### Geometry

<table>
<thead>
<tr>
<th>Shape</th>
<th>Area</th>
<th>Perimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle</td>
<td>( A = L \cdot W )</td>
<td>( P = 2L + 2W )</td>
</tr>
<tr>
<td>Square</td>
<td>( A = s^2 )</td>
<td>( P = 4s )</td>
</tr>
<tr>
<td>Trapezoid</td>
<td>( A = \frac{1}{2}(D + d) )</td>
<td></td>
</tr>
</tbody>
</table>

### Equations

**Distance Formula**
Distance between \( P_1(x_1, y_1) \) & \( P_2(x_2, y_2) \)
\[
d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}
\]

**Midpoint Formula**
Midpoint between \( P_1(x_1, y_1) \) & \( P_2(x_2,y_2) \)
Midpoint is \( \left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right) \)

**Slope**
Slope of the line between \( P_1(x_1, y_1) \) & \( P_2(x_2, y_2) \)
\[
m = \frac{y_2 - y_1}{x_2 - x_1}
\]

**Slope-Intercept Form**
Equation of a line with slope \( m \) and y-intercept \( (0, b) \)
\[
y = mx + b
\]

**Standard Form of a Line**
Equation of a line where \( A, B \) and \( C \) are integers and \( A \) is positive.
\[
Ax + By = C
\]

**Point Slope Form**
Equation of a line through the point \( (x_1, y_1) \) with slope \( m \).
\[
y - y_1 = m(x - x_1)
\]

### Find Equation of a line using two points \( P_1(x_1, y_1) \) & \( P_2(x_2, y_2) \).

1. **Label variables and find slope using the slope formula above.** The way the points are labeled (point one or two) does not make a difference.
\[
y_2 = 3; \ y_1 = 7; \ x_2 = 2; \ x_1 = 5
\]
\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 7}{2 - 5} = \frac{-4}{-3} = \frac{4}{3}
\]

2. **Plug slope and point one into Point Slope form.**
\[
y - y_1 = m(x - x_1) \rightarrow y - 7 = \frac{4}{3}(x - 5)
\]

3. **If Standard Form is required, multiply both sides of the equation by the denominator of the slope. Move variable terms to left and constants to the right. Multiply by -1 to make \( A \) positive if necessary.**
\[
3 \cdot (y - 7) = 3 \cdot \frac{4}{3}(x - 5) \rightarrow 3y - 21 = 4x - 20 \rightarrow -4x + 3y = -20 + 21 \rightarrow 4x - 3y = -1
\]

4. **If slope-intercept form is required distribute the slope and solve for \( y \).**
\[
y - 7 = \frac{4}{3}(x - 5) \rightarrow y - 7 = \frac{4}{3}x - \frac{20}{3} \rightarrow y = \frac{4}{3}x + \frac{1}{3}
\]