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BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • 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. **(CI)** Graph the following linear functions, given the conditions indicated:
   a. $g(x) = \frac{3}{4}x + 2$ on the domain of $[-4,8)$
   b. $2x - 5y - 20 = 0$ on the range of $\{-6 < y \le 6\}$
   c. $y - 5 = -\frac{1}{2}(x + 4)$ on the range of $(-10,10]$

2. **(CI)** For the following functions, evaluate the function as required:
   a. If $h(x) = 3x - 5$, evaluate $h(-2)$, $h(6)$, $h(a)$, $h(2x + 1)$
   b. If $E(x) = 5 \times 2^x$, evaluate $E(3)$, $E(0)$, $E(-2)$, $E(a)$, $E(1 - 3x)$
   c. If $P(x) = (x + 3)(x - 1)$, evaluate $P(-1)$, $P(4)$, $P(-3)$, $P(k)$

3. **(CA)** Decide whether each ordered pair is a solution to the given system of equations:
   a. $(2,-1)$; $3x + 2y = 4$ and $-x + 3y = -5$ b. $(1,4)$; $x + y = 5$ and $2x + 2y = 8$

4. **(CA)** USe DESMOS to work through the following question:
   a. Graph the linear function defined by $3x + 2y = -3$
   b. Multiply this equation by 2 and describe what happens when you graph the new function.
   c. Multiply this equation by -5 and describe what happens when you graph the new function.
   d. Graph the linear function defined by $-2x + 5y = 21$
   e. Multiply this equation by 3 and describe what happens when you graph the new function.
   f. Multiply this equation by -2 and describe what happens when you graph the new function.

5. **(CI)** Use the elimination method to solve the linear systems defined by the following pairs of equations. Verify your solutions using (i) algebra and (ii) your graphing calculator.
   a. L_1: $3x + 2y = -3$ and L_2: $-2x + 5y = 21$.   b. L_1: $x - 4y = -1$ and L_2: $-3x + 8y = -2$.

6. **(CI)** Use the substitution method to solve the linear systems defined by the following pairs of equations. Verify your solutions using (i) algebra and (ii) your graphing calculator.
   a. L_1: $y = 4x - 7$ and L_2: $2x - 3y = 6$ b. L_1: $f(x) = 5x - 8$ and L_2: $10x - 5y = 7$

Part 2 - Skills/Concepts Application Problems

7. **(CA)** Joanna is considering three job offers. Pheonix Phasions offers her $1500/month plus 2.5% commission; Styles By Styx offers her $1250/month plus 5.5% commission; Chanel No 2 offers here $36,000 per year, regardless of her sales.
    a. Write equations for the salary offer from each company.
    b. Graph each equation on your calculator.
    c. How many intersection points are there and what does each intersection point mean?
    d. Which job offer should she accept? Explain your choice.

8. **(CA)** Six cups of coffee and a dozen muffins originally cost $15.35. The price of coffee increases by 10% and the price of the muffins increases by 12%. So the new cost for six coffee and a dozen muffins is $17.06. Determine the new price of one cup of coffee and the new price of one muffin.

9. **(CI)** A linear systems is defined by the equations $ax + 2y = -5$ and $3x - 4y = 1$ may/may not intersect - it depends upon the value of a.
    a. Find value(s) of a such that two lines DO NOT intersect.
    b. Hence, find value(s) of a such that the lines DO intersect.
    c. **EXTENSION**: What is/are the intersection point(s) - Express your answer in terms of a?

10. **(CA)** The function f is defined by $f(x) = 2x + 3$ and the function g is defined as $g(x) = 3x + 5$. Answer the following questions about these functions.
    a. Evaluate: i. $f(3) - f(2)$ ii. $f(4) - f(3)$ iii. $f(5) - f(4)$ iv. $f(a + 1) - f(a)$
    b. What observation do you make and why does this happen?
    c. Evaluate: i. $g(3) - g(2)$ ii. $g(4) - g(3)$ iii. $g(5) - g(4)$ iv. $g(a + 1) - g(a)$
    d. What observation do you make and why does this happen?
    e. Evaluate   i. $g(f(-5))$ ii. $f(g(2))$ iii. $f(g(x))$ iv. $g(f(x))$.

11. **(CA)** To help protect the environment, a steel factory is thinking about setting new standards for its carbon dioxide CO_2 emissions. By 2022, the factory wants to emit less than 70 tonnes of CO_2 per year. The data table and a scatter-plot are presented below.

CO_2 (tonnes)	165	145	130	117	107	100
Year	2001	2002	2003	2004	2005	2006
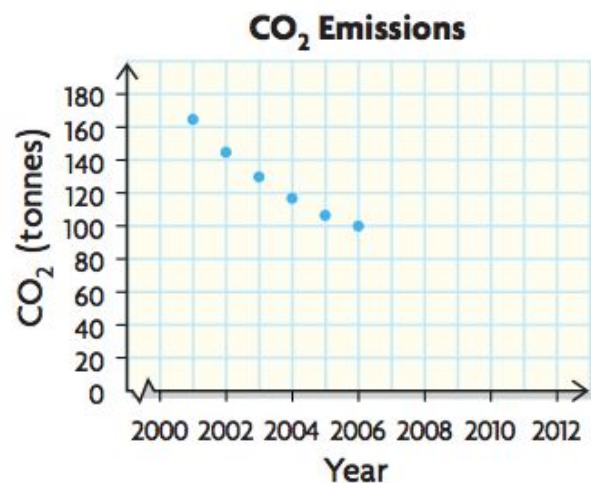
CO₂ Emissions

   a. Graph the data set on your TI-84.
   b. Determine an equation for the line of best fit. Predict the amount of CO_2 emissions in 2012.
   c. Explain why Mr R thinks that a curve would fit the data better.
   d. Draw a curve of best fit and predict the amount of CO_2 emissions in 2012.
   e. Which prediction do you think is better? Explain your reasoning.

Part 3 - Extension Problems

12. A function is defined by the following **recursion** formula: $f(n) = f(n-1) - f(n-2) + n$; $f(1) = 1$ and $f(2) = 1$ as well.

     a. Evaluate $f(3), f(4), f(5)$ and $f(6)$
     b. Hence or otherwise, evaluate $f(2018)$

13. A three-dimensional rectangular box with dimensions X, Y and Z has faces whose surface areas are 24, 24, 48, 48, 72 and 72. What is X + Y + Z equal to?

HOMEWORK PROBLEMS:

(1) Nelson 10, Chap 1.4, p39, Q9bdf and Q6 and Q7
(2) Nelson 10, Chap 1.6, p55, Q6de, 12