Please work the attached problems prior to returning school next fall. I will not collect them, but you will have a quiz covering these topics during the first week of school. Also, here is a list of benchmarks for the upcoming school year.

1. Internal Assessment deadlines - Select a topic by Labor Day. Submit a rough draft of your paper by Thanksgiving. Submit the final draft of the IA before we leave for Christmas break.
2. We will cover the rest of the topics in our textbook. Those topics will include vectors, differential calculus, integral calculus, and normal distributions.
3. We should finish the IB Math SL curriculum by early January. We will spend about two months covering extra topics in Calculus to give you the option of taking the AP Calculus AB exam in May. After spring break, you will spend your time reviewing for either exam. I recommend the Princeton Review, Cracking the AP Calculus Exam. That is the review book that I will be using as a guide.
4. The IB exam for Math SL will take place on the afternoon of May 13 (Paper 1 - No Calculator) and the morning of May 14 (Paper 2 - Calculator). The IB Exam is to be done in blue or black ink.
5. The AP Calculus AB exam will take place on May 14.

If you have any questions, please feel free to email questions to me at tommy.eggleston@knoxschools.org.
IB Math SL - Year 2 Summer Assignment

1a. There are nine books on a shelf. For each book, \( x \) is the number of pages, and \( y \) is the selling price in pounds (£). Let \( r \) be the correlation coefficient. Write down the possible minimum and maximum values of \( r \).

1b. Given that \( r = 0.95 \), which of the following diagrams best represents the data.

1c. For the data in diagram D at right, which two of the following expressions describe the correlation between \( x \) and \( y \)?

- perfect
- zero
- linear
- strong positive
- strong negative
- weak positive
- weak negative

2a. A data set has a mean of 20 and a standard deviation of 6. Each value in the data set has 10 added to it. Write down the value of
   (i) the new mean;
   (ii) the new standard deviation.

2b. Each value in the original data set is multiplied by 10.
   (i) Write down the value of the new mean.

   (ii) Find the value of the new variance.

3a. The expression \( 6 \sin x \cos x \) can be expressed in the form \( a \sin bx \).
Find the value of \( a \) and of \( b \).
3b. Hence or otherwise, solve the equation $6 \sin x \cos x = \frac{3}{2}$, for $\frac{\pi}{4} \leq x \leq \frac{\pi}{2}$.

4a. Let $f(x) = 3(x + 1)^2 - 12$.  Show that $f(x) = 3x^2 + 6x - 9$.

4b. For the graph of $f$
   (i) write down the coordinates of the vertex;

   (ii) write down the $y$-intercept;

   (iii) find both $x$-intercepts.

4c. Hence sketch the graph of $f$.

5a. Two standard six-sided dice are tossed.  A diagram representing the sample space is shown at right.  Let $X$ be the sum of the scores on the two dice.
   (i) Find $P(X = 6)$.
   (ii) Find $P(X > 6)$. 
(iii) Find \( P(X = 7 | X > 6) \).

5b. Elena plays a game where she tosses two dice. If the sum is 6, she wins 3 points. If the sum is greater than 6, she wins 1 point. If the sum is less than 6, she loses \( k \) points. Find the value of \( k \) for which the game is fair.

6a. In an arithmetic series, the first term is \(-7\) and the sum of the first 20 terms is 620. Find the common difference.

6b. Find the value of the 78 term.

7a. The probability of obtaining heads on a biased coin is 0.4. The coin is tossed 600 times.
   (i) Write down the mean number of heads.
   (ii) Find the standard deviation of the number of heads.

7b. Find the probability that the number of heads obtained is less than one standard deviation away from the mean.

9. The following diagram shows a pole BT 1.6 m tall on the roof of a vertical building. The angle of depression from T to a point A on the horizontal ground is \( 35^\circ \). The angle of elevation of the top of the building from A is \( 30^\circ \). Find the height of the building.
10a. Let \( h(x) = \frac{2x-1}{x+1}, x \neq -1 \). Find \( h^{-1}(x) \).

10b. (i) Sketch the graph of \( h \) for \(-4 \leq x \leq 4\) and \(-5 \leq y \leq 8\), including any asymptotes.

(ii) Write down the equations of the asymptotes.

(iii) Write down the \( x \)-intercept of the graph of \( h \).