5.8 Quadratic Inequalities

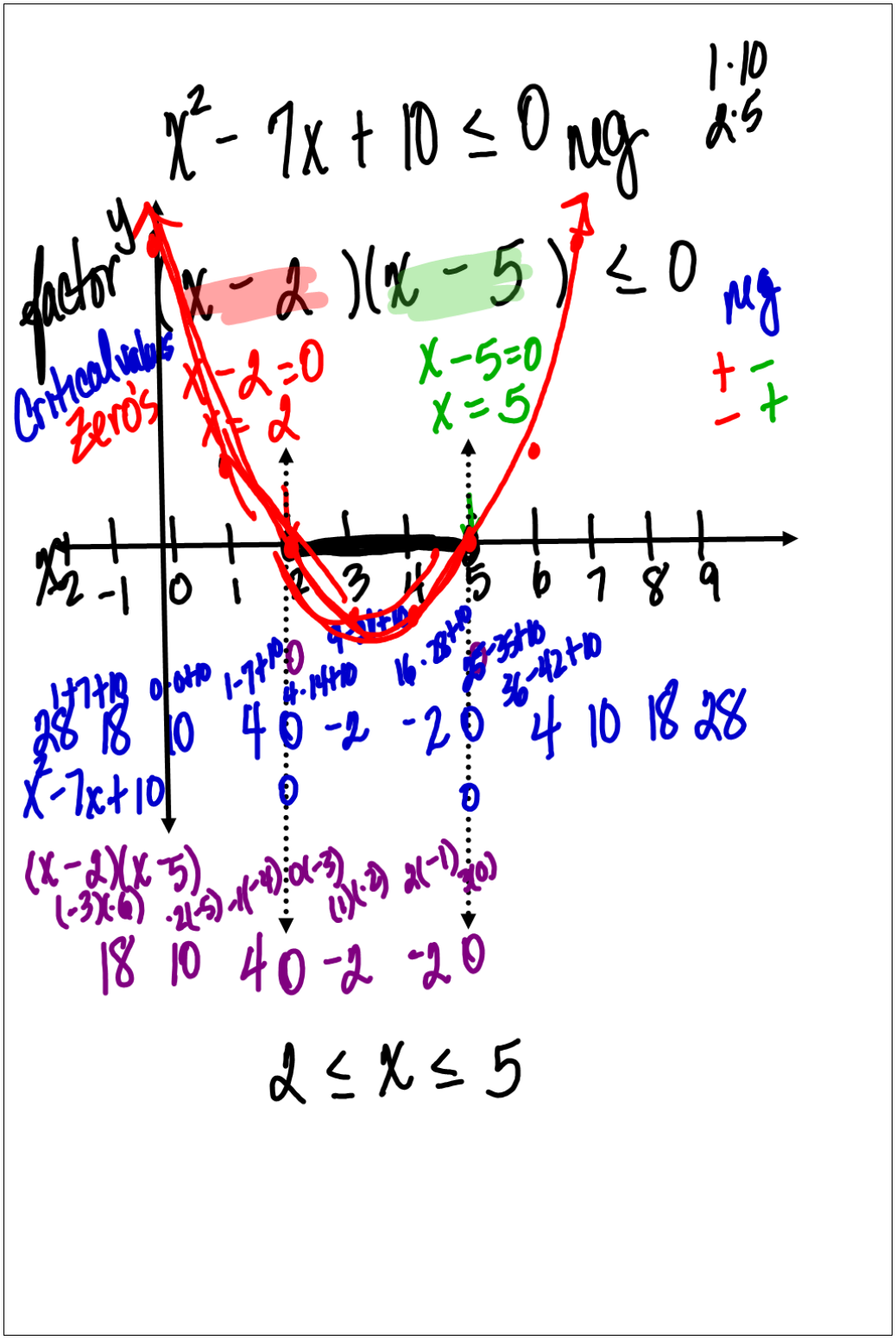
$x > 5$ $\quad$ $x = 5$

$x > 0$ positive

$x \geq 0$ positive or zero

$x < 0$ negative

$x \leq 0$ negative or zero


$x^2 - 7x + 10 \leq 0$ neg
1·10
2·5
factor
$(x-2)(x-5) \leq 0$
Critical values
Zeros
$x-2=0$
$x=2$
$x-5=0$
$x=5$
neg
+ −
− +
y
x
-2 -1 0 1 2 3 4 5 6 7 8 9
28 18 10 4 0 -2 -2 0 4 10 18 28
$x^2-7x+10$
$(x-2)(x-5)$
18 10 4 0 -2 -2 0
$2 \leq x \leq 5$

$-7x \quad -6 \qquad -7x \quad +6$

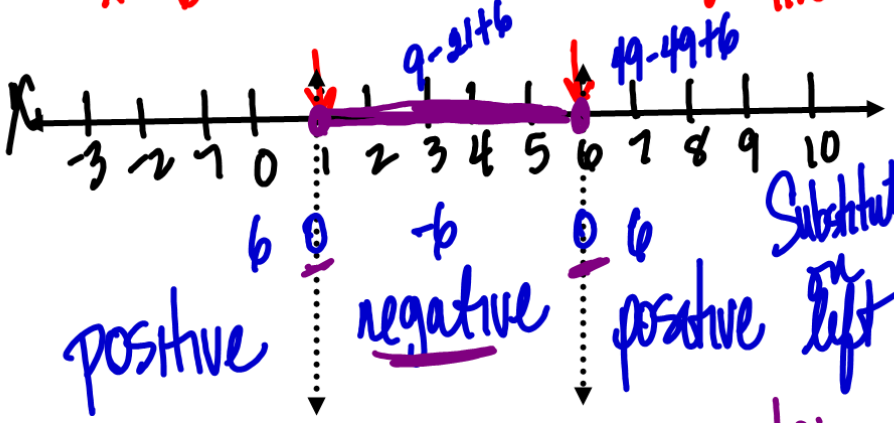
$x^2 \le 7x - 6$ Set ≤ 0

$x^2 - 7x + 6 \le 0$

$(x-6)(x-1) \le 0$ factor to find zeros

$x-6=0$ $x-1=0$

$x=6$ $x=1$ for number line



$1^2 - 2(1) + 6$ $\quad$ $7^2 - 7(7) + 6$

Substitute in left

6 0 -6 0 6

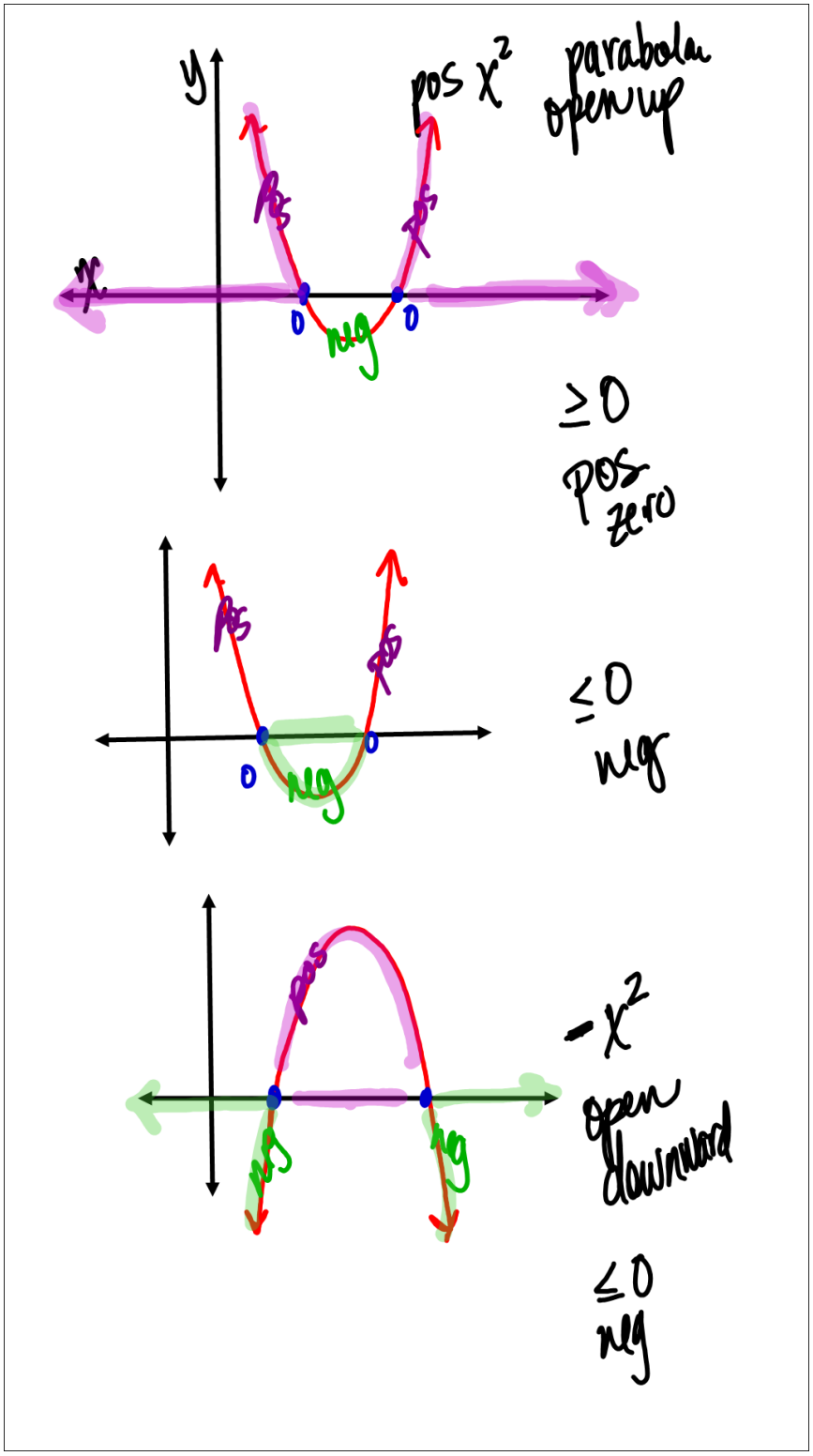
positive negative positive

$1 \le x \le 6$

go to inequality

$x^2 - 7x + 6 \le 0$

negative zero


y
pos x^2
parabola
open up
x
pos
pos
0
neg
0
≥ 0
pos
zero
pos
pos
0
neg
0
≤ 0
neg
pos
neg
neg
$-x^2$
open
downward
≤ 0
neg

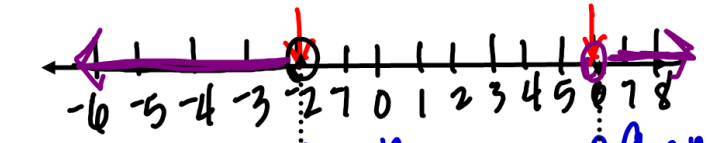
$x^2 - 4x - 12 > 0$ Set to 0

$(x-6)(x+2) > 0$ factor

Set factors = 0

$x-6=0$ $x=6$

$x+2=0$ $x=-2$



$x^2-4x-12$

20 pos

$16+16-12$

$32-12$

20

-12 neg

$0-0-12$

9 neg $-36-12$

pos -12

pos

Substitute

$x < -2$ or $x > 6$

Go to inequality

$x^2-4x-12 > 0$ pos

p 334

12-32 x 4