

Unit 11 Coordinate Geometry (PART I) Summary Sheet

1. Slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Midpoint Formula

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

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

BACKWARDS MIDPOINT

Line up points and do arithmetic (add/sub)

$$A (-3, 4)$$

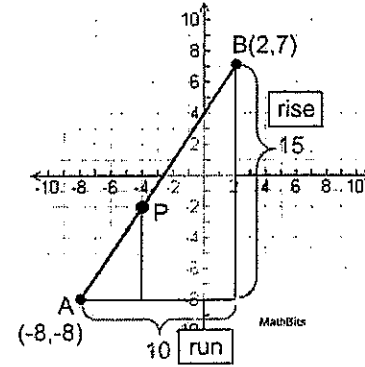
$$M (2, 1)$$

$$B (,)$$

2. **Partition:** If you want to partition a segment into an a:b ratio, divide rise and run by a+b and count!

Example shown: the segment shown is broken into a 2:3 ratio.

$$\left(x_1 + \left(\frac{a}{a+b} \right) \cdot (x_2 - x_1), y_1 + \left(\frac{a}{a+b} \right) \cdot (y_2 - y_1) \right)$$



3. Equations of a line

$$y = m x + b$$

↙
↘

Slope y - intercept

Point Slope Form

[if you know a point and the slope, use this form]

$$y - y_1 = m(x - x_1)$$

m = slope

(x_1, y_1) = any point on the line

parallel lines have the same slopes! perpendicular lines have negative reciprocal slopes!

Equation of a PERPENDICULAR BISECTOR:

STEP 1: Find slope of given segment (then determine **negative reciprocal** to use in equation of line)

STEP 2: Find midpoint using midpoint formula (use as x_1 and y_1 in equation of line)

STEP 3: Plug negative reciprocal slope (step 1) and midpoint (step 2) into $y - y_1 = m(x - x_1)$

4. **Perimeter of a polygon on a graph:** Use distance formula for ALL SIDES then add.

Given $\triangle ABC$, A (-3, 4) B (1, 7) C (7, -1), determine the perimeter.

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(1 - (-3))^2 + (7 - 4)^2}$$

$$\sqrt{(7 - 1)^2 + ((-1) - 7)^2}$$

$$\sqrt{((-3) - 7)^2 + (4 - (-1))^2}$$

$$\sqrt{(4)^2 + (3)^2}$$

$$\sqrt{(6)^2 + (-8)^2}$$

$$\sqrt{(-10)^2 + (5)^2}$$

$$\sqrt{16 + 9} = \sqrt{25} = 5$$

$$\sqrt{36 + 64} = \sqrt{100} = 10$$

$$\sqrt{100 + 25} = \sqrt{125} = 5\sqrt{5}$$

The perimeter of $\triangle ABC$ is $15 + 5\sqrt{5} \approx 26.18$ cm.

Area of a polygon on a graph: Box method

Step 1: Draw a box around the polygon

Step 2: Number sections created (must be able to count base and height)

Step 3: Find area of box

Step 4: Find area of all numbered sections (then add together)

Step 5: Area of Box - Sum of Numbered sections

Find the area of ABCD.

