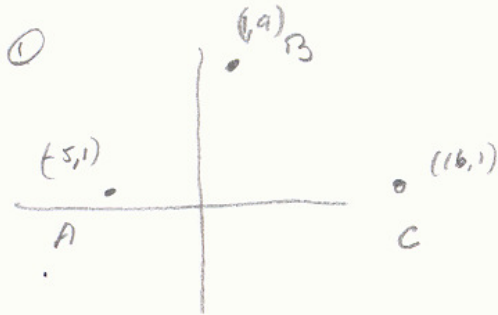


# APPLICATIONS OF COORDINATE GEOMETRY

GHP

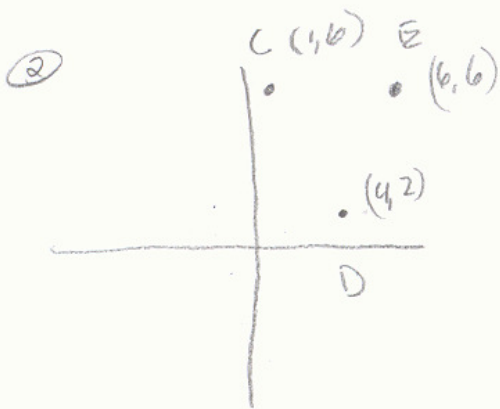


$$\begin{aligned} AB &= \sqrt{(1-5)^2 + (9-1)^2} \\ &= \sqrt{6^2 + 8^2} \\ &= \sqrt{36 + 64} \\ &= \sqrt{100} \\ &= 10 \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{(1-16)^2 + (9-1)^2} \\ &= \sqrt{(-15)^2 + (8)^2} \\ &= \sqrt{225 + 64} \\ &= \sqrt{289} \\ &= 17 \end{aligned}$$

$$\begin{aligned} AC &= \sqrt{(16-5)^2 + (1-1)^2} \\ &= \sqrt{21^2} \\ &= 21 \end{aligned}$$

$$21 + 10 + 17 = 48$$

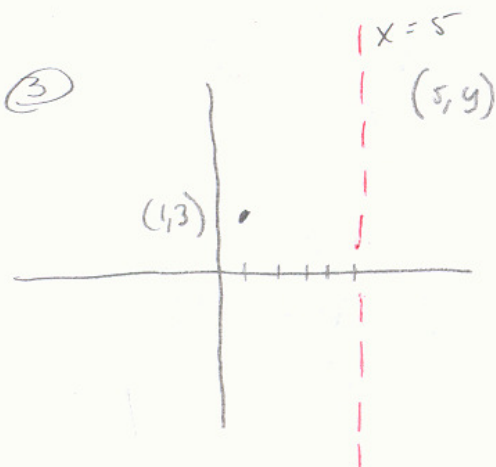


$$\begin{aligned} CD &= \sqrt{(4-1)^2 + (2-6)^2} \\ &= \sqrt{9 + 16} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

$$\begin{aligned} DE &= \sqrt{(4-6)^2 + (2-6)^2} \\ &= \sqrt{4 + 16} \\ &= \sqrt{20} \\ &= 2\sqrt{5} \end{aligned}$$

$$\begin{aligned} CE &= \sqrt{(6-1)^2 + (6-6)^2} \\ &= \sqrt{5^2} \\ &= 5 \end{aligned}$$

ISOSCELES



$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ 5 &= \sqrt{(5-1)^2 + (y-3)^2} \\ 5 &= \sqrt{16 + (y^2 - 6y + 9)} \\ (5)^2 &= (\sqrt{y^2 - 6y + 25})^2 \\ 25 &= y^2 - 6y + 25 \\ -25 & \quad -25 \end{aligned}$$

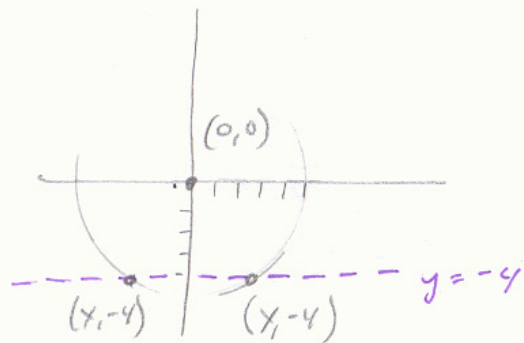
$$y^2 - 6y = 0$$

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

$$y = 0 \text{ or } y = 6$$

$$\text{So: } (5, 0) \text{ or } (5, 6)$$

④  $(x, -4)$



$$5 = \sqrt{(x-0)^2 + (-4-0)^2}$$

$$5 = \sqrt{x^2 + (-4)^2}$$

$$(5)^2 = (\sqrt{x^2 + 16})^2$$

$$25 = x^2 + 16$$

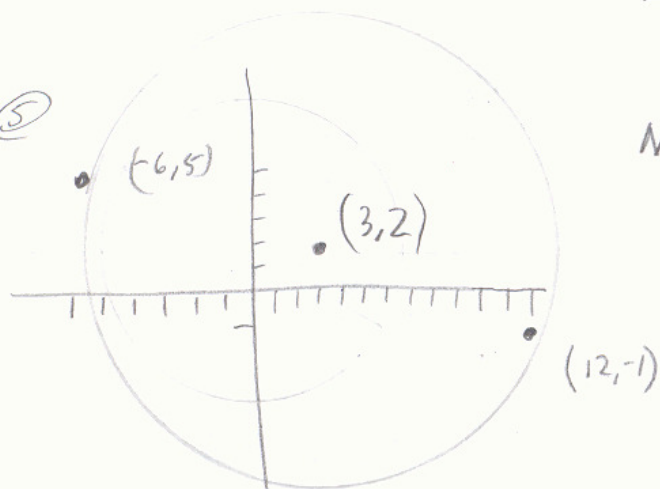
$$x^2 + 16 - 25 = 0$$

$$x^2 - 9 = 0$$

$$(x+3)(x-3)$$

$$\boxed{x = 3 \text{ or } x = -3}$$

⑤



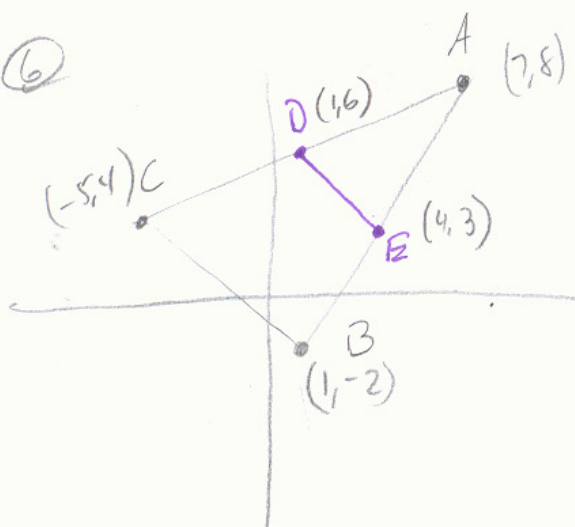
$$M = \left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$$

$$= \frac{-6 + 12}{2}, \frac{5 + (-1)}{2}$$

$$= \frac{6}{2}, \frac{4}{2}$$

$$\boxed{(3, 2)}$$

⑥



$$D = \left( \frac{7 + (-5)}{2}, \frac{8 + 4}{2} \right)$$

$$= \frac{2}{2}, \frac{12}{2}$$

$$= (1, 6)$$

$$E = \left( \frac{7 + 1}{2}, \frac{8 + (-2)}{2} \right)$$

$$= \left( \frac{8}{2}, \frac{6}{2} \right)$$

$$= (4, 3)$$

$$\overline{DE} = \sqrt{(1-4)^2 + (6-3)^2}$$

$$= \sqrt{-3^2 + 3^2}$$

$$= \sqrt{9+9}$$

$$= \sqrt{18}$$

$$= 3\sqrt{2}$$

$$\boxed{\frac{6\sqrt{2}}{2} = 3\sqrt{2}}$$

$$\overline{BC} = \sqrt{(-5-1)^2 + (4-(-2))^2}$$

$$= \sqrt{-6^2 + 6^2}$$

$$= \sqrt{36+36}$$

$$= \sqrt{72}$$

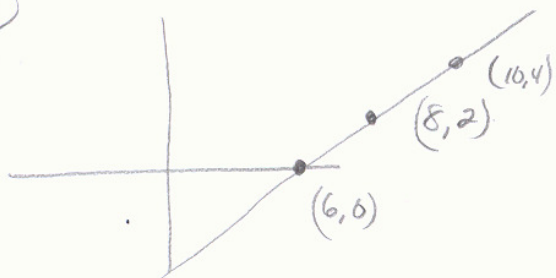
$$= \sqrt{9 \cdot 8}$$

$$= 3\sqrt{8}$$

$$= 3 \cdot 2\sqrt{2}$$

$$= 6\sqrt{2}$$

⑦



$$M = \left( \frac{6+10}{2}, \frac{0+4}{2} \right)$$

$$= \left( \frac{16}{2}, \frac{4}{2} \right)$$

$$= (8, 2) \checkmark$$

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

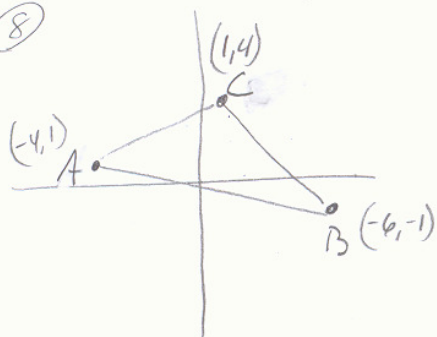
$$= \left( \frac{16}{2}, \frac{4}{2} \right)$$

$$= x_2 + 6 = 16 \quad y_2 + 0 = 4$$

$$x_2 = 10 \quad y_2 = 4$$

$$(10, 4)$$

⑧



$$AB = \sqrt{(-6-(-4))^2 + (-1-1)^2} \quad AC = \sqrt{(1-(-4))^2 + (4-1)^2}$$

$$= \sqrt{(-2)^2 + (-2)^2}$$

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

$$= \sqrt{4 + 4}$$

$$= \sqrt{34}$$

$$= \sqrt{8}$$

$$BC = \sqrt{(-6-1)^2 + (-1-4)^2}$$

$$= \sqrt{49 + 25}$$

$$(\sqrt{74})^2 = (\sqrt{8})^2 + (\sqrt{34})^2$$

$$= \sqrt{74}$$

$$74 = 8 + 34$$

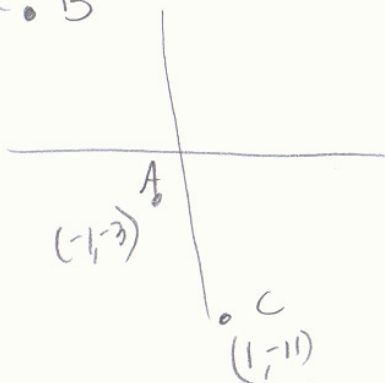
$$74 \neq 42$$

⑨  $A = (-1, -3)$

$B = (-5, 12)$

$C = (1, -11)$

$(-5, 12)$   
• B



$$AB = \sqrt{(-5-(-1))^2 + (12-(-3))^2}$$

$$= \sqrt{-4^2 + 15^2}$$

$$= \sqrt{16 + 225}$$

$$= \sqrt{241}$$

$$\approx 15.52$$

$$AC = \sqrt{(1-(-1))^2 + (-11-(-3))^2}$$

$$= \sqrt{4 + 64}$$

$$= \sqrt{68}$$

$$BC = \sqrt{(1-(-5))^2 + (-11-12)^2}$$

$$= \sqrt{36 + (-23)^2}$$

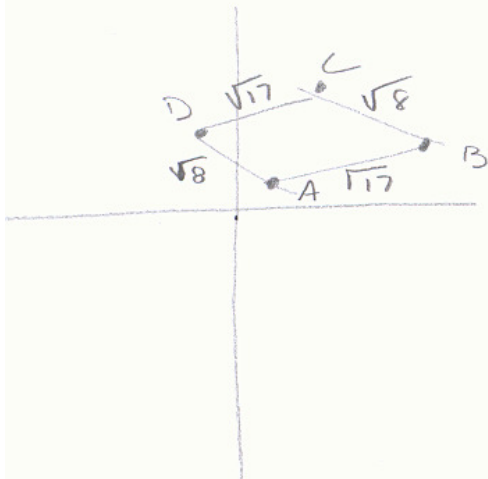
$$= \sqrt{36 + 529}$$

$$= \sqrt{565}$$

Does  $AB + AC = BC$  ?

NO.

(10)  $A = (1, 1)$   $B = (5, 2)$   $C = (3, 4)$   $D = (-1, 3)$



$$\begin{aligned}\overline{AB} &= \sqrt{(5-1)^2 + (2-1)^2} \\ &= \sqrt{16 + 1} \\ &= \sqrt{17}\end{aligned}$$

$$\begin{aligned}\overline{BC} &= \sqrt{(5-3)^2 + (2-4)^2} \\ &= \sqrt{4 + 4} \\ &= \sqrt{8}\end{aligned}$$

$$\begin{aligned}\overline{CD} &= \sqrt{(3-1)^2 + (4-3)^2} \\ &= \sqrt{4 + 1} \\ &= \sqrt{5}\end{aligned}$$

$$\begin{aligned}\overline{AD} &= \sqrt{(1-1)^2 + (1-3)^2} \\ &= \sqrt{0 + 4} \\ &= \sqrt{4}\end{aligned}$$

PARALLELOGRAM