#

# **Unit 3**

## Relations and Functions

Linear Relations and Functions

Linear Equations and Graphs

Arithmetic Sequences and Series

In this unit you will learn:

* Relations and Functions
* Domian and Range
* Slope
* Equation of a line
* Parallel and Perpendicular lines
* Arithmetic Sequences
* Arithmetic Series

**CHAPTER 4** – **Linear Relations and Functions**

# Lesson 1

## Graphs of Relations

Example 1:



Jennifer walks her dog with a retractable leash. She stops for a rest on a park bench while she continues to hold the end of the leash. The graph shows the distance the dog is away from the bench. Describe what the dog is doing.

Example 2: Which graph best represents a person’s height as the person ages?



Example 3:

Frank leaves his home and walks 1 km to the store. After buying a drink, he slowly jogs the three kms to his friend’s house, which is on the opposite direction of his house. Frank visits with his friend for a while and then runs directly home. Using the distances given, draw a distance time graph that shows Franks distance from the store. Explain each section of the graph.

Assignment: Pg. 274-277 #1-4, 6, 8-11, 13 & 14 + Identifying Qualitative Graphs Worksheet (both sides)

# Lesson 2

# **Linear Relations**

Define:

*Relation:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Linear relation:*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Non-linear relation:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Discrete data:*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Independent variable:*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Dependent variable:*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Example 1:

List 5 ways you can write a relationship between 2 quantities.

Example 2:

Convert $y=2x-3$ to a table of values, a set of ordered pairs and a graph.

Example 3:

Denise earns $8.50 per hour at a pet store. She is paid for whole numbers of hours worked, not for parts of hours worked.

* + 1. Identify the relationship as linear or a non-linear. Explain how you know.
		2. Create a variable to represent each quantity in the relation. Which is the independent variable?
		3. Create a table of values for this relation. What are the appropriate values for the independent variable?
		4. Create a graph for the relation. Are the data discrete or continuous?

p

h

|  |  |
| --- | --- |
| h | p |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Example 4:

# Determine whether each relation is linear. Explain why or why not.

# The relationship between the cost to rent a banquet hall and the number of people attending the banquet, if the hall charges $150 plus $6 for each person who attends

# The relation described by the equation x2+y2=16

# The relation described by the set of ordered pairs {(10,6), (15, -2), (20,-10),(25, -18), (30, -26)}

1. The relation described by the set of ordered pairs {(-3,-4), (-1,2), (1,8), (3,14), (5,18)}
2. The relation described by the set of ordered pairs {(-5,10), (0,7), (5,4), (10,1), (20, -5)}

Example 5:

Delview dance tickets are $6 per ticket. Is the relation discrete or continuous? Does the data represent a linear or non-linear relationship between the number of tickets purchased and the cost of the tickets? Represent the relationship all 5 ways.

p

h

#

#

# Assignment: Pg. 287-291 1-3, 5, 7-9 + 6.2 Extra Practice Sheet

# Quiz on 6.1 and 6.2 on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Lesson 3

### Domain and Range

* Domain (D) is the set of all first coordinates of ordered pairs in a relation.

(Input values 🡪 x - values)

* Range (R) is the set of all second coordinates of the ordered pairs in a relation.

(Output values 🡪 y – values)

Example 1: State the domain and range of each graph. Use words, a number line, interval notation and set notation.

y

x

5

5

-5

-5

y

x

5

5

-5

-5

y

x

5

5

-5

-5

y

x

5

5

-5

-5

Example 2:

y

x

5

5

-5

-5

y

x

5

5

-5

-5

Determine the Domain and Range of the following discrete data.

 Give the domain and range using words and a list.

1. (-2, 4) (-1, 2) (0, 0) (1, -2) (2, 4)

y

x

5

5

-5

-5

# Assignment: Domain and Range worksheet + Pg. 301-304 #1-11

# Quiz on Domain and Range on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Lesson 4

### Functions

Definition:

*Function* – a rule that gives a single output number for every valid input number.

 (X, Y)

# Example 1:

Determine if the following is a function or not:

(a) {(2, 3), (3, 4), (2, 5), (5, 6), (6, 7)}

(b)

|  |  |
| --- | --- |
| x | y |
| -1 | -3 |
| 0 | -2 |
| 1 | -3 |
| 2 | 0 |

y

x

5

5

-5

-5

(c)

y

x

5

5

-5

-5

(d)

THE VERTICAL LINE TEST ALSO HELPS TO DETERMINE FUNCTIONS!

Definition:

*Function Notation*:

* To represent functions, we use symbols: f(x) , g(x) , h(x)
* f(x) reads “f of x”. It means the equation is a function that has x as the input variable.
* f(x) is another name for y. For example: f(x) = 3x + 1 is the same as y = 3x + 1.
* Typically we are given a numerical value to SUBSTITUTE for x in the function.

Example 2:

1. If f(x) = -2x + 1, find the value of x if: (a) f(x)=12 (b) f(x)=-20
2. Given f(x) = 3x2 – x – 6, find: (a) f(2) (b) f(-1) (c)f()

Example 3:

 Trevor rents a car for a base fee of $25 per day plus 10 cents for each kilometre. Trevor’s bill per day can be modelled by the relation C= 0.10n + 25, where C is the total charge, in dollars, and n is the number of kilometers.

* + 1. Write the relation in function notation.
		2. Make a table of values. Graph the function if Trevor drives up to 200 km in a day.
		3. If Trevor’s bill was $27.50, how many kilometres did he drive that day?

C

n

|  |  |
| --- | --- |
| n | C |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Assignment: Pg. 311-314 #1-8, 10-11Lesson 5

**Slope**

Definition:

*Slope:* the ratio of the vertical change, or rise, to the horizontal change, or run, or a line or line segment.

*Slope*= rise

 run

Plot the following points on the grid provided and determine the slope of each line segment.

y

x

5

5

-5

-5

y

x

5

5

-5

-5

#

#  A (-3,2) and B(4,-4) C(-5,-2)and D(1,4)

What can you tell about negative and positive slopes?

You should have noticed that when calculating slope:

* The rise is the difference in the y-coordinates: y2-y1
* The run is the difference in the x-coordinates: x2-x1

Therefore, **Slope= rise = y2-y1**

 **run x2-x1**

# Example 1:

# Using the slope formula, determine the slope of the following line segments.

a) A(2,1) B(5,3) b) M(-3,4) N(-1,2)

c) R(-2,4) S(5,4) d) J(1,-2) K(1,3)

# Example 2:

Describe in words each of the slopes you found in Example 1; in other words, what would each line segment look like if you were to graph them?

a)

b)

c)

d)

# Example 3:

When discussing a roof truss, carpenters use the word *span* instead of the *width* and *pitch* rather than the *slope*. Determine the pitch of the following roof truss.



15ft

36ft

# Example 4:

 John opened a savings account with $300. The graph shows the amount that John has in his account for one year. Determine the average rate of change for John’s account.

# Untitled-1

# Assignment: Pg. 325-328 # 1-3, 5, 8-13Lesson 6

**Graphing Linear Functions Using Slope and Table of Values**

Example 1:

y

x

5

5

-5

-5

y= 2x-1

x y

Example 2:

y

x

5

5

-5

-5

y=(5/2)x +1

x y

Example 3:

For each point and slope graph the line and list three additional points on that line.

a) m=-2; (4,-2) b)m= 1/3; (-1,2)

y

x

5

5

-5

-5

y

x

5

5

-5

-5

#

Assignment: “Why did Zorna Pour Ketchup…” & 5-C

Practice Test on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Test on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CHAPTER 7** – **Linear Equations and Graphs**

# Lesson 1

## Graphing Linear Equations using Slope-Intercept Form

**y=mx+b**

Slope – intercept from: *y*=*mx*+*b*

y

x

5

5

-5

-5

Example 1:

 *y*=2*x*+1

Example 2:

State the slope and y-intercept for the line represented by

a) y=-4x+7 b) 3x+2y=-12

Example 3:

Write an equation of the line whose slope is 2/3 and y-intercept is 1, then graph.

y

x

5

5

-5

-5

Assignment: Worksheet “Whom Should You See….” + 7.4 and Pg. 349-351 #1-8

# Lesson 2

## Graphing Linear Equations using Slope-Intercept Form

**y=mx+b Part 2**

Example 1:

Determine the equation of each line given the graph.

a) b)

y

x

5

5

-5

-5

Example 2:

Consider the equation y = 2x + b. What is each value of b if a graph of the line passes through each point.

y

x

5

5

-5

-5

a) (1,7) b) (-3,-5)

y

x

5

5

-5

-5

Example 3:

Consider the equation y = mx -3. What is each value of b if a graph of the line passes through each point.

y

x

5

5

-5

-5

a) (1,7) b) (-3,-5)

Example 4:

Considering the following points, write the equation of a line, in slope-intercept form, that passes through both points.

y

x

5

5

-5

-5

1. (-2,5) (-5,-3) b) (-1,2), (5-4)

Example 5:

Asha has selected a hotel for her wedding reception. The cost involves a fee for the deluxe ballroom and a buffet charge that depends on the number of guests. This is shown in the table.

Number of Guests Cost ($)

 0 425

 25 1800

 50 3175

 100 5925

a) Sketch a graph of the data in the table.

C

n

1. What are the slope and y-intercept of the line? What does each **parameter** represent?
2. Write an equation that describes the relationship between the cost and the number of guests. Express the equation in slope-intercept form.
3. What is the cost of 140 guests?
4. Asha would like the total cost to be no more than $15 000. What is the maximum number of guests that can attend?

# Assignment: Pg. 351 #9,10,12 & 13 Quiz on The Equation of a Line on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Lesson 3

# **General Form Ax+By+C=0**

*x-intercept*- the x coordinate of the point when a line or curve crosses the x-axis; the value of x when y=0.

*y-intercept* – the y coordinate of the point when a line or curve crosses the y-axis; the value of y when x=0

Example 1:

For the linear equation 2x+3y-12=0,

1. state the x-intercept

Therefore, the coordinates for the x-intercept is ( , )

1. state the y-intercept

y

x

5

5

-5

-5

Therefore, the coordinates for the y-intercept is ( , )

1. use the intercepts to graph the line.
2. What is the slope of this graph?
3. Determine the equation of the line using

slope-intercept form, that is, **y-mx+b**

Example 2:

Change the equation from standard from 2x + 3y -12 = 0 to slope-intercept from algebraically.

Example 3:

Parents of the cheerleading squad rent a hall. They arrange a talent show as a fundraiser. The relationship between the number of tickets sold, x, and the profit, y, in dollars, may be represented by the equation 24x-2y-1680=0.

1. What is the slope of the line?
2. Identify the y-intercept.
3. How many tickets must the parents sell to reach the break-even point.

Example 4:

Rewrite the equation each equation in general form, Ax+By+C=0. What is the x and y intercepts of these lines?

1. y=-(2/3)x +6 b) y = (3/4)x - 2

#

**Special Cases of the equation Ax+By+C=0, when one or more of A, B, C are 0.**

**Ax+By=0 is a line that passes through the origin (0,0)**

**By+C=0 is a horizontal line.**

**Ax+C=0 is a vertical line.**

Example 5:

Describe each of the following lines. Identify the intercepts, then state the domain and range.

y

x

5

5

-5

-5

1. x – 3y = 0
2. 2y + 4 = 0
3. 3x – 12 = 0

Example 6:

Brook wants to save $336 to decorate her bedroom. She has two part-time jobs. On weekends, she works as a snowboard instructor and earns $12 per hour. On weeknights, she earns $16 per hour working as a high-school tutor.

1. Write an equation to represent the number of house Brooke needs to work as a snowboard instructor, S, and as a tutor, T.
2. What is the S-intercept of a graph of the equation? What does the S-intercept represent?
3. What would the T-intercept be? What does it represent?
4. Suppose Brooke works 8h as a snowboard instructor. How many hours will she need to work as a tutor?

Assignment: Why does a poor man drink coffee + Pg. 365-369 #1-8, 10, 11, 13-16, 18-20;

# Lesson 4

### Slope-Point Form y-y1=m(x-x1)

The slope-point form of an equation is found using the slope (m) formula.

m= y-y1

 x-x1

Multiplying both sides of the above equation by (x-x1) gives:

(x-x1)m= y-y1 (x-x1)

 x-x1

(x-x1)m= y-y1 (x-x1)

 x-x1

m(x-x1)= y-y1

This equation is called the slope-point form of a non-vertical line through point (x1, y1) with slope m. It is commonly written as y-y1=m(x-x1).

Example 1:

1. Write the equation of a line using point-slope form passing through (-2,5) with a slope of -3
2. Convert the equation into slope-intercept from, y=mx+b
3. Graph both lines and compare them.

y

x

5

5

-5

-5

Example 2:

Use slope-point form to write an equation of the line though the following sets of points. Rewrite the equation in general form Ax+By+C=0

1. (3,-4), (5,-1)
2. (-5,2), (-2,1)

Example 3:

A family drives at a constant speed from Wrigley, NT, to visit relatives in Fort Providence, NT. When they start driving at 9:00am, they are 540km from Fort Providence. At 12:30p.m., they reach Fort Simpson, located 225km from Fort Providence.

1. Write and equation that describes their distance, *d,* in kilometers, from Fort Providence in terms of *t* hours past 9:00am.
2. What time will the family arrive in Fort Providence.

# Assignment: Pg. 377 1-6, 8, 10-18 + 7.3 Extra Practice Sheet

# Quiz on Lesson 3 and 4 on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Lesson 5

### Parallel and Perpendicular Line Segments

Graph the line segments AB and CD. Calculate the slope of each line segment. What do you notice?

A(1,1) B(4,4) and C(-1,-3) D(2,0)

y

x

5

5

-5

-5

**The slopes of parallel line segments are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Graph the line segments EF and GH. Calculate the slope of each line segment. What do you notice?

E(-2,-2) F(4,2) and G(3,-3) H(-1,3)

y

x

5

5

-5

-5

**The slopes of perpendicular line segments are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Example 1:

Determine if the lines in each pair are parallel or perpendicular.

1. y=3x+7 b) y=4x+5 c) y=(4/5)x -2

y=- (1/3)x -6 y=4x-1/5 3x+5y=7

Example 2:

1. Write the equation of a line that is parallel to 3x-y+4=0 and through (5,-6). Express the equation in slope-intercept form.

Method 1: Use Slope-Point form

Method 2: Use Slope-Intercept Form

1. Convert the equations to general form.

Example 3:

Write the equation of a line that is parallel to 4x-5y+6=0 and through (1,-2). Express the equation in slope-intercept form and in general form.

Example 4:

Write the equation of a line that is perpendicular to x-2y-5=0 with an x-intercept of -4. Express the equation in slope-intercept form and in general form.

Example 5:

Write the equation of a line that is perpendicular to 3x-2y-5=0 and passing through (8, -6). Express the equation in slope-intercept form and in general form.

Assignment: Pg. 390-395 #1-2(odd), 3, 4 (c,d), 5-7 (odd), 10-11, 13, 16, 18-20, 22-24 + 7.4 Extra Practice Sheet.

Practice Test on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Test on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 1 – Sequences and Series**

Intro to Arithmetic Sequences

**WARM-UP:**

1. Evaluate the following:
2. -5 + (-6) = \_\_\_\_\_ (b) -9 – 7 = \_\_\_\_\_
3. -3 – (-11) = \_\_\_\_\_ (d) -5 + 13 = \_\_\_\_\_
4. 11 + 19 = \_\_\_\_\_ (f) 14 + (-7) = \_\_\_\_\_
5. 23 – 12 = \_\_\_\_\_ (h) -37 + 22 = \_\_\_\_\_
6. -45 + 19 = \_\_\_\_\_ (j) 25 + (-66) = \_\_\_\_\_
7. 74 – (-89) = \_\_\_\_\_ (l) 100 – 200 = \_\_\_\_\_

2. Determine the missing numbers in the sequence:

1. 2, 10, 18, \_\_\_\_\_, \_\_\_\_\_
2. 21, 18, 15, \_\_\_\_\_, \_\_\_\_\_
3. -3, -12, -21, \_\_\_\_\_, \_\_\_\_\_
4. -3, 0, \_\_\_\_\_, 6
5. \_\_\_\_\_, 27, 23, \_\_\_\_\_, 15, \_\_\_\_\_
6. 14, \_\_\_\_\_, -6, \_\_\_\_\_, -26
7. 4, \_\_\_\_\_, 12
8. 12, \_\_\_\_\_, \_\_\_\_\_, 45
9. the 8th term of the sequence: 4, 7, 10, …
10. the 5th term of the sequence: 33, 22, …

**Lesson 1**

* 1. **Arithmetic Sequences**

A sequence is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of numbers. Each number is called a \_\_\_\_\_\_\_\_\_\_.

Example: 2, 4, 6, 8, … 1st term = \_\_\_ , 2nd term = \_\_\_ , 3rd term = \_\_\_ and so on.

If a sequence has a \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between any 2 successive terms, then it is called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. To find the common difference take any term and subtract the term in front of it.

These are arithmetic sequences: 2, 4, 6, 8, … common difference = \_\_\_

 8, 14, 20, 26, … common difference = \_\_\_

 20, 15, 10, 5, … common difference = \_\_\_

 9, 8.5, 8, 7.5, … common difference = \_\_\_

Example 1: For the arithmetic sequence 2, 9, 16, …, determine the 6th term.

Example 2: For the arithmetic sequence –4, 1, 6, 11, …, determine the 8th term.

Example 3: A car salesperson receives a base salary of $275 per week, plus $250 for every car sold. What is the weekly salary if 6 cars are sold? 7 cars are sold? 8 cars are sold?

Example 4: A sum of $90 was deposited in a bank on January 31st. A sum of $50 is deposited in the bank on the 20th day of each month. Suppose this pattern continues. How much will be in the bank August 31st?

Example 5: Insert two numbers between 17 and 59, so the four numbers form an arithmetic sequence.

Example 6: Insert three numbers between 72 and 28, so the five numbers form an arithmetic sequence.

**The General Term of an Arithmetic Sequence**

Lets look at the following arithmetic sequence:

 2, 4, 6, 8, 10, … common difference = \_\_\_

the first term is written as t1 = \_\_\_. To get the next term we must take the first term and add \_\_\_.

 t2 = To get the next term we must take the first term and add \_\_\_.

 t3 = To get the next term we must take the first term and add \_\_\_.

 t4 = To get the next term we must take the first term and add \_\_\_.

 t5 =

In the general arithmetic sequence, the first term is represented by \_\_\_ and the common difference by \_\_\_. The first few terms are:

 t1 = a

 t2 = a + d

 t3 = a + \_\_\_d

 t4 = a + \_\_\_d

 .

 .

 .

 tn =

The general term of an arithmetic sequence is given by

 tn =

where *a* is the first term, *n* the term number, and *d* the common difference.

Example 1: Find the 237th term in the sequence 4, 7, 10, 13, …

Example 2: For the sequence –4, 1, 6, 11, … Write a formula for tn and use it to find t15.

Example 3: An arithmetic sequence is 3, 10, 17, 24, …One term in this sequence is 129. Which term is it?

Example 4: An arithmetic sequence is 102, 105, 108, …. Which term is 1002?

Example 5: In an arithmetic sequence, the 3rd term is 8 and the 10th term is 4.5.

1. Find the sequence.
2. Write the general term of the sequence.
3. How many terms of the sequence are greater than zero?

Example 6: In an arithmetic sequence, the 4th term is 73 and the 10th term is 121.

1. List the sequence to show the first four terms.
2. Write the general term of the sequence.
3. How many terms of the sequence are less than 200?

***Assignment:*** Pg. 16 #1-9, 13 & 14

**Lesson 2**

**1.2** **The Sum of an Arithmetic Series**

Lets look at the following arithmetic sequence:

 2, 4, 6, 8, 10

What is the sum of this arithmetic sequence?

When there are plus signs between arithmetic sequences they are called \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_.

You can also calculate the sum of any arithmetic series by doing the following:

 (mean of the first and last terms) × (number of terms)

Formula for sum of arithmetic series: Sn = (a + tn) × n

 2

Example 1: Determine the sum of the first 50 terms of the arithmetic series 3 + 4.5 + 6 + 7.5 …

Example 2: Find the sum of an arithmetic series of 20 terms if t1=6 and t10=42.

Example 3: Find the sum of the first 7 terms in the arithmetic series 3 + 13 + 17 + …

 4 12 12

Example 4: Determine the sum of the arithmetic series -8 + (-2) + 4 + 10 +… + 76.

Example 5: Determine the sum of the arithmetic series 6 + 10 + 14 + … + 50.

Example 6: How many terms in the series 539 + 528 + 517 + … are needed to give the sum of zero?

Example 7: Male fireflies flash in various patterns to signal location or to ward off predators. Suppose that under certain circumstances, a particular firefly flashes twice in the first minute, four times in the second minute, and six times in the third minute.

a) If this pattern continues, what is the number of flashes on the 30th minute?

b) What is the total number of flashes in 30 min?

***Assignment:*** Pg. 27 #1-11

Quiz next class