|  | - What is meant by the term FUNCTIONS and how do we work with them? |
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| BIG PICTURE | - mastery with working with basics \& applications of linear functions |
| of this UNIT: | - mastery with working with basics \& applications of linear systems |
|  | - understanding basics of function concepts and apply them to lines \& linear systems |

## Part 1 - Skills/Concepts Review

1. Determine the equation of the following lines and express each equation in standard form.
a. The line through the point $\mathrm{A}(5,-2)$ and perpendicular to $3 x-2 y-6=0$.
b. The line through the point $\mathrm{A}(-3,-4)$ and parallel to the line $4 x+2 y=-8$.
2. Factor each of the following linear equation and hence, determine where the line crosses the $x$-axis. Confirm your answer using DESMOS.
a. $y=-4 x+16$
b. $y=5 x+12$
c. $y=1 / 2 x+2$
3. For the linear relation $3 x+2 y=9$,
a. Determine the $x$ - and $y$-intercepts.
b. Determine the slope.
c. Graph this relation.
d. Evaluate for $y$ if $x=5$.
e. Evaluate for $x$ if $y=-2$.
f. Write the equation in function form $(f(x)=$ ?????)
4. Use your graphing calculator to determine where the linear functions $y=2 x-7$ and $y=-4 x+5$ intersect. Explain how you can use an algebraic method to come up with the same intersection point.

## Part 2 - Skills/Concepts Application Problems

5. Given the linear function $g(x)=-2 / 3 x+1$,
a. Determine the slope, the $y$-intercept and the $x$-intercept of this function.
b. Sketch a graph of this function.
c. Evaluate $g(-9)$.
d. Solve $-5=g(x)$.
e. Rewrite the equation in standard form.
f. Mr. S restricts the domain to be $\{x \in \boldsymbol{R} \mid-6 \leq x \leq 12\}$. Determine the range of this function.
6. A function, $f(x)$, is defined by $f(x)=5 x+12$. Evaluate
(i) $f(2)$
(ii) $f(-3)$
(iii) $f(-1 / 5)$
(iv) $f(a)$
7. Ben has a total of $\$ 225.00$ in 5 dollar bills and 20 dollar bills.
a. Determine the MAXIMUM amount of $\$ 5$ bills that Ben could have.
b. Determine the MAXIMUM amount of $\$ 20$ that Ben could have.
c. Determine 2 other possible combinations of $\$ 5$ bills and $\$ 20$ bills that Ben could have (you do NOT need an equation for this . $\qquad$ )
d. You now have 4 data points. Use any 2 of the points to write a linear equation. Express your final answer in standard form. What do you notice?
e. What might the $x$ and $y$ variables represent?
8. Mr. R wishes to investigate the intersection of the linear functions $y=x-2$ and $x+5 y=-4$.
a. How can he decide whether or not they intersect $\boldsymbol{B E F O R E}$ he does any graphing or algebra?
b. Use DESMOS to determine where the two lines intersect.
c. How could you use algebra to find the same intersection point?
9. State the domain and range of the following graphs. Use set notation as well as interval notation.

10. Barb is withdrawing $\$ 100$ from her bank account. She asks for the money in $\$ 5$ bills and $\$ 10$ bills.
a. If the teller gives her four $\$ 10$ bills, how many $\$ 5$ bills does she get?
b. If the teller gives her eight $\$ 5$ bills, how many $\$ 10$ bills does she get?
c. List 3 other combinations of $\$ 5$ and $\$ 10$ bills that Barb could get.
d. State the domain and range of this relation.
e. Determine an equation that can be used to model this situation.
11. Determine the equation of the line presented in this graph. Express your answer in standard form, slope-intercept form and point-slope form.

12. The graph included shows Kyle's distance from home as he cycles home from school.
a. How far is the school from Kyle's home?
b. What does the ordered pair $(10,1.5)$ mean in this context?
c. What are the domain and range for this relation?
d. At what speed does Kyle cycle?
e. What is the slope of this graph?
f. What does slope really mean, in the context of this problem?


## Part 3 - Extension Problems

13. A function has the following properties: (i) the domain of $f$ is the set of natural numbers, (ii) $f(1)=1$, and (iii) $f(x+1)=f(x)+3 x(x+1)+1$.
a. Determine $f(2), f(3), f(4), f(5)$ and $f(6)$
b. Describe this function.
14. A function is defined as follows: $f(n+1)=f(n)+3$ where $n$ is an integer greater than 0 and you are given that $f(1)=-2$. Evaluate $f(2)$ and $f(3)$ and $f(4)$ and $f(5)$.
15. Let $f(x)=3 x+1$ and let $g(x)=2-x$. Determine the values for $a$ such that:
a. $f(a)=g(a)$
b. $f\left(a^{2}\right)=g(2 a)$
