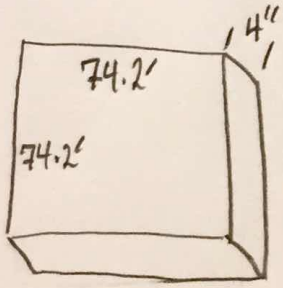
Dave Nuttall
Math 1030
Working in the yard assignment

January 28, 2018

Coverage area

- Neighbor is bringing in 4" of topsoil in order to prepare for new lawn
- lot dimensions are approximately 104' x 75' ≈ 7,800 sq ft.
- area not covered by grass (driveway, patio, house) ≈ 2,300 sq. ft.
  - house ≈ 1700 sq. ft.
  - driveway & patio ≈ 600 sq. ft.
- lot size (7,800 sq. ft) minus area not covered by new grass (2,300 sq. ft.)
  ≈ 5,500 sq. ft. covered by new grass

$\sqrt{5500} = 74.16$ (the length of the sides of the actual coverage area)



L x W x H = Volume of soil needed

$74.2' \times 74.2' \times 0.333 \approx 1{,}835\ ft^3$ of soil needed

$1{,}835\ ft^3 = 67.96\ yd^3$

- store sells topsoil in ¼ yd increments so $68\ yd^3$ is actual volume of topsoil needed

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Working in the yard (cont.)

Hauling the soil - options

- Dump truck
  - each truckload is approximately 18 yd^3
  - 68 yd^3 needed ÷ 18 yd^3 per load ≈ 3.777 loads
    - 4 loads needed as truck makes whole trip
    - delivery charge is $30 x 4 loads = $120.00
  - soil cost is $18 per yd^3
    - 68 yd^3 x $18 = $1,224.00 soil cost
    - $1224.00 + $120.00 = $1,344.00 for delivered soil

- Personal pick-up truck
  - truck bed is 80"L x 69"W x 20"H
    - convert to feet: 6.67'L x 5.75'W x 1.67'H = 62.04 ft^3
    - convert to yards: 62.04 ft^3 ≈ 2.3 yd^3
  - the pickup truck can haul 2.3 yd^3
  - 68 yd^3 needed ÷ 2.3 yd^3 capacity of truck = 29.565 loads
  - 30 pickup truck loads are needed

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- personal pickup truck (cont.)
  - soil store is 9 miles away so round trip is 18 miles
  - 30 loads x 18 miles each trip = 540 miles on truck
  - 540 miles ÷ 17 mpg = 31.76 gallons needed
  - 31.76 gallons x $3.79/gallon = $120.39 cost of gas
  - soil cost $18 yd^3 x 68 yd^3 = $1,224.00 soil cost
  - $1,224.00 + $120.39 = $1,344.39 for soil and gas

Cost Analysis

- the base cost for 68 yd^3 of soil is $1,224.00 regardless of truck choice
- the delivery fee for 4 loads with the dump truck is $120.00
- the cost of gas to haul 30 loads in the pickup is $120.39
  - both costs are virtually identical although the dump truck option shows a nominal savings

- additional points to consider before making the decision do exist: see next page

- Additional points to consider
  - 540 miles of "wear and tear" on personal truck with very heavy loads
  - 40 minute round trip per load (minimum)
    - 40 minutes x 30 loads = 20 hours (minimum)
  - estimated 30 minutes to unload each load
    - 30 minutes x 30 loads = 15 hours (minimum)
    - exhausting physical work
  - even at 4 loads per day, it would take 4.6 hours per day of hard work, for 7.5 days to accomplish what the dump truck would do easily in 2 days or less and the manual unloading is eliminated.

Conclusion

The clear choice to me is to pay the delivery fee and have the dump truck bring the soil to the project. This will save significant time, save the truck and possibly even help to avoid causing both guys early heart attacks. Have it delivered!

This is a graded discussion: 10 points possible due -

Working in the Yard!

It's greener to xeriscape, but...

A neighbor of yours has a lawn that isn't looking too good. It looks like the pictures below.

approx. 600 sq. ft.
= driveway size
≈ 30' x 20'
- house size ≈
30' x 30' plus
20' x 40'
900' + 800 =
approx. 1700 sq. ft.

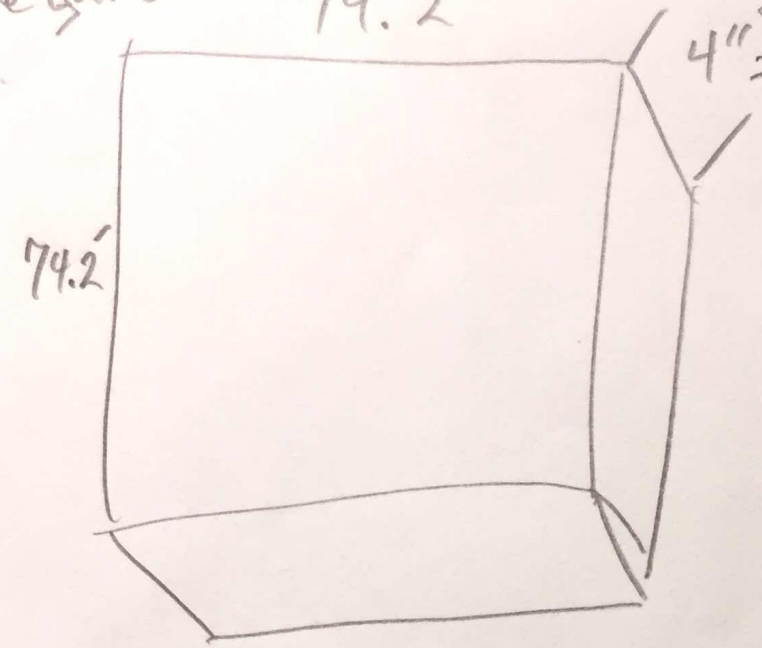
- lot size ≈
104' x 75'
approx. 7800 sq ft.

- 2300 sq. ft.
(house & driveway)
= @ 5500 sq. ft.
of grass

He has decided to remove all the old sod (grass), bring in a new 4 inch layer of topsoil, install new in-ground sprinklers, and reseed the lawn. He seems to think that he'll be able to save money by

Working in the yard

Notes



1835 ft³ = 67.96 yd³

L x W x H = 1835.029

74.2' x 74.2' x 0.3333' = 1835 ft³ of top soil needed

Truck bed is 80"L x 69"W x 20"H
5.75'
6.6666666667' 1.6666'

62.04 ft³ = 2.3 yd³

6.67' x 5.75' x 1.67' = 62.0436 ft³

1835 ft³ ÷ 62.04 ft³ = 29.577 loads

OR

67.96 yd³ ÷ 2.3 yd³ = 29.547 loads
68 yd³ ÷ 2.3 yd³ = 29.565 loads = 30 loads/trips

* 1 cy of top soil typically weighs 1 ton (2000 lbs)

Sold in ¼ yd³ increments

¼ yd³ = $4.50

1 yd³ = $18.00

68 yd³ x $18.00 = $1224.00

Working in the Yard Written Assignment

Submit Assignment

Due Jan 28 by 11:59pm **Points** 25 **Submitting** a file upload

Continuing on with the Working in the Yard problem...here is (most of) the information you asked for:

- Is he redoing the whole yard or just the front? whole yard
  - He's redoing the whole yard
- How much topsoil does he need? 67.96 yd^3 (sold in ¼ yd^3 increments so round up) 68 yd^3
  - I'm not sure, you'll have to figure that out. Remember he's putting a new 4 inch layer down over all the ~~area~~ currently covered by grass in the overhead picture above. @ 5500 sq ft. = $\sqrt{5500}$ = 74.1619
- How big is the yard?
  - I'm not sure, but you can probably estimate it using the overhead picture.
- What kind of pickup truck does he drive?
  - A 2003 Ford F-150 XL.
- How much can the pickup carry?
  - The truck bed is 80 inches long, 69 inches wide, and 20 inches tall. = 2.3 yd^3
- How much is the delivery charge?
  - $30 per truckload on top of the soil cost. Each truckload can deliver up to 18 cubic yards. dump truck 4 loads 68 ÷ 18 = 3.777 loads
- How much does the topsoil cost?
  - $18 per cubic yard (sold in 1/4 yard increments). 68 yd^3 = $1224.00
- How far is the soil store?
  - It is 9 miles away. It takes about 20 minutes to drive there. 540 miles for 30 loads
- What gas mileage does the pickup truck get?
  - It averages 17 miles to the gallon. 31.764 gallons x $3.79/gal = $120.385 for gas
- What is the current gas cost?
  - Assume it's $3.79/gallon.

30 x 4 = $120

40 min Round-Trip! + shoveling time!

Using this information, figure out whether your neighbor will save money by picking up the soil himself. Use the results of your calculations to guide your decision: would you recommend that your neighbor pick up the soil himself, or pay for delivery?

Detail all your assumptions and write your calculations with college a level presentation.

Clearly write out your final conclusions with your cost analysis.

days to complete 30 loads

Working the Yard Written Assignment