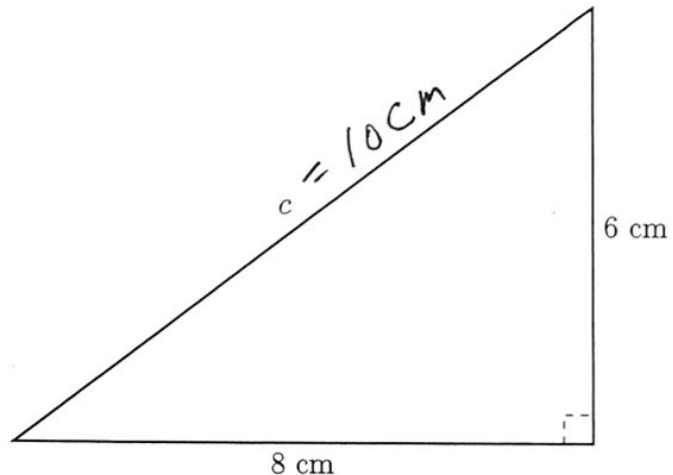


### 5.3 Classwork: Distance formula

1. Do Now: Use a centimeter ruler to measure the triangle side lengths.



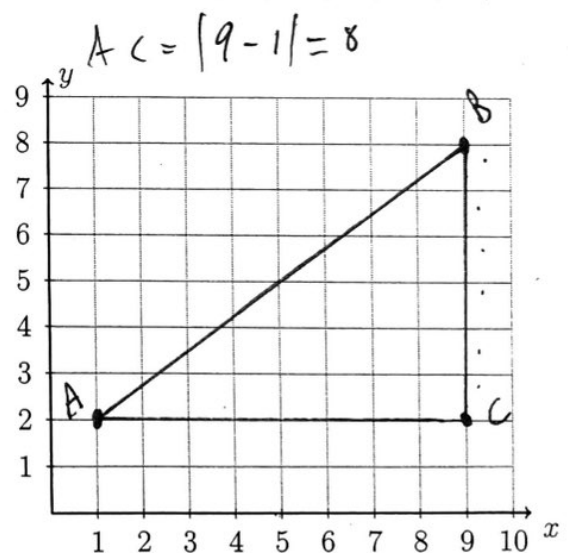
Note: The formula for distance is  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

2. Graph and label  $\triangle ABC$ . Calculate the lengths of its sides.  $A(1, 2)$ ,  $B(9, 8)$ ,  $C(9, 2)$ .

(a)  $AC = |9 - 1| = 8$

(b)  $BC = |8 - 2| = 6$

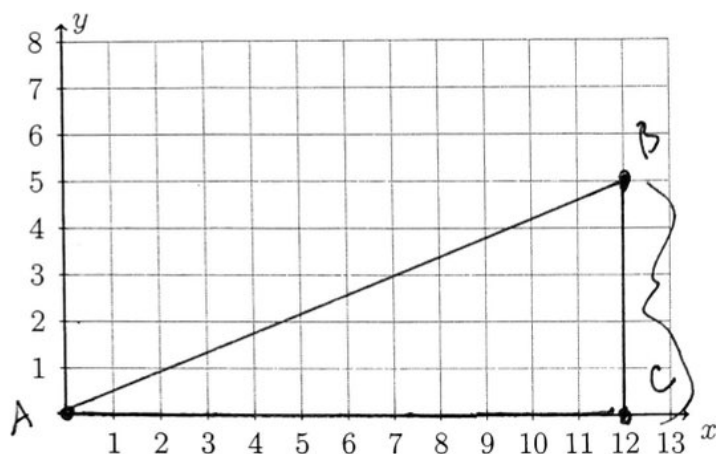
(c)  $AB = \sqrt{8^2 + 6^2}$   
 $= \sqrt{64 + 36}$   
 $= \sqrt{100}$   
 $= 10$



3. What is the length of  $\overline{CD}$  if  $C(3, -1)$  and  $D(-2, 11)$ ?

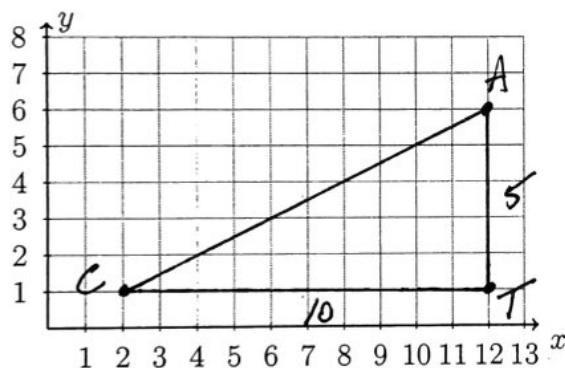
$$\begin{aligned} d &= \sqrt{(3 - (-2))^2 + (11 - (-1))^2} \\ &= \sqrt{5^2 + 12^2} \\ &= \sqrt{25 + 144} \\ &= \sqrt{169} \\ &= 13 \end{aligned}$$

4. Graph and label  $\triangle ABC$ . Calculate the lengths of its sides.  $A(0,0)$ ,  $B(12,5)$ ,  $C(12,0)$ .



$$\begin{aligned} BC &= 5 - 0 = 5 \\ AC &= 12 - 0 = 12 \\ AB &= \sqrt{5^2 + 12^2} \\ &= \sqrt{25 + 144} \\ &= \sqrt{169} \\ &= 13 \end{aligned}$$

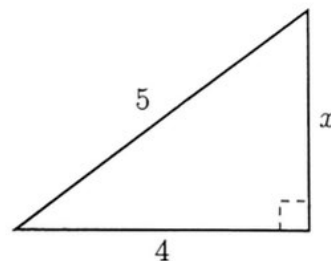
5. Graph and label  $\triangle CAT$ . Calculate the lengths of its sides.  $C(2,1)$ ,  $A(12,6)$ ,  $T(12,1)$ .



$$\begin{aligned} AT &= |6 - 1| = 5 \\ CT &= |12 - 2| = 10 \\ CA &= \sqrt{5^2 + 10^2} \\ &= \sqrt{25 + 100} \\ &= \sqrt{125} = \sqrt{25 \cdot 5} \\ &= 5\sqrt{5} \end{aligned}$$

6. The base of a right triangle is 4 centimeters long and its hypotenuse is 5 cm. Find its height,  $x$  cm.

$$\begin{aligned} x^2 + 4^2 &= 5^2 \\ x^2 + 16 &= 25 \\ x^2 &= 9 \\ x &= 3 \end{aligned}$$



7. Graph and label  $\triangle CAT$ . Calculate the lengths of its sides.  $C(1,2)$ ,  $A(10,8)$ ,  $T(10,2)$ .