Foundation Mathematics 1017SCG
Week 1 Summary Sheet

Order of Operations

B - Brackets
I - Index (Power/Exponent)
D - Division
M - Multiplication
A - Addition
S - Subtraction

Division and multiplication have the same priority.
Addition and subtraction have the same priority.

Example Simplify the following

$$\begin{aligned} 2+10\times 3\div 2 &= 2+30\div 2 && \text{multiplication}\\ &= 2+15 && \text{division}\\ &= 17 && \text{addition}\end{aligned}$$

Example Simplify the following

$$\begin{aligned} 3+4(25-23)^3 &= 3+4\times 2^3 && \text{brackets}\\ &= 3+4\times 8 && \text{index}\\ &= 3+32 && \text{multiplication}\\ &= 35 && \text{addition}\end{aligned}$$

Example Simplify the following

$$\begin{aligned} 7\times(12-8)-3^2 &= 7\times 4-3^2 && \text{brackets}\\ &= 7\times 4-9 && \text{index}\\ &= 28-9 && \text{multiplication}\\ &= 19 && \text{subtraction}\end{aligned}$$

Scientific Notation

Scientific notation can be used to write extremely large numbers and very small numbers easily.

- The power tells us how many places to move the decimal point.
- A positive power represents a large number
- A negative power represents a small number

Examples

$$86,000 = 8.6\times 10^4$$

$$0.0025 = 2.5\times 10^{-3}$$

$$9.21\times 10^6 = 9,210,000$$

$$2.35\times 10^{-5} = 0.0000235$$

Index Laws (Power Laws)

(Remember, $5^2 = 5\times 5 = 25$)

- $x^a\times x^b = x^{a+b}$
- $\dfrac{x^a}{x^b} = x^{a-b}$
- $(x^a)^b = x^{ab}$
- $x^{\frac{1}{a}} = \sqrt[a]{x}$
- $x^{-a} = \dfrac{1}{x^a}$
- $x^0 = 1$

Examples Simplify the following

$$x^5\times x^2 = x^{5+2} = x^7$$

$$y^{10}\div y^4 = y^{10-4} = y^6$$

$$(z^4)^3 = z^{4\times 3} = z^{12}$$

$$64^{\frac{1}{3}} = \sqrt[3]{64} = 4$$

$$7^{-2} = \frac{1}{7^2} = \frac{1}{49}$$

$$12^0 = 1$$

Examples Simplify the following

$$\begin{aligned} x^2y^5\times x^7y^3 &= x^2\times x^7\times y^5\times y^3\\ &= x^{2+7}\times y^{5+3}\\ &= x^9y^8\end{aligned}$$

$$\begin{aligned} 2x^3y^4\times 6x^5y^2 &= 2\times 6\times x^3\times x^5\times y^4\times y^2\\ &= 12\times x^{3+5}\times y^{4+2}\\ &= 12x^8y^6\end{aligned}$$

$$\begin{aligned} \frac{x^5y^2}{xy^5} &= x^{5-1}\times y^{2-5}\\ &= x^4y^{-3}\end{aligned}$$

Using the index laws, the final answer could also be written as

$$x^4y^{-3} = \frac{x^4}{y^3}$$