Name: AK Period: Date:

Unit 6 Points of Concurrency Practice

1. The vertices of triangle ABC are A(1, 6) B(5, 4) and C(5, -2). Find the coordinates of the circumcenter.

a) Graph and label the triangle on graph paper.

b) Find the midpoint of each side. Record them below and mark them in your picture.

AB	BC	AC
(3,5)	(5,1)	(3,2)

c) Find the slope of each side. Record them below.

AB	BC	AC
$-\frac{1}{2}$	undefined	-2

d) Find the perpendicular slopes for each of your slopes in c). Record them below.

AB	BC	AC
2	0	$\frac{1}{2}$

e) Use the midpoints from b) and slopes from d) to write the equations of each of the three perpendicular bisectors of each side of the triangle in slope intercept form ($y = mx + b$) or point slope form ($y - y_1 = m(x - x_1)$).

$y - 5 = 2(x - 3)$

$y - 5 = 2x - 6$

$y = 2x - 1$

$y = 1$

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

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

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

f) Pick two of your equations from e) and solve the system to find where they intersect. This is the circumcenter.

$y = 2x - 1$

$y = 1$

$1 = 2x - 1$

$2 = 2x$

$x = 1$

(1, 1)

g) Verify your answer in f) by constructing the perpendicular bisectors on your graph. Write the coordinates of the circumcenter below.

(1, 1)

2. The vertices of triangle DEF are D(5, 5) E(5, -4) and F(-1, -1). Find the coordinates of the orthocenter.

a) Graph and label the triangle on graph paper.

b) Find the slope of each side. Record them below.

DE	FE	DF
undefined	$-\frac{1}{2}$	1

c) Find the perpendicular slopes for each of your slopes in c). These are the slopes of your altitudes.

DE	FE	DF
0	2	-1

d) Use the vertices and the perpendicular slopes of the sides opposite each vertex to write the three equations of each of the altitudes in slope intercept form ($y = mx + b$) or point slope form ($y - y_1 = m(x - x_1)$).

through point: F

$y = -1$

E

$y + 4 = -1(x - 5)$

$y + 4 = -x + 5$

$y = -x + 1$

D

$y - 5 = 2(x - 5)$

$y - 5 = 2x - 10$

$y = 2x - 5$

e) Pick two of your equations from d) and solve the system to find where they intersect. This is orthocenter. Verify it on your graph by drawing the three altitudes and seeing where they meet.

$y = -1$ and $y = -x + 1$ $\rightarrow$ $-1 = -x + 1$, $-2 = -x$ $\rightarrow$ $x = 2$ $\quad (2, -1)$

3. The vertices of triangle MNO are M(-2, 5) N(6, -3) and O(2, -5). Find the coordinates of the centroid.

a) Graph and label the triangle on graph paper.

b) Find the midpoint of each side of the triangle. Record them below.

ON	MN	MO
(4, -4)	(2, 1)	(0, 0)

c) Write the equation of each of the three medians by writing the equations of the line through each vertex and the midpoint of the opposite side in point slope or slope intercept form.

Through M (-2, 5) (4, -4)

$m = \frac{5 - -4}{-2 - 4} = \frac{9}{-6} = -\frac{3}{2}$

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

$y + 4 = -\frac{3}{2}x + 6$

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

Through O (2, -5) (2, 1)

$x = 2$

Through N (6, -3) (0, 0)

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

$y - 0 = -\frac{1}{2}x - 0$

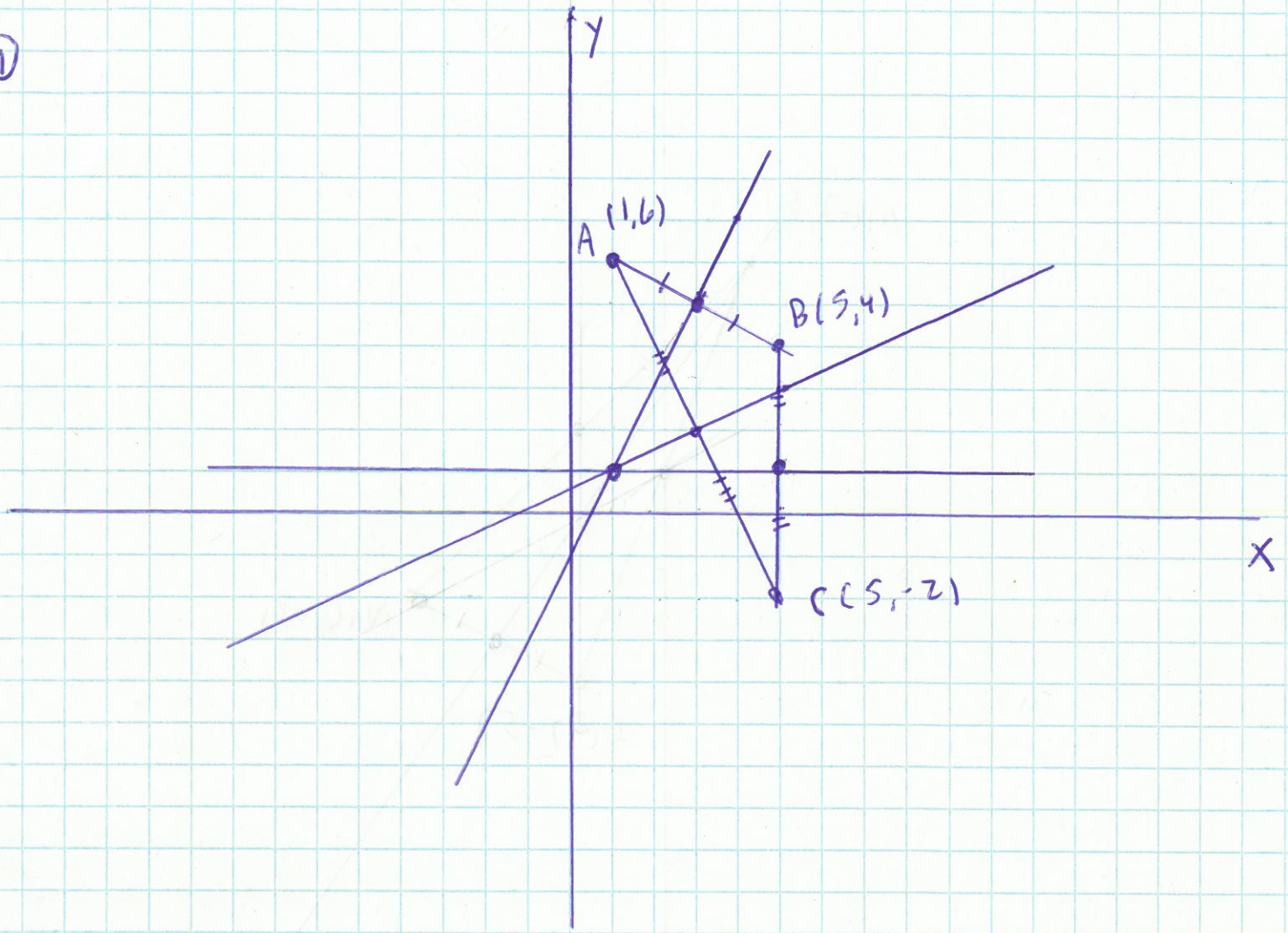
$y = -\frac{1}{2}x$

d) Pick two equations and solve the system to find the coordinates of the centroid. Check it by constructing the three medians on your graph paper and seeing where they intersect.

$x = 2$ and $y = -\frac{1}{2}x$ $\rightarrow$ $y = -\frac{1}{2}(2) = -1$ $\quad (2, -1)$

Homework: Online Textbook page 328, 4, 5, 9, 10, 11, 12, 13a, 14a, 14b.

①



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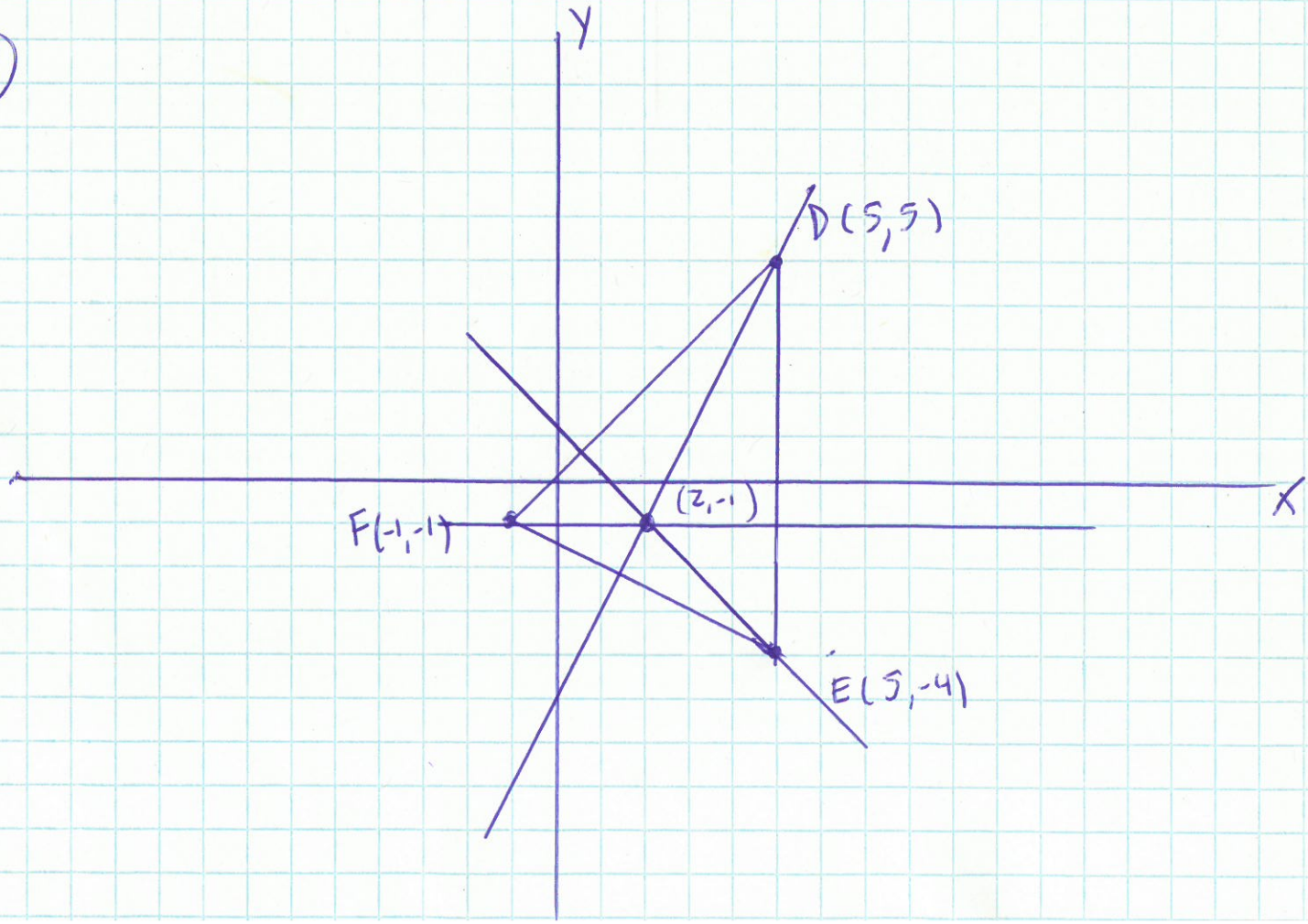

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