Modeling Measurement Conversions through Graphing

Learning Goals

-to determine through graphing that the slope of a linear relationship can be used as a conversion factor

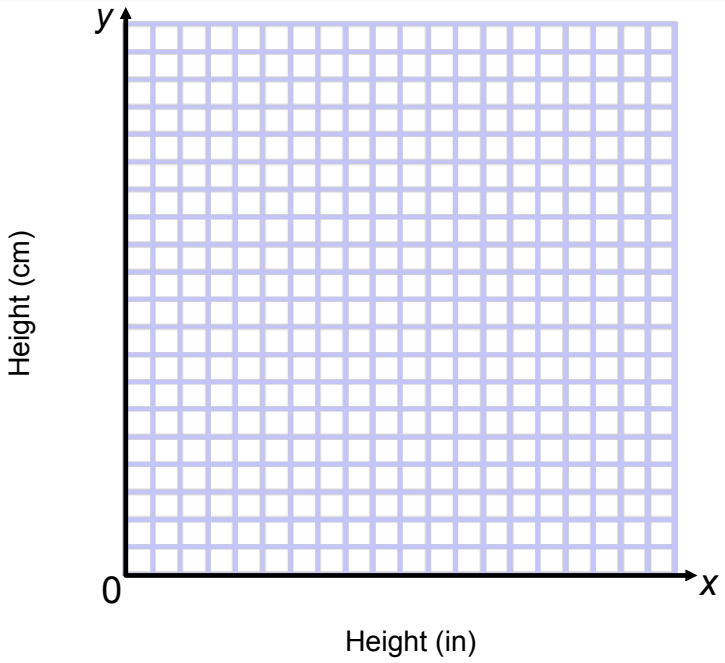
-to use conversion factors when converting from metric to imperial systems, and vice-versa

Class Data: Height in Different Units

Student	What is your height in CENTIMETRES?	What is your height in INCHES?	Convert your height in centimetres TO METRES.	Convert your height in inches TO FEET. Record to at least 4 decimal places.
A	170	67	1.702	5.5833
B	180.34	70	1.8	5.9167
C	151.8	59.81	1.51	4.7917
D	163.5	64.1	1.63	5.333
E	175	69	1.75	5.7917
F	151	59.43	1.51	4.75
G	175	68.75	1.75	5.5
H	151	59.43	1.51	4.75

A) Graph: Height in cm vs. Height in inches

Student	What is your height in CENTIMETRES?	What is your height in INCHES?
A	170	67
B	180.34	70
C	151.8	59.81
D	163.5	64.1
E	175	69
F	151	59.43
G	175	68.75
H	151	59.43



A) Graphical Analysis

1. Once you've plotted each ordered pair (i.e., point), draw a line of best fit (LoBF).

2. Using any two points on the line, determine the slope of your LoBF as the ratio ...

$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

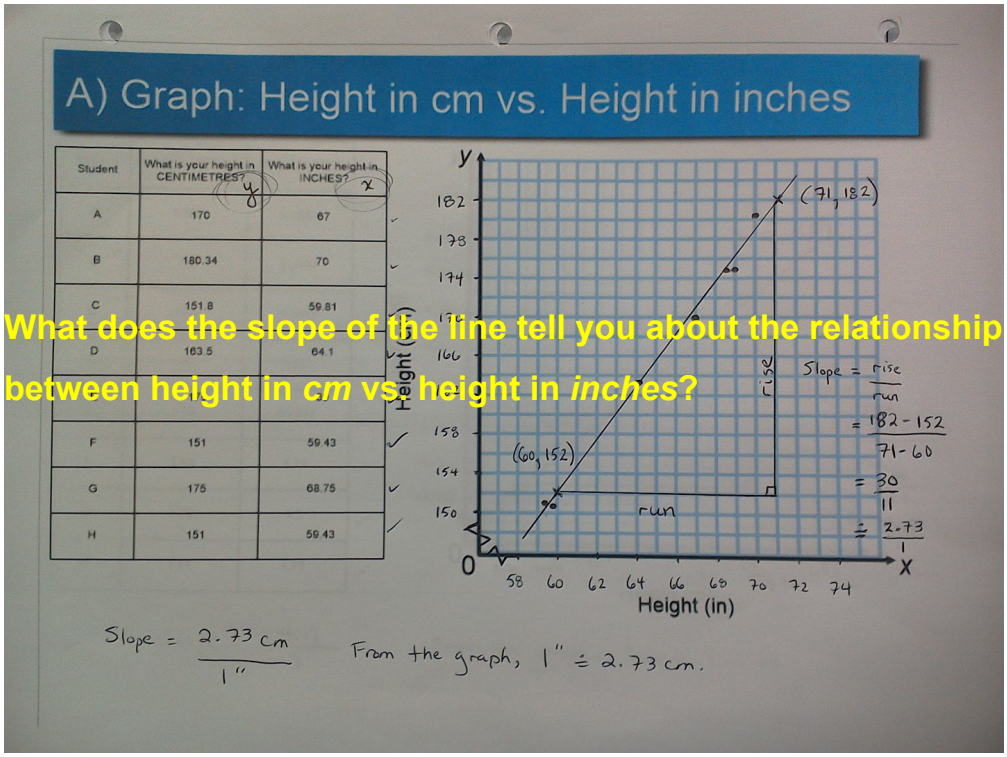
3. **QUESTIONS:** *Answer each of the following.*

a) What value did you calculate for slope? What does this value mean relative to your height in cm vs. your height in inches (")?

b) If someone was 72" tall, how tall would they be in cm?

c) If someone was 167.64 cm tall how tall would they be in ...

i) inches? ii) feet and inches?

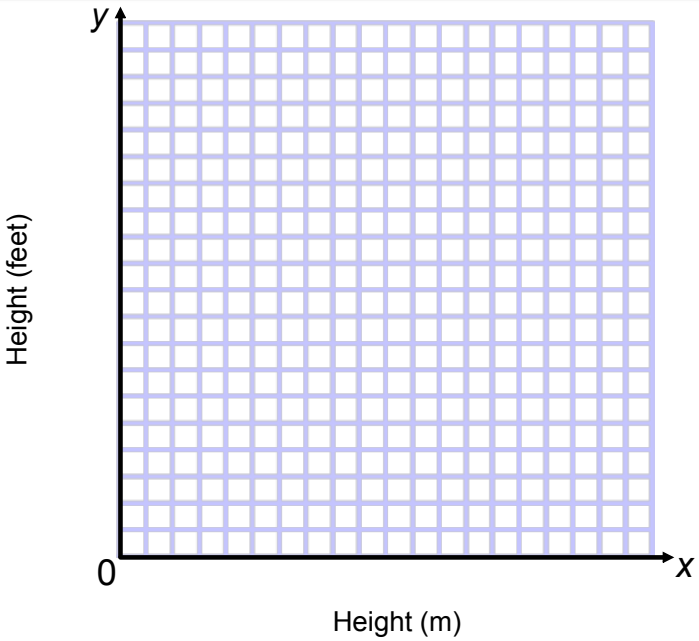


Student	What is your height in CENTIMETRES? (y)	What is your height in INCHES? (x)
A	170	67
B	180.34	70
C	151.8	59.81
D	163.5	64.1
F	151	59.43
G	175	68.75
H	151	59.43

B) Graph: Height in *ft* vs. Height in *m*

OPTION 1:
Graph by Hand

Student	Height in METRES	Height in FEET
A	1.702	5.5833
B	1.8	5.9167
C	1.51	4.7917
D	1.63	5.333
E	1.75	5.7917
F	1.51	4.75
G	1.75	5.5
H	1.51	4.75



B) Graphical Analysis

1. Once you've plotted each ordered pair (i.e., point), draw a line of best fit (LoBF).

2. Using any two points on the line, determine the slope of your LoBF as the ratio ...

slope = $\frac{\text{rise}}{\text{run}}$

3. **QUESTIONS:** *Answer each of the following.* $m = 3.8474$

a) What value did you calculate for slope? What does this value mean relative to your height in feet vs. your height in metres?

b) If someone was 6' (' = feet) tall, how tall would they be in metres?

c) If someone was 1.6 m tall how tall would they be in ...

i) feet? ii) feet and inches?

b) 6'

$m = 3.8474 \frac{ft}{m}$

$6' \div 3.8474 \frac{ft}{m}$

$\doteq 1.6\ m$

$\frac{3.8474\ ft}{1\ m} = \frac{6\ ft}{x}$

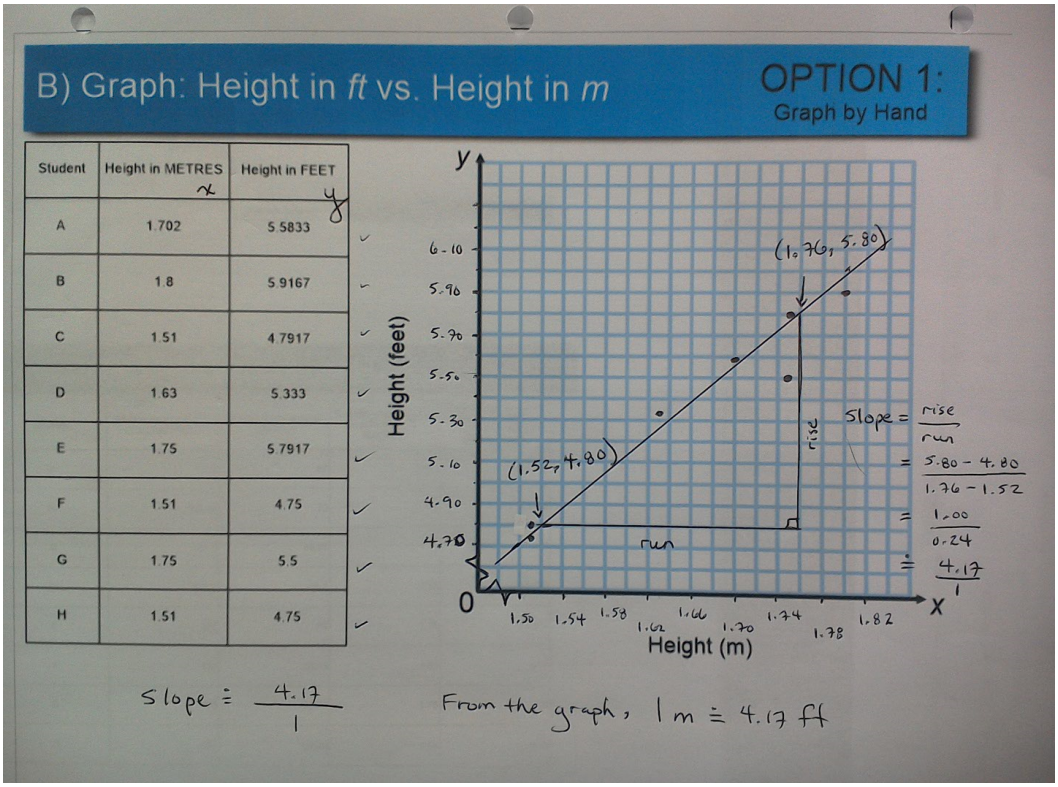
$\frac{6}{3.8474} = \frac{3.8474x}{3.8474}$

$1.6 = x$

c) 1.6 m

$1.6\ \cancel{m} \times 3.8474\ \frac{ft}{\cancel{m}}$

$\doteq 6.15\ ft$



B) Graph: Height in *ft* vs. Height in *m*

OPTION 2:
Graphing with Tech

Student	Height in METRES	Height in FEET
A	1.702	5.5833
B	1.8	5.9167
C	1.51	4.7917
D	1.63	5.333
E	1.75	5.7917
F	1.51	4.75
G	1.75	5.5
H	1.51	4.75

i) Install app: DESMOS

ii) Create a table and enter the data:

x_1 as metres; y_1 as feet

iii) Create an equation for a line:

$y_1 \sim mx_1 + b$ m = slope ; b = y-intercept

iv) Write down the value you get for the *parameter*, m (otherwise known as the slope of the line). m = 3.84741 ; b = -1.0278

v) Go back to answer the questions (#3) on the previous slide.

y-intercept is where the line crosses the y-axis.

Practice

i) Complete "Forensic Analysis"

ii) Use DESMOS to confirm your answers in "Forensic Analysis"

-Graph (How did the position of the LoBF differ from your hand-drawn graph?)

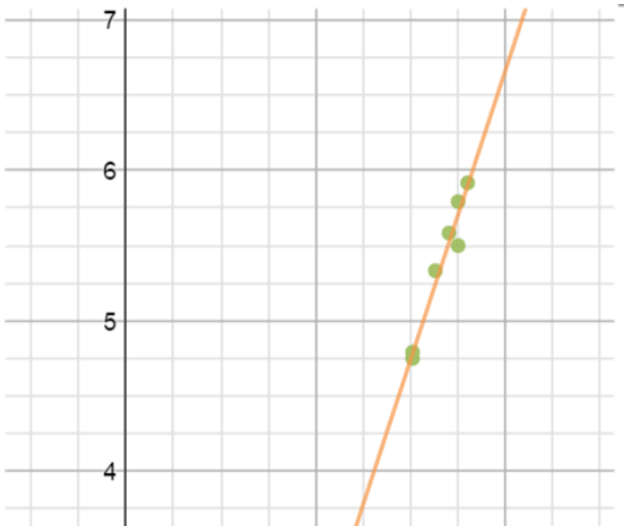
-Slope from answers (By how much did your slope estimate from the LoBF differ from what DESMOS calculated?)

NOTE:

Scatter plots_LoBF_Slope_Practice.pdf

Scatter plots_LoBF_Slope_Practice_Solutions.pdf

DESMOS: Graph for Part B (Height in *ft* vs. Height in *m*)



$y_1 \sim mx_1 + b$

STATISTICS

$r^2 = 0.96$

$r = 0.98$

RESIDUALS

e_1 plot

PARAMETERS

$m = 3.8474$

$b = -1.0278$

Attachments

Scatter plots_LoBF_Slope_Practice.pdf

Scatter plots_LoBF_Slope_Practice_Solutions.pdf

gimli glider-SD.mp4