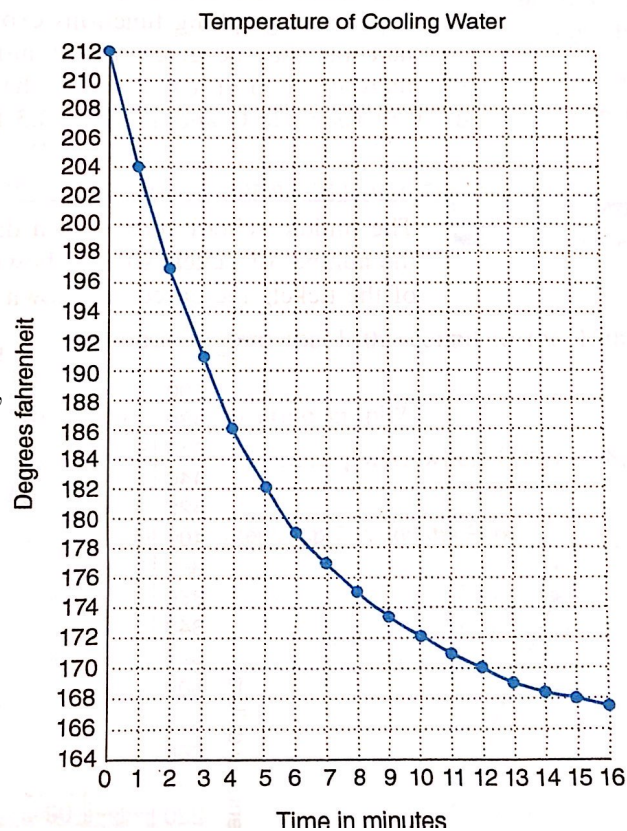As a reminder, you are welcome to use a non-internet accessing calculator (which includes Desmos Test Mode) and one 2-sided 8.5 in by 11 in sheet of notes. Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

1. Fourth graders conducted an experiment to observe the rate at which water cools. They placed a thermometer in a beaker of water and heated the water to boiling. They recorded the water temperature every minute until the temperature dropped to just below 168° F. Then they plotted the results on the grid like the one below.

   (a) [2] (Suggested §9.3 #5) Does the rule described above and graphed to the right determine a function or not? Briefly justify your answer.
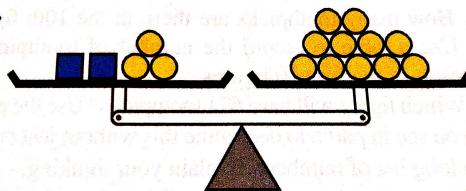
   (b) [2] (Function2Activity #2) What is the temperature of the water, 10 minutes after boiling?

   (c) [2] (Function2Activity #2) Approximately how many minutes does it take for water to cool from 212° F to 182° F?

Temperature of Cooling Water

2. Consider the balanced scales below. We want to find how many chips weigh the same as a box.
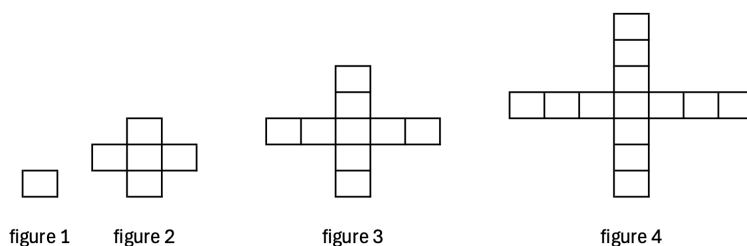
   (a) [3] (Quiz8 #3) Define variables and use the variables in an equation that corresponds to the scale shown.

   (b) [3] (§9.1 #6) Use the scales or the equation to find how many chips weigh the same as a box. Write enough that your work can be easily followed by a peer.

3. Ksenija is making a block pattern of windmills. The first four are shown below.

(a) [3] (§9.2 #24a) Create an input-output table with the figure number and the number of boxes in each figure for the first 5 figures.

figure 1   figure 2   figure 3   figure 4

(b) [2] (CoordLinesActivity #3) Graph the coordinate points on the axes below.

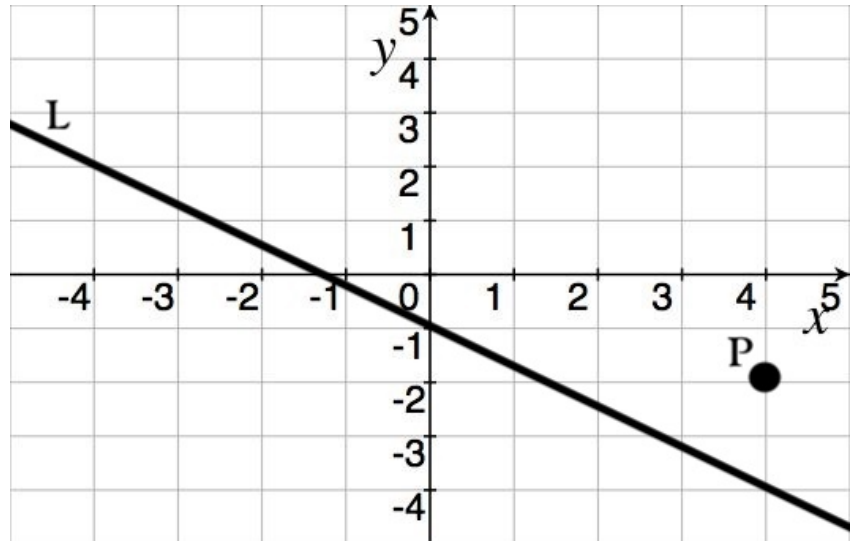(c) [4] (§9.2 #24b) Write the algebraic rule for the number of boxes for the sequence.

(d) [3] (Suggested §9.1 #1) Which figure will have 93 boxes? Provide work so that your process can be followed.

4. Consider the coordinate axes below.

(a) [2] (CoordLineActivity #1) Write down the Cartesian coordinates for P.

(b) [2] (CoordLineActivity #1) Label the point Q with coordinates $(0, -1)$ on the Cartesian plane.

(c) [2] (§9.2 #14b) Find the slope of the line L.

(d) [2] (§5.2 #20a) Find another fraction equivalent to your answer in part (c).

(e) [2] (Suggested §9.2 #15a) Sketch a line on the graph that is parallel to L and passes through point P.

5. [6] Let a and b be non-zero whole numbers. Are the following statement always true, sometimes true, or never true? Briefly justify your answer (consider giving examples!).

(a) (§4.2 #10a & Suggested #11) The $\mathrm{GCF}(a, b)$ is a prime number.

(b) (FractionActivity #5) A rational number $\frac{a}{b}$ is in reduced form if $\mathrm{LCM}(a, b) = 1$.

6. The work for the problems below are wrong. Find the error(s), try to detect the reason for the error, and provide the correct work. Let a be a non-zero whole number.

   (a) [3] (Quiz7 #1)

   $$\frac{6}{9+3a} = \frac{2}{3+3a}$$

   (b) [3] (§5.3#18)

   $$\frac{7}{a} + \frac{1}{4} = \frac{8}{a+4}$$

   (c) [3] (FracAddMultActivity #3)

   Keep chnge flip.

   $$\frac{2}{5a^2} \div \frac{4}{a} = \frac{2}{5a^2} \times \frac{a}{4} = \frac{2a}{5a^2 \cdot 4} = \frac{2}{5a \cdot 2} = 5a2 = 10a$$

7. [1] What topic or concept did you study and prepare for, but not see on the exam?