**Learner inspired questions**

**17 June 2020**

**LOG FUNCTIONS**

# BASIC IDENTITIES

- $\log_a 1 = 0$

**Examples**

1. $\log_5 1 = 0$
2. $\log_{\frac{1}{3}} 1 = 0$

- $\log_a a = 1$

**Examples**

1. $\log_5 5 = 1$
2. $\log_{\frac{1}{3}} \frac{1}{3} = 1$

- $\log_a a^b$
  $= b \log_a a$
  $= b.1$

**Examples**

1. $\log_5 5^2 = 2$
2. $\log_{\frac{1}{3}} \left(\frac{1}{3}\right)^5 = 5$

# Operations

- $\log_a b.c = \log_a b + \log_a c$
- $\log_a b + \log_a c = \log_a b.c$

**Examples**

$$\log_3(2.5) = \log_3 2 + \log_3 5$$
$$\log_3 2 + \log_3 5 = \log_3(2.5)$$

- $\log_a \frac{b}{c} = \log_a b - \log_a c$
- $\log_a b - \log_a c = \log_a \frac{b}{c}$

**Examples**

$$\log_5 \frac{4}{5} = \log_5 4 - \log_5 5$$
$$\log_5 4 - \log_5 5 = \log_5 \frac{4}{5}$$

**CHANGING A FUNCTION INTO A LOG FUNCTION**

**CHANGING AN EXPONENTIAL FUNCTION INTO A LOG FUNCTION**

$\boldsymbol{f(x) = 5^x}$

$\boldsymbol{y = 5^x}$

$\boldsymbol{x = \log_5 y}$

**CHANGING AN QUADRATIC FUNCTION INTO A LOG FUNCTION**

$\boldsymbol{f(x) = 3x^2}$

$\boldsymbol{y = 3x^2}$

$\boldsymbol{\frac{y}{3} = x^2}$

$\boldsymbol{\log_x \frac{y}{3} = 2}$

- THE BASE IS X
- THE POWER IS 2
- THE ANSWER IS $\frac{y}{3}$