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MFM2P: Foundations of Mathematics 10

Numeracy and Algebra

## Sign Rules for Add/Sub/Mult/Div/Exponents/Roots

### 1. Adding or Subtracting Integers

When two of the **same signs** are adjacent, replace with **addition**.

$$3 - (-5) = 3 + 5 = 8$$

When two **different signs** are adjacent, replace with **subtraction**.

$$7 + (-4) = 7 - 4 = 3$$

### 2. Multiplying or Dividing Integers

Mult/div two values with the **same signs** results in a **positive** value.

$$(-2)(-4) = 8, \quad 10 \div 5 = 2$$

Mult/div two values with **different signs** results in a **negative** value.

$$3(-2) = -6, \quad -12 \div 4 = -3$$

Mult/div an **even number** of negative values results in a **positive** value.

$$-2 \times 3(-5) = 30$$

Mult/div an **odd number** of negative values results in a **negative** value.

$$\frac{-4(-6)}{-8} = -3$$

### 3. Integers and Exponents/Roots

Brackets can be used to specify a negative base.

$$(-3)^2 = (-3)(-3) = 9, \quad -3^2 = -(3 \times 3) = -9$$

Square roots can only be calculated for **positive** values.

$$\sqrt{9} = 3, \quad \sqrt{-9} \text{ is not a real number}$$

### 4. Examples

A. Evaluate  $7 + (-5) - (-8)$ .

Replace the two different signs with subtraction, and the two identical signs with addition.

$$\begin{aligned} 7 + (-5) - (-8) &= 7 - 5 + 8 \\ &= 2 + 8 \\ &= 10 \end{aligned}$$

B. Evaluate  $\frac{-6^2}{9}$ .

Since there are no brackets in the numerator, the exponent does not apply to the negative sign.

$$\begin{aligned} \frac{-6^2}{9} &= \frac{-(6 \times 6)}{9} \\ &= \frac{-36}{9} \end{aligned}$$

Since we are dividing a negative by a positive, the result will be negative.

$$\frac{-36}{9} = -4$$

C. Evaluate  $(-2)(-7) - (-3)^2$

Since there are brackets around the -3, the exponent applied to the negative sign.

$$\begin{aligned} (-2)(-7) - (-3)^2 &= (-2)(-7) - (-3)(-3) \\ &= (-2)(-7) - 9 \end{aligned}$$

Perform the multiplication before the subtraction.

$$\begin{aligned} (-2)(-7) - 9 &= 14 - 9 \\ &= 5 \end{aligned}$$