

**ANSWER KEY:** Door Order Sheet  
Skill Builders: Entry Forms, Technical Drawings

1. What 2 purposes is the form used for? **Recording a quote or completing an order.**
2. What measurement system does the form use? **Imperial (inches).**
3. How many gauges of metal door are always available? What are they? **18 gauge and 16 gauge are always available. (14 gauge may not be available.)**
4. What do the abbreviations PO and QUAN mean? **PO = purchase order, QUAN = quantity.**
5. In addition to hinges, latch, edge seam and prime, what 3 features of door construction must be selected to complete an order? **Metal gauge, metal material and core.**
6. Measure all of the doorways in the room you are in. Enter that information in the form in the columns: quan, net width, net length and thickness. **Figures will vary.**
7. Draw and label a door using the dimensions from one of the doors you just measured. Include height, width, and depth measurements. Show hinge locations, door knob and any windows in the door. Use the graph paper provided and the scale 1 square = 3 inches. **Drawings will vary.**

## ANSWER KEY: Heating Systems

Skill Builders: Key Words & Phrases, Charts & Graphs, Tables & Lists

1. What is the main focus of the article? **The cost of different heating systems**
2. What systems are being compared? **Gas furnaces, heat pumps, wood stoves and solar panels**
3. What specific features are being compared? **The costs of installation and annual operating, and any available rebates**
4. Calculate for each system the total cost after each of the following.  
**Calculation = install- rebate + [annual operating cost x # years]**
  - a.

	<b>1 year</b>
Heat Pump	<b>\$6, 100</b>
Gas Furnace	<b>\$6, 000</b>
Wood Stove	<b>\$4, 800</b>
Solar Panels	<b>\$10, 200</b>

b.

	<b>10 years</b>
Heat Pump	<b>\$9, 700</b>
Gas Furnace	<b>\$22, 200</b>
Wood Stove	<b>\$16, 500</b>
Solar Panels	<b>\$12, 000</b>

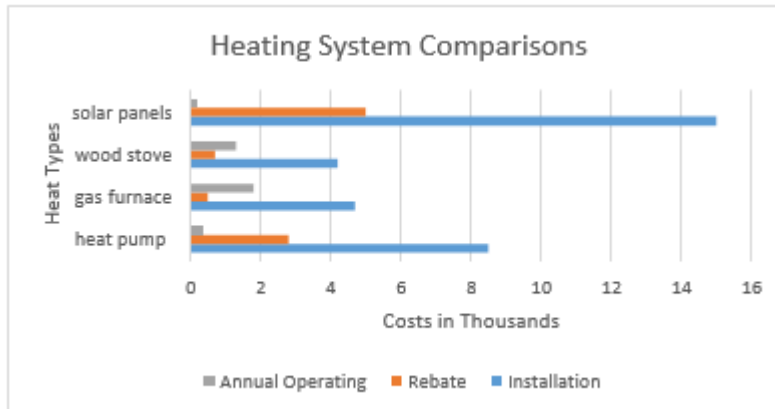
c.

	<b>20 years</b>
Heat Pump	<b>\$13, 700</b>
Gas Furnace	<b>\$40, 200</b>
Wood Stove	<b>\$29, 500</b>
Solar Panels	<b>\$14, 000</b>

5. Organize the information in the article as a table. **Layout may vary.**

	Installation	Rebate	Annual Operating
Heat Pump	\$8,500	\$2,800	\$400
Gas Furnace	\$4,700	\$500	\$1,800
Wood Stove	\$4,200	\$700	\$1,300
Solar Panels	\$15,00	\$5,000	\$200

6. Organize the information in the article as a bar chart. **Layout may vary.**



7. Which layout do you think is easiest to understand? Why? **Answers will vary.**

**ANSWER KEY:** House Front Measurement  
Skill Builders: Calculating Area, Rounding, Technical Drawings

1. The area of the wooden slatted front of the house is  $48.7845 \text{ m}^2$ . Rounding up, the answer is  **$49 \text{ m}^2$** .

Suggested steps for calculating the answer:

- A. First, work out the area of the main shape of the house – that is the rectangle and triangle that make up the shape.
- The main rectangle ( $B \times C$ ) or  $7.6 \times 8.8 = 66.88 \text{ m}^2$ .
  - The height of the triangle is ( $A - B$ ) or  $9.7 - 7.6 = 2.1 \text{ m}$ .
  - The area of the triangle is therefore  $[(2.1 \times C) \div 2]$  or  $[(2.1 \times 8.8 = 18.48) \div 2]$ .  
 $18.48 \div 2 = 9.24 \text{ m}^2$ .
  - The combined full area of the front of the house is the sum of the areas of the rectangle and triangle:  $66.88 + 9.24 = 76.12 \text{ m}^2$ .
- B. Next, work out the areas of the windows and doors, so they can be subtracted from the full area.
- The area of the door and steps is ( $D \times E$ ) or  $4.5 \times 2.3 = 10.35 \text{ m}^2$ .
  - The area of one rectangular window is ( $G \times F$ ) or  $1.2 \times 2.7 = 3.24 \text{ m}^2$ .
  - There are five rectangular windows. Multiply the area of one window by 5.  
 $3.24 \times 5 = 16.2 \text{ m}^2$ .
  - The round window has a diameter of 1m its radius is therefore 0.5 m.
  - Using  $\pi r^2$  work out the area of the round window. Use 3.142 for  $\pi$ .  
 $3.142 \times 0.5 \times 0.5 = 0.7855 \text{ m}^2$ .
- C. Next add up the areas of the door and windows.  
(door area)  $10.35 +$  (rectangle windows area)  $16.2 +$  (round window area)  $0.7855$   
 $= 27.3355 \text{ m}^2$
- D. Finally, subtract the total area for the windows and doors from the full area.  
 $76.12 - 27.3355 = 48.7845 \text{ m}^2$
- E. Round the full area to the nearest whole number.  
 **$48.7845 \text{ m}^2 = 49 \text{ m}^2$**

**ANSWER KEY:** Invoice 1  
Skill Builders: Entry Forms, Tables & Lists

Questions 1 and 2. See the entries in the invoice below.



**CROWN TOOLS &  
CONTRACTING**

We treat you like royalty!

INVOICE

TO: Alicia Wu  
LANDER CORP.  
1234 Main Street  
Anytown, AB, T1T 1T1  
(403) 888-8888

Salesperson	Invoice #	Payment Terms	Due Date
R. Johnson	0019-23	Due on receipt	Oct 27, 2019

Qty	Description	Unit Price	Line Total
5	Deluxe tool set (121 pieces)	79.00	395.00
1	Featherweight industrial ladder	156.00	156.00
3	Heavy duty 6080N fire extinguisher	99.99	299.97
1	Workshop wet-dry vac	139.00	139.00
3.5	Site Visit	127.00	444.50
Taxes:			
	Labour @ 5% =	22.23	22.23
	Items and materials @ 11% =	108.90	108.90
Subtotal			1,434.47
Sales Tax			131.13
Total			\$1,565.60

*Thank you for your business!*

Crowns Tools & Contracting, Warehouse CC, 23<sup>rd</sup> Street E, Anytown, AB

3. Crown Tools & Contracting offers a 15% discount on items and materials (not labour) for returning customers. The calculation is made before taxes are added. Recalculate the invoice to apply the discount. What is the new total? **\$1,400.76**.

One way to calculate the answer:

- a. Calculate the total of the items and materials (not labour): 989.97
- b. Multiply by 0.85: 841.47
- c. Calculate the tax on the new amount:  $841.47 \times .11 = 92.56$
- d. Add the items and materials and tax costs:  $841.47 + 92.56 = 934.03$
- e. Add the labour and tax costs:  $934.03 + 444.50 + 22.23 = 1,400.76$
- f. New total: = \$ 1,400.76

**ANSWER KEY:** Invoice 2  
Skill Builders: Conversion, Entry Forms, Tables & Lists

Questions 1 and 2. See the entries in the invoice below.



**ABC Pro Supplies**

**INVOICE**

Qty	Description	Unit Price	Line Total
5	Apprentice tool set (11 pieces; Klein)	314.00	1570.00
3	27.94 cm Rubber gloves	66.50	199.50
3	Heavy duty 6080N fire extinguisher	99.99	299.97
1	Pull-it 4-pack	38.95	38.95
2	2.27 kg carton of cast iron rods, 6.35 mm (0.635 cm) diameter and 609.6 mm (60.96 cm) in length	37.00	74.00
1	81.28 cm mechanical pick-up tool	39.54	39.54
		Subtotal	\$2221.96
		Sales Tax	\$244.42
		Total	\$2466.38

3. ABC Pro Supplies offers a 7% discount on items and materials for returning customers. The calculation is made before taxes are added. Recalculate the invoice to apply the discount. What is the new total?

**New subtotal:**  $\$2,221.96 \times 0.93 = \$2,066.42$

**New taxes:**  $\$2,066.42 \times 0.11 = \$227.31$

**New total:**  $\$2,066.42 + \$227.31 = \$2,293.73$

**ANSWER KEY:** Map Reading: Estimation  
Skill Builders: Key Words & Phrases, Rounding, Technical Drawings

- Based on information provided in the map legend, what is the main difference between Lake Michigan and the other Great Lakes?  
**All of Lake Michigan is in the United States. The international border runs through all the other lakes.**
- What geographical feature defines the southern part of the Ontario– Quebec border?  
**The Ottawa River.**
- If the scale on the map is 4 cm long, how many centimetres represent 200 km?  
**200 km = 2 cm.**
- Using the scale as a reference, complete the following table. Estimate the distances and assume driver drives an average of 80 km an hour. Round your answers up to the nearest 30 minutes.  
**Estimates may vary, but should be close to those shown below. Note: time answers should be rounded up to the hour or half hour.**

Travel From	To	Km	Time
Ottawa	North Bay	360 km	4.5 hours
Toronto	Ottawa	450 km	6 hours
Sault Ste Marie	Pembroke	650 km	8.5 hours

- There are 2 possible routes from North Bay to Thunder Bay: one goes north; the other south. Estimate the distance of, and the time it would take to travel, each route, driving an average of 80 km an hour. **Estimates may vary.**  
**Northern route: 1,110 km at 80 km/h: 13 hours, 53 mins.**  
**Southern route: 1,140 km at 80 km/h: 14 hours, 15 mins.**
- You are driving from Toronto to Kenora.
  - Estimate, using the scale, what you think the total distance is.  
**Approximately 1900 km.** Estimate should follow available driving route options and should not be estimated as a straight-line route from point to point.
  - You want to drive approximately the same number of hours each day and will drive an average of 100 km an hour. Complete the following table to show where you would stop each night.  
**Answers are approximations.**

Days	Travel From	To	Km	Time
1	Toronto	Elliot Lake	633	6:20
2	Elliot Lake	Marathon	633	6:20
3	Marathon	Kenora	633	6:20



**ANSWER KEY: Measuring Temperature**  
Skill Builders: Conversion

1. Compare measurements A and B. Which mixture is hotter? **B**
2. What is the temperature in degrees Celsius of the mixture measured in C? **20° C**
3. Calculate the temperature in degrees Fahrenheit of the mixture measured in E. Round your answer to the nearest whole degree. **162° F** ( $161.6^{\circ} \text{F} = 72^{\circ} \text{C}$ )
4. Which is the coolest mixture? **A**
5. The temperature measurements were taken, in the order presented, from the same site over the course of one day. Any sudden changes in temperature need to be reported. Which measurement(s) signal a sudden change? **C to D**
6. Review all the temperature measurements taken. Describe the trend that occurred over the day. **Answers may vary. Suggested answer: Temperatures were constant for the first 3 readings. At reading 4 they jumped and slowly increased for the rest of the day.**
7. To safely measure the temperature and other properties of the mixture workers need to wear appropriate PPE. The available heat-resistant gloves are recommended for use with temperatures over 110 degrees F. For which measurement(s) should heat resistant gloves be worn? **(110° F = 43.3° C) Therefore the gloves should be worn for measurements D through H.**

**ANSWER KEY: Mixing Cement**  
Skill Builders: Conversion, Percentages

1. Convert the packet size to grams.

$$2.1 \times 28.35 = 59.54 \text{ g}$$

2. Convert 50-70 pounds to metric.

Conversion factor is  $1 \text{ kg} = 2.2 \text{ lb.}$

$$50 \text{ lb.} = 22.73 \text{ kg}$$

$$70 \text{ lb.} = 31.82 \text{ kg}$$

$$22.73 - 31.82 \text{ kg}$$

3. What is the recommended ratio of packets to kilos?

4 per 22.73 kg – 31.82 kg bag

OR

1 per 5.68 kg – 7.96 kg bag

4. You have 160 kg of cement product. How many packets of QuickSET are needed?

20 – 28.

Since you cannot exceed 4 packets of QuickSET per 50 lb.-70 lb. (22.73 kg-31.82 kg) bag of cement product, you must round down to the nearest whole number (i.e., you cannot add more packets of QuickSET to the mixture than specified).

5. The cement mixer has a 3.5 cubic foot capacity and will hold two 90 pounds bags of mix with water. To the nearest whole number, how many loads do you need to mix to use the 160 kg of cement product?

2 loads

**ANSWER KEY:** Noise Levels

Skill Builders: Charts & Graphs, Rounding, Tables & Lists

1. If the information in Table 1 was displayed as a chart, what would the title, and the labels of the x and y axes be? **Suggested answers. Title: noise levels. X axis (horizontal): noise sources. Y axis (vertical): dBA levels**
2. Create a table to represent the following text. Give the table a title that helps describe the information in the table. Label the columns. Include all data points between 85 and 115 dBA. Round times up to nearest 0.5 of a minute.

Extreme noise can have serious negative effects on an individual’s hearing. At 85 dBA the maximum recommended exposure is 8 hours. At 88 it is reduced to 4 hours. According to the generally-accepted “dBA exchange rate”, for every 3 dBA over 85, the permissible exposure is cut in half.

**Sample Answer.**

**Title: Noise Levels by Maximum Recommended Exposure Time**

Noise Level (dBA)	Maximum Recommended Exposure Time
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	7.5 minutes
106	4 minutes (3.75 minutes)
109	2 minutes (1.875 minutes)
112	1 minute (0.9375 minutes)
115	0.5 minutes (0.46845 minutes)

3. Complete the following table for each of the tools shown in column 3 of Table 1 on the next page. Show the dBA for each tool and, using the data in the table you created, how many minutes of exposure is considered safe. Round down the tool dBA to ensure the exposure is safe. The first one is done for you.

TOOL	dBA	Minutes
Arc welder	90	240 minutes (4 hours) *rounded down to 88 dBA
<b>Belt sander</b>	<b>95</b>	<b>60 minutes (1 hour)</b>
<b>Handheld drill</b>	<b>100</b>	<b>15 minutes</b>
<b>Table saw</b>	<b>105</b>	<b>7.5 minutes</b>
<b>Jackhammer</b>	<b>110</b>	<b>2 minutes</b>
<b>Riveter</b>	<b>115</b>	<b>0.5 minutes</b>
<b>Oxygen torch</b>	<b>120</b>	<b>No acceptable exposure</b>

**ANSWER KEY: On the Job Calculations****Skill Builders: Conversion, Rounding, Percentages, Decimals & Fractions**

1. Substrate needs to be 30.5 x 38 centimetres. How many square inches is that?

**Step 1: Convert metric to imperial for 30.5 cm**

**(1 in. = 2.54 cm)**

$$\frac{? \text{ in.}}{30.5 \text{ cm}} = \frac{1 \text{ in.}}{2.54 \text{ cm}} \quad \gg \quad ? \text{ in.} = \frac{30.5 \text{ in.}}{2.54} \quad \gg \quad ? \text{ in.} = 12.01 \text{ in.}$$

$$30.5 \text{ cm} = 12.01 \text{ in.}$$

**Step 2: Convert metric to imperial for 38 cm**

$$\frac{? \text{ in.}}{38 \text{ cm}} = \frac{1 \text{ in.}}{2.54 \text{ cm}} \quad \gg \quad ? \text{ in.} = \frac{38 \text{ in.}}{2.54} \quad \gg \quad ? \text{ in.} = 14.96 \text{ in.}$$

$$38 \text{ cm} = 14.96 \text{ in.}$$

**Step 3: Calculate square inches**

$$12.01 \text{ in.} \times 14.96 \text{ in.} = 179.67 \text{ in.}^2$$

2. How many square centimetres are in a 4-in<sup>2</sup> piece of glass?

**Step 1: Convert imperial to metric**

**(1 in.<sup>2</sup> = 6.45 cm<sup>2</sup>)**

$$\frac{? \text{ cm}^2}{4 \text{ in.}^2} = \frac{6.45 \text{ cm}^2}{1 \text{ in.}^2} \quad \gg \quad ? \text{ cm}^2 = \frac{6.45 \text{ cm}^2 \times 4 \text{ in.}^2}{1 \text{ in.}^2} \quad \gg \quad ? \text{ cm}^2 = 25.80 \text{ cm}^2$$

$$4 \text{ in.}^2 = 25.80 \text{ cm}^2$$

3. When cutting glass, the cutter should be 0.06 inches from the edge of the glass. How many millimetres is that?

**Step 1: Convert imperial to metric**

**(1 in. = 25.4 mm)**

$$\frac{? \text{ mm}}{0.06 \text{ in.}} = \frac{25.4 \text{ mm}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = \frac{25.4 \text{ mm} \times 0.06 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = 1.52 \text{ mm}$$

$$0.06 \text{ in.} = 1.52 \text{ mm}$$

4. Calculate the area, in square centimetres, of a piece of glass that measures 6 feet x 3 inches.

**Step 1: Convert feet to inches**

**(1 ft = 12 in.) >> 6 x 12 in. = 72 in.**

**Step 2: Calculate square inches**

$$72 \text{ in.} \times 3 \text{ in.} = 216 \text{ in.}^2$$

**Step 3: Convert from imperial to metric**

**(1 in.<sup>2</sup> = 6.45 cm<sup>2</sup>)**

$$\frac{? \text{ cm}^2}{216 \text{ in.}^2} = \frac{6.45 \text{ cm}^2}{1 \text{ in.}^2} \quad \gg \quad ? \text{ cm}^2 = \frac{6.45 \text{ cm}^2 \times 216 \text{ in.}^2}{1 \text{ in.}^2} \quad \gg \quad ? \text{ cm}^2 = 1,393.20 \text{ cm}^2$$

$$216 \text{ in.}^2 = 1,393.20 \text{ cm}^2$$

5. A project requires 3.5 metres of electrode wire. Calculate the length in millimetres, centimetres and inches.

**(1 m = 1000 mm) > 3.5 m = 3500 mm**

**(1 m = 100 cm) > 3.5 m = 350 cm**

**Convert from metric to imperial**

**(1m = 39.37 in.)**

$$\frac{? \text{ in.}}{3.5 \text{ m}} = \frac{39.37 \text{ in.}}{1 \text{ m}} \quad \gg \quad ? \text{ in.} = \frac{39.37 \text{ in.} \times 3.5 \text{ m}}{1 \text{ m}} \quad \gg \quad ? \text{ in.} = 137.80 \text{ in.}$$

**3.5 m = 137.80 in.**

6. An electrode wire stickout is 3/8 inch. Calculate the length in millimetres and centimetres

**Step 1: Change the fraction 3/8 to a decimal.**

**3/8 in = 0.375 in.**

**Step 2: Change from imperial to metric to find millimetres.**

**(1 in. = 25.4 mm)**

$$\frac{? \text{ mm}}{0.375 \text{ in.}} = \frac{25.4 \text{ mm}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = \frac{25.4 \text{ mm} \times 0.375 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = 9.525 \text{ mm}$$

**0.375 in. = 9.525 mm = 9.53 mm**

**Step 3: Convert from imperial to metric to find centimeters.**

**(1 in. = 2.54 cm)**

$$\frac{? \text{ cm}}{0.375 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 0.375 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 0.9525 \text{ cm}$$

**0.375 in. = 0.9525 cm = 0.95 cm**

7. Convert the following quantities to the metric measurements provided.

a) 2 lbs. of flux	<b>0.91 kg</b> (1 kg = 2.2 lb.)
b) 4 quarts (US) of solution	<b>3.77 L</b> (1 L = 1.06 qt. (US))
c) 3/4 in. pipe	<b>1.19 cm</b> (1 in. = 2.54 cm)
d) 100 lbs. of fire brick	<b>45.45 kg</b> (1 kg = 2.2 lb.)
e) 18 in. welding rod	<b>45.72 cm</b> (1 in. = 2.54 cm)

**ANSWER KEY:** Patio Layout

Skill Builders: Pythagorean Theorem, Volume, Calculating Area, Rounding

1. A client wants a garden installed in one corner of her new patio. The corner is a right angle. One of the sides along the edge of the garden is to be 2 m and the other side along the edge of the garden is to be 1.5 m. How long will the third side of the garden be?

$$(a^2 + b^2 = c^2)$$

$$1.5^2 + 2^2 = c^2$$

$$c^2 = 6.25$$

$$c = \sqrt{6.25}$$

$$c = 2.5 \text{ m}$$

2. The client would like the garden framed with landscaping timbers. What is the total length of timbers that needs to be purchased?

**Sides  $1.5 + 2 + 2.5 = 6 \text{ m}$**

**Total length = 6 m**

3. The timbers are sold in 8 ft. lengths. How many lengths will need to be purchased to frame the garden?

**Convert meters to feet.**

**Use conversion ratio (1 m = 3.28 ft.)**

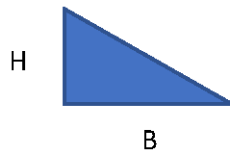
$$\frac{? \text{ ft.}}{6 \text{ m}} = \frac{3.28 \text{ ft.}}{1 \text{ m}} \quad \gg \quad ? \text{ ft.} = \frac{3.28 \text{ ft.} \times 6 \text{ m}}{1 \text{ m}} \quad \gg \quad ? \text{ ft.} = 19.68 \text{ ft.}$$

**6 m = 19.68 ft.**

**Need to purchase three (3) lengths of 8 ft. timbers.**

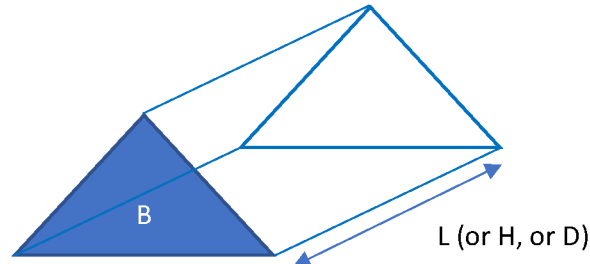
4. Steer manure needs to be ordered to fill the garden from the ground level to the top of the timbers. Manure is ordered in cubic metres. Assume the timbers are 4 x 4 inches and the manure needs to be level with the top of the timbers. How many cubic metres need to be ordered? *Round to the nearest hundredth. Recall the concept for area, volume and the conversion ratio provided (1 m = 39.37 in.).*

Recall: Area of a triangle = B (base) x H (height) ÷ 2



Recall: Volume of triangular prism = B (base) x L (length)

- where B = triangular area forming the base of a triangular prism;
- where L= the overall length (or height (H) or depth (D)) of the third dimension in the triangular prism.



Calculate the quantity of steer manure needed.

**Step 1: Convert the 4x4s to metres.**

(1 m = 39.37 in.).

$$\frac{? m}{4 in.} = \frac{1 m}{39.37 in.} \quad \gg \quad ? m = \frac{1 m \times 4 in.}{39.37 in.} \quad \gg \quad ? m = 0.1016002 m$$

**Step 2: Calculate volume of the triangular garden**

$$V = B \times D$$

$$V = [B = \text{Area of triangle}] \times [D = \text{Depth of Timbers}]$$

$$V = [B = \text{Area of triangle} = \text{base} \times \text{height} \div 2] \times [\text{Depth of timbers} = 4 in. = 0.1016002 m]$$

$$V = [1.5 m \times 2 m \div 2] \times [0.1016002 m]$$

$$V = 0.1524003 m^3$$

**Step 3: Round to the nearest hundredth.**

$$V = 0.1524003 m^3$$

$$V = 0.15 m^3$$



5. Assume the patio is a rectangle and the shortest side of the garden is  $\frac{1}{6}$  of the width of the finished patio. The longest side of the patio is 1.5 times the length of the shortest side. Using the graph paper on the next page, draw and label the patio including the new garden. Include information on the scale you use.

**Shortest side of garden = 1.5 m**

Width of patio  $\div 6 =$  shortest side of garden

Width of patio = shortest side of garden  $\times 6$

Width of patio =  $1.5 \text{ m} \times 6 = 9 \text{ m}$

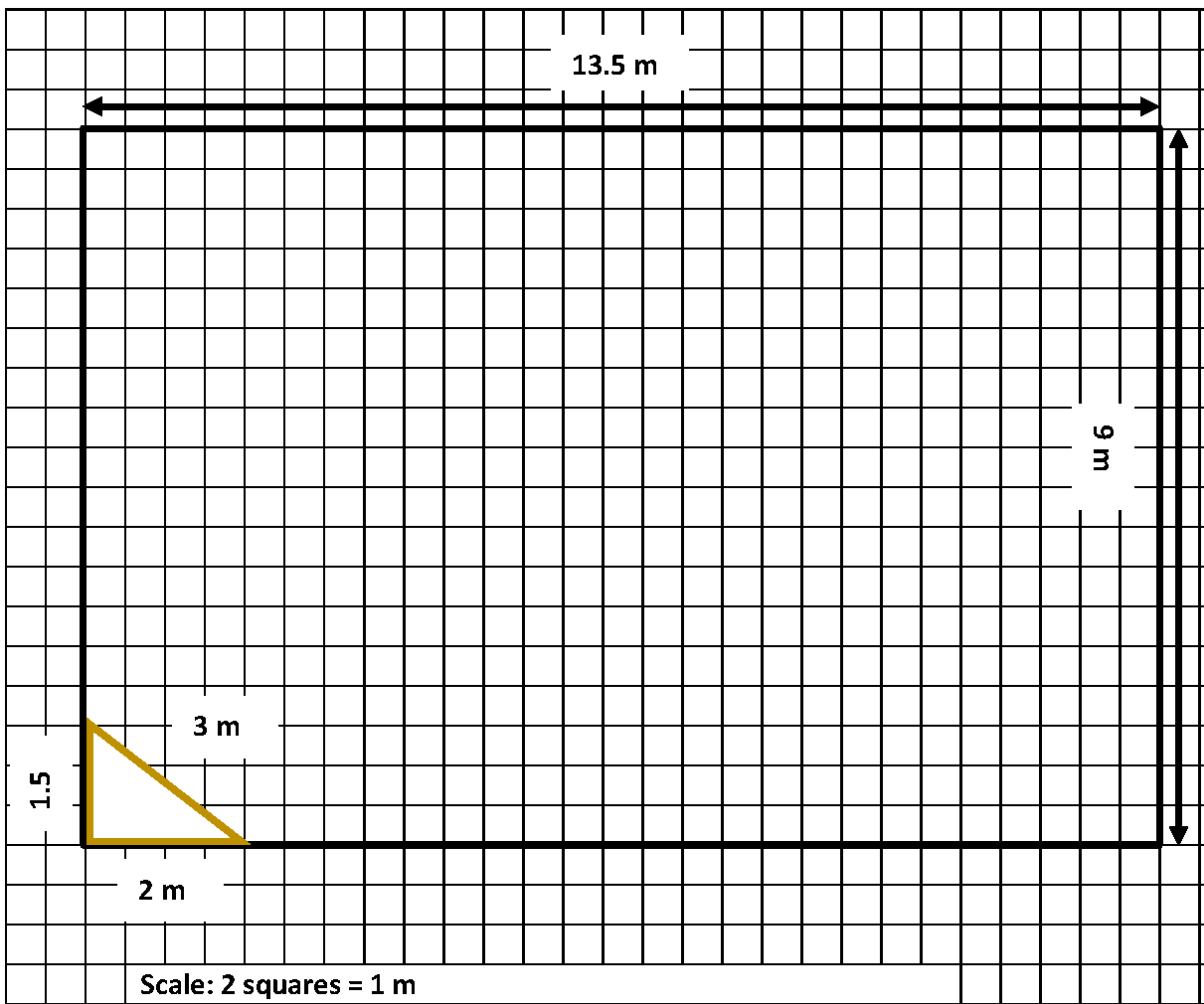
**Width of patio = 9 m**

Length of patio =  $1.5 \times$  shortest side of patio (patio width)

Length of patio =  $1.5 \times 9 \text{ m}$

**Length of patio = 13.5 m**

**Patio dimensions (W X L) = 9 m x 13.5 m**



**ANSWER KEY: Pay Statements**  
 Skill Builders: Key Words & Phrases, Entry Forms, Percentages, Decimals & Fractions

1. Refer to **Pay Statements 1** and **2** to complete the following table.

	<b>Pay Statement 1</b>	<b>Pay Statement 2</b>
Worker name	<b>John Smith</b>	<b>Joseph Mayer</b>
Cheque number	<b>321654</b>	<b>0044853</b>
Pay period end date	<b>2013/11/25</b>	<b>2018/11/25</b>
Pay date	<b>2013/11/20</b>	<b>2018/12/03</b>
Total hours worked	<b>85</b>	<b>75</b>
Gross pay	<b>\$1,725.00</b>	<b>\$1200.00</b>
Net pay	<b>\$1,294.66</b>	<b>\$968.09</b>
Year to date gross	<b>\$39,675.00</b>	<b>\$30,000.00</b>
Current EI deduction	<b>\$28.62</b>	<b>\$22.56</b>
Year to date CPP deduction	<b>\$1,495.69</b>	<b>\$1,318.50</b>

2. What do CPP, EI and YTD stand for? **Canada Pension Plan, Employment Insurance, and Year to Date**
3. What type of employee ID does each company use? **Pay statement 1 uses company issued ID numbers. Pay Statement 2 uses company issued employee numbers.**
4. Calculate the CPP and EI rates on Pay Statement 1.

$$65.03/1725 = 0.0376985$$

$$0.0376985 \times 100 = 3.76985$$

$$\text{CPP} = 3.77\%$$

$$28.62/1725 = 0.0165913$$

$$0.0165913 \times 100 = 1.65913$$

$$\text{EI} = 1.66\%$$

5. If the rate of deduction for CPP goes up 1%, calculate the new deduction amounts for each employee for this pay period.

**Pay Statement 1**

Original CPP is 3.77%. Increase = 4.77%.

New CPP =  $1725 \times 0.0477 = 82.2825$

New CPP = \$82.28

**Pay Statement 2**

Original CPP is 4.40%. Increase = 5.40%.

New CPP =  $1200 \times 0.0540 = 64.80$

New CPP = \$64.80

6. Calculate the total percentage of the deductions for this pay period for each employee.

**Pay Statement 1**

$430.34/1725 = 0.2494724$

$0.2494724 \times 100 = 24.94724$

= 24.95%

**Pay Statement 2**

$231.91/1200 = 0.1932583$

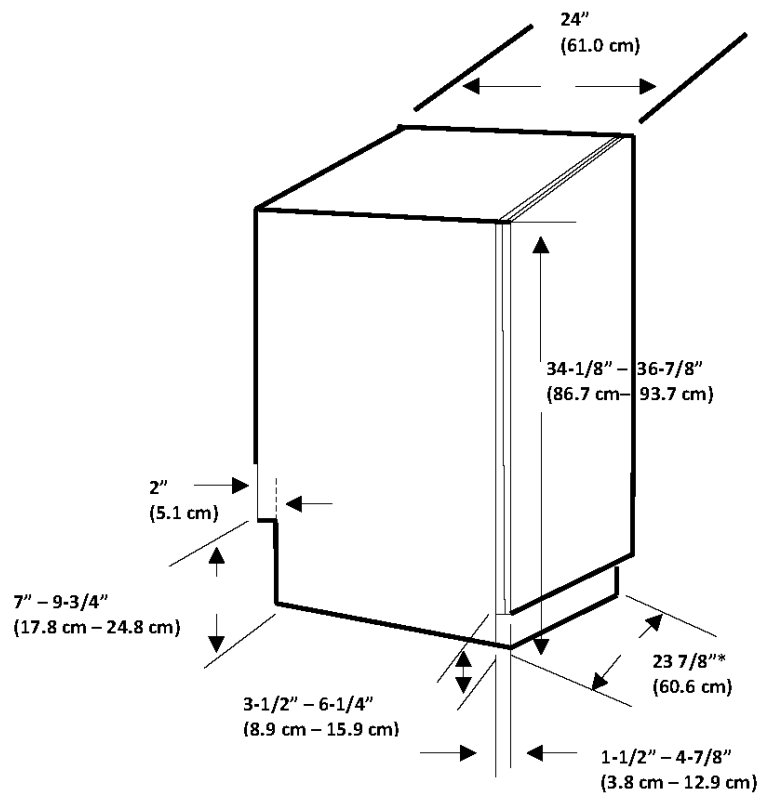
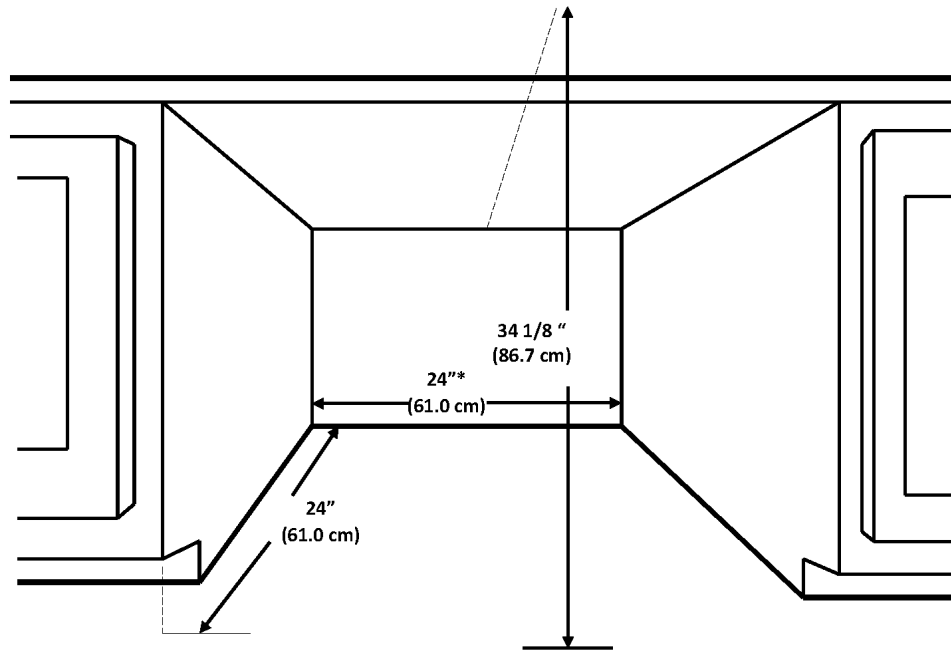
$0.1932583 \times 100 = 19.32583$

= 19.33%

**ANSWER KEY:** Product Installation

Skill Builders: Conversion, Technical Drawings, Rounding & Percentages, Decimals & Fractions

1. Answers shown in the technical drawings below.



1. The technical drawings include both metric and imperial measurements. Calculate the correct conversion to centimetres for the four measurements that are circled and lettered on the drawing. Round to the nearest tenth. (1 inch = 2.54 cm)

**A.  $34\text{-}1/8'' = 86.7$  cm**

$$\frac{? \text{ cm}}{34.125 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 34.125 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 86.\underline{6}775 \text{ in.}$$

**B.  $2'' = 5.1$  cm**

$$\frac{? \text{ cm}}{2 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 2 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 5.\underline{0}8 \text{ in.}$$

**C.  $3\text{-}1/2'' - 6\text{-}1/4'' = 8.9$  cm –  $15.9$  cm**

$$\frac{? \text{ cm}}{3.5 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 3.5 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 8.\underline{9}9 \text{ in.}$$

$$\frac{? \text{ cm}}{6.25 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 6.25 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 15.\underline{8}75 \text{ in.}$$

**D.  $1\text{-}1/2'' - 4\text{-}7/8'' = 3.8$  cm –  $12.4$  cm**

$$\frac{? \text{ cm}}{1.5 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 1.5 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 3.\underline{8}1 \text{ in.}$$

$$\frac{? \text{ cm}}{4.875 \text{ in.}} = \frac{2.54 \text{ cm}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = \frac{2.54 \text{ cm} \times 4.875 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ cm} = 12.\underline{3}825 \text{ in.}$$

2. If the dishwasher requires a half inch clearance on all 3 sides, and a half inch at the top, what are the dimensions of the largest dishwasher that will fit in the opening? Include width, depth, and height. Show your answers in imperial and metric.

**$23\text{-}1/2$  in. (w) x  $23\text{-}1/2$  in. (d) x  $33\text{-}5/8$  in. (h)**

**$59.69$  cm (w) x  $59.69$  cm (d) x  $85.41$  cm (h)**

3. Calculate the cubic volume of the opening, as shown in the Cutout Dimensions technical drawing. Show the dimensions in imperial.

**$24$  in. x  $24$  in. x  $34.125$  in. =  $19,656$  in.<sup>3</sup>**

4. Trim pieces are provided with the unit to fit the opening shown in the drawing. Without side trims, the unit width and depth is 59.7 cm. Without top trim, the unit height is 85.7 cm.

Calculate the difference in volume between the unit with trim and without trim. Show your answer in imperial units. Round volume to the nearest whole number. (1 in.<sup>3</sup> = 16.39 cm<sup>3</sup>).

**Step 1: Calculate unit volume without trim.**

**$59.7$  cm. x  $59.7$  cm. x  $85.7$  cm. =  $305,442.51$  cm<sup>3</sup>**

**Step 2: Convert unit volume from metric to imperial.**

$$\frac{? \text{ in.}^3}{305,442.51 \text{ cm}^3} = \frac{1 \text{ in.}^3}{16.39 \text{ cm}^3} \quad \gg \quad ? \text{ in.}^3 = \frac{1 \text{ in.}^3 \times 305,442.51 \text{ cm}^3}{16.39 \text{ cm}^3} \quad \gg \quad ? \text{ in.}^3 = 18,635.91 \text{ in.}^3 = 18,636 \text{ in.}^3$$

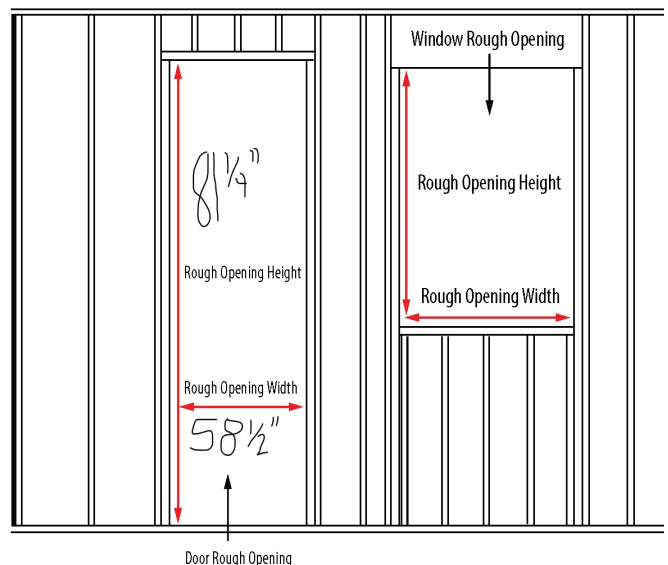
**$305,442.51$  cm<sup>3</sup> =  $18,636$  in.<sup>3</sup>**

**Step 3: Subtract volume without trim from volume with trim.**

**$19,656$  in.<sup>3</sup> –  $18,636$  in.<sup>3</sup> =  $1,020$  in.<sup>3</sup>**

**ANSWER KEY:** Rough Openings: Calculation  
Skill Builder: Tables & Lists, Technical Drawings

- Locate the following:
  - Frame width for a 5' door. **62"**
  - Opening height for the tallest 2'10" outswing door. **85 1/4"**
  - Minimum rough opening width for the smallest double door available. **58 1/2"**
  - Maximum opening height for 5' 8" door. **86"**
- Calculate the following:
  - 80" in feet. **6.67' or 6'8"**
  - 63 1/4" in feet: **5.27' or 5' 3 1/4"**
  - 84 1/2" in feet: **7.04' or 7' 1/2"**
- The rough opening was made for a 2'8" single door and should have been for a 4'8" double. Using the minimum rough opening dimensions for both, how much larger does the opening need to be? **24.5" or 24 1/2"**
- What is the difference between the largest opening height for a 2'6" inswing door and a 5'4" double outswing door? **3/4"**
- Label the illustration showing the rough opening measurement for the smallest double door shown in the chart. **Label should be 58-1/2"**.
- Label the illustration showing the shortest rough opening height measurement for a 6' o" double outswing door. **Label should be 81 1/4"**
- Refer to your textbook, or search online, to locate the rough opening width and height for a common window and door size. Label the illustration with those dimensions. **Answers will vary.**



## ANSWER KEY: Rough Openings: Conversion Skill Builders: Conversion, Rounding, Tables & Lists

1. Convert the following from inches to mm. Calculate to 2 decimal places. Include the unit in your answer. (1 in. = 25.4 mm)

a)  $27\frac{3}{4}$ " **704.85 mm**

$$\frac{? \text{ mm}}{27.75 \text{ in.}} = \frac{25.4 \text{ mm}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = \frac{25.4 \text{ mm} \times 27.75 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = 704.85 \text{ mm}$$

b) 84" **2133.60 mm**

$$\frac{? \text{ mm}}{84 \text{ in.}} = \frac{25.4 \text{ mm}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = \frac{25.4 \text{ mm} \times 84 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = 2133.60 \text{ mm}$$

c)  $71\frac{1}{4}$ " **1809.75 mm**

$$\frac{? \text{ mm}}{71.25 \text{ in.}} = \frac{25.4 \text{ mm}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = \frac{25.4 \text{ mm} \times 71.25 \text{ in.}}{1 \text{ in.}} \quad \gg \quad ? \text{ mm} = 1809.75 \text{ mm}$$

2. Convert the following from mm to inches. Calculate to the closest 1/8 inch. Include the unit in your answer. (1 in. = 25.4 mm)

a) 2032 mm **80"**

$$\frac{? \text{ in.}}{2032 \text{ mm}} = \frac{1 \text{ in.}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = \frac{1 \text{ in.} \times 2032 \text{ mm}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = 80 \text{ in.}$$

b) 915 mm **36"**

$$\frac{? \text{ in.}}{915 \text{ mm}} = \frac{1 \text{ in.}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = \frac{1 \text{ in.} \times 915 \text{ mm}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = 36.02 \text{ in.}$$

c) 1000 mm **39-3/8"**

$$\frac{? \text{ in.}}{1000 \text{ mm}} = \frac{1 \text{ in.}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = \frac{1 \text{ in.} \times 1000 \text{ mm}}{25.4 \text{ mm}} \quad \gg \quad ? \text{ in.} = 39.37 \text{ in.}$$

3. Complete the following table of popular door sizes. Include the unit in your answers. Calculate all metric measurements to the nearest whole number.

Metric mm	Imperial feet & inches	Imperial inches
1830 mm x 610 mm	6' 0" x 2' 0"	<b>72" x 24"</b>
<b>1981 mm x 457 mm</b>	6' 6" x 1' 6"	78" x 18"
1981 mm x 762 mm	<b>6' 6" x 2' 6"</b>	78" x 30"
<b>2038 mm x 613 mm</b>	6' 8-1/4" x 2'-1/8"	80-1/4" x 24-1/8"
2040 mm x 721 mm	6' 8-5/16" x 2' 4-3/8"	<b>80-5/16" x 28-3/8"</b>

4. Recreate the Opening Height sub-headings and the first 2 lines of the **Rough Openings** table using metric instead of imperial measurements. Calculate to the nearest whole number. Include the unit in your answers.

## Rough Openings

Door Description	Opening Width		Opening Height	
	Actual Frame Width Size	Stud to Stud Rough Opening Minimum	2032 mm	2134 mm
610 mm	648 mm	661 mm	Inswing 2083 mm	Inswing 2184 mm
711 mm	749 mm	762 mm	Outswing 2064 mm	Outswing 2165 mm



**ANSWER KEY: Tiny House**  
Skill Builder: Calculating Area, Technical Drawings

1. Is the structure intended to be fixed in place or movable? How do you know? **Movable. There is a trailer hitch.**
2. How many stories is the structure? **1 ½ (1 + a loft and bedroom on the second level with an open ceiling above the LR).**
3. What is the exterior perimeter of the structure? **80 ft. 8 in.**
4. What is the total square footage of the bedroom (including the closet)?  
(5 ft. 8 in. x 12 ft.) + (2 ft. 6 in. x 8 ft. 2 in.)  
 $(5.67 \text{ ft.} \times 12 \text{ ft.}) + (2.5 \text{ ft.} \times 8.17 \text{ ft.}) = 68 \text{ ft.}^2 + 20.4167 \text{ ft.}^2 = 88.42 \text{ ft.}^2$
5. What are the dimensions of the staircase? **2 ft. 6 in. x 3 ft. 4 in.**
6. How many exits are there? Where are they? **Two. 1 at the end opposite the hitch and 1 to the left of the kitchen.**
7. What is the total square footage of the developed spaces on the second level?  
(answer from 4) + (8 ft. 4 in. x 5 ft.)  
 $88.42 \text{ ft.}^2 + (8.33 \text{ ft.} \times 5) = 130.08 \text{ ft.}^2$
8. What is the square footage of the kitchen?  
**8 ft. 4 in. x 8 ft. 8 in.**  
 $8.33 \text{ ft.} \times 8.67 \text{ ft.} = 72.22 \text{ ft.}^2$
9. What are the dimensions of the bathroom? **3 ft. x 8 ft. 4 in.**
10. If a city bylaw permits tiny houses that occupy no more than ½ of the existing backyard, how large must the yard be to accommodate this structure? **The backyard must be equal to or greater than 16 ft. 8 in. x 32 ft. OR, 8 ft. 4 in. x 64 ft.**

OR

The backyard dimensions must have an area of at least 533.12 sq. ft. (the square footage of the main level of the house x 2).

**8 ft. 4 in. x 32 ft.**

$8.33 \text{ ft.} \times 32 \text{ ft.} = 266.56 \text{ ft.}^2$

$266.56 \text{ ft.}^2 \times 2 = 533.12 \text{ ft.}^2$

## ANSWER KEY: Volume of Cylinders and Cones

### Skill Builders: Volume, Rounding

1. A cylindrical septic tank is 1.2m in diameter and 1.8m high. How many litres will it hold? Round to the nearest whole number. (1 m<sup>3</sup> = 1000 L)

$$V = \pi r^2 h$$

$$V = \pi \times 0.6^2 \times 1.8$$

$$V = 2.036 \text{ m}^3$$

$$V = 2.036 \times 1000$$

$$V = 2036 \text{ litres}$$

2. A rainwater downpipe is 30" high and 4" wide. Calculate the volume of the pipe, in litres. Round to the nearest hundredth. (1 L = 61.023 in.<sup>3</sup>)

$$V = \pi r^2 h$$

$$V = \pi \times 2^2 \times 30 \text{ in.}$$

$$V = 376.991 \text{ in.}^3$$

$$V = \frac{? \text{ L}}{376.991 \text{ in.}^3} = \frac{1 \text{ L}}{61.023 \text{ in.}^3} \gg V = \frac{1 \text{ L} \times 376.991 \text{ in.}^3}{61.023 \text{ in.}^3} \gg V = 6.178 \text{ L}$$

$$V = 6.18 \text{ litres}$$

3. Residential sewer pipe, connected to a toilet, must have a diameter that is a minimum of 3". Using that standard, if the pipe is 20' long, calculate the volume of the pipe, in litres. Round to the nearest tenth. (1 L = 61.023 in.<sup>3</sup>).

**Converted all measurements to inches. >> 20 ft. = 240 in.**

$$V = \pi r^2 h$$

$$V = \pi \times 1.5^2 \times 240 \text{ in.} = 1696.46 \text{ in.}^3$$

$$V = \frac{? \text{ L}}{1696.46 \text{ in.}^3} = \frac{1 \text{ L}}{61.023 \text{ in.}^3} \gg V = \frac{1 \text{ L} \times 1696.46 \text{ in.}^3}{61.023 \text{ in.}^3} \gg V = 27.800 \text{ L}$$

$$V = 27.8 \text{ litres}$$

4. A storage tank is 13' in diameter and 3m high. How many gallons will it hold? There are 7.481 cubic feet in a US liquid gallon. Round to the nearest hundredth. (1 gal. (US) = 7.48 ft.<sup>3</sup> and (1 m = 3.28 ft.)

**Converted all measurements to feet. >> 3m = 9.48 ft.**

$$V = \pi r^2 h$$

$$V = \pi \times 6.5^2 \times 9.48 \text{ ft.}$$

$$V = 1306.08573 \text{ ft.}^3$$

$$V = \frac{? \text{ gal. (US)}}{1306.08573 \text{ ft.}^3} = \frac{1 \text{ gal. (US)}}{7.48 \text{ ft.}^3} \gg V = \frac{1 \text{ gal. (US)} \times 1306.08573 \text{ ft.}^3}{7.48 \text{ ft.}^3} \gg V = 9770.827345 \text{ gal. (US)}$$

$$V = 9770.83 \text{ gallons (US)}$$

5. A storm water pipe has an exterior dimension of 8" and the interior dimension is 1" smaller. Calculate the volume, of the pipe, in litres, per 50'. Round to the nearest hundredth. (1 L = 61.023 in.<sup>3</sup>)

**Converted all measurements to inches. >> 50 ft. = 600 in.**

$$V = \pi r^2 h$$

$$V = \pi \times 3.5^2 \times 600 \text{ in.}$$

$$V = 23,090.706 \text{ in.}^3$$

$$V = \frac{? L}{23,090.706 \text{ in.}^3} = \frac{1 L}{61.023 \text{ in.}^3} \gg V = \frac{1 L \times 23,090.706 \text{ in.}^3}{61.023 \text{ in.}^3} \gg V = 378.393 L$$

**V = 378.39 litres (per 50 ft.)**

6. Once it is welded, the bottom cone for a grain hopper will have a height of 2.04 metres and the radius will be 1.57 metres. How much grain will the cone hold? Round to the nearest hundredth.

$$V = \pi r^2 h \div 3$$

$$V = \pi \times 1.57^2 \times 2.04 \div 3$$

$$V = 15.79717193 \text{ m}^3 \div 3$$

$$V = 5.265723978 \text{ m}^3$$

$$V = 5.27 \text{ m}^3$$

7. By looking at the amount of fill dropped off at a construction site, the foreperson estimates that it is not going to be enough for the area that needs to be filled. The fill is piled in a cone shape on the edge of the site. The amount ordered was 100 m<sup>3</sup>. The pile of fill is 7.5 m high with a diameter of 7 m. Was enough fill delivered? Show your calculations. Round to the nearest tenth.

$$V = \pi r^2 h \div 3$$

$$V = \pi \times 3.5^2 \times 7.5 \div 3$$

$$V = 288.633825 \text{ m}^3 \div 3$$

$$V = 96.21127502 \text{ m}^3$$

$$V = 96.2 \text{ m}^3$$

**No. The amount of fill delivered is about 4 cubic metres short.**

8. Engine cleaner needs to diluted at 180 mL of liquid concentrate in 4 litres of water. Is the bucket below large enough to hold the mixture? Round to the nearest hundredth. (1 mL = 1000 m<sup>3</sup>) and (1 L = 1000 mL)

**Calculate volume in mm<sup>3</sup>**

$$V = \pi r^2 h$$

$$V = \pi \times 100^2 \times 140 \text{ mm}^3$$

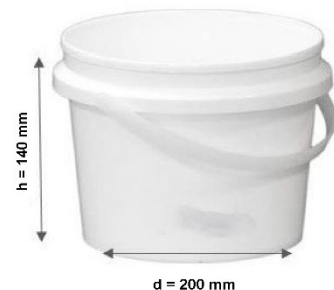
$$V = 4,398,229.715 \text{ mm}^3$$

$$V = \frac{? \text{ mL}}{4,398,229.715 \text{ m}^3} = \frac{1 \text{ mL}}{1000 \text{ m}^3} \gg V = \frac{1 \text{ mL} \times 4,398,229.715 \text{ m}^3}{1000 \text{ m}^3} \gg V = 4,398.229715 \text{ mL}$$

$$V = \frac{? L}{4,398.229715 \text{ mL}} = \frac{1 L}{1000 \text{ mL}} \gg V = \frac{1 L \times 4,398.229715 \text{ mL}}{1000 \text{ mL}} \gg V = 4.398229715 L$$

$$V = 4.40 L$$

**Yes. The bucket can hold almost 4.4 litres and the concentrate and water mixed together are only 4.18 litres.**



**ANSWER KEY: Work Schedules**

Skill Builders: Key Words &amp; Phrases, Tables &amp; Lists

1. How many days a week does the company operate? **6 days.**
2. Which crew has the fewest working days this period? **Crew C (9 days)**
3. Crew B needs to add a day on Monday the 21. Which crew is available to assist? **Crew C.**
4. Which project are scheduled for the shortest period of time? **Main St. and Teal Trail are both scheduled for only 1 day.**
5. Kim is unable to work on the final day of the 42<sup>nd</sup> Avenue project. What workers could be available to pick up the shift? **Anyone from Crew A.**
6. Which crew will be working at the Paper Street site on the June 25? **Crew B.**
7. Which crew works the fewest number of job sites this period? **Crew B (2 sites. Treesdale and Paper).**
8. On which day will work at 659 Treesdale Crt be completed? **Saturday June 19.**
9. Which crew does not work Saturdays? **Crew A.**
10. Each shift is 8.5 hours. How many hours will Hester work during this pay period? **76.5 hours.**