Welding: Hibachi Grill Project

Vent Hole Layout

Mathematical Precedence (Order of Operations)

There is a specific order of operations used to simplify a multi-step mathematical expression. The problem arises with even a simple expression like:

$$3 + 4 \times 5$$

If 3 and 4 were added first, then multiplied by 5 the result would be 35.
If 4 and 5 were multiplied first, then 3 was added the result would be 23.

$$35 \neq 23$$

Mathematics has established rules that dictate in what order operations are preformed. Some operations are considered more important and must precede others (mathematical precedence or order of operations). Mathematical expressions will consist of constants, variables, operators, and symbols. It is the operators, sometimes modified by special symbols that must be performed according to the rules of precedence.

The correct answer above is 23 when the proper order of operations is followed.

Order of Operations or Mathematical Precedence:

First	Operations within parentheses or other grouping symbols ( ), { }, [ ]
:	Exponents and Radicals N^x, $\sqrt[x]{N}$
:	Multiplication/Division in order left to right
Last	Addition/Subtraction in order left to right

Notice multiplication and division are done in order from left to right:

$$40 \div 5 \times 4 = 8 \times 4 = 32$$

$$\frac{7}{4} - \left(\frac{1}{2}\right)\left(\frac{3}{16}\right) = \frac{7}{4} - \frac{3}{32} = \frac{7}{4}\left(\frac{8}{8}\right) - \frac{3}{32} = \frac{56}{32} - \frac{3}{32} = \frac{53}{32} = 1\frac{21}{32}$$

Also addition and subtraction are done in order from left to right:

$$9 - 12 \div 3 + 1 = 9 - 4 + 1 = 5 + 1 = 6$$

Application:

Look at the attached shop drawing of the airbox assembly; on the front piece there is a hole to drill, a hole to punch and a nut to braze on. These operations will be done before assembling the airbox.

List the order in which these operations need to be done:

1.

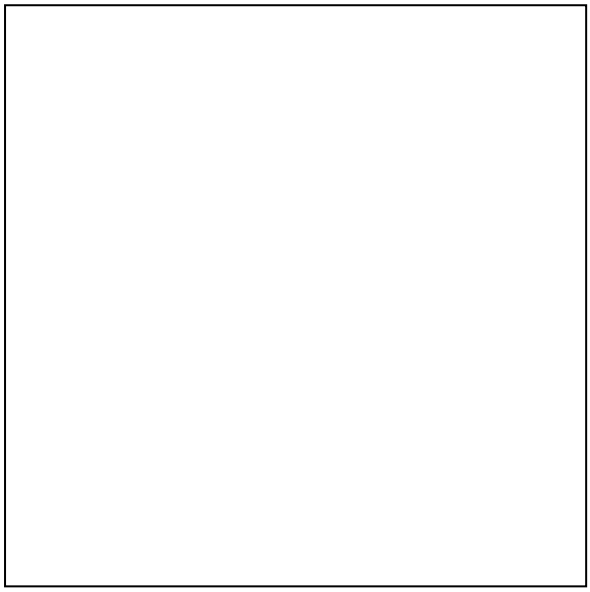
2.

3.

Perform the following operations; make sure to follow the proper order of operations.

1. $10-8\times2+3$	2. $\frac{3}{4}+\frac{1}{2}\left(\frac{5}{8}\right)$
3. $2(3+5)-7=$	4. $\frac{1}{4}\left(\frac{1}{2}\right)+\frac{1}{8}=$
5. $2\times30-15\div3$	6. $\frac{1}{8}\left(\frac{5}{2}\right)+\frac{1}{2}\left(\frac{3}{4}\right)=$

7. Using measuring tools sketch the face of your ventilation box where you will punch the vent hole. Make the sketch to scale (1 in = 1 in).



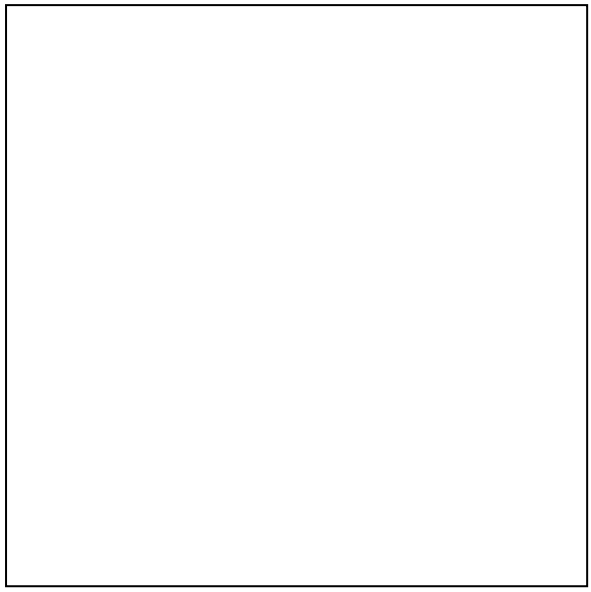
8. Place a vent hole with diameter $\frac{3}{16}$" in the middle of the panel on your sketch.

9. How much distance would be left on all four sides of the hole? Show your calculations below and label the distances on the sketch.

10. To the left of the vent hole, place a pivot hole of diameter $\frac{1}{4}$" exactly half way between the vent hole and the edge of the box.

11. How much distance is on all four side of the pivot hole? Show your calculations below and label the distances on the sketch.

12. Using measuring tools sketch the face of your ventilation box where you will punch the vent hole. Make the sketch to scale (1 in = 1 in).



13. Place a vent hole with diameter $\frac{3}{16}$", in the lower half of the panel, so that $\frac{3}{4}$" was of the panal is left undisturbed under the hole, sketch the hole and the dimension around the hole on your sketch.

14. How much distance would be left on all four sides of the hole? Show your calculations below and label the distances on the sketch.

15. To the left of the vent hole, place a pivot hole of diameter $\frac{1}{4}$" exactly half way between the vent hole and the edge of the box.

16. How much distance is on all four side of the pivot hole? Show your calculations below and label the distances on the sketch.