Questions

Logarithms

Given a logarithm in base a give an expression to convert it to base b?

$$y = log_a x \therefore x = a^y$$

$$log_b x = log_b a^y = y log_b a = log_a x log_b a$$

$$log_b x = log_a x log_b a$$

Powers

1. $a^m \times a^n = a^{m+n}$
2. $a^m \div a^n = a^{m-n}$
3. $a^0 = 1$
4. $a^{-m} = \frac{1}{a^m}$
5. $a^{\frac{1}{m}} = \sqrt[m]{a}$
6. $a^{\frac{n}{m}} = \sqrt[m]{a^n}$

Logarithms

1. $log_a\, x\, y = log_a\, x + log_a\, y$
2. $log_a \frac{x}{y} = log_a\, x - log_a\, y$
3. $x^n = (a^b)^n = a^{bn}$
4. $log_a\, x^n = n \times log_a\, x$
5. $log_a\, a^x = x \times log_a\, a = x.1 = x$
6. $a^{log_a\, x} = x$
7. $log_a\, b = \frac{1}{log_b\, a}$
8. $log_b\, x = log_b\, a \times log_a\, x$

Terminology

Term	Example	Description
Expression	$4x + 3$	

Term	$\mathbf{4}\boldsymbol{x} + 3$	A part of an expression. Note we highlighted the term 4x in the example
Coefficient	$\mathbf{4}x + 3$	The numberical multiplier in a term
Equation	$4x + 3 = 2$	An equation requires an equals sign
Inequality	$x \leq 5$	
Formula	$e = mc^2$	
Function	f	
Function Value	$f(x), f(1)$	

Symbols

Symbol	Meaning	Example	Description
{ }	Set	$\{\mathbf{1}, \mathbf{2}\}$	The set consisting of the objects 1 and 2
|	Such that	$\{x \mid x^2 < 2\}$	The set of all x such that $x^2 < 2$
∃	Existential qualifier (there exists)	$\exists x \in \mathbb{Z} \mid x^2 = 4$	There exists an integer x such that $x^2 = 4$
∀	Univeral qualifier (for all)	$\forall x \in \mathbb{Z} \mid x^2 > 0$	For all positive integers x, $x^2 \geq 0$

Factorizing Polynomials

1. Extraction of common factors

$35x^2y^2 - 10xy^3 = 5xy^2(7x - 2y)$

2. Grouping

Four termed expressions can sometimes be factorized into two binomial expressions

$2ac + 6bc + ad + 3bd = 2c(a + 3b) + d(a + 3b) = (2c + d)(a + 3b)$

3. Standard Factors of Quadratic Polynomials

- $a^2 + 2ab + b^2 = (a + b)^2$
- $a^2 - 2ab + b^2 = (a - b)^2$
- $a^2 - b^2 = (a - b)(a + b)$

4. Test for simple factors

A quadratic polynomial $ax^2 + bx + c$can be written as the product of two simple factor if $b^2 - 4ac$is a perfect square

5. Solving quadratic equations with no simple factors

$x = \frac{=b \pm \sqrt{b^2 - 4ac}}{2a}$