What you will learn about:
Logarithms

Changing between Logarithmic and exponential form:

If $x > 0, b > 0$ and $b \neq 1$, then $y = \log_b x$ if and only if $b^y = x$

Find the inverse function for $y = 2^x$

y equals log base b of a

$y = \log_b a$

$x = 2^y \Rightarrow y = \log_2 x$

Properties:

If $x > 0, b > 0\ b \neq 1$, and any real number y

- $\log_b 1 = 0$ because $b^0 = 1$
- $\log_b b = 1$ because $b^1 = b$
- $\log_b b^y = y$ because $b^y = b^y$
- $b^{\log_b x} = x$ because $\log_b x = \log_b y$

$\sqrt{x} = x^{\frac{1}{2}}$

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

Evaluate the logarithmic expression without using a calculator

a) $\log_2 8 = x$

$2^x = 8$

$x = 3$

b) $\log_3 \sqrt{3} =$

$3^x = \sqrt{3}$

$3^x = 3^{1/2}$

$x = \frac{1}{2}$

c) $\log_5 \frac{1}{25} =$

$5^x = \frac{1}{25}$

$x = -2$

d) $\log_4 1 =$

$4^x = 1$

$x = 0$

e) $\log_7 7 =$

$7^x = 7$

$x = 1$

$x^{-1} = \frac{1}{x}$

$y^{-3} = \frac{1}{y^3}$

$2^{-2} = \frac{1}{4}$

Common log

log

Base 10

ln → log natural

natural log

ln → base "e"

Evaluate the logarithmic expression without using a calculator

a) $\log 100 = 2$

$10^x = 100$

b) $\log \sqrt[5]{10} =$

$10^x = \sqrt[5]{10}$

$10^x = 10^{1/5}$

$x = \frac{1}{5}$

c) $\log \frac{1}{100} =$

$10^x = \frac{1}{100}$

$= 10^{-2}$

$x = -2$

d) $\ln \sqrt{e} =$

$\log_e \sqrt{e} = x$

$e^x = e^{1/2}$

$1/2$

e) $\ln e^5 =$

$e^x = e^5$

5

f) $\ln \sqrt[5]{e} =$

$e^x = e^{1/5}$

$x = \frac{1}{5}$

Evaluate the logarithmic expression without using a calculator

a) $6^{\log_6 11} = x$

$\log_6 11 = \log_6 x$

b) $10^{\log 6} = x$

$\log 6 = \log x$

$10^{\log 6}$

$6^{\log_6 11}$

$15^{\log_{15} 12}$

c) $e^{\ln 4} =$

$e^{\ln 4}$ 4

$\sqrt[2]{25}$

Use a calculator to evaluate the logarithmic expression if it is defined and check your result by evaluating the corresponding exponential expression

a) log 34.5 = 1.53

$10^{1.53} = 34.5$

b) log 0.43 = −.36

$10^{-.36} \approx .43$

c) log (-3) = N/A

d) ln 23.5 = 3.15

e) ln 0.48 = −.73

f) ln(-5) = N/A

Solve the equation

a) log x = 3

b) $\log_2 x = 5$