Algebra II
1st Trimester Learning Targets

Unit 1 - Sequences (Chapter 1)

1a. I can use a recursive formula to write out a sequence

Write out the first 5 terms of the following sequences:

1) $\begin{cases} a_1 = 20 \\ a_n = a_{n-1} + 7 \end{cases}$

2) $\begin{cases} b_1 = 72 \\ b_n = 2.25 b_{n-1} \end{cases}$

3) $\begin{cases} c_1 = 100 \\ c_n = 0.75 c_{n-1} + 50 \end{cases}$

1b. I can write the recursive formula for an arithmetic sequence.
1c. I can write the recursive formula for a geometric sequence.

Write the recursive formula for the following sequences.

4) 15.6, 19.4, 23.2, 27, 30.8, 34.6, …

5) 3.2, 10.88, 36.99, 125.77, 427.63, …

6) 200, -190, 180.5, -171.5, 162.9, …

7) 1372, 1319.7, 1267.4, 1215.1, …

1d. I can use a geometric sequence to model growth and decay problems.
1f. I can use shifted geometric sequences to model data.
1i I can use a geometric sequence to model compound interest.

8) Write a recursive formula for each of the following:

   a) Start at 40 with 35% growth

   b) Start at 7000 with 12% decay

   c) Deposit $500 into an account that pays 0.75% interest compounded quarterly.

   d) A bacteria colony starts at 300 cells. Every hour 50 cells die, however the colony grows by 12.5%

9) Darcy bought a car for $15,000. According to Delilah, it will depreciate at 20% every year.

   a) Write a recursive routine find the value of the car after n years.

   b) List out how much the car was worth each year for the first 5 years.

   c) If Darcy wants to sell the car before it is worth less than $2000, how many years can she keep the car?

10) Darcy got a loan to pay for her car. After taxes, extended warranty and armor coating, the cost of her $15,000 car was $17,000. She was charged 1.9% annual interest compounded monthly. Her monthly payments were 297.

a) Write a recursive routine to model the amount she owes on the car after n months.

b) List out how much she owes on the car at the end of each year.

c) If Darcy totals the car after two years and her insurance pays her the depreciated value of the car, how much money will Darcy have, after paying off the car loan, to buy a new car?

d) If Darcy trades in the car after three years and the dealer gives her 70% of the depreciated value of the car as a trade in, how much will that leave Darcy to put toward the new car after paying off the balance on her loan?

1e I can find the long-term value of a geometric sequence.

Find the long-term value of the following sequences

10) $\begin{cases} a_1 = 5000 \\ a_n = 0.75a_{n-1} + 200 \end{cases}$ 11) $\begin{cases} a_1 = 40 \\ a_n = 1.4a_{n-1} - 10 \end{cases}$ 12) $\begin{cases} a_1 = 0 \\ a_n = 0.7a_{n-1} + 60 \end{cases}$

Unit 2 – Linear Models (Chapter 3)

3a I can write an explicit formula given an arithmetic sequence

Write the explicit formula for the following sequences

13) $\begin{cases} u_0 = 5 \\ u_n = u_{n-1} + 5 \end{cases}$ 14) $\begin{cases} u_0 = -5 \\ u_n = u_{n-1} + 2.5 \end{cases}$ 15) $\begin{cases} u_0 = 25 \\ u_n = u_{n-1} - 8.25 \end{cases}$

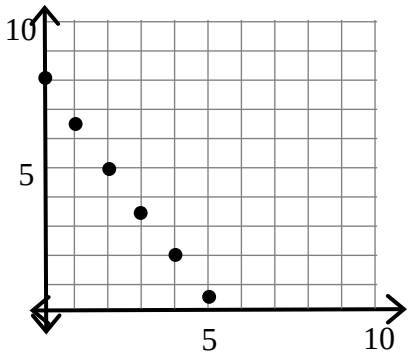
1h I can write a recursive sequence given a graph.
3b I can describe a linear set of data with both a recursive and an explicit formula

For each set of data, write a recursive formula and an explicit formula

16)

x	y
0	-8.4
1	-6.1
2	-3.8
3	-1.5
4	8
5	3.1
6	5.4

17)



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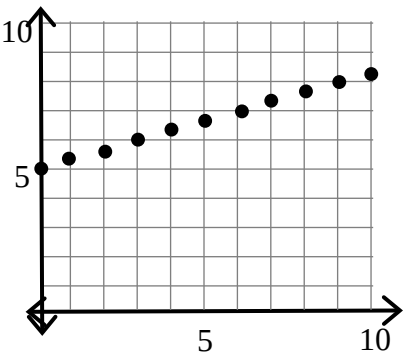
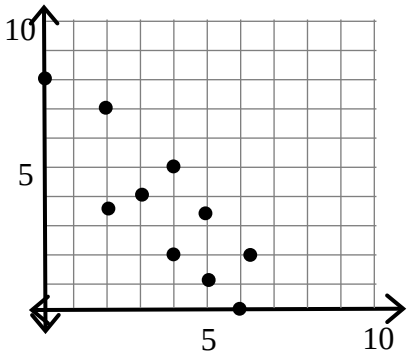


3c I can write a reasonable equation for a set of data that looks close to linear

For each set of data, draw a reasonable line of fit. Write the equation of the line you drew.

19)



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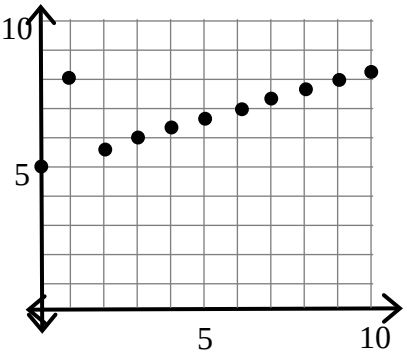


3d I can evaluate how well my linear equation fits a set of data
3e I can give real-world meaning to the slope and y-intercept of my equation.
3f I can use a graphing calculator to generate a linear equation to fit a set of data.

The following data show the college enrollment for public and private colleges in the United States from 1965 to 2014. All values are in millions of students. (Statista https://www.statista.com/statistics/183995/us-college-enrollment-and-projections-in-public-and-private-institutions/)

Year	1965	1967	1969	1971	1973	1975	1977	1979	1981
Enrollment	5.92	6.62	8.01	8.94	9.60	11.18	11.29	11.57	12.37

Year	1983	1985	1987	1989	1991	1993	1995	1997	1999
Enrollment	12.46	12.25	12.77	13.54	14.36	14.31	14.26	14.51	14.85

Year	2001	2003	2005	2007	2009	2011	2013	2015
Enrollment	15.92	16.91	17.49	18.23	20.31	21.01	20.38	20.27

21) Write the median-median line to model this data.

22) What is the real-world meaning of the slope of your equation?

23) Use your model to find the predicted enrollment and residual for the following years:
a) 1975 b) 1983 c) 1997 d) 2011

24) What is the root-mean-square-error for you model?

Unit 3 – Functions and Transformations (Chapter 4)

4b ***I can determine if a relation is a function.***
4d ***I can define the domain and range of a function.***

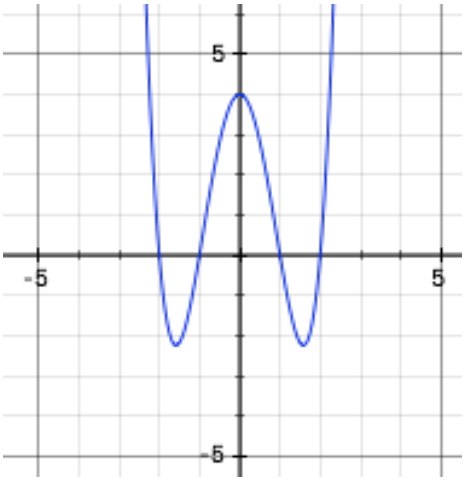
For each of the following relations, state the domain and range. Determine if the relation is a function.

25)

x	1	3	4	6	7	5	3	9
y	2	2	2	3	3	3	2	5

x	4	5	4	6	-4	3	-9	2
y	2	2	2	3	3	3	2	5

26)



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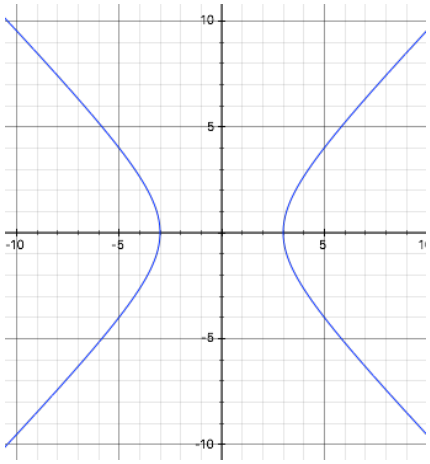


4c ***I can use function notation.***
4m ***I can do the composition of functions.***

Use the following function definitions to evaluate the expressions.

$f(x) = 3(x-4)^2 - 5$ $\quad g(x) = -2\sqrt{x+7} + 5$ $\quad h(x) = \frac{2}{3}[x-6]$

28) $g(-3)$ 29) $f(6)$

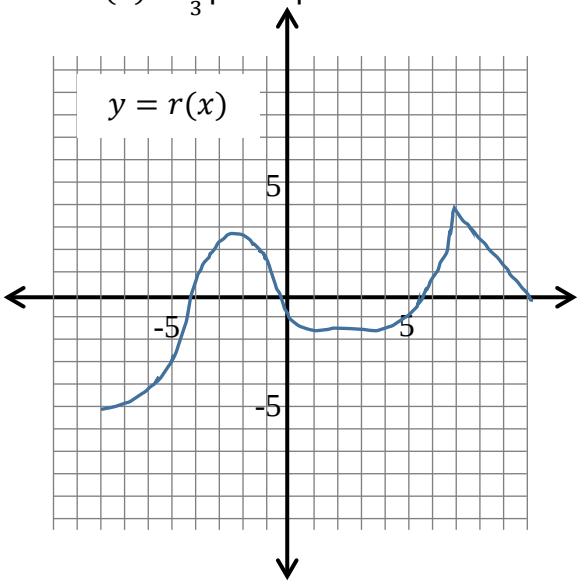
30) $r(-2)$ 31) $h(4)$

32) $g(8)h(2)$ 33) $r(-8) + f(-5)$

34) $2r(0) + 3g(0)$ 35) $h(-3) - 5f(3)$

36) $g(r(6))$ 37) $h(-g(-6))$

38) If $g(x) = 5x - 12$ and $t(x) = 4x^2 + 2$, find $g(t(x))$



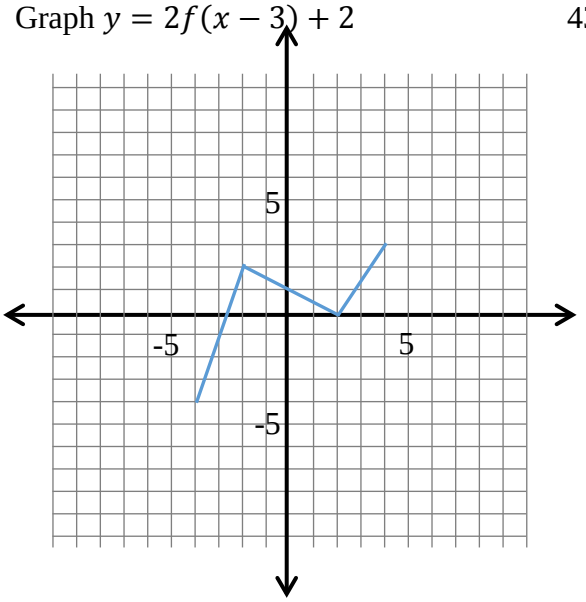
4e ***I can graph a basic quadratic function***
4f ***I can graph a basic square root function***
4g ***I can graph a basic absolute value function***
4i ***I can translate a function vertically and horizontally.***
4j ***I can dilate a function vertically and horizontally.***
4k ***I can reflect a function.***

For the following problems, give the parent function, describe the transformations and graph the function.

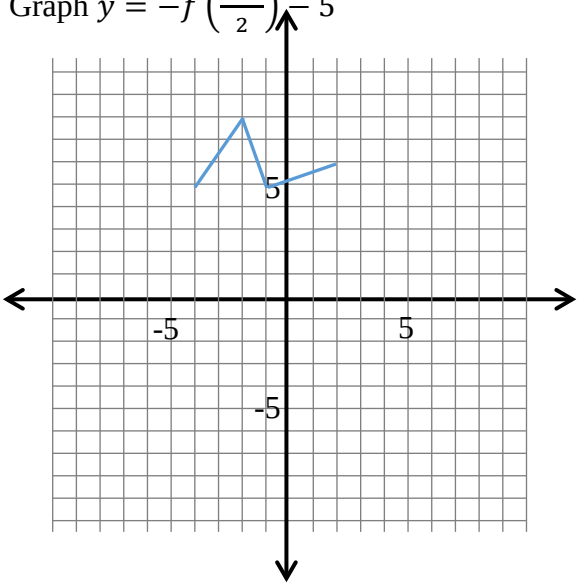
39) $y = -3(x+4)^2 + 2$ 40) $y = \frac{1}{2}\sqrt{-(x-3)} + 2$ 41) $y = -4\lfloor 3(x+5) \rfloor - 4$

Given $y = f(x)$ graphed below, graph the transformed function.

42) Graph $y = 2f(x-3) + 2$



43) Graph $y = -f\left(\frac{x+3}{2}\right) - 5$



4n ***I can apply composition of functions to real world contexts.***

44) The clothing warehouse is running a special, offering 30% off their clearance items. These items are already clearance at 50% of their original price.

a) How much would a jacket originally priced at $120 cost?

b) The store claims that these items are priced 80% of their original price. Prove them either right or wrong by finding the actual savings on these items.

Unit 4 – Linear Systems (Chapters 3 and 6)

3g I can solve a system of linear equations graphically.

Solve the following systems by graphing.

45) $\begin{cases} x + y = 6 \\ 2x - y = 2 \end{cases}$

46) $\begin{cases} x + y = 1 \\ 3x + 5y = 7 \end{cases}$

3h I can solve a system of linear equations algebraically

Solve the following systems by substitution of elimination.

47) $\begin{cases} 6x + 4y = 80 \\ x - 7y = -2 \end{cases}$

48) $\begin{cases} x = 2 - y \\ x - 2y = 0 \end{cases}$

49) $\begin{cases} 9x - y = 30 \\ 6x - 15 = y \end{cases}$

50) $\begin{cases} 2x - y = 36 \\ 3x - \frac{1}{2}y = 26 \end{cases}$

6a I can graph an inequality in two variables.
6b I can graph a system of inequalities.

Graph the following systems

51) $\begin{cases} y < -x - 3 \\ x > y - 2 \end{cases}$

52) $\begin{cases} y \geq x + 3 \\ y < x - 4 \\ 2y + 3x \geq 4 \end{cases}$

6c I can write a system of inequalities given a real-world situation.
6d I can find the feasible region of a system of inequalities.
6e I can find the vertices of a feasible region.
6f I can optimize a function over a feasible region

53) The Oklahoma City division of SuperSport Inc. produces footballs and basketballs. It takes 4 hours on machine A and 2 hours on machine B to make a football. Producing a basketball requires 6 hours on machine A, 6 hours on machine B, and 1 hour on machine C, Machine A is available 120 hours a week, machine B is available 72 hours a week, and machine C is available 10 hours per week. If the company makes $3 profit on each football and $2 profit on each basketball, how many of each should they make to maximize their profit?