Consider your "Bounce that Ball" data:

$\times\frac{1}{2}$ 80 cm drop → 60 cm bounce $\times\frac{1}{2}$
40 cm drop → 30 cm bounce

Working with Proportionalities in Physics

If you have a linear graph with a y-intercept of zero (i.e. "Bounce that Ball"), then this suggests a direct proportionality.

$\propto$

$y \propto x$ "is proportional to"

"y is directly proportional to x"

"y varies directly with x"

Consider your bounce that ball data:

$h_b \propto h_d$ (proportionality statement)

$h_b = k h_d$ (general equation)

proportionality constant.

$$\frac{60\text{cm}}{80\text{cm}} = \frac{k(80\text{cm})}{80\text{cm}}$$

$k = 0.75$ (proportionality constant)

A graph of h_b vs h_d will be linear with a slope of k and a y-intercept of zero.

$h_b = 0.75 h_d$ (specific equation)

$(y = mx + b)$

Examples of a proportionality statement.

$A \propto B^2$ "A is proportional to the square of B"

"A is directly proportional to B^2"

"A varies directly with the square of B"

$F \propto \frac{v^2}{r}$ "F varies directly with the square of v and inversely with r"