Formulae:

Distance between 2 points:
\[ d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \]: this is the Pythagorean Theorem.

Midpoint:
\[ m = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \]

Slope:
\[ m = \frac{y_1 - y_2}{x_1 - x_2} \]

Perpendicular lines: \( m_1 = -\frac{1}{m_2} \)
Parallel lines: \( m_1 = m_2 \)
Vertical line: \( x = \text{constant} \)
Horizontal line: \( y = \text{constant} \)
Inverse functions: \( (f(f^{-1}(x))) = x \)
Exponential:
\[ e^x = b \implies \ln(b) = x \]
Limit definition of derivative:
\[ \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = f'(x) \]
Average rate of change:
\[ \frac{f(b) - f(a)}{b-a} \]

For related rates or optimization problems:

Pythagorean theorem: \( a^2 + b^2 = c^2 \)
Circle: \( A = \pi r^2, P = 2\pi r \)
Rectangle: \( A = wh, P = 2l + 2w \)
Box (closed top): \( SA = 2wl + 2wh + 2hl, V = whl \)
Cylinder: \( SA = 2\pi r^2 + 2\pi rh, V = \pi r^2 h \)

Differentiation rules:
\[ \frac{d}{dx} (f(x)^n) = n(f(x))^{n-1}f'(x) \]
\[ \frac{d}{dx} (e^{f(x)}) = e^{f(x)}f'(x) \]
\[ \frac{d}{dx} (\ln (f(x))) = \frac{1}{f(x)}f'(x) \]
\[ \frac{d}{dx} (\frac{f(x)}{g(x)}) = \frac{f'g - gf'}{g^2} \]
\[ \frac{d}{dx} (f(x)g(x)) = f'g + gf' \]
\[ \frac{d}{dx} (\text{constant}) = 0 \]

Integration by parts:
\[ \int f g' dx = fg - \int f'gdx \]
(but I will give this one to you on the final)