Worksheet - First Differences

2. Copy each table and include a third column to record first differences. Classify each relation as linear or non-linear.

a)

x	y
0	5
1	6
2	8
3	12

b)

x	y
3	−4
4	−1
5	2
6	5

c)

x	y
−1	1
0	0
1	1
2	4

d)

x	y
−5	8
−3	4
−1	0
1	−4

3. Each table shows the speed of a skydiver before the parachute opens. Without graphing, determine whether the relation is linear or non-linear.

a) There is no air resistance.

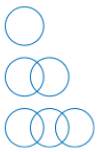
Time (s)	Speed (m/s)
0	0
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0

b) There is air resistance.

Time (s)	Speed (m/s)
0	0
1	9.6
2	16.6
3	23.1
4	30.8
5	34.2

5. Use first differences to determine which relations are linear and which are non-linear. ~~Write an equation representing each linear~~ relation. Extrapolate the relation to predict the outcome for the seventh step.

a)



Number of Circles	Number of Intersection Points
1	
2	
3	
4	

b)

Number of Sides	Number of Diagonals
4	
5	
6	
7	

6. Chapter Problem A pattern is made from toothpicks as shown.

Diagram 1 Diagram 2 Diagram 3

a) Create a table comparing the diagram number to the number of toothpicks.

b) Use first differences to show that the pattern is a linear relation.

c) ~~Write an equation for the relation.~~

d) Extrapolate the relation to predict the outcome for the 10th step.

Please note: **Extrapolation** means to predict/estimate beyond the data

Answers:

2. a) non-linear b) linear c) non-linear d) linear
3. a) linear b) non-linear
5. a) linear, seventh step – 12 diagonals b) non linear, seventh step – 35 diagonals
6. a) See table below: b) linear d) 31 toothpicks

Diagram #	# of Toothpicks
1	4
2	7
3	10
4	13