

U5D4 review Linear Models

Saturday, November 18, 2017 9:23 AM



U5D4
review Li...

Unit 5 lesson 4: Review: Linear Relations

- A linear relationship means

equal changes over equal intervals.

- To calculate First Differences, the independent variable (x-values) must be increasing or decreasing

by the same number.

- The First Differences are the same number (constant).

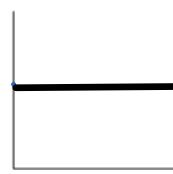
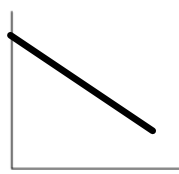
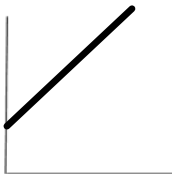
- Points on the graph lie along a straight line.

If rate of change is positive,

If rate of change is negative,

If rate of change is zero,

the quantity is increasing. the quantity is decreasing. the quantity is constant.



The rate of change of a linear relation is constant. For example, a car travelling at a constant speed will travel equal distances over equal time intervals.

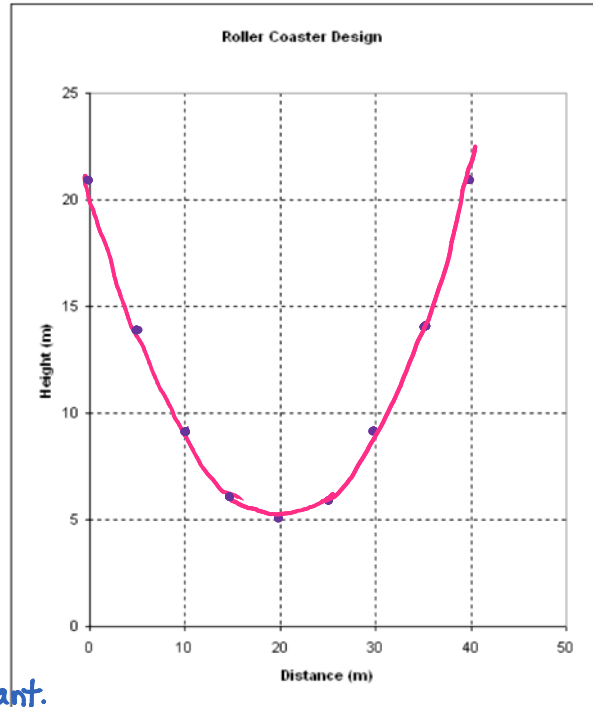


U5D4
Quadratic...

Unit 5 Lesson 4

Quadratic Model : Roller Coaster

Distance (m)	Height (m)	1st Differences	2nd Differences
0	21		
5	14	-7	2
10	9	-5	2
15	6	-3	2
20	5	-1	2
25	6	1	2
30	9	3	2
35	14	5	2
40	21	7	



1. Calculate 1st and 2nd differences.
2. Is this relationship quadratic, how can you tell?
Yes. Second differences are constant.
3. Plot the data on the given graph.
4. Where is the roller coaster closest to the ground?
20 m into the ride.



U5D4 -
Quadratic...

Summary:

- Finite Differences = First and Second Differences
- To use Finite Differences the x-values must be increasing or decreasing by the same amount.
- If the First Differences are not constant, the relation is

non-linear.

- If the Second Differences are constant, it is a

quadratic (parabola).

- You can use quadratic regression on a graphing calculator to

find the equation of the quadratic.

- You can use an equation that models the data set to

make predictions about the data.

Practice: Pg. 289 # 1, 2, 3, 8 abcd CHECK Answers Pg. 553-554



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page

5.2 Quadratic Models

Ex.1 Quadratic Model: Roller Coaster (handout)

Summary:

- Finite Differences = First and Second Differences
- To use Finite Differences the x-values must be increasing or decreasing by the same amount.
- If the First Differences are not constant, the relation is _____.
- If the Second Differences are constant, it is a _____.
- You can use quadratic regression on a graphing calculator to find the _____ of the _____.
- You can use an equation that models the data set to _____ about the data.

2. Calculate the first and second differences. Then, determine if each relation is linear, quadratic, or neither.

a)

x	y	First Differences	Second Differences
-1	16		
0	14	-2	-4
1	8	-6	-4
2	-2	-10	-4
3	-16	-14	

QUADRATIC

b)

x	y	First Differences	Second Differences
0	1		
1	2	1	1
2	4	2	2
3	8	4	4
4	16	8	

NEITHER

c)

x	y	First Differences	Second Differences
-2	3		
-1	0	-3	1
0	-2	-2	1
1	-3	-1	1
2	-3	0	

QUADRATIC

d)

x	y	First Differences	Second Differences
-4	-1		
0	2	3	0
4	5	3	0
8	8	3	0
12	11	3	

LINEAR

3. For each relation in question 2 that is linear or quadratic, use technology to determine the equation of the line or curve of best fit.

Hint: Enter the x-values into L1 and the y-values into L2.
 Press **STAT**. Select the **CALC** menu, then
 4: **LinReg(ax+b)** or 5: **QuadReg**.
 Press **ENTER** twice.

With Desmos:
 Enter data into a table
 Enter expression:
 $\rightarrow y_1 \sim mx_1 + b$
 $\rightarrow y_1 \sim ax_1^2 + bx_1 + c$

Practice: Pg. 289 # 1, 2, 3, 8 abcd