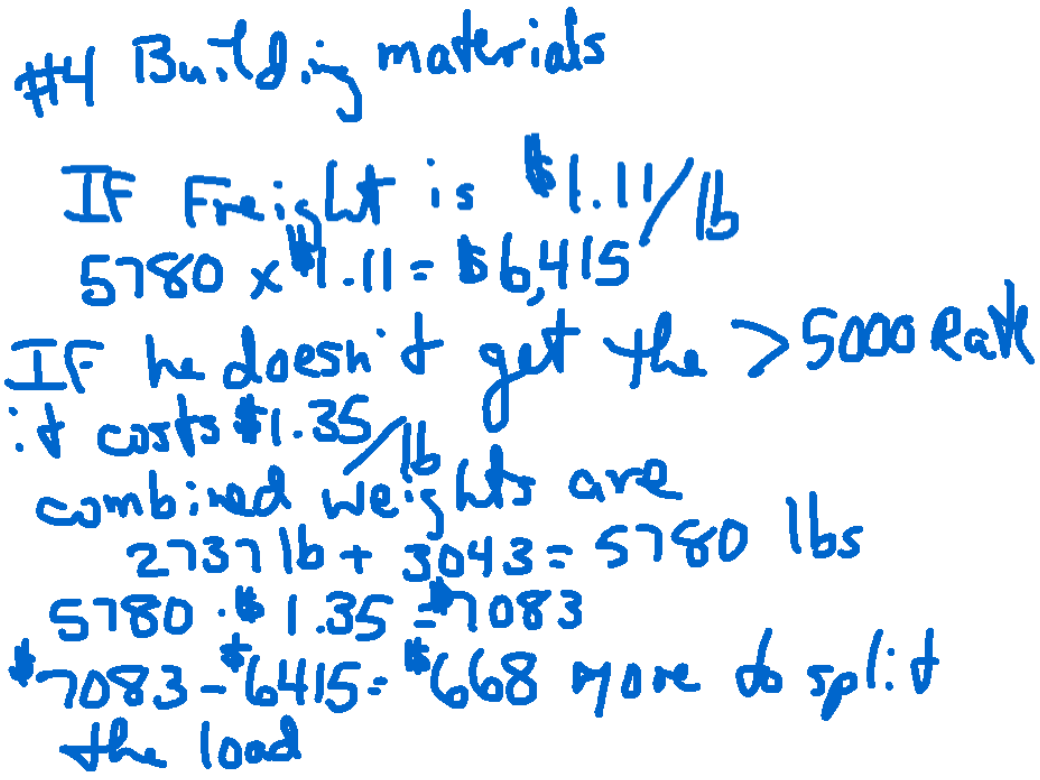
A 2x8 is the same as a 1x16
A 1x16 has $\frac{4}{3}$ BF For every linear foot.
A 2x8x8 has $\frac{4}{3} \cdot 8 = 10.6$ BF each
IF lumber is \$1.20/BF then the 2x8x8 cost $10.6 \times \$1.20 = \$12.72$

A 2x10 is the same as a 1x20
A 1x20 has $\frac{20}{12}$ or $\frac{5}{3}$ BF For every linear foot.
A 2"x10"x8' has $\frac{5}{3} \cdot 8 = 13.3$ BF each
The 2"x10"x8' cost $13.3 \times \$1.20 = \$15.96$

TREE MATH

SOLUTION - Part 2 #2

NOTE: This is mistakenly labeled as #4.



TREE MATH

SOLUTION– Part 3 #1

24" diameter = 12" Radius

$A = \pi r^2$

$A = 3.14 \times 144$

$A = 452$ sq"

25" diameter = 12.5" Radius

$A = \pi r^2$

$A = 3.14 \cdot 156$

$A = 491$ sq"

Increase: 491 - 452 = 39 sq"

6" diameter = 3" Radius

$A = \pi r^2$

$A = 3.14 \cdot 9 = 28.3$

7" diameter = 3.5" Radius

$A = 3.14 \cdot 12.25$

$A = 38.5$

Increase of 38.5 - 28.3 = 10.2

So, in 5 years, the larger tree produced almost 4x as much new wood as the younger tree.