

# *Absolute Value*

$$|a| = \begin{cases} a, & a \geq 0 \\ -a, & a < 0 \end{cases}$$

Absolute value is **distance of a number from 0**.

It is magnitude only, direction is **NOT** considered.

## **Absolute Value Results**

1.  $|-x| = |x|$

4.  $\left|\frac{x}{y}\right| = \frac{|x|}{|y|}$

2.  $|x - y| = |y - x|$

5.  $|x|^2 = x^2$

3.  $|xy| = |x||y|$

6.  $\sqrt{x^2} = |x|$

e.g. (i)  $|-5| = \underline{5}$

(ii)  $|6 - 8 - 2| = |-4|$   
 $= \underline{4}$

(iii)  $7 - |6 \times 3 - 20| = 7 - |-2|$   
 $= 7 - 2$   
 $= \underline{5}$

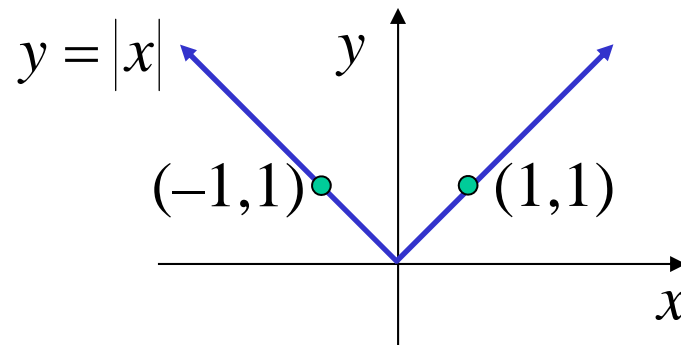
(iv)  $3|-6| = 3 \times 6$   
 $= \underline{18}$

(v)  $\sqrt{x^2}$ , if  $x < 0$   
 $= \underline{-x}$

## Absolute Value Graphs

$y = |mx + b|$

the part of  $y = mx + b$ , below the  $x$  axis is reflected above the  $x$  axis



e.g. (i) Sketch  $y = |x + 2|$

1. *basic curve*:  $y = |x|$

2. *shift left 2 units*

**OR**

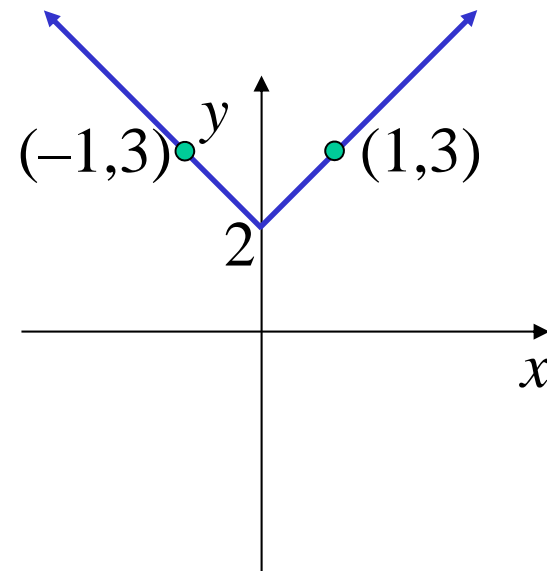
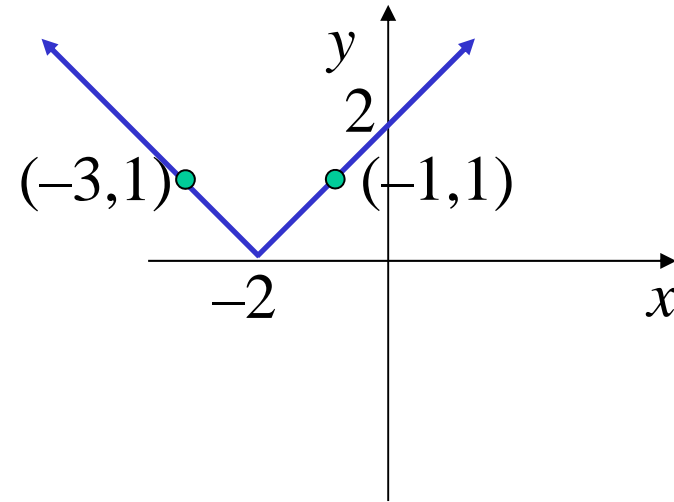
1. *basic curve*:  $y = x + 2$

2. *reflect up in the x axis*

(ii)  $y = |x| + 2$

1. *basic curve*:  $y = |x|$

2. *shift up 2 units*



## Absolute Value Equations

e.g. (i)  $|x| = 7$

$x = 7$  or  $x = -7$

(ii)  $|2x - 3| = 7$

$2x - 3 = 7$  or  $-(2x - 3) = 7$

$2x = 10$

$-2x + 3 = 7$

$x = 5$

$2x = -4$

$x = -2$

$x = -2$  or  $x = 5$

(iii)  $|2x + 6| = 3x - 1$

$2x + 6 = 3x - 1$  or  $-(2x + 6) = 3x - 1$

$-x = -7$

$x = 7$

$-2x - 6 = 3x - 1$

$-5x = 5$

$x = -1$

(NOT a solution)

$\therefore x = 7$

*Note: the equation  
 $|| =$  something with pronumerals  
may produce an answer that  
is not a solution*

**Exercise 4D; 1acfh, 2d, 3b, 8bdh, 9b i & iv, 11ae, 13,  
14, 15, 16acd, 17, 18, 19, 20**