Properties of Logarithms - Proof of Property 2

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \qquad \Leftrightarrow \qquad x = b^m$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$

$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

$$\frac{x}{y} =$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n}$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \qquad \Leftrightarrow \qquad x = b^m$$
$$n = log_b(y) \qquad \Leftrightarrow \qquad y = b^n$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Taking the logarithm of both sides, we get:

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$\begin{aligned} m = log_b(x) \quad &\Leftrightarrow \quad x = b^m \\ n = log_b(y) \quad &\Leftrightarrow \quad y = b^n \end{aligned}$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Taking the logarithm of both sides, we get:

$$log_b\left(\frac{x}{y}\right) = log_b\left(b^{m-n}\right)$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\frac{b^m}{b^n} = b^{m-n}$

▸ We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Taking the logarithm of both sides, we get:

$$log_b\left(\frac{x}{y}\right) = log_b\left(b^{m-n}\right) = m - n$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$\begin{array}{rcl} m = log_b(x) & \Leftrightarrow & x = b^m \\ n = log_b(y) & \Leftrightarrow & y = b^n \end{array}$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Taking the logarithm of both sides, we get:

$$log_b\left(\frac{x}{y}\right) = log_b\left(b^{m-n}\right) = m - n = log_b(x) - log_b(y)$$

Properties of Logarithms - Proof of Property 2

We will prove the property:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$

To prove this, we will use the property of exponents: $\dfrac{b^m}{b^n} = b^{m-n}$

We saw the following way to interpret that fact that logarithms are the inverses of exponents:

$$m = log_b(x) \quad \Leftrightarrow \quad x = b^m$$
$$n = log_b(y) \quad \Leftrightarrow \quad y = b^n$$

Proof:

$$\frac{x}{y} = \frac{b^m}{b^n} = b^{m-n}$$

Taking the logarithm of both sides, we get:

$$log_b\left(\frac{x}{y}\right) = log_b\left(b^{m-n}\right) = m - n = log_b(x) - log_b(y)$$

This leaves us with our result:

$$log_b\left(\frac{x}{y}\right) = log_b(x) - log_b(y)$$