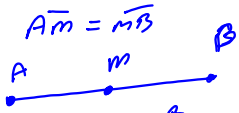
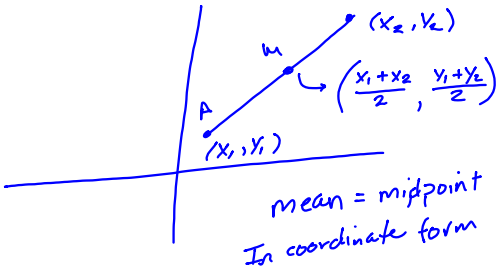
5.3 Midpoints

In a segment $\overline{AB}$
M is the midpoint of $\overline{AB}$
iff $\overline{Am} = \overline{mB}$



Am = mB

In a coordinate plane
we get a specific formula
to find the midpoint



mean = midpoint
In coordinate form

A = (−6, 3) B (12, 7)

$M\left(\frac{-6+12}{2}, \frac{3+7}{2}\right)$

$M\left(\frac{6}{2}, \frac{10}{2}\right)$ A, B Endpoints

M = (3, 5)

A = (7, −6) B (12, 5)

$M\left(\frac{7+12}{2}, \frac{-6+5}{2}\right)$

$M = \left(\frac{19}{2}, \frac{-1}{2}\right) = (9.5, -0.5)$

A (−6, 3) B (12, 7) M (3, 5)

Verify Midpoint
Show Am = mB

$d = \sqrt{(-6-3)^2 + (3-5)^2}$
$= \sqrt{(-9)^2 + (-2)^2}$
$= \sqrt{81+4}$
$= \sqrt{85}$

$d = \sqrt{(3-12)^2 + (5-7)^2}$
$d = \sqrt{(-9)^2 + (-2)^2}$
$d = \sqrt{81+4}$
$d = \sqrt{85}$

Finding Another Endpoint given one endpoint and the midpoint

$B(9, -3)$ $m(3, 4)$

$m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$2\left(3 = \frac{9 + x}{2}\right)$ $2\left(4 = \frac{-3 + y}{2}\right)$ $A = (-3, 11)$

$6 = 9 + x$ $8 = -3 + y$

$-3 = x$ $11 = y$