Ch. 3.1 Text Solutions

1.a) $\dfrac{3520\text{ yd}}{} \Big| \dfrac{1\text{ mi}}{1760\text{ yd}} = \boxed{2.0\text{ miles}}$

b) $10'\frac{3}{16}'' = 10$ feet and $\frac{3}{16}$ inches

$\dfrac{10\text{ ft}}{} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 120\text{ in} + \frac{3}{16}\text{ in} = \boxed{120\frac{3}{16}''}$

c) $8\frac{3}{4}\text{ yd} = \dfrac{8.75\text{ yd}}{} \Big| \dfrac{3\text{ ft}}{1\text{ yd}} = \boxed{26.25\text{ ft or } 26\frac{1}{4}\text{ ft}}$

2. Convert 100 yd. to inches:

$\dfrac{100\text{ yd}}{} \Big| \dfrac{3\text{ ft}}{1\text{ yd}} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 3600\text{ in.}$

$\dfrac{10\text{ in.}}{1\text{ bouquet}} = \dfrac{3600\text{ in}}{x\text{ bouquets}} \Rightarrow 10x = 3600$

$\boxed{x = 360\text{ bouquets}}$

3. $l + w + h = 2' + 1'4'' + 9''$

CONVERT TO INCHES

l: $\dfrac{2\text{ ft}}{} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 24''$ $\quad w: 12'' + 4'' = 16''$

$h = 9''$

$l + w + h = 24'' + 16'' + 9'' = 49''$

Calm Air will <u>not</u> allow it!

4. $\dfrac{48''}{} \left| \dfrac{1\ ft}{12''} \right. = 4\ ft$ high boards

so 8 ft lengths

Find perimeter $= P = 49\ ft + 49\ ft + \underbrace{\tfrac{1}{2}\pi d}_{\text{half circumference}} + \tfrac{1}{2}\pi d$

$$P = 98\ ft + \pi d$$

$$P = 98\ ft + \pi(32)$$

$$P = 198.53\ ft$$

a) $\dfrac{8\ ft}{1\ \text{plywood}} = \dfrac{198.53\ ft}{x\ \text{plywood}} \Rightarrow 8x = 198.53$

$x = 24.8$ sheets plywood

round UP!

$\boxed{\text{25 sheets of plywood will be required.}}$

b) $\underset{\text{sheets}}{25} \times \$14.15/\text{sheet} = \boxed{\$353.75}$

5. Find perimeter of one sector and multiply by 4.

$P(\text{one sector}) = r + r + \tfrac{1}{4}\pi d = 4'3'' + 4'3'' + \tfrac{1}{4}\pi(8'6'')$

$= 8'6'' + \tfrac{1}{4}\pi(8'6'')$

$\dfrac{8\ ft}{} \left| \dfrac{12\ in}{1\ ft} \right. = 96\ in.$

$= 102'' + \tfrac{1}{4}\pi(102'')$

$8'6'' = 96'' + 6'' = 102\ in.$ $= 182.11''$ convert to ft.

$P(\text{one sector}) = \dfrac{182.11\ in}{} \left| \dfrac{1\ ft}{12\ in} \right. = 15.176\ ft \times 4$ sectors

$= 60.7\ ft$

$\dfrac{20\ ft}{1\ roll} = \dfrac{60.7\ ft}{x\ rolls} \Rightarrow 20x = 60.7 \Rightarrow x = 3.04$ rolls

4 rolls needed (partial rolls cannot be purchased)

$$4 \text{ rolls} \times \$9.99/\text{roll} = \boxed{\$39.96}$$

TOTAL COST.

6. Need perimeter of inner rectangle on diagram:

$$l = 109'6'' - 2\tfrac{1}{2}' - 2\tfrac{1}{2}\text{ft} \quad (6'' = \tfrac{1}{2}\text{ ft})$$

$$= 109\tfrac{1}{2}\text{ ft} - 2\tfrac{1}{2}\text{ ft} - 2\tfrac{1}{2}\text{ ft}$$

$$= 104\tfrac{1}{2}\text{ ft}$$

$$W = 48'9'' - 2\tfrac{1}{2}\text{ ft} - 2\tfrac{1}{2}\text{ ft}$$

$$= 48'9'' - 5\text{ ft}$$

$$= 43'9''$$

$$P(\text{inner}) = (2 \times 104.5\text{ft}) + (2 \times 43'9'')$$

$$= 209\text{ ft} + (2 \times 525\text{in})$$

$$= 209\text{ ft} + 1050\text{ in}$$

$$= 209\text{ ft} + 87.5\text{ft}$$

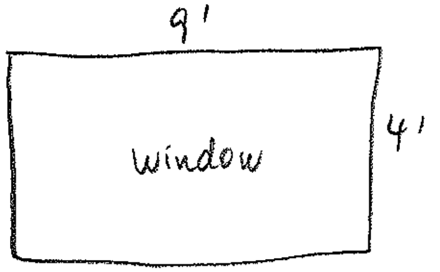
$$= \underline{296.5\text{ ft}}$$

$$\frac{43\text{ ft}}{} \left| \frac{12\text{ in}}{1\text{ ft}} \right. = 516\text{ in} + 9\text{ in} = 525\text{ in}$$

$$\frac{1050\text{ in}}{} \left| \frac{1\text{ ft}}{12\text{ in}} \right. = 87.5\text{ft}$$

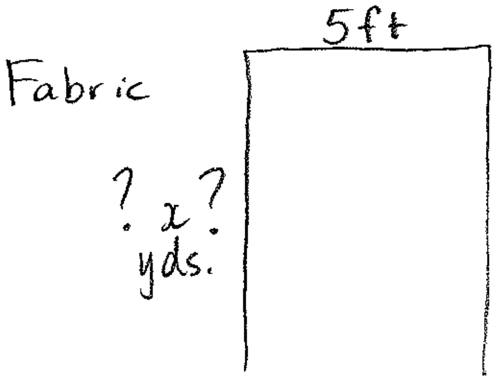
$$\frac{296.5\text{ ft}}{x\text{ rails}} = \frac{20\text{ ft}}{1\text{ rail}} \Rightarrow 20x = 296.5$$

$$x = 14.8 = \boxed{15\text{ rails}}$$

7.a) 

Drapes will be 18' wide and 6' long

Fabric is $\frac{60 \text{ in}}{} \Big| \frac{1 \text{ ft}}{12 \text{ in}} = 5$ ft wide



$\frac{5 \text{ ft.}}{1 \text{ length}} = \frac{18 \text{ ft}}{x \text{ lengths}} \Rightarrow 5x = 18$

$\frac{18 \text{ ft}}{5 \text{ ft}} = 3.6$ lengths of 5 ft wide fabric needed (6 ft of length each) — round to $\underline{\underline{4}}$

So, 4 lengths of 6 ft fabric.

$6 \text{ ft} \times 4 = 24 \text{ ft needed} \Big| \frac{1 \text{ yd}}{3 \text{ ft}} = \boxed{8 \text{ yd.}}$

b) $\frac{\$15.00}{1 \text{ yd}} = \frac{\$x}{8 \text{ yd}} \Rightarrow \boxed{x = \$120.00}$

8. No baseboards around tub or across door opening. But, baseboards will be put around vanity.

$P(\text{bathroom}) = (11' - 36'' - 30'') + (66'' - 18'') + 4' + 18'' + (11' - 4' - 36'')$

convert all to inches first: $\frac{11'}{} \Big| \frac{12 \text{ in}}{1 \text{ ft}} = 132$ in.

$\frac{4'}{} \Big| \frac{12 \text{ in}}{1 \text{ ft}} = 48''$

$$P = (132'' - 36'' - 30'') + (66'' - 18'') + 48'' + 18'' + (132'' - 48'' - 36'')$$

$$= 66'' + 48'' + 48'' + 18'' + 48''$$

$$= 228''$$

convert to feet: $\dfrac{228 \text{ in}}{} \Big| \dfrac{1 \text{ ft}}{12 \text{ in}} = 19 \text{ ft.}$ baseboard req'd

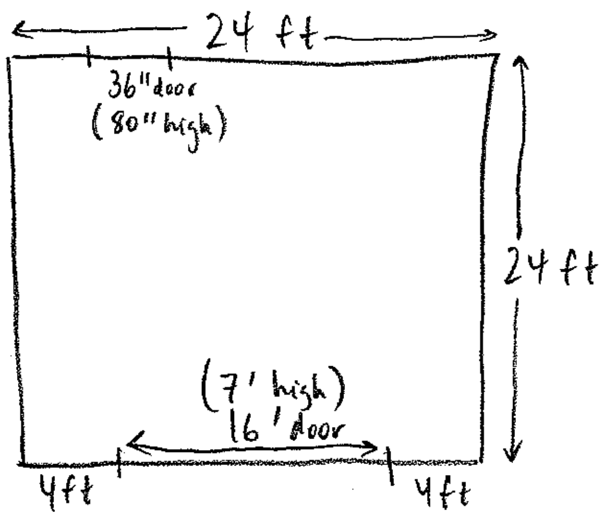
$$\frac{\$6.50}{1 \text{ ft}} = \frac{\$x}{19 \text{ ft}} \Rightarrow x = \$123.50$$

Materials Markup: $\$123.50 \times 1.15 = \$142.03$ for materials

Labour: $\dfrac{\$45.00}{1 \text{ hr}} = \dfrac{\$x}{2.5 \text{ hr}} \Rightarrow x = \$112.50$

TOTAL: $\$142.03 + \$112.50 = \boxed{\$254.53}$

9.



8 ft high walls.

If studs spaced 16" apart, then insulation's width will fit perfectly.

Two bare (non-door) walls: Figure out one, then double it:

$$\frac{24 \text{ ft}}{} \left| \frac{12 \text{ in}}{1 \text{ ft}} \right. = 288 \text{ in}$$

$$\frac{16'' \text{ width}}{1 \text{ pc. insul. (batt)}} = \frac{288''}{x \text{ pc. insul}}$$

$16x = 288$

$x = 18$ pcs. go 47" high

36 pcs. cover 94" high

close enough to 96"

$$\frac{8 \text{ ft high}}{} \left| \frac{12 \text{ in}}{1 \text{ ft}} \right. = 96''$$

So, 36 pcs. for one wall, $\therefore$ (therefore) 72 pcs. for two walls.

Large garage door wall: has 3 parts → 2 identical 4 ft sections
→ part above door

Find one 4 ft. section, then double it:

$$\frac{4 \text{ ft}}{} \left| \frac{12 \text{ in}}{1 \text{ ft}} \right. = 48''$$

$$\frac{16'' \text{ width}}{1 \text{ pc. insul}} = \frac{48''}{x \text{ pc insul}}$$

$16x = 48$

$x = 3$ pcs. go 47" high

6 pcs. cover 94" high

So, 6 pcs. for one section, $\therefore$ 12 pcs. for two

Part above door: door is 7' high, walls are 8' high

$\therefore$ 1 ft to cover (12 in.)

$$\frac{16'}{} \left| \frac{12 \text{ in}}{1 \text{ ft}} \right. = 192 \text{ in width}$$

Each pc. insulation can be cut into 4 12-inch × 16-inch pieces.

$$\frac{16'' \text{ width}}{1 \text{ pc. insul}} = \frac{192''}{x \text{ pc. insul}} \Rightarrow 16x = 192 \Rightarrow x = 12 \text{ pcs.} \div 4 = 3 \text{ pcs.}$$

Last wall with small door → two sections → non-door part; → above door

Non-door wall part: $\frac{36''}{} \Big| \frac{1\text{ ft}}{12\text{ in}} = 3\text{ft}$

$= 24\text{ ft} - 3\text{ft} = 21\text{ ft}$ in length

$\frac{21\text{ ft}}{} \Big| \frac{12\text{ in}}{1\text{ ft}} = 252''$ $\quad \frac{16''\text{ width}}{1\text{ pc. insul}} = \frac{252''}{x\text{ pc. insul}}$

$16x = 252$

$x = 15.75 = 16$ pcs. go $47''$ high

$\boxed{32\text{ pcs.}}$ go $94''$ high

Above door: $36''$ wide and $96'' - 80'' = 16$ in. high
(8 ft)
(turn insulation 'sideways')

need $36''$ of a 16 in wide piece
which is the better part of $\boxed{1\text{ piece}}$

TOTAL $= 72 + 12 + 3 + 32 + 1 = 120$ pcs. needed

$\frac{18\text{ batts}}{1\text{ pkg}} = \frac{120\text{ batts}}{x\text{ pkg}} \Rightarrow 18x = 120$

$x = 6.7 = \boxed{7\text{ packages required}}$

Ch. 3.2 Text Solutions

1. $\dfrac{7\text{ ft}}{} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 84\text{ in} + 6'' = 90\text{ in}$

$\dfrac{90\text{ in}}{} \Big| \dfrac{1\text{ ft}}{12\text{ in}} \Big| \dfrac{0.305\text{ m}}{1\text{ ft}} = 2.29\text{ m}$ No, the truck will not fit under the bridge.

2. $\dfrac{4200\text{ m}}{} \Big| \dfrac{1\text{ ft}}{0.305\text{ m}} = \boxed{13770.5\text{ ft}}$

3. $\dfrac{5'}{} \Big| \dfrac{12''}{1'} = 60'' + 8'' = 68\text{ in.}$

$\dfrac{68\text{ in}}{} \Big| \dfrac{2.54\text{ cm}}{1\text{ in}} = \boxed{172.72\text{ cm}}$

4. $\dfrac{2\text{ ft}}{} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 24\text{ in}$ $\quad \dfrac{6\text{ ft}}{} \Big| \dfrac{12\text{ in}}{1\text{ ft}} = 72\text{ in}$

Countertop is $24'' \times 72'' = 1728\text{ in}^2$

Tile is $4'' \times 4'' = 16\text{ in}^2$

$\dfrac{16\text{ in}^2}{1\text{ tile}} = \dfrac{1728\text{ in}^2}{x\text{ tiles}} \Rightarrow 16x = 1728$

$x = 108$ tiles required

$\dfrac{\$3.50}{1\text{ tile}} = \dfrac{\$x}{108\text{ tiles}} \Rightarrow x = \$378$ total cost for materials

Sandy's total fee: $\$378 + \$350 = \boxed{\$728.00}$

5. Company A: $\frac{20m \mid 1\,yd}{\mid 0.915m} = 21.86\,yd$

$\frac{40m \mid 1\,yd}{\mid 0.915m} = 43.72\,yd$

$21.86\,yd \times 43.72\,yd = 955.72\,yd^2$

$955.72\,yd^2 \times \$4.00/yd^2 = \$3822.88$

Company B: $20\,m \times 40\,m = 800\,m^2$

$800\,m^2 \times \$2.50/m^2 = \$2000 + \$2000$ (installation fee)

$= \$4000.00$

Company A should get the job!

6. Hardwood: $\frac{22\,ft \mid 0.305\,m}{\mid 1\,ft} = 6.71\,m$

$\frac{16\,ft \mid 0.305\,m}{\mid 1\,ft} = 4.88\,m$

$6.71m \times 4.88\,m = 32.745\,m^2$

$32.745\,m^2 \times \$18.99/m^2 = \$621.83 + \$1500.00$ (fee)

$= \$2121.83$

Carpet: $\frac{22\,ft \mid 1\,yd}{\mid 3\,ft} = 7.333\,yd$

$\frac{16\,ft \mid 1\,yd}{\mid 3\,ft} = 5.333\,yd$

$7.333\,yd \times 5.333\,yd = 39.107\,yd^2$

$\frac{39.107\,yd^2 \mid \$21.95}{\mid 1\,yd^2} = \$858.40 + \$1350$ (fee) $= \$2208.40$

Hardwood is cheaper.

7. a) $\dfrac{72\text{ yd}}{} \Big| \dfrac{3\text{ ft}}{1\text{ yd}} = 216\text{ ft}$

$\dfrac{65\text{ yd}}{} \Big| \dfrac{3\text{ ft}}{1\text{ yd}} = 195\text{ ft}$

Area $= 42120\text{ ft}^2$

$$\frac{64\text{ ft}^2}{1\text{ seedling}} = \frac{42120\text{ ft}^2}{x\text{ seedlings}} \Rightarrow 64x = 42120$$

$\boxed{x = 658 \text{ seedlings can fit.}}$

b) $$\frac{20\text{ seedlings}}{1\text{ bundle}} = \frac{658\text{ seedlings}}{x\text{ bundles}}$$

$20x = 658$

$x = 32.9 = 33$ bundles needed

1 bundle costs $20 \times \$0.65 = \$13$

33 bundles costs $33 \times \$13 = \boxed{\$429.00}$

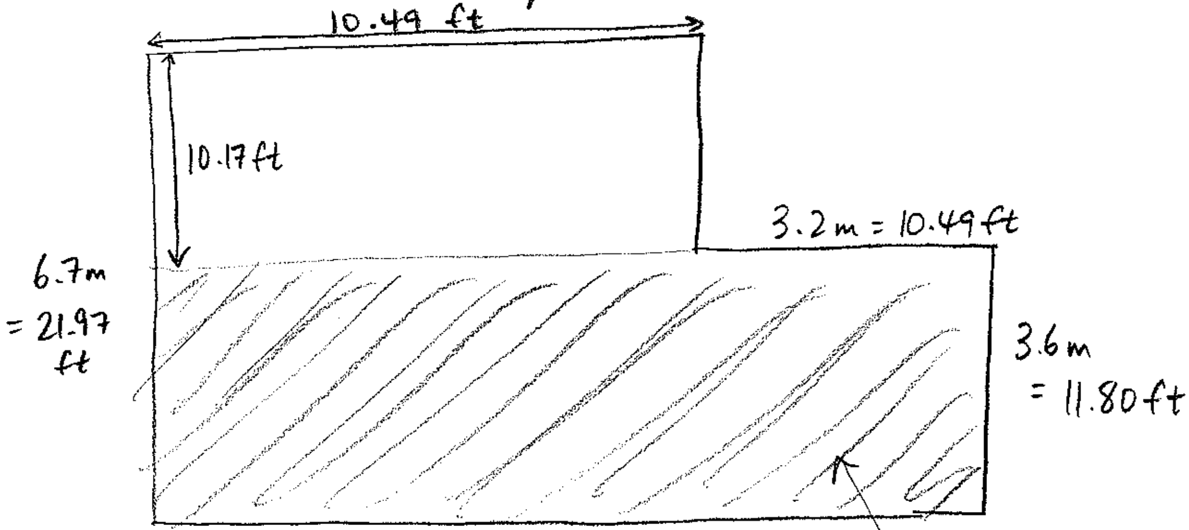
8. 10 ft wide flooring. So, in foyer he'll need 5 running feet, in Meeting Room he'll need 12 running feet, and in Kitchen he'll need 4 running feet (to ensure pattern matches).

21 total feet $\times$ 1.15 (wastage worry) $= 24.15$ ft, which means he needs 25 ft.

$25\text{ ft} \times \$12.50/\text{ft} = \$312.50 + \$560$ (labour)

$\boxed{= \$872.50}$

9. Nap = the fuzzy part of the carpet, so having nap run in same direction means that she'll always unroll the carpet the same direction.



To minimize seams, cut 0.20 ft. off of a 20.98 ft length of carpet and lay as shown above.

$$\frac{12\text{ ft} \times 1\text{ yd}}{3\text{ ft}} = 4\text{ yd} \qquad \frac{\overset{20.98\text{ ft}}{=21\text{ ft}} \cdot 1\text{ yd}}{3\text{ ft}} = 7\text{yd}$$

$$4\text{ yd} \times 7\text{yd} = 28\text{ yd}^2$$

Cost for this portion: $28\text{ yd}^2 \times \$22.95/\text{yd}^2 = \$642.60$

For remaining part, cut 1.83 ft off a 10.49 ft length (~10.5 ft)

$$\frac{12\text{ ft} \cdot 1\text{ yd}}{3\text{ ft}} = 4\text{ yd} \qquad \frac{10.5\text{ ft} \cdot 1\text{ yd}}{3\text{ ft}} = 3.5\text{ yd}$$

$$4\text{yd} \times 3.5\text{ yd} = 14\text{ yd}^2$$

Cost: $14\text{ yd}^2 \times \$22.95/\text{yd}^2 = \$321.30$

Perimeter of room = 21.97 ft + 10.49 ft + 10.17 ft + 10.49 ft + 11.80 ft + 20.98 ft = 85.9 ft

Length of seam = 10.49 ft Total tape needed = 85.9 + 10.49 = 96.4 ft

Tape

$$\frac{30 \text{ ft}}{1 \text{ roll}} = \frac{96.4 \text{ ft}}{x \text{ rolls}} \Rightarrow 30x = 96.4$$

$$x = 3.2 \text{ rolls}$$

so 4 rolls needed

$$4 \text{ rolls} \times \$4.^{85}/\text{roll} = \$19.^{40} \text{ (tape)}$$

$$\text{Total cost} = \$642.^{60} + \$321.^{30} + \$19.^{40}$$

$$\boxed{= \$983.\underline{^{30}}}$$

* realize that there will be some wastage (there always is when carpeting/flooring).

Ch. 3.3 Text Solutions

1. $SA(\text{pond}) = SA(\text{cylinder}) - SA(\text{one circle})$

$= \pi r^2 + 2\pi r h \qquad r = 2\,ft$

$= \pi(2)^2 + 2\pi(2)(1.5)$

$= 31.42\ ft^2$

Area covered by one roll $= 10' \times 15' = 150\,ft^2$

a) $\dfrac{150\ ft^2}{x\ \text{ponds}} = \dfrac{31.42\ ft^2}{1\ \text{pond}}$

$31.42x = 150$

$x = 4.8$ ponds. can be lined with one roll

So, only $\boxed{4 \text{ ponds}}$ can be lined completely with one roll

b) $\dfrac{\$149.^{00}}{4\ \text{ponds}} = \dfrac{\$x}{1\ \text{pond}} \Rightarrow 4x = 149$

$x = \$37.^{25}$ to line one pond.

2. $SA(\text{can } 1) = 2\pi r^2 + 2\pi r h$

$= 2\pi(1.25")^2 + 2\pi(1.25")(4.5")$

$= 45.2\ in^2$

$SA(\text{can}2) = 2\pi r^2 + 2\pi r h$

$= 2\pi(1.5")^2 + 2\pi(1.5")(3")$

$= 42.4\ in^2$

Can 1 requires more Al.

3. Convert dimensions from inches to feet and meters:

Feet:

$$\frac{7.5''}{} \Big| \frac{1\text{ ft}}{12''} = \underline{0.625\text{ ft}} \qquad \frac{12.5\text{ in}}{} \Big| \frac{1\text{ ft}}{12\text{ in}} = \underline{1.042\text{ ft}}$$

$$\frac{23''}{} \Big| \frac{1\text{ ft}}{12''} = \underline{1.917\text{ ft}} \qquad \frac{15\text{ in}}{} \Big| \frac{1\text{ ft}}{12\text{ in}} = \underline{1.25\text{ ft}}$$

$$\frac{25\text{ in}}{} \Big| \frac{1\text{ ft}}{12''} = \underline{2.083\text{ ft}}$$

Meters:

$$\frac{0.625\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.191\text{ m} \qquad \frac{1.042\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.318\text{ m}$$

$$\frac{1.917\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.585\text{ m} \qquad \frac{1.25\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.381\text{ m}$$

$$\frac{2.083\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.635\text{ m}$$

$$SA(\text{bench}) \; (\text{in ft}^2) = \overbrace{4(2.083' \times 1.25')}^{\text{top / bottom (both sides)}} + \overbrace{4(1.25' \times 1.917')}^{\text{sides (both sides)}} + \overbrace{4(2.083' \times 1.917')}^{\text{front/back (both sides)}}$$

$$+ \underbrace{2\pi(0.625')^2}_{\text{side semi-circles (both sides)}} + \underbrace{\pi(1.042')^2}_{\text{back semi-circle (both sides)}}$$

$$= 10.415\text{ ft}^2 + 9.585\text{ ft}^2 + 15.972\text{ ft}^2 + 2.454\text{ ft}^2 + 3.411\text{ ft}^2$$

$$= 41.837\text{ ft}^2 \text{ (one coat)}$$

$$= 83.674\text{ ft}^2 \text{ (two coats)}$$

One can of paint covers 100 ft^2, so one can is enough $\Rightarrow$ \$14.99 for paint

$$SA\,(\text{bench})\ (\text{in meters}) = 4(0.635\,m \times 0.381\,m) + 4(0.381\,m \times 0.585\,m) + 4(0.635\,m \times 0.585\,m) + 2\pi(0.191\,m)^2 + \pi(0.318\,m)^2$$

$$= 0.968\,m^2 + 0.892\,m^2 + 1.486\,m^2 + 0.229\,m^2 + 0.318\,m^2$$

$$= 3.893\,m^2 \text{ (one coat)}$$

$$= 7.786\,m^2 \text{ (two coats)}$$

One can of stain covers $15\,m^2$, so one can is enough $\Rightarrow$ \$12.99 for stain.

$\boxed{\text{Stain is cheaper!}}$

4. $SA\,(\text{hopper}) = SA\,(\text{side of cylinder only}) + (2 \times SA\,(\text{side of cone}))$

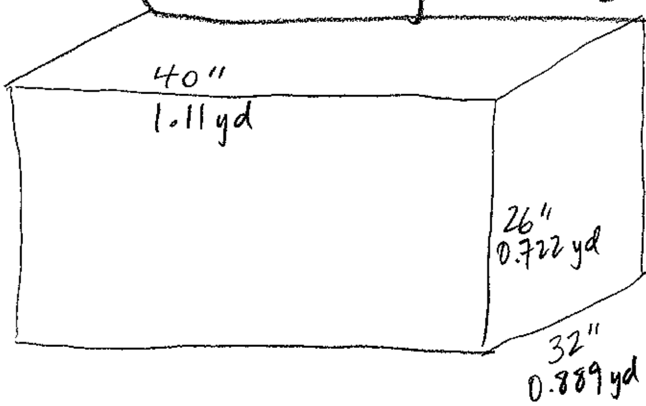
$$= 2\pi rh + 2(\pi rs)$$

$$= 2\pi(1.75\,yd)(4.7\,yd) + 2(\pi(1.75\,yd)(2.73\,yd))$$

$$= 51.679\,yd^2 + 30.018\,yd^2$$

$$\boxed{= 81.70\,yd^2 \text{ of sheet metal required.}}$$

5.



Convert inches to yds.

$$40'' \times \frac{1\,ft}{12\,in} \times \frac{1\,yd}{3\,ft} = 1.11\,yd$$

$$32'' \times \frac{1\,ft}{12\,in} \times \frac{1\,yd}{3\,ft} = 0.889\,yd$$

$$26'' \times \frac{1\,ft}{12\,in} \times \frac{1\,yd}{3\,ft} = 0.722\,yd.$$

$$SA = 2(0.722\,yd)(0.889\,yd) + (1.11\,yd)(0.722\,yd) + (1.11\,yd)(0.889\,yd) = 3.072\,yd^2 \text{ to brick.}$$

$$\frac{48 \text{ bricks}}{1 \text{ yd}^2} = \frac{x \text{ bricks}}{3.072 \text{ yd}^2}$$

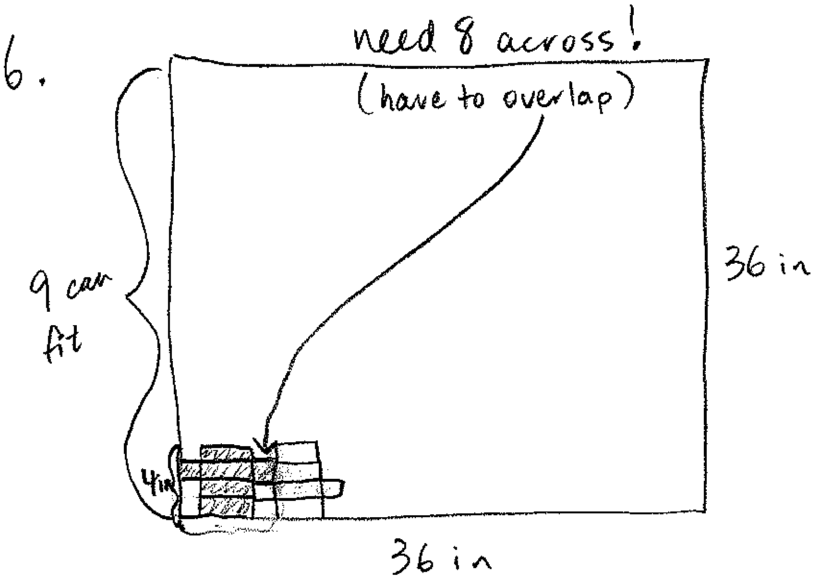
$x = 147.456$ bricks needed

a)

$147.456 \times \underset{\text{(cutting/breakage)}}{1.05} = 154.83 \rightarrow \boxed{155 \text{ bricks needed}}$

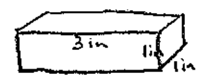
b) $155 \text{ bricks} \times \$0.80/\text{brick} = \boxed{\$124.00}$

6.

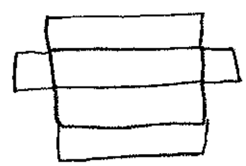


$$\frac{1 \text{ yd}}{} \Big| \frac{3 \text{ ft}}{1 \text{ yd}} \Big| \frac{12 \text{ in}}{1 \text{ ft}} = 36 \text{ in}$$

1 box



1 box geometric net:



* see text for another diagram

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7. SA(Circular Platforms) $= \left(2\pi r^2 + 2\pi r h\right) - \pi r^2$ (of pole)

Convert to feet:

$\frac{12''}{} \Big| \frac{1 \text{ ft}}{12 \text{ in}} = 1 \text{ ft}$

$\frac{2 \text{ in}}{} \Big| \frac{1 \text{ ft}}{12 \text{ in}} = 0.167 \text{ ft}$

$\frac{3 \text{ in}}{} \Big| \frac{1 \text{ ft}}{12 \text{ in}} = 0.25 \text{ ft}$

$= \left(2\pi(0.5 \text{ ft})^2 + 2\pi(0.5 \text{ ft})(0.25 \text{ ft})\right) - \pi(0.0833 \text{ ft})^2$

$= 2.356 \text{ ft}^2 - 0.0218 \text{ ft}^2$

$= 2.334 \text{ ft}^2$ (area of one circ. platform)

SA(all 3) $= 3 \times 2.334 \text{ ft}^2 = 7.002 \text{ ft}^2$

SA (shortest pole) $= $ side of cylinder only

$$= 2\pi r h$$
$$= 2\pi (0.0833\ ft)(2\ ft)$$
$$= 1.047\ ft^2$$

SA (medium pole) $= 2\pi r h$

$$= 2\pi (0.0833\ ft)(3\ ft)$$
$$= 1.570\ ft^2$$

SA (longest pole) $= 2\pi r h$

$$= 2\pi (0.0833\ ft)(4\ ft)$$
$$= 2.094\ ft^2$$

carpet inside and outside

SA (cylindrical playhouse) $= 2(SA(\text{one circle}) + SA(\text{side}) - SA(\text{hole}))$

$$= 2(\pi r^2 + 2\pi r h - \pi \underset{\text{hole}}{r^2})$$

$\frac{12'' \mid 1\ ft}{\mid 12\ in} = 1\ ft$

$$= 2(\pi (0.5\ ft)^2 + 2\pi (0.5\ ft)(1.5\ ft) - \pi (0.25\ ft)^2)$$

$\frac{6'' \mid 1\ ft}{\mid 12\ in} = 0.5\ ft$

$$= 2(5.301\ ft^2)$$
$$= 10.603\ ft^2$$

SA (base) $= 2(2\ ft \times 2\ ft) + 4(2\ ft \times 0.167\ ft) - (\underbrace{3\pi r^2}_{\text{area of poles}})$

$$= 8\ ft^2 + 1.336\ ft^2 - (3\pi (0.0833\ ft)^2)$$

$\frac{2\ in \mid 1\ ft}{\mid 12\ in} = 0.167\ ft$

$$= 9.336\ ft^2 - 0.0654\ ft^2$$
$$= 9.271\ ft^2$$

Total SA (scratching post) $= 7.002\ ft^2 + 1.047\ ft^2 + 1.570\ ft^2 + 2.094\ ft^2 + 10.603\ ft^2 + 9.271\ ft^2$

$$= 31.597\ ft^2$$

$31.587\ ft^2 \times \$5.60/ft^2 = \boxed{\$176.89 \text{ to cover it}}$

Ch. 3.4 Text Solutions

1. 1 cup = approx 250 mL

   He'll need 3 × 250 mL = $\boxed{750\text{ mL}}$

   more exactly: $\dfrac{3\text{ cups}}{} \Big| \dfrac{1\text{ pt}}{2\text{ cups}} \Big| \dfrac{1\text{ qt.}}{2\text{ pt.}} \Big| \dfrac{1\text{ L}}{1.06\text{ qt}} \Big| \dfrac{10^3\text{ mL}}{1\text{ L}} = \boxed{707.5\text{ mL}}$

2. a) $\dfrac{12\text{ US fl.oz.}}{} \Big| \dfrac{1\text{ pt}}{16\text{ fl.oz}} \Big| \dfrac{1\text{ qt.}}{2\text{ pt.}} \Big| \dfrac{1\text{ L}}{1.06\text{ qt}} \Big| \dfrac{10^3\text{ mL}}{1\text{ L}} = \boxed{354\text{ mL}}$

   (355 mL cans)

   b) $\dfrac{16\text{ US fl oz.}}{} \Big| \dfrac{1\text{ pt.}}{16\text{ fl.oz}} \Big| \dfrac{1\text{ qt}}{2\text{ pt}} \Big| \dfrac{1\text{ L}}{1.06\text{ qt}} \Big| \dfrac{10^3\text{ mL}}{1\text{ L}} = \boxed{472\text{ mL}}$

   c) $\dfrac{28\text{ US fl.oz}}{x\text{ mL}} = \dfrac{12\text{ US fl.oz}}{354\text{ mL}}$ * another way (once you know one ratio)

   $12x = 9912 \longrightarrow \boxed{x = 826\text{ mL}}$

   d) $\dfrac{40\text{ US fl.oz}}{} \Big| \dfrac{1\text{ pt}}{16\text{ fl.oz}} \Big| \dfrac{1\text{ qt.}}{2\text{ pt.}} \Big| \dfrac{1\text{ L}}{1.06\text{ qt}} \Big| \dfrac{10^3\text{ mL}}{1\text{ L}} = \boxed{1179\text{ mL}}$

3. Convert inches to cm:

   $\dfrac{12\text{ in}}{} \Big| \dfrac{2.54\text{ cm}}{1\text{ in}} = 30.48\text{ cm}$ $\qquad$ $\dfrac{6\text{ in}}{} \Big| \dfrac{2.54\text{ cm}}{1\text{ in}} = 15.24\text{ cm}$

   $\dfrac{8\text{ in}}{} \Big| \dfrac{2.54\text{ cm}}{1\text{ in}} = 20.32\text{ cm}$

$$V_{(box)} = l \times w \times h = (30.48\text{ cm})(15.24\text{cm})(20.32\text{ cm})$$
$$= 9438.95\text{ cm}^3$$

$$V(game) = l \times w \times h = (20\text{ cm})(11\text{ cm})(16\text{ cm})$$
$$= 3520\text{ cm}^3$$

Yes, the game will fit rather easily

4. 15 gallons $\times \frac{1}{8}$ = 1.875 gallons in tank

He needs 15 − 1.875 = 13.125 gallons of gas

Convert to L:

$$\frac{13.125\text{ gal}}{} \bigg| \frac{1\text{ L}}{0.26\text{ gal}} = 50.481\text{ L required}$$

$$50.481\text{ L} \times \$1.10/\text{L} = \boxed{\$55.53}$$

5. ~~J&L:~~ Convert to yd:

$$\frac{24\text{ ft}}{} \bigg| \frac{1\text{ yd}}{3\text{ ft}} = 8\text{ yd} \qquad \frac{22\text{ ft}}{} \bigg| \frac{1\text{ yd}}{3\text{ ft}} = 7.333\text{ yd}$$

$$\frac{4\text{ in}}{} \bigg| \frac{1\text{ ft}}{12\text{ in}} \bigg| \frac{1\text{ yd}}{3\text{ ft}} = 0.111\text{ yd}$$

$$V(\text{yd}^3) = 8\text{ yd} \times 7.333\text{ yd} \times 0.111\text{ yd} = 6.512\text{ yd}^3$$

$$6.512\text{ yd}^3 \times \$145.00/\text{yd}^3 = \$944.24\ (\text{J\&L})$$

M & W: convert to m

$$\frac{24\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 7.32\text{ m} \qquad \frac{22\text{ ft}}{} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 6.71\text{ m}$$

$$\frac{4\text{ in}}{} \Big| \frac{1\text{ ft}}{12\text{ in}} \Big| \frac{0.305\text{ m}}{1\text{ ft}} = 0.102\text{ m}$$

$$V(m^3) = 7.32\text{ m} \times 6.71\text{ m} \times 0.102\text{ m}$$
$$= 5.010\text{ m}^3$$

$$5.010\text{ m}^3 \times \$165.^{00}/\text{m}^3 = \$826.^{65} \text{ (M \& W)}$$

$$\boxed{\text{M \& W is cheaper}}$$

6. Convert to yards:

$$\frac{2.5\text{ in}}{} \Big| \frac{1\text{ ft}}{12\text{ in}} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 0.0694\text{ yd deep}$$

$$\frac{6.5\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 2.167\text{ yd} \qquad \frac{3\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 1\text{ yd.}$$

$$\frac{16\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 5.333\text{ yd} \qquad \frac{6\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 2\text{ yd.}$$

$$\frac{15.5\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 5.167\text{ yd.} \qquad \frac{9\text{ ft}}{} \Big| \frac{1\text{ yd}}{3\text{ ft}} = 3\text{ yd.}$$

$$\left.\begin{aligned} V(\text{spall 1}) &= (0.0694\text{ yd})(2.167\text{ yd})(1\text{ yd}) = 0.150\text{ yd}^3 \\ V(\text{spall 2}) &= (0.0694\text{ yd})(5.333\text{ yd})(2\text{ yd}) = 0.740\text{ yd}^3 \\ V(\text{spall 3}) &= (0.0694\text{ yd})(5.167\text{ yd})(3\text{ yd}) = 1.076\text{ yd}^3 \end{aligned}\right\} + 0.5\text{ yd}^3 \text{ extra}$$

$$\boxed{= 2.47\text{ yd}^3 \text{ concrete to order}}$$

7. Car 1:

$$\frac{45 \text{ mi}}{} \bigg| \frac{1.6 \text{ km}}{1 \text{ mi}} = 72 \text{ km}$$

$$\frac{1 \text{ gal US}}{} \bigg| \frac{1 \text{ L}}{0.26 \text{ gal}} = 3.846 \text{ L}$$

$$\frac{3.846 \text{ L}}{72 \text{ km}} = \frac{x \text{ L}}{100 \text{ km}} \Rightarrow 72x = 384.6$$

$$x = 5.342 \text{ L per } 100 \text{ km}$$

Car 2: 10 L per 100 km.

Car 1 is more efficient (almost twice as efficient!)

Practise Your New Skills Solutions

1. $$\frac{600\text{ m}}{} \left| \frac{1\text{ km}}{10^3\text{ m}} \right. = 0.600\text{ km}$$

$$\frac{1\text{ bench}}{0.600\text{ km}} = \frac{x\text{ benches}}{10.8\text{ km}} \Rightarrow 0.600x = 10.8$$

$$x = 18\text{ benches required}$$

$$18\text{ benches} \times \$350/\text{bench} = \$6300 + \$1500\ (\text{labour}) = \boxed{\$7800}$$

2. $$\frac{90\text{ in}}{} \left| \frac{1\text{ ft}}{12\text{ in}} \right. = 7.5\text{ ft} \qquad \frac{48\text{ in}}{} \left| \frac{1\text{ ft}}{12\text{ in}} \right. = 4\text{ ft}$$

$$P(\text{window}) = (2 \times 7.5\text{ ft}) + (2 \times 4\text{ ft}) = 23\text{ ft}$$

$$\text{Cost (moulding)} = 23\text{ ft} \times \$3.25/\text{ft} = \$74.75$$

$$\text{Cost (labour)} = 23\text{ ft} \times \$8.50/\text{ft} = \$195.50$$

$$\text{Total Cost} = \boxed{\$270.25}$$

3. $$\frac{30\text{ in}}{} \left| \frac{1\text{ ft}}{12\text{ in}} \right. = 2.5\text{ ft}$$

$$SA(\text{walls}) = 2(21\text{ ft} \times 8\text{ ft}) + 2(12\text{ ft} \times 8\text{ ft}) - \big(\underbrace{(2.5\text{ ft} \times 7\text{ ft})}_{\text{door}} + \underbrace{2(5\text{ ft} \times 3\text{ ft})}_{\text{windows}}\big)$$

$$= 336\text{ ft}^2 + 192\text{ ft}^2 - 45\text{ ft}^2$$

$$= 483\text{ ft}^2$$

$$483\text{ ft}^2 \times \$6.95/\text{ft}^2 = \boxed{\$3356.85}$$

4. convert feet/inches to meters:

$$15'6'' = \frac{15.5\text{ ft}}{} \bigg| \frac{0.305\text{m}}{1\text{ ft}} = 4.7275\text{ m (diameter)}$$

$$\frac{18\text{ ft}}{} \bigg| \frac{0.305\text{m}}{1\text{ ft}} = 5.49\text{ m (height)}$$

$$\begin{aligned} SA(\text{cylinder}) &= 2\pi r^2 + 2\pi r h \\ &= 2\pi(2.36375\text{m})^2 + 2\pi(2.36375\text{m})(5.49\text{m}) \\ &= 116.64\text{ m}^2 \end{aligned}$$

$$\frac{40\text{ m}^2}{1\text{ can primer}} = \frac{116.64\text{ m}^2}{x\text{ cans primer}} \longrightarrow 40x = 116.64$$

$$x = 2.92$$

$$= \underline{3\text{ cans}}$$

$$3\text{ cans} \times \$47.13/\text{can} = \boxed{\$141.39}$$

5. Convert inches to feet:

$$\frac{12\text{ in}}{} \bigg| \frac{1\text{ft}}{12\text{ in}} = 1\text{ ft diameter} \qquad \frac{36\text{ in}}{} \bigg| \frac{1\text{ ft}}{12\text{ in}} = 3\text{ft height}$$

$$\frac{36.5\text{ in}}{} \bigg| \frac{1\text{ft}}{12\text{ in}} = 3.042\text{ ft slant height}$$

assuming there is fake ice cream in the cone.

$$\begin{aligned} SA(\text{ice cr. cone}) &= SA(\text{side of cone}) + SA(\text{half of sphere}) \\ &= \pi r s + \tfrac{1}{2}(\pi d^2) \\ &= \pi(0.5\text{ ft})(3.042\text{ ft}) + \tfrac{1}{2}(\pi(1)^2) \\ &\boxed{= 6.35\text{ ft}^2\text{ aluminum}} \end{aligned}$$

* book's answer is for an 'empty', hollow cone.

6. $\frac{1}{2}$ of 18 gallons is : $18 \times \frac{1}{2} = 9$ gallons left

$$\frac{28 \text{ miles}}{1 \text{ gal}} = \frac{x \text{ miles}}{9 \text{ gal}} \Rightarrow x = 252 \text{ mi can be driven}$$

$$\frac{252 \text{ mi} \mid 1.6 \text{ km}}{\mid 1 \text{ mi}} = 403.2 \text{ km can be driven}$$

She does not need to stop.

7. In feet, dimensions are $30 \text{ ft} \times 18 \text{ ft} \times 0.5 \text{ ft}$

$$\frac{6 \text{ in} \mid 1 \text{ ft}}{\mid 12 \text{ in}} = 0.5 \text{ ft} \qquad V = 270 \text{ ft}^3$$

$$\frac{3.8 \text{ ft}^3}{1 \text{ bale}} = \frac{270 \text{ ft}^3}{x \text{ bales}} \Rightarrow 3.8x = 270 \Rightarrow x = 71.1 \text{ bales} = 72 \text{ bales needed}$$

$$72 \text{ bales} \times \$12.49/\text{bale} = \$899.28$$

In yards, dimensions are :

$$\frac{30 \text{ ft} \mid 1 \text{ yd}}{\mid 3 \text{ ft}} = 10 \text{ yd.} \qquad \frac{18 \text{ ft} \mid 1 \text{ yd}}{\mid 3 \text{ ft}} = 6 \text{ yd} \qquad \frac{0.5 \text{ ft} \mid 1 \text{ yd}}{\mid 3 \text{ ft}} = 0.167 \text{ yd}$$

$$10 \text{ yd} \times 6 \text{ yd} \times 0.167 \text{ yd}$$

$$V = 10.02 \text{ yd}^3$$

$$\frac{1 \text{ yd}^3}{1 \text{ bale}} = \frac{10.02 \text{ yd}^3}{x \text{ bales}} \Rightarrow x = 10.02 \text{ bales} = 11 \text{ bales needed}$$

$$11 \text{ bales} \times \$39/\text{bale} = \$429$$

Buying the 1 yd³ bales gives the best price

9. Convert to yd.

$$\frac{8\text{ in}}{} \left| \frac{1\text{ ft}}{12\text{ in}} \right| \frac{1\text{ yd}}{3\text{ ft}} = 0.222\text{ yd thick}$$

$$\frac{75\text{ ft}}{} \left| \frac{1\text{ yd}}{3\text{ ft}} \right. = 25\text{ yd. long}$$

$$\frac{2.5\text{ ft}}{} \left| \frac{1\text{ yd}}{3\text{ ft}} \right. = 0.833\text{ yd high.}$$

$$\underbrace{4\text{ parts gravel} + 2\text{ parts sand} + 1\text{ part cement}}_{7\text{ total parts}} = \text{Concrete}$$

so, 1 portion of concrete $= \frac{4}{7}$ gravel $+ \frac{2}{7}$ sand $+ \frac{1}{7}$ cement

$\Rightarrow$ Volume concrete required $= (0.222\text{ yd}) \times (25\text{ yd}) \times (0.833\text{ yd})$

$= 4.6232\text{ yd}^3$

made up of 7 parts.

a) i) $V(\text{cement}) = 4.6232\text{ yd}^3 \times \frac{1}{7} = \boxed{0.66\text{ yd}^3}$

ii) $V(\text{sand}) = 4.6232\text{ yd}^3 \times \frac{2}{7} = \boxed{1.321\text{ yd}^3}$

iii) $V(\text{gravel}) = 4.6232\text{ yd}^3 \times \frac{4}{7} = \boxed{2.642\text{ yd}^3}$

b) Cement: $0.66\text{ yd}^3 \times \$65/\text{yd}^3 = \$42.90$

Sand: $1.321\text{ yd}^3 \times \$18/\text{yd}^3 = \$23.78$

Gravel: $2.642\text{ yd}^3 \times \$8.99/\text{yd}^3 = \$23.75$

$+$ labour $= \$1500.00$

total cost $= \boxed{\$1590.43}$