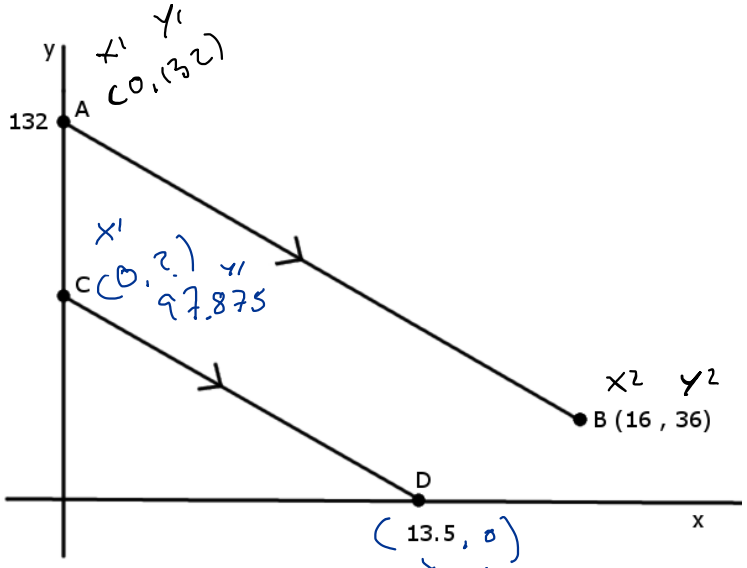
Name: _____
Date; _____

Final Review – 10
Analytic / Linear / Systems Toughies

1. Consider lines AB and CD.
   - Lines AB and CD are parallel
   - Points A and C are on the y-axis.
   - Point D is on the x-axis.

To the nearest tenth of unit, what is the length of line segment CD?



$\frac{y_2-y_1}{x_2-x_1} = \frac{36-132}{16-0} = \frac{-96}{16} = -6$

$y = ax + b$

$0 = -6(-13.5) + b$

$0 = -81 + b$

$+81 \quad +81$

$81 = b$

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

$\sqrt{(13.5-0)^2 + (0-81)^2}$

$\sqrt{(13.5)^2 + (-81)^2}$

$\sqrt{182.25 + 6561}$

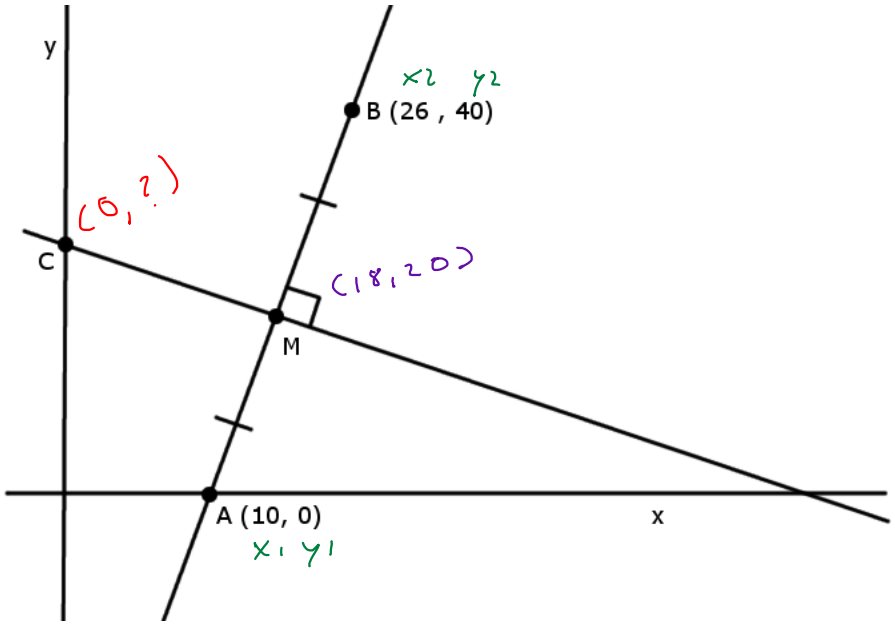
$\sqrt{6743.25}$

$= 82.117$

Answer: To the nearest tenth, the length of line segment CD is
82.1 units.

2. Consider lines AB and CM.
   - AB meets CM at a right angle.
   - Point M divides line AB into two line segments of equal length.
   - Point C is on the y-axis.

What are the coordinates of point C?



$\frac{y_2 - y_1}{x_2 - x_1} = \frac{40 - 0}{26 - 10} = \frac{40}{16} = 2.5$

NRS $\frac{2.5}{1} \rightarrow \frac{-1}{2.5} = -0.4$

$y = ax + b$

$20 = -0.4(18) + b$

$20 = -7.2 + b$

$+7.2 \quad +7.2$

$27.2 = b$

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

$\frac{26 + 10}{2}, \frac{40 + 0}{2}$

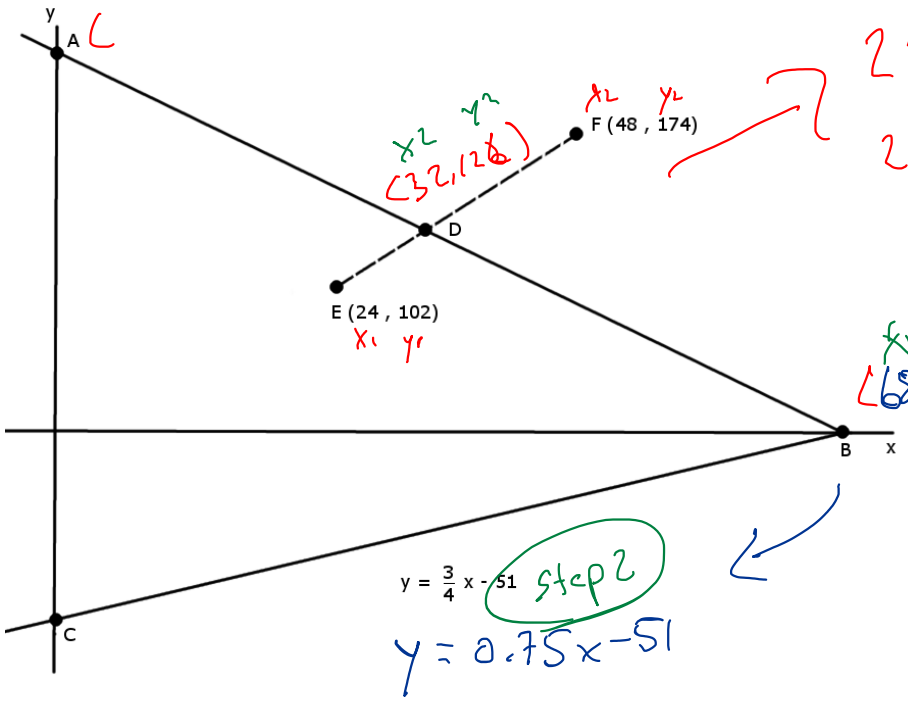
$\frac{36}{2} \quad \frac{40}{2}$

$18, 20$

Answer: The coordinates of point C are (0 , 27.2)

3. Consider lines AB and CB.
   - Points A and C are on the y-axis.
   - Point B is on the x-axis.
   - Point D divides line EF into a ratio of 1 : 2
   - The rule for line BC is given by the equation: $y = \frac{3}{4}x - 51$

What are the coordinates of point A?



$\frac{1}{3}$

step 1

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

$24 + \frac{1}{3}(48 - 24),\ 102 + \frac{1}{3}(174 - 102)$

$24 + \frac{1}{3}(24),\ 102 + \frac{1}{3}(72)$

$24 + 8 \qquad 102 + 24$

$32 \qquad 126$

$(68, 0)$

step 2

$y = 0.75x - 51$

$0 = 0.75x - 51$

$+51 \qquad +51$

$51 = 0.75x$

$\frac{51}{0.75} = \frac{0.75x}{0.75}$

$68 = x$

step 3

slope of AB

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{126 - 0}{32 - 68} = \frac{126}{-36} = -3.5$

$y = ax + b$

$126 = -3.5(32) + b$

$126 = -112 + b$

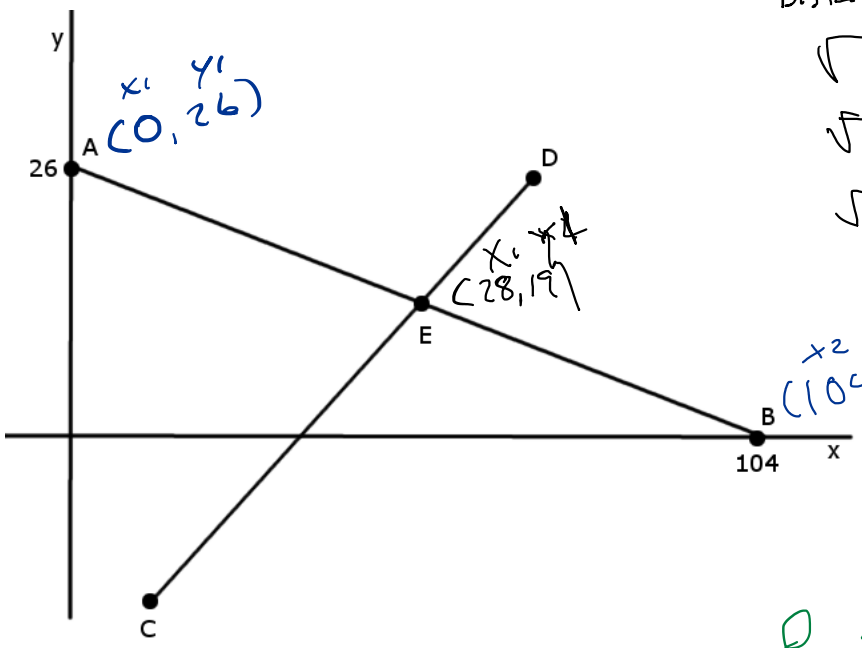
$+112 \qquad +112$

$238 = b$

Answer: The coordinates of point A are (0 , 238)

4. Consider lines AB and CD
   - Point A is on the y-axis
   - Point B is on the x-axis
   - The rule for line CD is represented by the equation: 6x – 3y – 111 = 0.
   - Point E is the intersection of lines AB and CD.

To the nearest tenth of a unit, what is the length of line segment BE?



x_1, y_1
$(0, 26)$

x_2, y_2
$(104, 0)$

x_1, y_1
$(28, 19)$

Distance BE

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

$\sqrt{(104-28)^2 + (0-19)^2}$

$\sqrt{(76)^2 + (-19)^2}$

$\sqrt{5776 + 361}$

$\sqrt{6137}$

78.3

Line AB

$\frac{y_2-y_1}{x_2-x_1} = \frac{0-26}{104-0} = \frac{-26}{104} = -0.25$

$y = -0.25x + 26$

Line CD

$6x - 3y - 111 = 0$

$-6x \quad +111 \quad -6x + 111$

$\frac{-3y}{-3} = \frac{-6x+111}{-3}$

$y = 2x - 37$

Point E

$-0.25x + 26 = 2x - 37$

$+0.25x \qquad +0.25x$

$26 = 2.25x - 37$

$+37 \qquad +37$

$\frac{63}{2.25} = \frac{2.25x}{2.25}$

$28 = x$

$y = -0.25(28) + 26$

$y = -7 + 26$

$y = 19$

Answer: To the nearest tenth, the length of line segment BE is 78.3 units.