

Before we begin the new unit,
are there any questions from last day's review homework?

pp.158-159 #1 to 4, 5a*,5b, 6 to 9*, 10

7.8.9

***In #5a the text forgot to say in the Answers section that there is measurement bias!**

Do you know why there is measurement bias in 5a?

***9 variance =204.49, std. dev.=14.3**

p.158

7. A nut and a washer are to fit onto the end of a bolt. The centre of the washer must have a mean diameter of 1.5 cm. The variance of the washers is 0.01 cm. The centre of the nut must have a diameter of 1.15 cm, with a standard deviation of 0.01 cm. Assume the diameters are distributed normally.

- What is the standard deviation of the washers?
- Give the range of centre diameters necessary for the washers to be within two standard deviations of the mean.
- Give the range of centre diameters necessary for the nuts to be within two standard deviations of the mean.
- Why do the nuts and the washers have different standard deviations? Explain.



Washer

Nut

diameter = 1.5 cm

diameter = 1.15 cm

Variance = 0.01 cm

std. dev. = 0.01 cm

$$\begin{aligned} \text{a) std dev} &= \sqrt{\text{variance}} \\ &= \sqrt{0.01} \\ &= 0.1 \text{ cm} \end{aligned}$$

$$\text{c) std} = 0.02$$

Range

$$\begin{aligned} \therefore 2 \text{ std. dev} &= (0.1) \times 2 \\ &= 0.2 \text{ cm} \end{aligned}$$

1.15
 $\downarrow +0.02$
 1.17 cm
 $\downarrow -0.02$
 1.13 cm

1.5 cm
 $\swarrow -0.2 \text{ cm}$
 1.3 cm
 $\searrow +0.2 \text{ cm}$
 1.7 cm

$$\therefore \text{Range} = 1.3 \text{ cm} + 1.7 \text{ cm}$$

p.159

8. A large doughnut chain recorded the opening week sales for eight new shops
 \$37 500, \$42 300, \$58 800, \$31 300,
 \$41 800, \$37 100, \$63 200, \$58 000
- a) Find the range, the mean, the median, and the mode for the data.
- b) Are sales at the new shops likely to increase or decrease after the opening week? Explain.

31 300, 37 100, 37 500, 41 800, 42 300, 58 000, 58 800, 63 200

$$a) \text{Range} = 63\,200 - 31\,300 \\ = 31\,900$$

$$\text{Median} = \frac{41\,800 + 42\,300}{2} \\ = 42\,050$$

$$\text{Mean} = \frac{+ + + + + + + +}{8}$$

$$= \frac{362\,000}{8}$$

$$= 45\,250$$

Mode = No Mode

9. A manufacturer of rechargeable batteries tests 10 batteries at random and records the time it takes, in minutes, to drain each battery after a full charge has been applied.

195, 203, 177, 186, 191,
 225, 216, 202, 197, 218

Find the range, the variance, and the standard deviation of the data.

$$\text{Range} = 225 - 186$$

=

$$\text{Mean} = \frac{\quad}{10}$$

Cycle 1 Day 1 MBF 3CI CHAPTERS 4, 5, 7: RELATIONS

Date: Oct. 26/17

“I know what a relation is.

I can calculate the first and second differences, and the y -ratios of a relation.

I can graph relations from a table of values.

Using a table, I know if relation is linear or non-linear.”

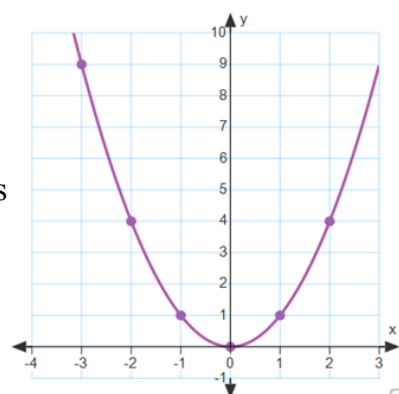
A **relation** is an identified pattern (a relationship) between two variables (such as x and y). Here is an example of a relation, expressed in three different ways:

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
<i>etc...</i>	

means

$$y = x^2$$

means

**Table of Values****Equation****Graph**

To calculate the **First Differences** (FD) of a relation, subtract consecutive y -values, for equal steps of x -values. To calculate the **Second Differences** (SD) of a relation, subtract consecutive FD-values, for equal steps of x -values.

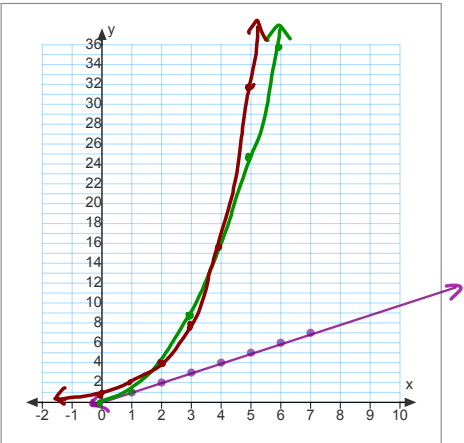
Complete the tables of values, then graph:

undefined

x	y	FD	SD
0	0	$1-0=1$	$1-1=0$
1	1	$2-1=1$	$2-1=1$
2	2	$3-2=1$	$3-2=1$
3	3	$4-3=1$	$4-3=1$
4	4	$5-4=1$	$5-4=1$
5	5	$6-5=1$	$6-5=1$
6	6	$7-6=1$	$7-6=1$
7	7	$8-7=1$	$8-7=1$

x	y	FD	SD
0	0	$1-0=1$	$3-1=2$
1	1	$4-1=3$	$5-3=2$
2	4	$9-4=5$	$7-5=2$
3	9	$16-9=7$	$9-7=2$
4	16	$25-16=9$	$11-9=2$
5	25	$36-25=11$	$13-11=2$
6	36	$49-36=13$	$15-13=2$
7	49		

x	y	FD	SD
0	1	$2-1=1$	$2-1=1$
1	2	$4-2=2$	$4-2=2$
2	4	$8-4=4$	$8-4=4$
3	8	$16-8=8$	$16-8=8$
4	16	$32-16=16$	$32-16=16$
5	32	$64-32=32$	$64-32=32$
6	64	$128-64=64$	$128-64=64$
7	128		



To calculate the **y-ratios** of a relation, divide consecutive y -values, for equal steps of x -values.

Add an extra column for each relation above, then calculate the y -ratios.

With a partner, compare properties (characteristics) of all three relations.

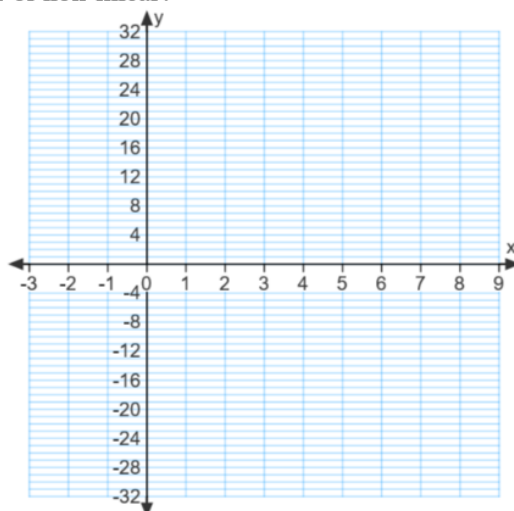
As a class, summarize the properties:

Linear	Non-Linear #1	Non-Linear #2

PRACTICE

1. Graph this relation. Is it linear or non-linear?

x	y
-3	-32
-1	-12
1	0
3	4
5	0
7	-12
9	-32



2. Without graphing, determine if the relation is linear or non-linear. Explain your choice!

a)

x	y
-30	250
-29	241
-28	232
-27	223
-26	214
-25	205
-24	196

b)

x	y
18	0
20	3
22	4
24	4
26	0
28	-5
30	-12

c)

x	y
3	128
6	200
9	288
12	392
15	512
18	648
21	800

d)

x	y
1	2
2	4
3	8
4	16
5	32
6	64
7	128

3. Using only the table 2d) above, calculate the y -ratios.

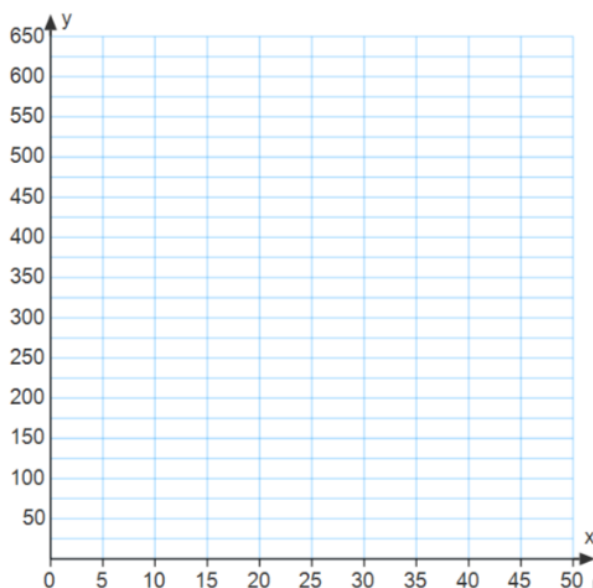
Cycle 1 Day 1 MBF 3CI CHAPTERS 4, 5, 7: RELATIONS

4. A farmer wants to use 100 m of fencing to build a small rectangular pen for his llamas. He would like the pen to have the greatest possible area.

a) Copy and complete the table. Provide six possible sets of dimensions for the pen. (Decrease the length in increments of 5 m.)

Length (m)	Width (m)	Perimeter (m)
40	10	$2(40) + 2(10) = 100$

- b) Add a fourth column to the table. Calculate the area of each pen.
 c) Draw a graph to compare length and area.
 d) Use the graph to determine the dimensions of the pen with the greatest possible area.



5. Go back to the Learning Target .
 Can you confidently say that you have met today's goal?

SHORT ANSWERS:

1. Non-linear
2. a) linear b) non-linear c) non-linear d) non-linear
3. All y -ratios are 2
4. a) all perimeter values are 100 m
 b) the area values are: 400, 525, 600, 625, 600, 525, 400
 c) *show your teacher the graph*
 d) 25 m by 25 m