42. Joey has $50 (← starting point) and earns $12.50 per day. He wants to save **at least** $250.00. Write an inequality that represents this scenario. Do Not Solve!

$12.50x + 50 \geq 250$

43. Evaluate each absolute value expression.

a. $|4-12| = |-8| = 8$

b. $|-8(7)| = |-56| = 56$

c. $|-13| - |6-10|$

$13 - |-4|$

$13 - 4 = 9$

d. $\left|\frac{-15+13}{5}\right|$ *Write your answer as a fraction!

$\left|\frac{-2}{5}\right| = \frac{2}{5}$

44. Solve each absolute value equation. Remember, get the absolute value sign by itself (as if it were a variable). Then, set what is inside the absolute value sign equal to the positive and negative values of the number on the other side of the equals sign.

a. $|2x-5| = 7$

$2x - 5 = 7$, $+5\ +5$, $2x = 12$, $x = 6$

$2x - 5 = -7$, $+5\ +5$, $2x = -2$, $x = -1$

b. $|-2x+7| = 11$

$-2x + 7 = 11$, $-7\ -7$, $-2x = 4$, $x = -2$

$-2x + 7 = -11$, $-7\ -7$, $-2x = -18$, $x = 9$

Get the absolute value by itself!

c. $|x-6| + 8 = 41$

$-8\ -8$

$|x-6| = 33$

$x - 6 = 33$, $+6\ +6$, $x = 39$

$x - 6 = -33$, $+6\ +6$, $x = -27$

d. $52 = 7|x-2| - 4$

$+4\ +4$

$\frac{56}{7} = \frac{7|x-2|}{7}$

$8 = |x-2|$

$8 = x - 2$, $+2\ +2$, $10 = x$

$-8 = x - 2$, $+2\ +2$, $-6 = x$

45. Consider the sequence shown.

a. Describe the pattern.

Add one more row of dots.

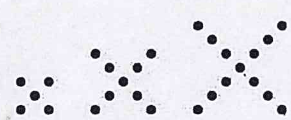
b. Draw the next two figures of the pattern.

c. Write a numeric sequence to represent the first 5 figures.

$3 \xrightarrow{+3} 6 \xrightarrow{+4} 10 \xrightarrow{+5} 15 \xrightarrow{+6} 21$

_3_, _6_, _10_, _15_, _21_

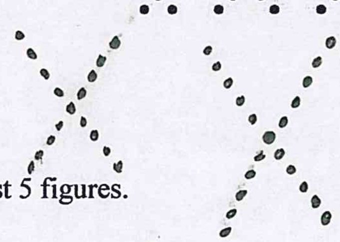
46. Consider the sequence shown.



a. Describe the pattern.

Add a dot to each arm.

b. Draw the next two figures of the pattern.



c. Write a numeric sequence to represent the first 5 figures.

$5 \xrightarrow{+4} 9 \xrightarrow{+4} 13 \xrightarrow{+4} 17 \xrightarrow{+21} 21$

_5_, _9_, _13_, _17_, _21_

47. JoJo's Pizza Shop made 16 pizzas on Monday, 22 pizzas on Tuesday, and 28 pizzas on Wednesday. If this pattern continues, how many pizzas will JoJo's Pizza Shop make on Friday?

Mon	Tues	Wed	Thurs	Fri
16	22	28	34	40

+6 +6 +6 +6

40 pizzas

48. Bradley sends two text messages to his friends to tell them school is cancelled because of snow. **Each** of those friends send two text messages to tell their friends the same news. **Each** of those friends send two text messages to tell their friends the same news, and so on.

a. Write a numeric sequence to represent the number of calls made in each of the first 5 sets of phone calls.

1, 2, 4, 8, 16, 32

$2-1=1$
$4-2=2$ > not the same = not arithmetic

b. Is this an arithmetic or geometric sequence?

$\frac{2}{1}=\frac{4}{2}=\frac{8}{4}=2$ same common ratio Geometric

49. The Robinsons are draining their family swimming pool. After $\frac{1}{2}$ hour, there are 7500 gallons of water in the pool. After 1 hour, there are 7200 gallons of water in the pool. After $1\frac{1}{2}$ hours, there are 6900 gallons of water in the pool. If this pattern continues, how much water will be in the pool after 3 hours?

½ hr	1 hr	1½ hr	2 hr	2½ hr	3 hr
7500	7200	6900	6600	6300	6000

−300 −300 −300 −300 −300

300 gallon draining every ½ hour 6000 gallons

50. Identify each sequence as **arithmetic** or **geometric**. Then, determine the **common difference** or **common ratio** for each sequence.
"d" "r"

a. 2, 5, 8, 11, 14, 17

$5-2=3$
$8-5=3$
$d=3$ Arithmetic

b. -6, 12, −24, 48, −96

$\frac{12}{-6}=-2$ $\frac{-24}{12}=-2$

$r=-2$ Geometric

c. $1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \frac{1}{256}$

$\frac{\frac{1}{4}}{1}=\frac{1}{4}$ $\frac{\frac{1}{16}}{\frac{1}{4}}=\frac{4}{1}\cdot\frac{1}{16}=\frac{1}{4}$

$r=\frac{1}{4}$ Geometric

d. 0.13, 0.38, 0.63, 0.88, 1.13

$0.38-0.13=0.25$
$0.63-0.38=0.25$

$d=0.25$ Arithmetic

e. −6, −8, −10, −12, −14

$-8-(-6)=-8+6=-2$
$-10-(-8)=-10+8=-2$
$d=-2$ Arithmetic

f. 200, 20, 2, 0.2, 0.02

$\frac{20}{200}=0.1$ $\frac{2}{20}=0.1$

$r=0.1$ Geometric

g. $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

$\frac{\frac{1}{3}}{1}=\frac{1}{3}$ $\frac{\frac{1}{9}}{\frac{1}{3}}=\frac{3}{1}\cdot\frac{1}{9}=\frac{1}{3}$

$r=\frac{1}{3}$ Geometric

h. 8, −1, −10, −19, −28

$-1-8=-9$
$-10-(-1)=-10+1=-9$

$d=-9$ Arithmetic

51. For each sequence, determine whether it is **arithmetic** or **geometric**. Then, use the appropriate formula to determine the **<u>15th term</u>** in the sequence.

$$a_n = \underset{\text{1st term}}{a_1} + \underset{\text{common difference}}{d}(n-1) \qquad g_n = \underset{\text{1st term}}{g_1} \cdot \underset{\text{common ratio}}{r}^{n-1}$$

a. 5, 10, 20, 40, 80, 160

$\frac{10}{5} = 2$ $\frac{20}{10} = 2$ $r = 2$ Geometric

$g_{15} = 5 \cdot 2^{15-1} = 5 \cdot 2^{14}$

$g_{15} = 81920$

b. $\frac{1}{2}, 1, \frac{3}{2}, 2, \frac{5}{2}, 3, \frac{7}{2}$

$1 - \frac{1}{2} = \frac{1}{2}$ $\frac{3}{2} - 1 = \frac{1}{2}$ $d = \frac{1}{2}$ Arithmetic

$a_{15} = \frac{1}{2} + \frac{1}{2}(15-1) = \frac{1}{2} + \frac{1}{2}(14)$

$a_{15} = 7\frac{1}{2} = \frac{15}{2}$

c. −0.25, 0.5, 1.25, 2, 2.75

$0.5 - (-0.25) = 0.75$ $d = 0.75$

$1.25 - 0.5 = 0.75$ Arithmetic

$a_{15} = -0.25 + 0.75(15-1)$

$a_{15} = -0.25 + 0.75(14) = 10.25$

d. $4, 2, 1, \frac{1}{2}, \frac{1}{4}$

$\frac{2}{4} = \frac{1}{2}$ $\frac{1}{2}$ $r = \frac{1}{2}$ Geometric

$g_{15} = 4 \cdot \left(\frac{1}{2}\right)^{15-1} = 4 \cdot \left(\frac{1}{2}\right)^{14} = \frac{1}{4096}$

52. Determine the **<u>50th term</u>** in the sequence defined by $a_n = -11 + 5(n-1)$.

$a_{50} = -11 + 5(50-1)$

$a_{50} = -11 + 5(49)$

$a_{50} = 234$

53. Determine the **<u>7th term</u>** in the sequence defined by $g_n = 2 \cdot \left(\frac{1}{2}\right)^{n-1}$.

$g_7 = 2 \cdot \left(\frac{1}{2}\right)^{7-1}$ $g_7 = \frac{1}{32}$ or 0.03125

$g_7 = 2 \cdot \left(\frac{1}{2}\right)^{6}$

54. Determine the pattern in the sequence: 7, 14, 21, 28, …. Then, write a function to represent the pattern.

+7 +7 +7 $a_n = 7 + 7(n-1)$

$d = 7$ Arithmetic

Complete the table and graph each exponential function. Identify the *x*-intercept, *y*-intercept, asymptote, domain, and range. **Type each expression into the calculator exactly as it is written, replacing *x* with its value.**

55. $f(x) = -4 \cdot 2^x$

a. *x*-intercept(s) None

b.* *y*-intercept (0, −4)

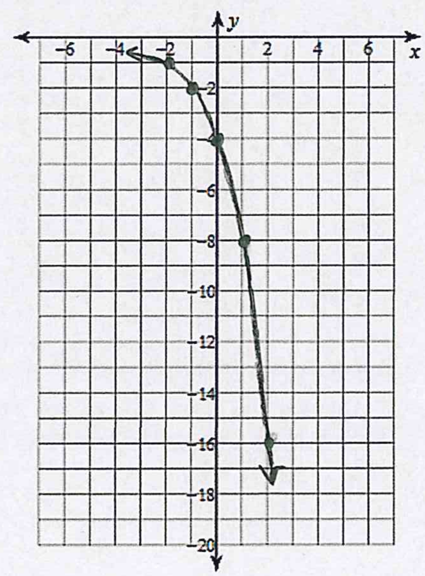
c. asymptote $y = 0$

d. domain All real numbers

e. range $y < 0$

f. Circle one: increasing or decreasing

x	y
-2	-1
-1	-2
* 0	-4
1	-8
2	-16



56. $f(x) = 3 \cdot 2^x$.

x	y
-2	0.75 or $\frac{3}{4}$
-1	1.5 or $1\frac{1}{2}$
* 0	3
1	6
2	12

a. x-intercept(s) None

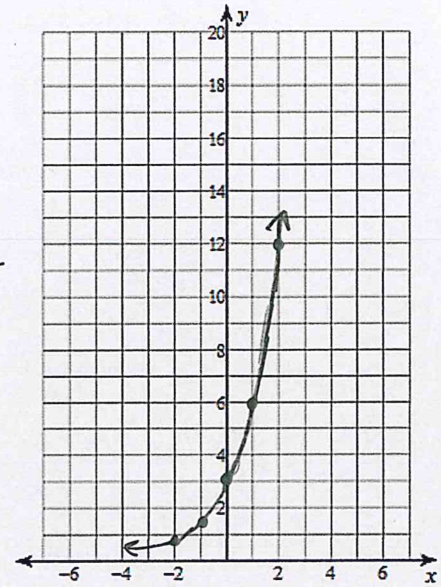
b. *y-intercept (0, 3)

c. asymptote $y = 0$

d. domain All real numbers

e. range $y > 0$

f. Circle one: increasing or decreasing



57. Use the simple and compound interest formulas to complete the table. Round to the nearest **cent**.

Simple: $A = P + (Pr)t$ $\quad A = 20000 + 20000(0.025)t$

$A =$ $\quad = 20000 + 500t$

Compound: $A = P \cdot (1+r)^t$ $\quad A = 20000(1+0.025)^t$

$\quad = 20000(1.025)^t$

Use 0.5 or 1/2

Time	Simple Interest Balance	Compound Interest Balance
6 months	20250	20248.46
1 year	20500	20500
5 years	22500	22628.16
20 years	30000	32772.33

a. Complete the table given an initial deposit of $20,000 and an interest rate of 2.5%. $P = 20000$ $r = 0.025$

b. Would it be worth paying a fee of $250 to keep your money in the compound interest account for 20 years? Why or why not?

$$\begin{array}{r} 32772.33 \\ -250 \\ \hline \$32522.33 \end{array}$$

Yes, it's more than the simple interest acct

c. How would you find the rate of change for a simple interest account? Would you use the common difference or the common ratio? The account increases by $500 each year. so you would use the common difference

d. Which account is growing exponentially?

Compound interest

58. Carrie plans to deposit $1,480 into an account that pays compound interest. How much will be in her account given the rate of interest over a specified period of time? Round to the nearest **cent.** $A = P(1+r)^t$

$P = 1480$

a. 1.9% for 10 years

$r = 0.019$ $\quad t = 10$

$A = 1480(1+0.019)^{10}$

$A = 1480(1.019)^{10}$

$A = \$1786.50$

b. 3.6% for 15 years

$r = 0.036$ $\quad t = 15$

$A = 1480(1+0.036)^{15}$

$A = 1480(1.036)^{15}$

$A = \$2515.70$

59. The utility costs for Hoover High School this year were $74,000. Write a function that represents HHS's utility costs as a function of time in years for each scenario. Choose the correct formula!

P

$A = P(1+r)^t$ *or* $A = P(1-r)^t$

a. Costs ***increase*** at a rate of 2.3% per year

$\rightarrow 0.023$

$A = P(1+r)^t = 74000(1+0.023)^t$

$A = 74000(1.023)^t$

b. Costs ***decrease*** at a rate of 1.7% per year

$\rightarrow 0.017$

$A = P(1-r)^t = 74000(1-0.017)^t$

$A = 74000(0.983)^t$

60. Enrollment at the University of Alabama has reached 60,000 and is expected to increase at a rate of 7.5% per year. How many students are expected to be enrolled after 3 years? $A = P(1+r)^t$

$P = 60000$ $\quad A = 60000(1+0.075)^3$

$r = 0.075$ $\quad A = 60000(1.075)^3$

$t = 3$ $\quad A = 74538$

61. Approximately, 456 bacteria are living in a Petrie dish. Scientists are testing a new vaccine that is expected to decrease the number of bacteria at a rate of 2% per year. How many bacteria will be left after 6 years?

$A = P(1-r)^t$ $\quad P = 456$ $\quad A = 456(1.-0.02)^6$

$r = 0.02$ $\quad A = 456(0.98)^6$

$t = 6$ $\quad A = 404$

62. Write the equation of each new function $g(x)$ after the translation described.

a. $f(x) = -10x$ after a translation 5 units to the right $\ominus$ HT $(x-5)$

$g(x) = -10(x-5)$

b. $f(x) = 3^x$ after a translation 4 units up VT $+4$

$g(x) = 3^x + 4$

c. $f(x) = 2x^2$ after a translation 2 units left $\oplus$ HT $(x+2)$

$g(x) = 2(x+2)^2$

d. $f(x) = x^3$ after a translation 2 units up $\oplus$ VT $+2$

$g(x) = x^3 + 2$

63. Describe each graph in relation to its basic function, i.e. vertical translation up 2 units.

a. Compare $g(x) = (x+3)^2$ to the basic function $f(x) = x^2$.

Horizontal translation left 3 units

b. Compare $g(x) = b^x + 1$ to the basic function $f(x) = b^x$.

Vertical translation up 1 unit.

c. ~~Compare $g(x) = b^{-x}$ to the basic function $f(x) = b^x$~~.

d. Compare $g(x) = x^3 + 9$ to the basic function $f(x) = x^3$.

Vertical translation up 9 units

e. Compare $g(x) = b^{(x-1)}$ to the basic function $f(x) = b^x$.

Horizontal translation right 1 unit