DISTANCE FORMULA:

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

Date ____________

Unit 11 Lesson 1

Geometry CC

Distance WORKSHEET

1. If the endpoints of $\overline{AB}$ are $A(-4,5)$ and $B(2,-5)$, what is the length of $\overline{AB}$ to the nearest tenth?

$$d = \sqrt{(-4-2)^2 + (5 - -5)^2}$$
$$= \sqrt{36 + 100}$$
$$= \sqrt{136} \approx \boxed{11.7}$$

2. The endpoints of $\overline{PQ}$ are $P(-3,1)$ and $Q(4,25)$. Find the length of $\overline{PQ}$.

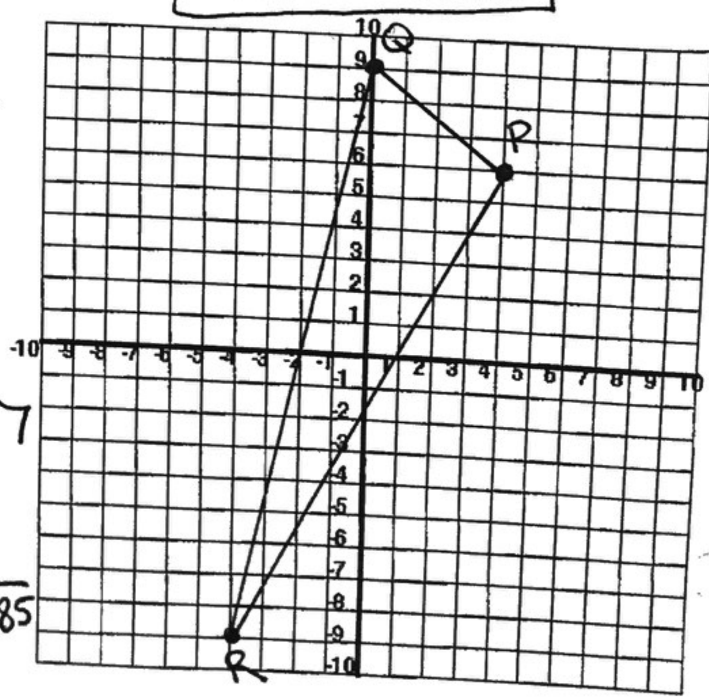
$$d = \sqrt{(-3-4)^2 + (1-25)^2}$$
$$= \sqrt{49 + 576}$$
$$= \sqrt{625} = \boxed{25}$$

3. The coordinates of the endpoints of $\overline{FG}$ are $(-4,3)$ and $(2,5)$. Find the length of $\overline{FG}$ in simplest radical form.

$$d = \sqrt{(-4-2)^2 + (3-5)^2}$$
$$= \sqrt{36 + 4}$$
$$= \sqrt{40} = \boxed{2\sqrt{10}}$$

4. Find, in simplest radical form, the perimeter of $\triangle PQR$ with vertices $P(4,6)$, $Q(0,9)$, and $R(-4,-9)$.

$\boxed{22 + 2\sqrt{85}}$



$\overline{QP}$ $d = \sqrt{(4-0)^2 + (6-9)^2}$

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

$\overline{PR}$ $d = \sqrt{(4 - -4)^2 + (6 - -9)^2}$

$= \sqrt{64 + 225} = \sqrt{289} = 17$

$\overline{QR}$ $d = \sqrt{(0 - -4)^2 + (9 - -9)^2}$

$= \sqrt{16 + 324} = \sqrt{340} = 2\sqrt{85}$

nit 11 Lesson 2

Geometry CC
Midpoint and Slope Worksheet

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

1. Line segment AB has endpoints $A(2,-3)$ and $B(-4,6)$. What are the coordinates of the midpoint of $\overline{AB}$?

$$\left(\frac{2+-4}{2}, \frac{-3+6}{2}\right)$$

$$\left(-1, \frac{3}{2}\right)$$

2. What are the coordinates of the center of a circle if the endpoints of its diameter are $A(8,-4)$ and $B(-3,2)$?

$$\left(\frac{8+-3}{2}, \frac{-4+2}{2}\right)$$

$$\left(\frac{5}{2}, -1\right)$$

3. Point M is the midpoint of $\overline{AB}$. If the coordinates of A are $(-3,6)$ and the coordinates of M are $(-5,2)$, what are the coordinates of B?

B(-7, -2)

$$\frac{-3+x}{2}=-5 \qquad \frac{6+y}{2}=2$$

$$-3+x=-10 \qquad 6+y=4$$

$$x=-7 \qquad y=-2$$

4. Line segment AB is a diameter of circle O whose center has coordinates $(6,8)$. What are the coordinates of point B if the coordinates of point A are $(4,2)$?

$$\frac{4+x}{2}=6 \qquad \frac{2+y}{2}=8$$

$$4+x=12 \qquad 2+y=16$$

$$x=8 \qquad y=14$$

B(8, 14)

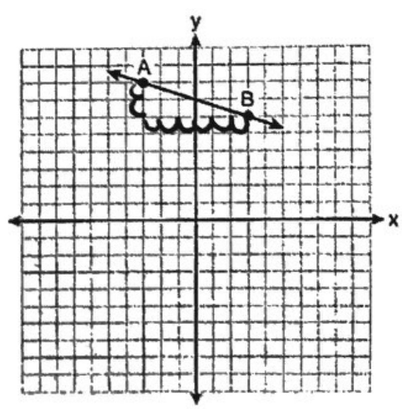
5. What is the slope of a line that passes through the points $(-2,-7)$ and $(-6,-2)$?

$$m=\frac{-7--2}{-2--6}=\frac{-5}{4}$$

6. What is the slope of a line passing through points $(-7,5)$ and $(5,-3)$?

$$m=\frac{5--3}{-7-5}=\frac{8}{-12}=\frac{2}{-3}$$

7. What is the slope of the line passing through the points A and B, as shown on the graph below?



down 2
right 6

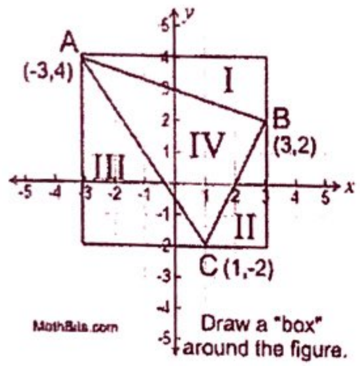
$$\frac{-2}{6}=-\frac{1}{3}$$

Unit 11 Lesson 3
Area of Polygons on a Grid

If the sides of a polygon lie on the grids of the graph paper (horizontal or vertical). the lengths of the sides of the polygon can be found by simply counting. You have used this counting method in the past to find such lengths.

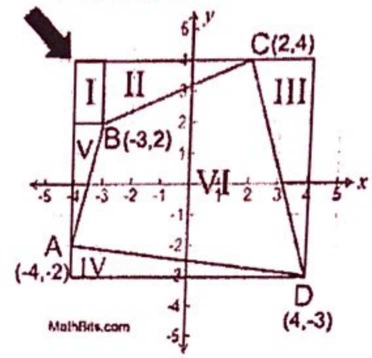
Unfortunately, not all polygons are positioned so their sides lie on the grids of the graph paper. When this happens we need to use more sophisticated techniques to find the lengths of the sides.

Find the area of ΔABC.



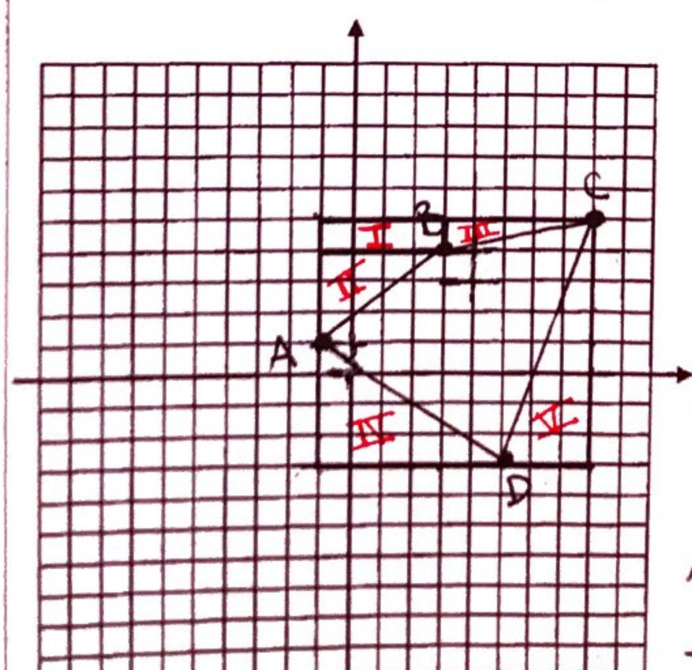
Dealing with odd shaped pieces:

Find the area of ABCD.



Example 1

Find the area of quadrilateral ABCD with vertices A(-1,1), B(3,4), C(8,5), and D(5,-3).



Area Rectangle
(8)(9) = 72

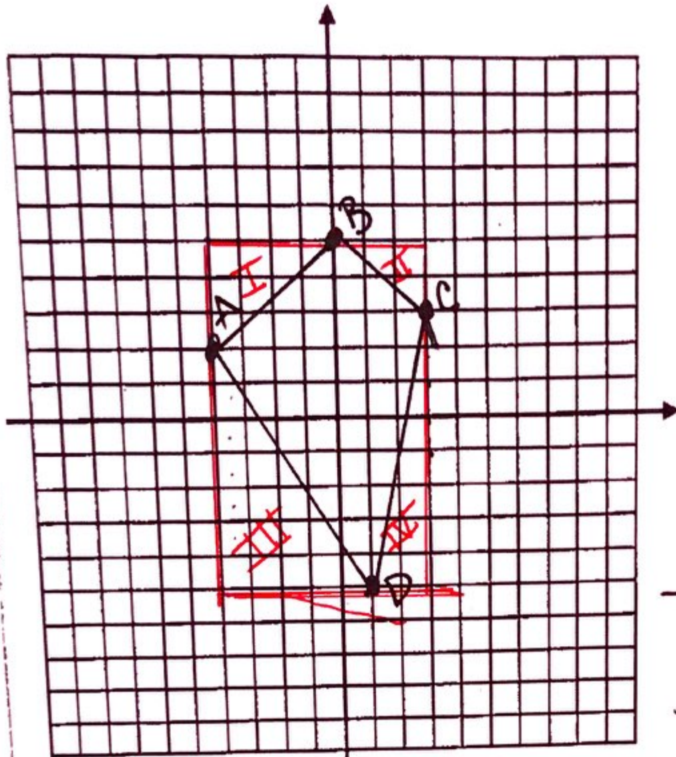
AI = 4(1) = 4
AII = ½(3)(4) = 6
AIII = ½(1)(5) = 2.5
AIV = ½(6)(4) = 12
AV = ½(3)(8) = 12

36.5

72 − 36.5 = $\boxed{35.5}$

Example 2

Find the area of quadrilateral ABCD with vertices A(-4,2), B(0,5), C(3,3), and D(1,-5).



$A_{I} = \frac{1}{2}(3)(4) = 6$

$A_{II} = \frac{1}{2}(2)(3) = 3$

$A_{III} = \frac{1}{2}(5)(7) = 17.5$

$A_{IV} = \frac{1}{2}(2)(8) = 8$

34.5

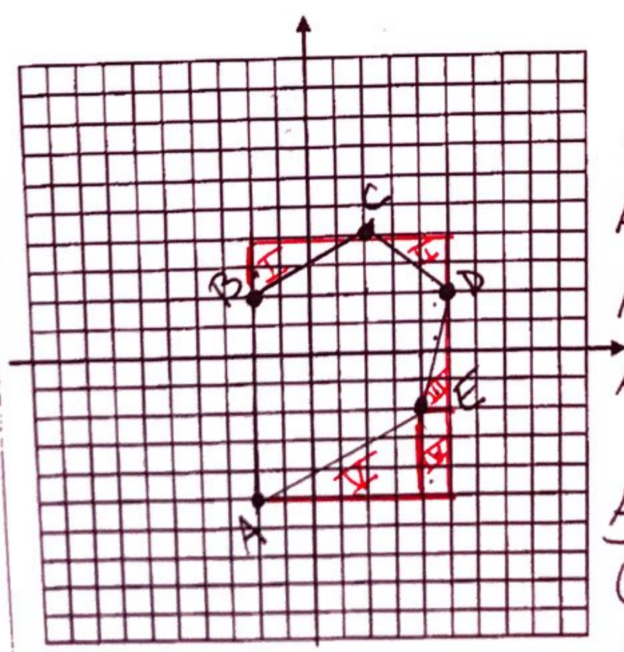
Area rectangle

$(7)(10) = 70$

$70 - 34.5 = \boxed{35.5}$

Example 3

Find the area of pentagon ABCDE whose vertices are A(-2,-5), B(-2,2), C(2,4), D(5,2), and E(4,-2).



$A_{I} = \frac{1}{2}(2)(4) = 4$

$A_{II} = \frac{1}{2}(2)(3) = 3$

$A_{III} = \frac{1}{2}(1)(4) = 2$

$A_{IV} = (3)(1) = 3$

$A_{V} = \frac{1}{2}(3)(6) = 9$

21

Area Rectangle

$(7)(9) = 63$

$63 - 21 = \boxed{42}$

Geometry CC

Date ____________

Lesson 4 HW: Writing Equations of Parallel and Perpendicular Lines

1. Determine whether the given equations of lines are Parallel (||), Perpendicular (⊥) or Intersecting (×).

a) $2x+4=y$
$y=-2x-3$

|| or ⊥ or ×

b) $y=\frac{5}{4}x$
$y=-\frac{4}{5}x+4$

|| or ⊥ or ×

c) $3x+5y=15$
$3x+5y=10$

|| or ⊥ or ×

d) $y=4x-3$
$2y+12=8x$
$y=4x-6$

|| or ⊥ or ×

2. Write the equation of the line that is...

a) parallel to y = -3x + 2 and goes through (1,5) in slope intercept form.

$y-5=-3(x-1)$

$\boxed{y=-3x+8}$

b) parallel to $y=\frac{1}{5}x-4$ and goes through (10,-2) in slope intercept form.

$y+2=\frac{1}{5}(x-10)$

$\boxed{y=\frac{1}{5}x-4}$

c) perpendicular to y = 5x + 4 through (-2,-3) in slope intercept form.

$y+3=-\frac{1}{5}(x+2)$

$\boxed{y=-\frac{1}{5}x-3.4}$

d) perpendicular to y = -2x – 1 through (-5,2) in the slope intercept form.

$y-2=\frac{1}{2}(x+5)$

$\boxed{y=\frac{1}{2}x+4.5}$

3. Write the equation of the perpendicular bisector of $\overline{AB}$, A (-4,4) B (4,8) in slope intercept form.

$m=\frac{1}{2}$

midpt: $\left(\frac{-4+4}{2}, \frac{4+8}{2}\right)$

: $(0,6)$

slope: -2

$y-6=-2(x-0)$

$\boxed{y=-2x+6}$

4. Write the equation of the perpendicular bisector of $\overline{AB}$, A (-2,7) B (4, 11) in slope intercept form. $m=\frac{2}{3}$

midpt: $\left(\frac{-2+4}{2}, \frac{7+11}{2}\right)$

: $(1,9)$

slope: $-\frac{3}{2}$

$y-9=-\frac{3}{2}(x-1)$

$\boxed{y=-\frac{3}{2}x+10.5}$

9

5. The slope of $\overline{QR}$ is $\frac{x-1}{4}$ and the slope of $\overline{ST}$ is $\frac{8}{3}$. If $\overline{QR} \perp \overline{ST}$, determine and state the value of x.

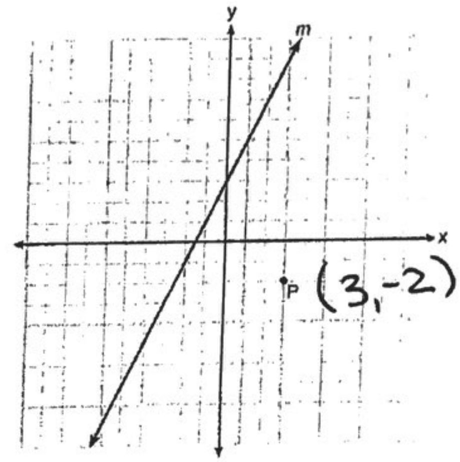
$$\frac{x-1}{4} = -\frac{3}{8} \rightarrow 8x-8=-12$$
$$8x=-4$$
$$\boxed{x=-\frac{1}{2}}$$

6. Two lines are represented by the equations $-\frac{1}{2}y = 6x + 10$ and $y = mx$. For which value of m will the lines be parallel?

1) -12
2) -3
3) 3
4) 12

$y=-12x-20$

7. Line m and point P are shown in the graph below.



Which equation represents the line passing through P and parallel to line m?

1) ~~$y-3=2(x+2)$~~
2) $y+2=2(x-3)$
3) $y-3=-\frac{1}{2}(x+2)$
4) $y+2=-\frac{1}{2}(x-3)$

slope line m: 2

$y+2=2(x-3)$

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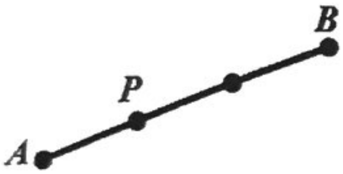
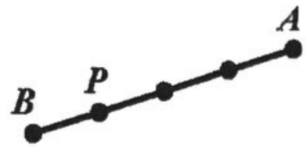
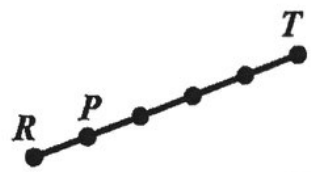
1. Determine the ratio of the directed line segment $\overline{AB}$ when partitioned by point P. (Hint: A is the initial point)

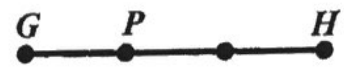




a) 1 : 2 b) 3 : 1 c) 5 : 1

2. Determine the ratio of the directed line segment when partitioned by point P.





a) Directed Line Segment $\overline{DC}$ 1 : 3

b) Directed Line Segment $\overline{RT}$ 1 : 4

c) Directed Line Segment $\overline{HG}$ 2 : 1

3. Determine the point P that partitions the directed line segment $\overline{AB}$ into a ratio of 4:5, where A (5,-4) and B (14,5).

$x_1\ y_1 \quad x_2\ y_2$

$$\left(5+\underbrace{\tfrac{4}{9}(14-5)}_{4},\ -4+\underbrace{\tfrac{4}{9}(5-(-4))}_{4}\right)$$

$$\boxed{P(9,0)}$$

4. Determine the point P that partitions the directed line segment $\overline{AB}$ into a ratio of 1:3, where A (8,6) and B (0,10).

$x_1\ y_1 \quad x_2\ y_2$

$$\left(8+\underbrace{\tfrac{1}{4}(0-8)}_{-2},\ 6+\underbrace{\tfrac{1}{4}(10-6)}\right)$$

$$\boxed{P(6,7)}$$

5. Determine the point P that partitions the directed line segment $\overline{AB}$ into a ratio of 2:1, where A (0,5) and B (3,11).

$x_1\ y_1 \quad x_2\ y_2$

$$\left(0+\underbrace{\tfrac{2}{3}(3-0)}_{2},\ 5+\underbrace{\tfrac{2}{3}(11-5)}_{4}\right)$$

$$\boxed{P(2,9)}$$

Date ________

Review: Unit 3-11 Test Coordinate Geometry

1. What is the slope of a line that is parallel to the line whose equation is $3x - 2y = 7$? → $y = \frac{3}{2}x - \frac{7}{2}$

   $m = \frac{3}{2}$

2. The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are $m = 2$ & $m = \frac{1}{2}$
   1) parallel
   2) perpendicular
   3) the same line
   4) neither parallel nor perpendicular

3. Given directed line segment $\overline{AB}$, where A(0,0) and B(12,0). Determine the point P that partitions the segment into a 1:2 ratio.

   P(4, 0)

4. The two lines represented by the equations below are graphed on a coordinate plane.

   $x + 6y = 12$ → $y = -\frac{1}{6}x + 2$

   $3(x - 2) = -y - 4$ → $y = -3x + 2$

   Which statement best describes the two lines?
   1) The lines are parallel.
   2) The lines are the same line.
   3) The lines are perpendicular.
   4) The lines intersect at an angle other than 90°.

5. In circle O, diameter $\overline{RS}$ has endpoints $R(3a, 2b - 1)$ and $S(a - 6, 4b + 5)$. Find the coordinates of point O, in terms of a and b. Express your answer in simplest form. midpt!

   $O(2a - 3, 3b + 2)$

6. If $\overline{BC}$ has endpoints $B(6,8)$, and $C(8,4)$. Write an equation that represents the perpendicular bisector of $\overline{BC}$? $\overline{BC}$ midpt: (7, 6)

   $m = -2$

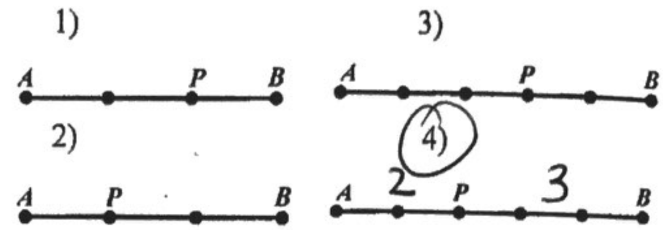
   $\boxed{y - 6 = \frac{1}{2}(x - 7)}$

7. Given the points A(−1, 2) and B(7, 14), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:3. USE THE FORMULA.

   $\left(-1 + \underbrace{\frac{1}{4}(7+1)}_{2},\ 2 + \underbrace{\frac{1}{4}(14-2)}_{3}\right)$

   P(1, 5)

8. Directed line segment $\overline{AB}$ is partitioned by point P into a ratio of 2:3. Which of the following represent this relationship?



9. The midpoint of $\overline{AB}$ is $M(4,2)$. If the coordinates of A are $(6,-4)$, what are the coordinates of B?

   B(2, 8)

10. What is the slope of the line containing the points (3, 4) and (-5, 10)?

    $m = \frac{10-4}{-5-3} = \frac{6}{-8} = -\frac{3}{4}$

11. Which equation represents the line that passes through the point (−2,2) and is parallel to $y = \frac{1}{2}x + 8$?

    1 $y = \frac{1}{2}x$

    2 $y = -2x - 3$

    3 $y = \frac{1}{2}x + 3$

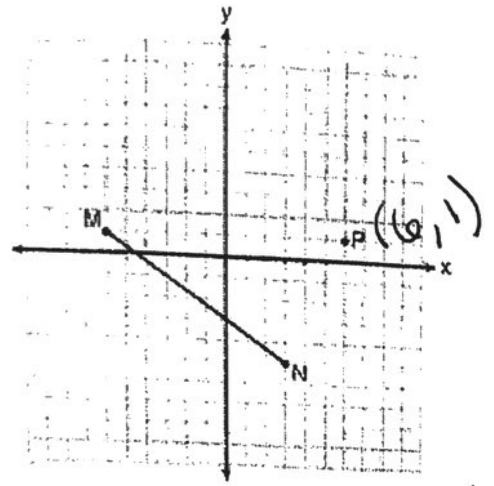
    4 $y = -2x + 3$

    $y - 2 = \frac{1}{2}(x + 2)$

    $y - 2 = \frac{1}{2}x + 1$

    $y = \frac{1}{2}x + 3$

Given $\overline{MN}$ shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to $\overline{MN}$?



1 $y=-\frac{2}{3}x+5$

2 $y=-\frac{2}{3}x-3$

3 $y=\frac{3}{2}x+7$

4 $y=\frac{3}{2}x-8$

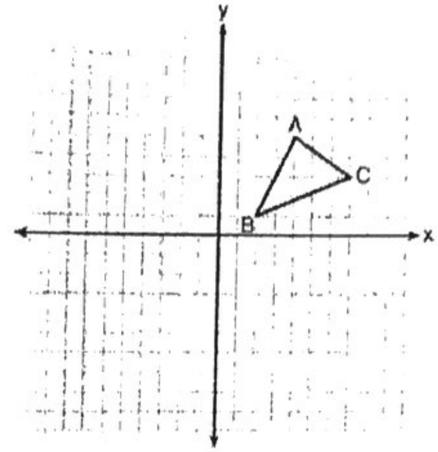
$m=\frac{-5-1}{3+6}=\frac{-6}{9}=-\frac{2}{3}$

$y-1=-\frac{2}{3}(x-6)$

$y-1=-\frac{2}{3}x+4$

$y=-\frac{2}{3}x+5$

14. In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.



What is the slope of the altitude drawn from A to $\overline{BC}$?

$\perp$ to $\overline{BC}$

1 $\frac{2}{5}$

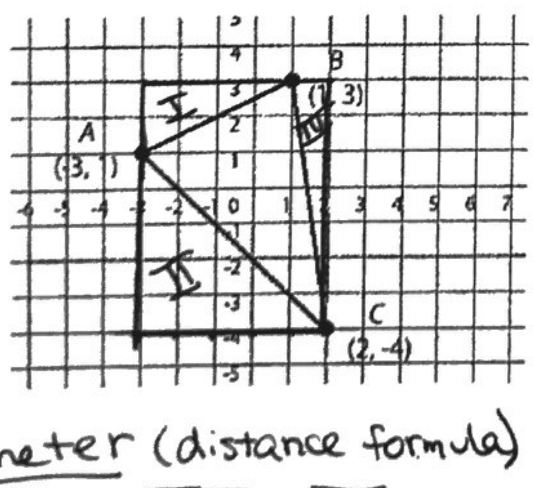
2 $\frac{3}{2}$

3 $-\frac{1}{2}$

4 $-\frac{5}{2}$

slope $\overline{BC}=\frac{2}{5}$

13. Find the area AND perimeter of $\triangle ABC$ with vertices A (-3, 1), B(1, 3), C(2, -4). Round values to the nearest tenth.



Area

A rectangle: $5(7)=35$

$A_{I}=\frac{1}{2}(2)(4)=4$

$A_{II}=\frac{1}{2}(5)(5)=12.5$

$A_{III}=\frac{1}{2}(1)(7)=3.5$

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Area $=35-20=15$

Perimeter (distance formula)

$\overline{AB}=\sqrt{(-3-1)^2+(1-3)^2}=\sqrt{20}$

$\overline{BC}=\sqrt{(1-2)^2+(3+4)^2}=\sqrt{50}$

$\overline{AC}=\sqrt{(-3-2)^2+(1+4)^2}=\sqrt{50}$

$P=\sqrt{20}+\sqrt{50}+\sqrt{50}\approx 18.6$