Today's Plan:

Learning Target (standard): I will find the area under a curve using Riemann sums and define the area as a definite integral.

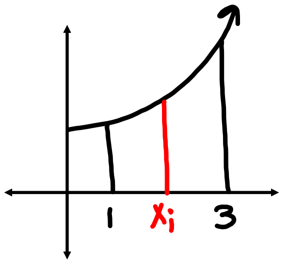
Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, and take a quiz.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide quiz problems.

Assessment: Board work, homework check and quiz

Differentiation: Students will work at the board, go over and correct homework at their seats, and actively engage in a quiz.

Find the area under $f(x) = 9x^2 - 4x + 3$ on [1,3].



$\Delta x = \frac{b-a}{n} = \frac{3-1}{n} = \frac{2}{n}$

$x_0 = 1$

$x_1 = 1+\Delta x = 1+\frac{2}{n}$

$x_2 = 1+2\Delta x = 1+\frac{4}{n}$

$\vdots$

$x_i = 1+i\Delta x = 1+\frac{2i}{n}$

$\vdots$

$x_n = 1+n\Delta x = 1+n\left(\frac{2}{n}\right)$

$= 1+2$

$= 3$ ✓

$A_{R_i} = \Delta x \cdot f(x_i)$

$= \frac{2}{n}\left[9\left(1+\frac{2i}{n}\right)^2 - 4\left(1+\frac{2i}{n}\right)+3\right]$

$= \frac{2}{n}\left[9\left(1+\frac{4i}{n}+\frac{4i^2}{n^2}\right) - 4 - \frac{8i}{n}+3\right]$

$= \frac{2}{n}\left[9+\frac{36i}{n}+\frac{36i^2}{n^2} - 1 - \frac{8i}{n}\right]$

$= \frac{2}{n}\left(8+\frac{28i}{n}+\frac{36i^2}{n^2}\right)$

$A_{R_i} = \frac{16}{n}+\frac{56i}{n^2}+\frac{72i^2}{n^3}$

$A = \sum_{i=1}^{n} A_{R_i} = \sum_{i=1}^{n}\left(\frac{16}{n}+\frac{56i}{n^2}+\frac{72i^2}{n^3}\right)$

$= \sum_{i=1}^{n}\frac{16}{n} + \sum_{i=1}^{n}\frac{56i}{n^2} + \sum_{i=1}^{n}\frac{72i^2}{n^3}$

$= n\left(\frac{16}{n}\right) + \frac{56}{n^2}\sum_{i=1}^{n} i + \frac{72}{n^3}\sum_{i=1}^{n} i^2$

$2n^2+3n+1$

$= 16 + \frac{\cancel{56}\,28}{n^{\cancel{2}}}\left(\frac{\cancel{n}(n+1)}{\cancel{2}\,1}\right) + \frac{\cancel{72}\,12}{n^{\cancel{3}\,2}}\left(\frac{\cancel{n}(n+1)(2n+1)}{\cancel{6}\,1}\right)$

$= 16 + \frac{28}{n}(n+1) + \frac{12}{n^2}(2n^2+3n+1)$

$= 16+28+\frac{28}{n}+24+\frac{36}{n}+\frac{12}{n^2}$

$= 68+\frac{64}{n}+\frac{12}{n^2}$

$A = \lim_{n\to\infty}\left(68+\frac{64}{n}+\frac{12}{n^2}\right)$

$= 68+0+0$

$A = 68u^2$

$$\boxed{\int_0^2 x^3 dx = 4}$$

$$\boxed{\int_0^2 x dx = 2}$$

$$\int_0^2 \left(-2x^3 + 5x - 7\right) dx =$$

$$= \int_0^2 -2x^3 dx + \int_0^2 5x dx - \int_0^2 7 dx$$

$$= -2\boxed{\int_0^2 x^3 dx} + 5\boxed{\int_0^2 x dx} - 7(2-0)$$

$$= -2(4) + 5(2) - 7(2)$$

$$= -8 + 10 - 14$$

$$= -12$$