chapter 7

Algebra 3

Section 7.3 Modulus

PROJECT MATHS Text & Tests 6 231

$|3| = 3$

$|-4| = 4$

absolute value = Size

1. Modular equations

Example 1

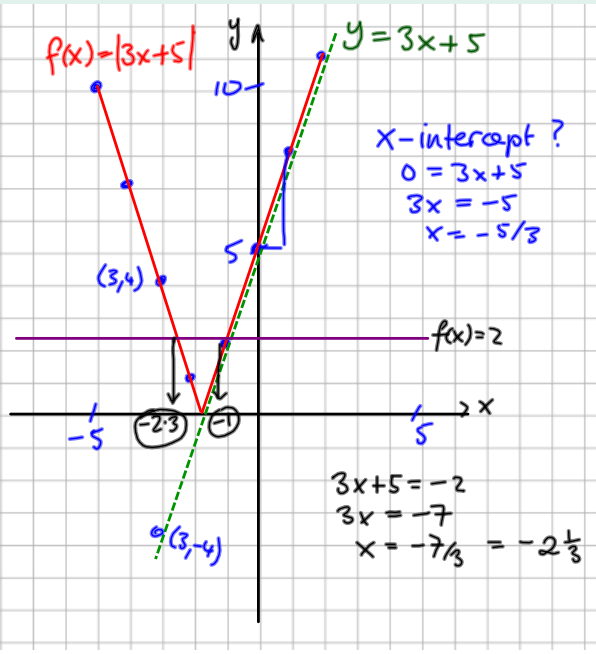
Sketch the graph of $f(x) = |3x + 5|$ and hence solve the equation $|3x + 5| = 2$ (i) geometrically and (ii) algebraically.

$|2| = 2$ or $|-2| = 2$

$f(x) = |3x+5|$

x	$f(x)$
-5	10
-4	7
-3	4
-2	1
-1	2
0	5
1	8
2	11

positive



x-intercept ?

$0 = 3x+5$

$3x = -5$

$x = -5/3$

$3x+5 = -2$

$3x = -7$

$x = -7/3 = -2\frac{1}{3}$

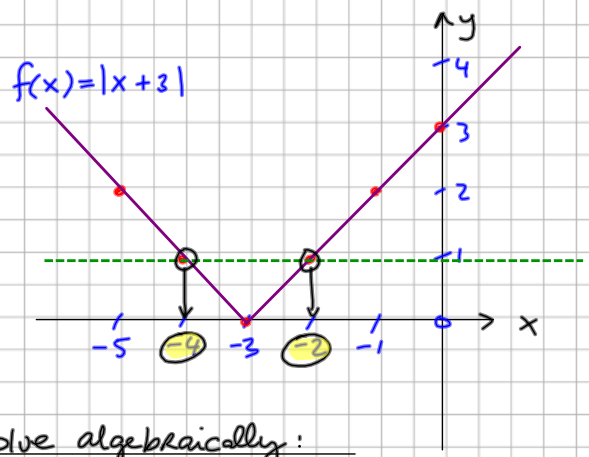
Exercise 7.3

1. Solve each of the following inequalities for $x \in R$.

(i) $|x + 3| = 1$ (ii) $|x - 2| = 4$ (iii) $|2x - 1| = 5$

- Sketch $f(x) = |x+3|$
- Solve from graph
- Solve from algebraically

x	$f(x)$
-5	2
-4	1
-3	0
-2	1
-1	2
0	3



Solve algebraically:

If $|x+3| = 1$

either $x+3 = 1$

$x = -2$

or $x+3 = -1$

$x = -4$

$|x+3|^2 = 1^2$

$x^2+6x+9 = 1$

$x^2+6x+8 = 0$

$(x+2)(x+4) = 0$

$x = -2$, $x = -4$

1. Solve each of the following inequalities for $x \in R$.

(iv) $|3x - 2| = x$ (v) $2|x - 3| = 2$ (vi) $|x - 5| = |x + 1|$

Solve (v)

$2|x-3| = 2$

$|x-3| = 1$

Method 1
Consider
|positive|
and |negative|

$\Rightarrow$ either $x-3 = 1$

$x = 4$

or $x-3 = -1$

$x = 2$

Method 2
Square both sides

$\Rightarrow |x-3|^2 = 1^2$

$x^2 - 6x + 9 = 1$

$x^2 - 6x + 8 = 0$

$(x-2)(x-4) = 0$

$x = 2$ or $x = 4$

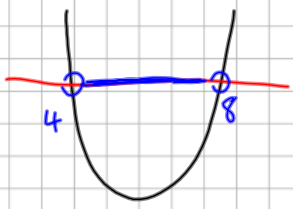
6. Solve each of the following inequalities for $x \in R$.

(i) $|x - 6| < 2$ (ii) $|x + 2| \leqslant 4$ (iii) $|2x - 1| \geqslant 5$

(1) If $|x-6|^2 < 2^2$

$x^2 - 12x + 36 < 4$

$x^2 - 12x + 32 < 0$



inside

If $x^2 - 12x + 32 = 0$

$(x - 8)(x - 4) = 0$

$x = 8$, $x = 4$

$4 < x < 8$