

## Lesson Worksheet 8.2B(I)

*Objective: To learn and use the properties of rectangles.*

A rectangle is a quadrilateral with all interior angles equal to  $90^\circ$ .

長方形是一個所有內角的大小都是  $90^\circ$  的四邊形。

The followings are the properties of rectangles: 以下是長方形的性質：

(1) All properties of a parallelogram. 平行四邊形的所有性質。

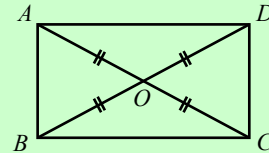
(2) The diagonals are equal. 對角線相等。

i.e.  $AC = BD$

(3) The diagonals bisect each other into four equal line segments.

對角線互相平分為四個相等的線段。

i.e.  $OA = OB = OC = OD$

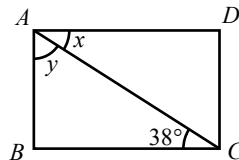


[Ref.: *property of rectangle*] [簡記：長方形性質]

1. In the figure,  $ABCD$  is a rectangle.  $AC$  is a diagonal of the rectangle and  $\angle ACB = 38^\circ$ . Find the values of  $x$  and  $y$ .

$\angle CAD = \angle ACB$

(alt.  $\angle$ s,  $AD \parallel BC$ )



$x = \underline{38^\circ}$

$\angle BAD = 90^\circ$  (definition of rectangle)

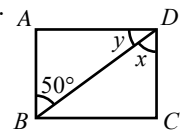
$y = 90^\circ - \angle CAD$

$= 90^\circ - 38^\circ$

$= \underline{52^\circ}$

### Demonstration

In the figure,  $ABCD$  is a rectangle.  $BD$  is a diagonal of the rectangle and  $\angle ABD = 50^\circ$ . Find the values of  $x$  and  $y$ .



### Solution

$\angle CDB = \angle ABD$  (alt.  $\angle$ s,  $AB \parallel DC$ )

$x = \underline{50^\circ}$

$\angle ADC = 90^\circ$  (definition of rectangle)

$y = \angle ADC - \angle CDB$

$= 90^\circ - 50^\circ$

$= \underline{40^\circ}$

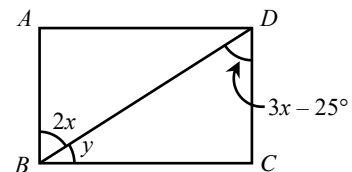
2. In the figure,  $ABCD$  is a rectangle.  $BD$  is a diagonal of the rectangle. Find the values of  $x$  and  $y$ .

$\angle CDB = \angle ABD$  (alt.  $\angle$ s,  $AB \parallel DC$ )

$3x - 25^\circ = 2x$

$x = \underline{25^\circ}$

What is the size of  $\angle ABC$ ?



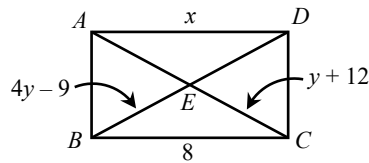
$\angle ABC = 90^\circ$  (definition of rectangle)

$y = 90^\circ - \angle ABD$

$= 90^\circ - 2(25^\circ)$

$= \underline{40^\circ}$

3. In the figure,  $ABCD$  is a rectangle.  $AC$  and  $BD$  intersect at  $E$ . Find the values of  $x$  and  $y$ .



$$AD = BC \quad (\text{property of rectangle})$$

$$x = \underline{8}$$

$$BE = CE \quad (\text{property of rectangle})$$

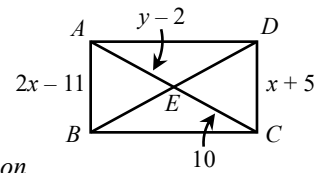
$$4y - 9 = y + 12$$

$$3y = 21$$

$$y = \underline{7}$$

Demonstration

In the figure,  $ABCD$  is a rectangle.  $AC$  and  $BD$  intersect at  $E$ . Find the values of  $x$  and  $y$ .



Solution

$$AB = DC \quad (\text{property of rectangle})$$

$$2x - 11 = x + 5$$

$$x = \underline{16}$$

$$AE = CE \quad (\text{property of rectangle})$$

$$y - 2 = 10$$

$$y = \underline{12}$$

4. In the figure,  $ABCD$  is a rectangle.  $AC$  and  $BD$  intersect at  $E$ . Find the values of  $x$  and  $y$ .

$$DE = AE \quad (\text{property of rectangle})$$

$$x - 1 = 9$$

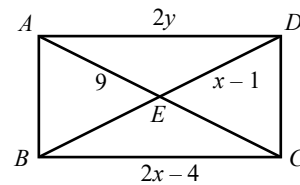
$$x = \underline{10}$$

$$AD = BC \quad (\text{property of rectangle})$$

$$2y = 2(10) - 4$$

$$= 16$$

$$y = \underline{8}$$



Challenging Question(Optional)

5. In the figure,  $PQRS$  is a rectangle.  $T$  is a point on  $PQ$  such that  $\angle RTS = 44^\circ$  and  $\angle QRT = 26^\circ$ . Find the value of  $x$ .

Draw a line parallel to  $PS$  and passes through  $T$  which meets  $RS$  at  $U$ .

$$\therefore PS \parallel QR \quad (\text{property of rectangle})$$

$$\therefore PS \parallel TU \parallel QR$$

$$\angle STU = \angle PST = 2x \quad (\text{alt. } \angle s, PS \parallel TU)$$

$$\angle RTU = \angle QRT = 26^\circ \quad (\text{alt. } \angle s, TU \parallel QR)$$

$$\angle STU + \angle RTU = 44^\circ$$

$$2x + 26^\circ = 44^\circ$$

$$x = \underline{9^\circ}$$

