ISO 9000 Overview 110: Rules—Properties of Real Numbers

ISO 9000 supplies the industry with a set of common rules to follow. This brings consistent quality control to the customer regardless of who the supplier is.

The same type of rules or Properties exists in Mathematics, called the Properties of real numbers. Below is a list of the Properties of Multiplication and Addition. There are no properties of Division or Subtraction, but that is a different lesson.

	Property	Example
1.	Commutative Property of Addition $a + b = b + a$	$2 + 3 = 3 + 2$
2.	Commutative Property of Multiplication $a \bullet b = b \bullet a$	$2 \bullet (3) = 3 \bullet (2)$
3.	Associative Property of Addition $a + (b + c) = (a + b) + c$	$2 + (3 + 4) = (2 + 3) + 4$
4.	Associative Property of Multiplication $a \bullet (b \bullet c) = (a \bullet b) \bullet c$	$2 \bullet (3 \bullet 4)= (2 \bullet 3) \bullet 4$
5.	Distributive Property $a \bullet (b + c) = a \bullet b + a \bullet c$	$2 \bullet (3 + 4) = 2 \bullet 3 + 2 \bullet 4$
6.	Additive Identity Property $a + 0 = a$	$3 + 0 = 3$
7.	Multiplicative Identity Property $a \bullet 1 = a$	$3 \bullet 1 = 3$
8.	Additive Inverse Property $a + (-a) = 0$	$3 + (-3) = 0$
9.	Multiplicative Inverse Property $a \bullet \left(\dfrac{1}{a} \right) = 1$ Note: a cannot $= 0$	$3 \bullet (\underline{1}) = 1$ 3
10.	Zero Property $a \bullet 0 = 0$	$5 \bullet 0 = 0$

The following are questions for exhibiting the rules of arithmetic. See if you can identify the properties of each problem.

1. Choose a number between 1 and 10. Add 4 and double the result. Subtract 3, then, multiply by 3. Subtract 5 times one more than the original number. Tell me the answer and I will tell you your original number. (It is ten less than the answer.) How does this work?

Equation—

Work—

Properties used—

2. Choose a number. Add 2, double the result. Subtract 2, double again. Divide by 4. Subtract your original number. I will tell you the answer. (It is 1.)

This can be justified by manipulations similar to those of the previous problem.

Equation—

Work—

Properties used—

3. The crib sells safety glasses for $7.95 and gloves for $3.95. It offers 10% discount if you buy them together. One Saturday they sold 17 safety glasses / gloves combinations, and on Sunday they sold 19. What was their total value of sales of the safety glasses / gloves combinations for the weekend?

Equation—

Work—

Properties used—

4. Janelle runs a press. She has 3 aluminum molds, each of which holds 8 parts, and 2 cast iron molds which also hold 8 parts each. She also has two stainless steel molds which hold 12 parts each. If Janelle fills all her molds at once, how many parts would that be?

Equation—

Work—

Properties used—

5. Prunella is inspecting parts. Plastic Parts are $2.50 per part to inspect. Steel parts are $3.00 per part, large metal parts are also $3.00, and brass parts are $3.50 each. Prunella gets two plastic bearings, two plastic shafts, one plastic housing, three steel cups, one large steel plate, and two brass screws. Everything is subject to 6% tax. How much will the inspections cost the company?

Equation—

Work—

Properties used—