NSF ATE Grant "Welding: Wisconsin's Ultimate STEM Pathway" Math Kit

The following items were compiled to create a math kit that can be utilized in math classes taken by students in manufacturing related fields, specifically welding. The activities where each of the items are used are listed and can be found at www.nwtc.edu/mathnsf. Answer keys and instructor facilitation notes can be sent to instructors or appropriate users of the resources by submitting a request through the website. Also, if any additional information is needed about where to order items, direct these questions through the website request for more information.

Item	Quantity	Description	Approximate Cost of Materials	Activities items are necessary for
DeWalt Contractor Tool Chest	1	Utilized to carry all math kit items	$50	None
Combination Squares	10	Steel Rulers used for measuring in many activities, there are 10 in our kits	$7 each x10 = $70	2 – Fractions 4 – Measurement 6 – Algebra 8 – Trigonometry 9 – Bolt Hole Circle
Pee Wee Tape	20	Soft retractable tape measure with US and Metric System units, we ordered these in bulk with a logo, Ten would be sufficient instead of 20	$1 each x20 = $20 Ten of these would be sufficient	7 – Geometry 8 - Trigonometry
Kitchen Scale	1	Best if it measures to the nearest 0.05 oz	$20	3 – Decimals 4 – Measurement 6 – Algebra 7 - Geometry
Measuring Cup	1	1 or 2 cup size is ideal	$3	7 – Geometry
Scissors	10	Ten may not be necessary for some size classes, one per group is ideal	$1.50 eachx10 = $15	1 – Whole Numbers if using optional visual aids 8 – Trigonometry 9 – Bolt Hole Circle
Compasses	10	Ten may not be necessary for some size classes, one per group is ideal	$0.70 each x 10 = $7.00	8 – Trigonometry 9 – Bolt Hole Circle
Angle Finders	4	Used to measure angles, not necessary for Trigonometry Activity but it is referenced in a step to use	$7 each x 4 = $28	8 – Trigonometry
Micrometer	1	Not necessary, but referred to in Decimal Activity and a good tool for students to get familiar with and take turns using	$31	3 – Decimals
Dial Caliper	1	Not necessary, but referred to in Decimal Activity and a good tool for students to get familiar with and take turns using	$21	3 – Decimals
Copies of Ryerson Stock List Charts	20	Copies to look up weights for materials utilized	Cost of printing	3 – Decimals 4 – Measurement 7 - Geometry
Storage Boxes (shoe size) or Gallon Baggies for organizing aluminum parts	2	Not necessary, but keeps items in the kit organized	$5	---

Produced Items				
Aluminum Parts for Fraction and Decimal Activities	10 of each part	See dimensions below, parts are all deburred (ends smoothed) and stamped with part label (A1, A2, T1,…), Ten may not be necessary for some size classes, one per group is needed	$45	2 – Fractions 3 - Decimals
Aluminum Parts for Algebra Activity	10 of each part	See dimensions below, parts are all deburred, Ten may not be necessary for some size classes, one per group is needed	$28	6 - Algebra
Motor Stand	1	See blueprint below	$6.50	4 - Measurement
Fuel Tank	1	See blueprint below	$18	7 - Geometry
Tank Reducer	1	See blueprint below	$6	8 - Trigonometry
Bolt Hole Circle	1	See blueprint below	$6	9 – Bolt Hole Circle
		Approximate Total Cost of Produced Items *	$110	
		Approximate Total Cost of Kit	$380	

*This is an approximate cost of materials when ordered. This may change due to the cost of metals fluctuating. For the aluminum parts, it was not much more to order these pre-cut versus order full lengths and having the welding faculty cut them which we did after our first round of making our first few kits. The prices above reflect when they were bought as full lengths.

Aluminum Parts for Fraction and Decimal Activities – Dimensions

These parts should be stamped

A1: Angle Iron - $1\frac{1}{2}$" x $1\frac{1}{2}$"x $\frac{1}{8}$", length = $3\frac{1}{4}$"

A2: Angle Iron - $1\frac{1}{2}$" x $1\frac{1}{2}$"x $\frac{1}{8}$", length = $4\frac{7}{16}$"

T1: Rectangular Tubing - 1" x 1"x $\frac{1}{8}$", length = $2\frac{5}{8}$"

T2: Rectangular Tubing -1" x 1"x $\frac{1}{8}$", length = $3\frac{9}{16}$"

FB1: Flat Bar - 1"x $\frac{1}{4}$", length = $1\frac{15}{16}$"

FB2: Flat Bar - $1\frac{1}{2}$"x $\frac{1}{8}$", length = $3\frac{1}{2}$"

FB3: Flat Bar - 2"x $\frac{3}{16}$", length = $5\frac{1}{8}$"

Aluminum Parts for Algebra Activity – Dimensions

These should remain unlabeled

Round Stock – 1” diameter, $3\frac{1}{8}$" length

Round Stock – $\frac{1}{2}$" diameter, $5\frac{1}{2}$" length

Square Stock - $\frac{3}{8}$" x $\frac{3}{8}$" , $6\frac{3}{4}$" length

Rectangular Bar – $\frac{1}{2}$"x$\frac{3}{4}$", $4\frac{13}{16}$" length

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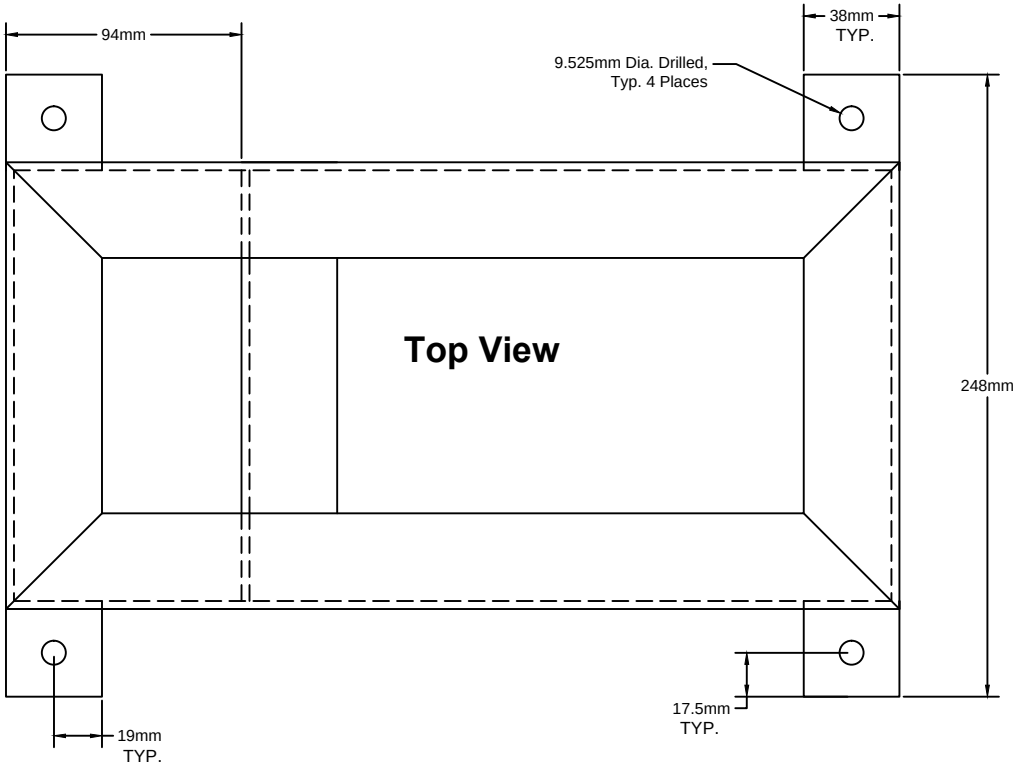
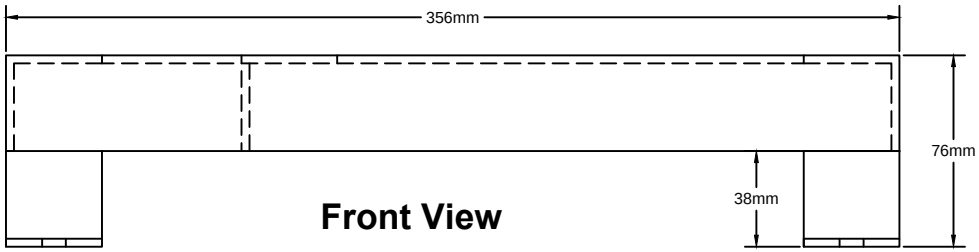
- This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit http://creativecommons.org/licenses/by/4.0/.
- For answer keys and additional resources about this activity, go to www.nwtc.edu/mathnsf and submit the form for more information.



Note:

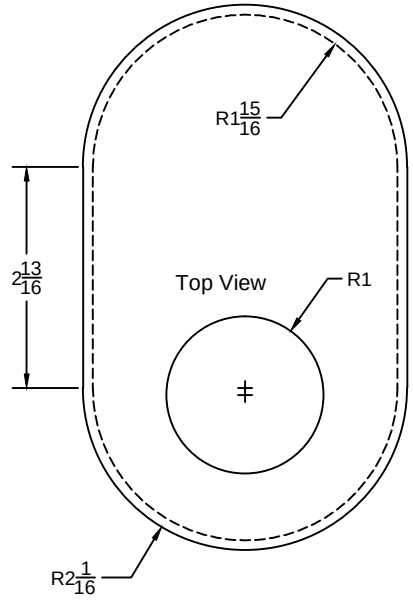
1. All Material is 1 $\frac{1}{2}$" X 1 $\frac{1}{2}$" X $\frac{1}{8}$" Angle Iron
2. All Welds to be continuous unless otherwise noted
3. Grind top surface of pump base smooth
4. Break all sharp edges

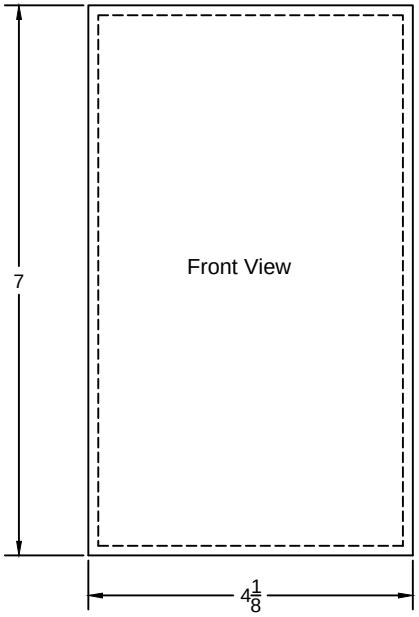


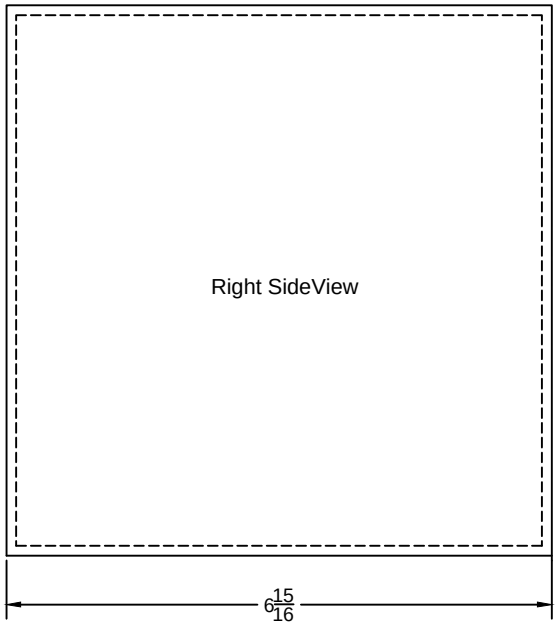
Rev. 1	NWTC Metal Fab II	
Drawn By: Wayne Haines		
Checked By:	Motor Stand	
Scale: $\frac{1}{4}$" = 1"		
Date: 12/20/2012	Drawing Number: MF 2012	1 of 1

Storage Tank

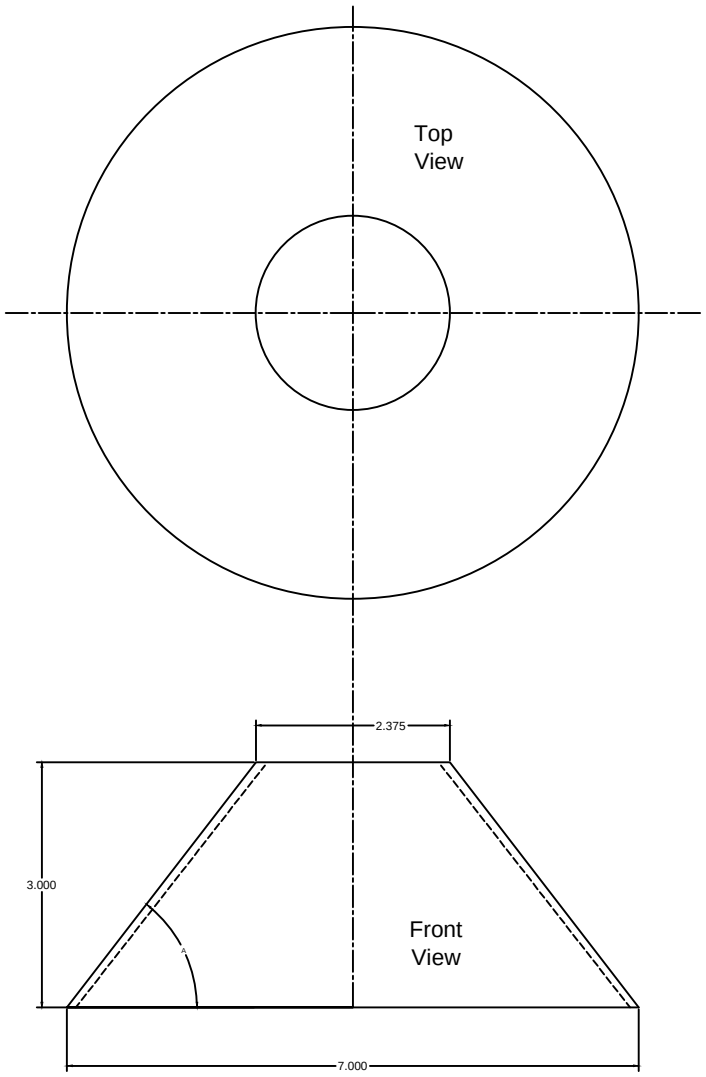
Note: All material is $\frac{1}{8}$" thick



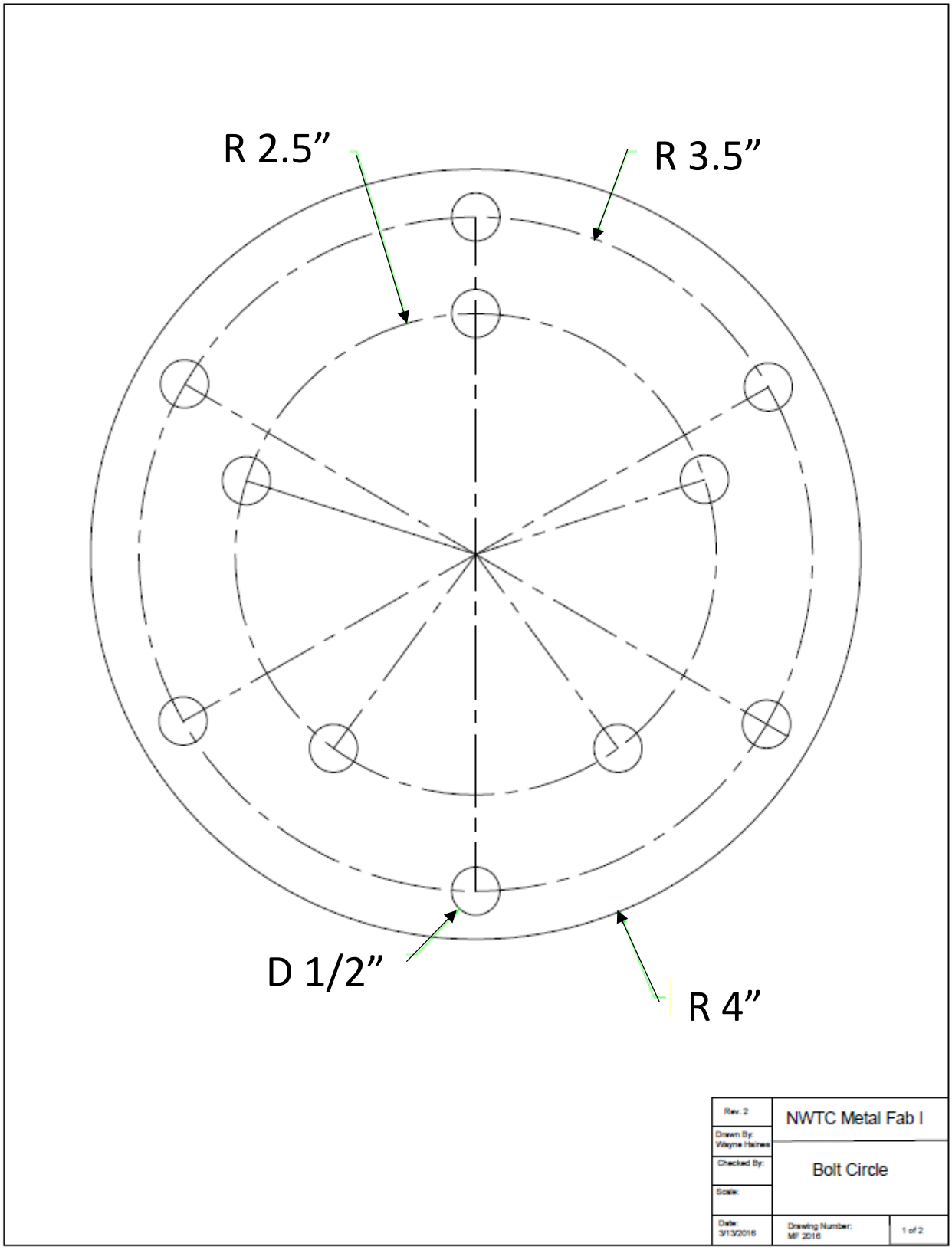




Rev. 2	NWTC Metal Fab II	
Drawn By: Wayne Haines	Final Project Tank	
Checked By:		
Scale:		
Date: 4/1/2012	Drawing Number: MF 2012	1 of 1



Rev. 2	NWTC Metal Fab II	
Drawn By: Wayne Haines		
Checked By:	Tank Cone	
Scale:		
Date: 3/13/2012	Drawing Number: MF 2012	1 of 2



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