§ 2.5 Variation

- Constructing a model using variation.

- Write the quantity or expression that varies, followed by "= ".

- Write the constant of proportionality, \( k \), multiplied by an empty fraction.

- Write directly \( \rightarrow \) numerator, inversely \( \rightarrow \) denominator, jointly \( \rightarrow \) both in numerator.

1. \( A \) varies directly with \( x^2 \).
   \[
   A = k \cdot \frac{x^2}{1} = kx^2
   \]

2. The square of \( T \) varies directly with the cube of \( a \) and inversely with the square of \( d \).
§ 2.5 Variation

- Constructing a model using variation.

- Write the quantity or expression that varies, followed by "=".

- Write the constant of proportionality, \( k \), mult. by an empty fraction.

- Next write...
  - directly \( \rightarrow \) numerator
  - inversely \( \rightarrow \) denominator
  - jointly \( \rightarrow \) both in numerator

4. \( A \) varies directly with \( x^2 \)

\[
A = k \cdot \frac{x^2}{1}
\]

\[
A = kx^2
\]

8. The square of \( T \) varies directly w/ the cube of \( a \) and inversely w/ the square of \( d \).
(cont'd)

\[ T^2 = k \cdot \frac{a^3}{d^2} \rightarrow T^2 = \frac{k}{d^2} \]

\[ = T^2 = \frac{K a^3}{d^2} \rightarrow \text{how mml wants it} \]

Write an equation. \( F \) varies jointly w/ \( s \) and \( h \).

\[ F = k \cdot \frac{s \cdot h}{d^2} \rightarrow F = ksh \]

Determining the constant of proportionality \( "k" \)

Write a general formula.

\( F \) varies inversely with \( d \) squared.

\[ F = 24 \text{ when } d = 6 \rightarrow F = \frac{k}{d^2} \rightarrow \text{checkpoint 1} \]

\[ F = k \cdot \frac{1}{d^2} \rightarrow 24 = k \cdot \frac{1}{36} \rightarrow 24 = \frac{k}{36} \]

\[ 24 \cdot (36) = k \cdot \frac{36}{36} \rightarrow \sqrt{864} = k \rightarrow \text{checkpoint 2} \]

\[ F = \frac{864}{d^2} \rightarrow \text{Final answer} \]
6. Write a general formula to describe the variation:

Z varies directly with the sum of the squares of x and y.

\[ Z = k \cdot \frac{x^2 + y^2}{1} \]

(Side note: \( x^2 + y^2 \) is not equal to \((xy)^2\))

\[ Z = k (x^2 + y^2) \]

\[ Z_1 = \frac{1}{13} (x^2 + y^2) \]

\[ Z_1 = 4 \]

\[ x = 4 \]

\[ y = 6 \]

\[ 4 = k (4^2 + 6^2) \]

\[ 4 = k (16 + 36) \]

\[ 4 = k (52) \]

\[ \frac{4}{52} = \frac{1}{13} \]

\[ k = \frac{1}{13} \]

↑ Final Answer