

VOM Excel2013 Model Trendline Multi 1

Model Using Trendline Multiple Models in Excel 2013

by
Milo Schield

*Member: International Statistical Institute
US Rep: International Statistical Literacy Project
Director, W. M. Keck Statistical Literacy Project*

Slides at: www.StatLit.org/pdf/Excel2013-Model-Trendline-Multi-Slides.pdf

VOM Excel2013 Model Trendline Multi 2

Assignment:

1. Goal: Generate six charts. Use different models of the association between two variables (slides 6-11).
2. Six models: linear with forecast, linear with zero intercept, polynomial, logarithmic, power & exponential.
3. For each chart, show trend-line, regression equation and R^2 . Show title and axis headings for all
4. No description of association (trend) is required. No comparison of fit is required (See slide 12)

Get data at www.StatLit.org/Excel/pulse.xls
To review using Trendline, see www.StatLit.org/pdf/Excel2013-Model-Trendline-Linear-Slides.pdf

VOM Excel2013 Model Trendline Multi 3

Process Advice

1. Create first XY chart: Weight (Y), Height (X)
2. Format Y axis [Min, Max]: [90, 230]
3. Add axis titles and chart title.
Create trendline, equation and R-squared.
Format as needed. Line can be solid or dashed
4. Copy + paste this graph to create next graph.
5. Modify next graph as needed.

Step 4 saves time: skip repeating first 3 steps.

VOM Excel2013 Model Trendline Multi 4

Algebraic Models

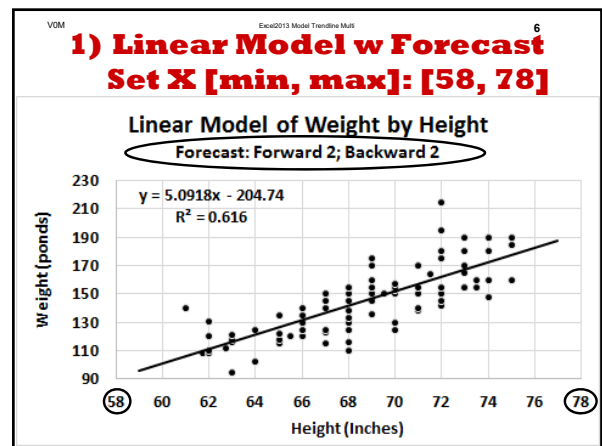
- 1) **Linear:** $Y=a+bx$. Linear with prediction
- 2) **Linear:** $Y=a+bx$. Linear with zero intercept
- 3) **Polynomial:** $Y= a+bx+cx^2+dx^3$. Multi-curves
- 4) **Logarithmic:** $Y=a*\ln(x) + b$. Ratio scale.
Equal ratios have equal differences
 $\log_{10}(1) = 0$; $\log_{10}(10) = 1$; $\log_{10}(100) = 2$
- 5) **Power model:** $Y=ax^b$ [Between log & exp.]
- 6) **Exponential:** $Y=ae^{x/b}$. Constant rate of change

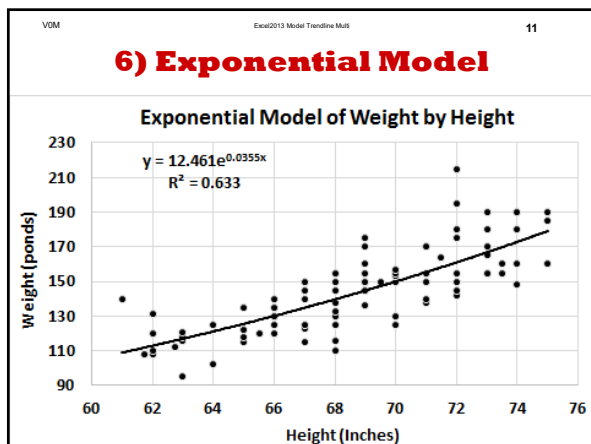
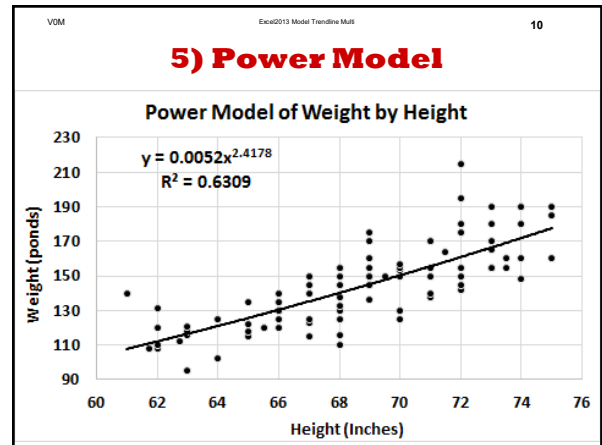
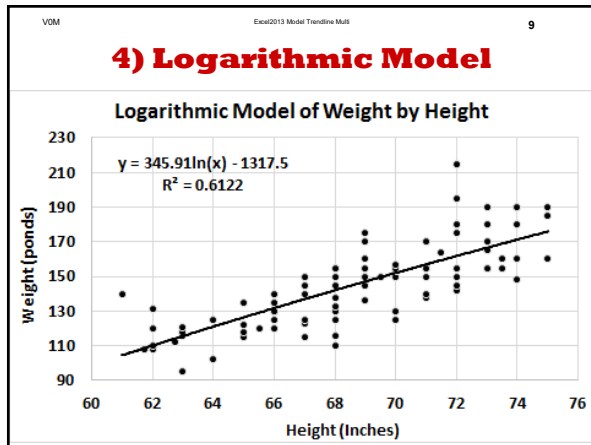
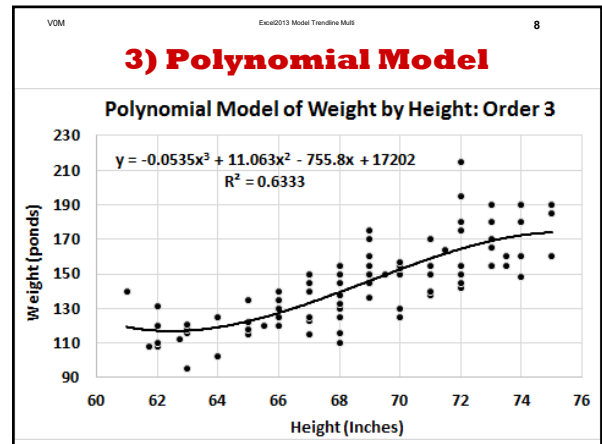
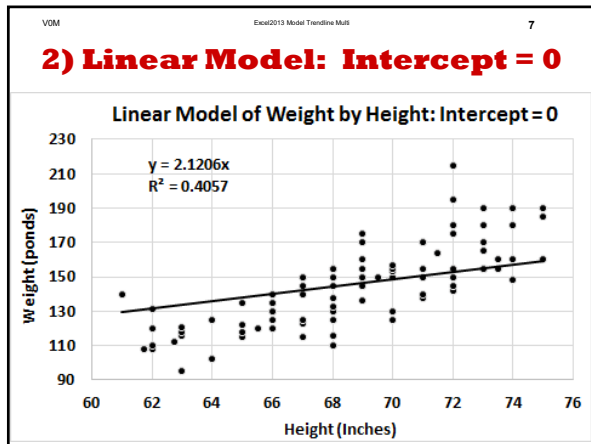
VOM Excel2013 Model Trendline Multi 5

To create each graph, use Trendline: "More Options"

Select Chart Elements.
Check Trendline box.
Select More Options.

Select Algebraic model
Check Equation & R-square
[Check Forecast or Intercept]





VOM Excel2013 Model Trendline Multi 12

Comparison of Models by Fit [Not Required]

Fit measured by R-sq:
Percentage of Weight “explained by” Height

- 40.6% Linear (intercept=0) << Worst fit
- 61.2% Logarithmic model << OK fit.
- 61.6% Linear model << OK fit. Simplest
- 62.1% Polynomial model << OK fit.
- 63.3% Exponential << Best fit. Complex
- 63.33% Power model (2) << Best fit. Complex

Model Using Trendline Multiple Models in Excel 2013

by

Milo Schield

Member: International Statistical Institute

US Rep: International Statistical Literacy Project

Director, W. M. Keck Statistical Literacy Project

Slides at: www.StatLit.org/pdf

/Excel2013-Model-Trendline-Multi-Slides.pdf

Assignment:

1. Goal: Generate six charts. Use different models of the association between two variables (slides 6-11).
2. Six models: linear with forecast, linear with zero intercept, polynomial, logarithmic, power & exponential.
3. For each chart, show trend-line, regression equation and R^2 . Show title and axis headings for all
4. No description of association (trend) is required.
No comparison of fit is required (See slide 12)

Get data at www.StatLit.org/Excel/pulse.xls

To review using Trendline, see www.StatLit.org/pdf/Excel2013-Model-Trendline-Linear-Slides.pdf

Process Advice

1. Create first XY chart: Weight (Y), Height (X)

2. Format Y axis [Min, Max]: [90, 230]

3. Add axis titles and chart title.

 Create trendline, equation and R-squared.

 Format as needed. Line can be solid or dashed

4. Copy + paste this graph to create next graph.

5. Modify next graph as needed.

Step 4 saves time: skip repeating first 3 steps.

Algebraic Models

- 1) **Linear:** $Y=a+bx$. Linear with prediction
- 2) **Linear:** $Y=a+bx$. Linear with zero intercept
- 3) **Polynomial:** $Y= a+bx+cx^2+dx^3$. Multi-curves
- 4) **Logarithmic:** $Y=a*\text{Ln}(x) + b$. Ratio scale.
Equal ratios have equal differences
 $\text{Log}_{10}(1) = 0$; $\text{Log}_{10}(10) = 1$; $\text{Log}_{10}(100) = 2$
- 5) **Power model:** $Y=ax^b$ [Between log & exp.]
- 6) **Exponential:** $Y=ae^{x/b}$. Constant rate of change

To create each graph, use Trendline: “More Options”

CHART ELEMENTS

- Axes
- Axis Titles
- Chart Title
- Data Labels
- Error Bars
- Gridlines
- Legend
- Trendline

TRENDLINE OPTIONS

Linear
Exponential
Linear Forecast
Two Period Moving Average
More Options...

TRENDLINE OPTIONS

6 Exponential
1,2 Linear
4 Logarithmic
3 Polynomial
5 Power
 Moving Average

Trendline Name

Automatic
 Custom

Forecast 1

Forward 0.0
Backward 0.0

Set Intercept 2
 Display Equation on chart
 Display R-squared value on chart

All

Select *Chart Elements*.
Check *Trendline* box.
Select *More Options*.

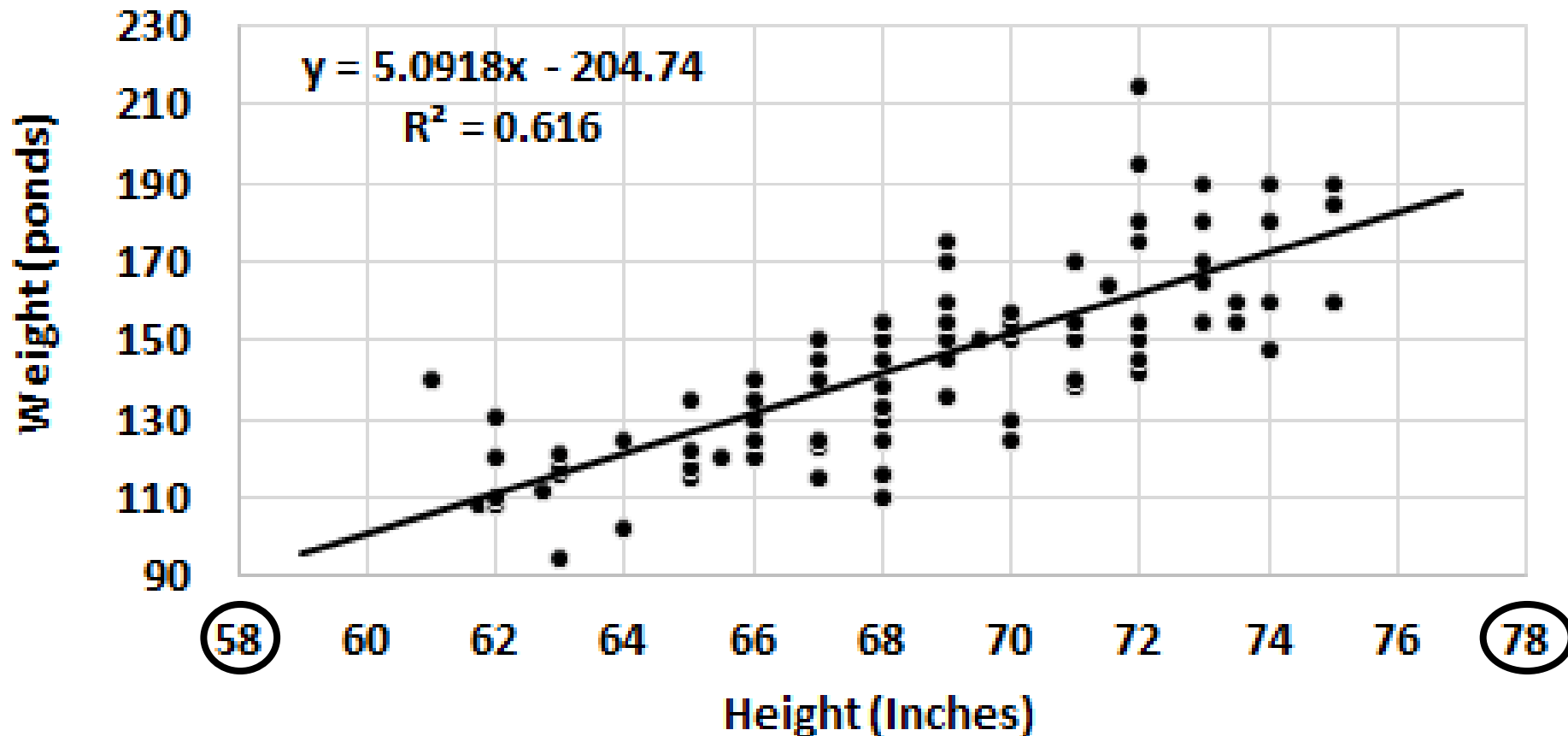
Select *Algebraic model*
Check *Equation & R-square*
[Check *Forecast or Intercept*]

1) Linear Model w Forecast

Set X [min, max]: [58, 78]

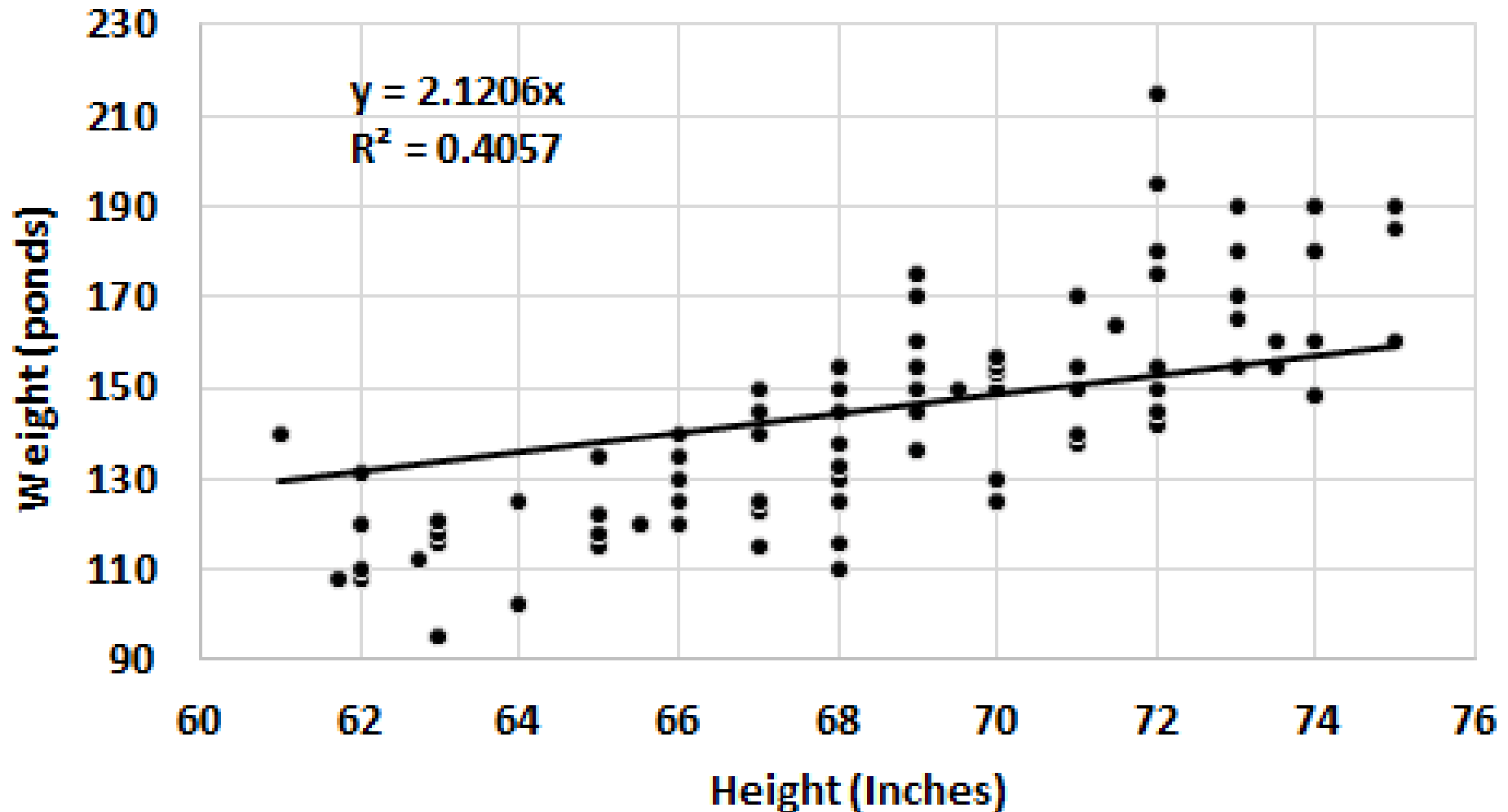
Linear Model of Weight by Height

Forecast: Forward 2; Backward 2



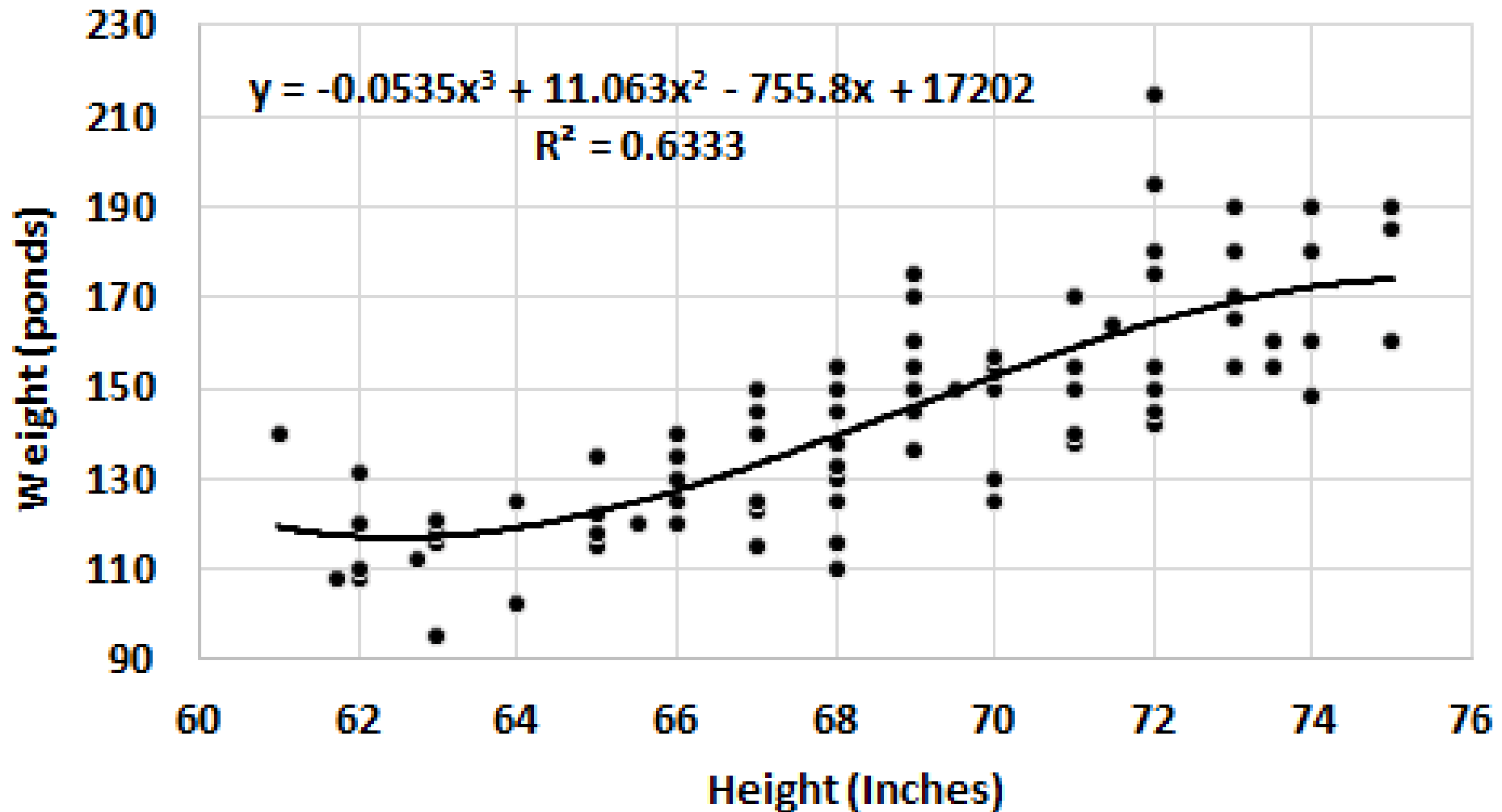
2) Linear Model: Intercept = 0

Linear Model of Weight by Height: Intercept = 0



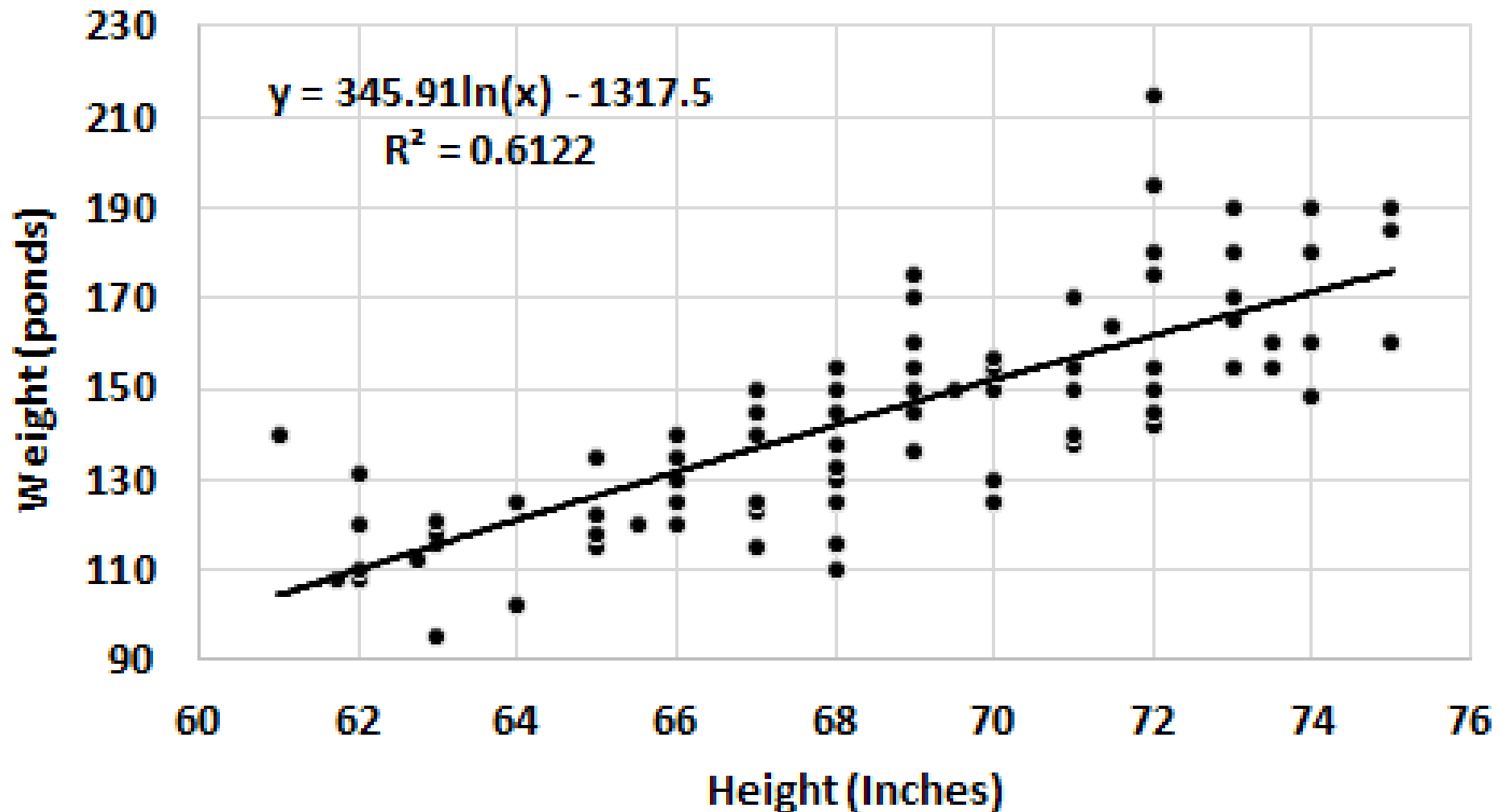
3) Polynomial Model

Polynomial Model of Weight by Height: Order 3

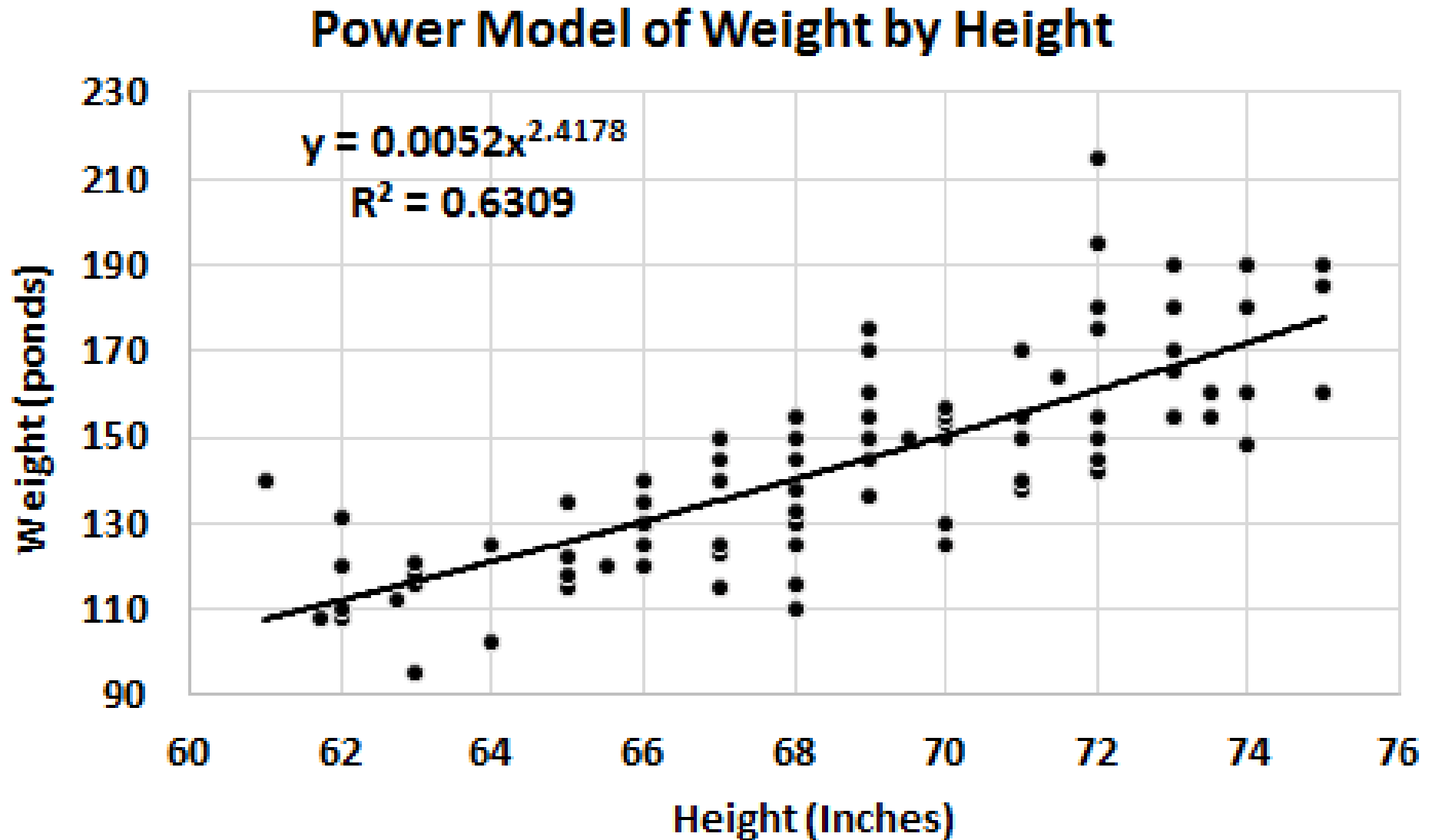


4) Logarithmic Model

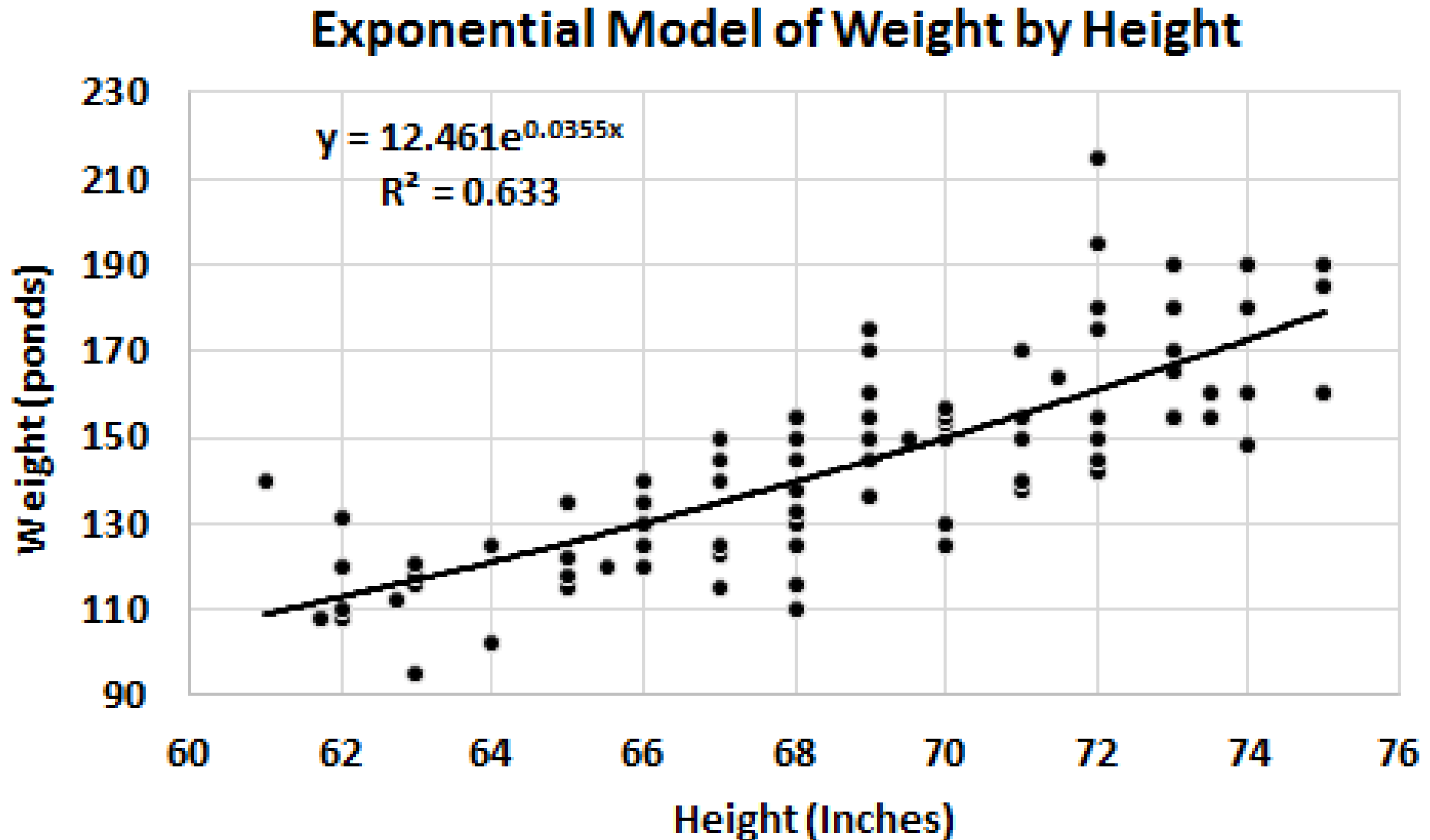
Logarithmic Model of Weight by Height



5) Power Model



6) Exponential Model



Comparison of Models by Fit [Not Required]

Fit measured by R-sq:

Percentage of Weight “explained by” Height

- 40.6% Linear (intercept=0) << Worst fit
- 61.2% Logarithmic model << OK fit.
- 61.6% Linear model << OK fit. Simplest
- 62.1% Polynomial model << OK fit.
- 63.3% Exponential << Best fit. Complex
- 63.33% Power model (2) << Best fit. Complex