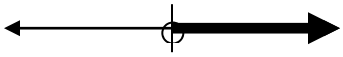
COLLEGE REVIEW MATH NAME KEY
Review Sections 3A & 3B

Solve & graph (by shading the number line) each "single" inequality.

1) $3y - 11 < 5y + 17$

$-11 < 2y + 17$
$-28 < 2y$
$-14 < y$ or $y > -14$



2) $\frac{3n+7}{-4} \geq 8$

$3n + 7 \leq -32$
$3n \leq -39$
$n \leq -13$

3) $4(9 - 5y) + 8y > -12y$

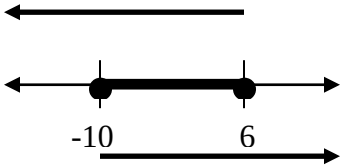
$36 - 20y + 8y > -12y$
$36 - 12y > -12y$
$36 > 0$, true statement
therefore; infinite solutions

Solve & graph the absolute value (compound) inequality. Don't forget to separate it into ***two*** versions.

4) $|x + 2| \leq 8$

$x + 2 \leq 8$ and $x + 2 \geq -8$
$x \leq 6$ $x \geq -10$

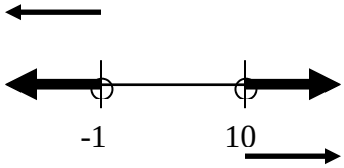
$\{-10 \leq x \leq 6\}$



5) $|2x - 9| > 11$

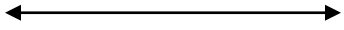
$2x - 9 > 11$ or $2x - 9 < -11$
$2x > 20$ $2x < -2$
$x > 10$ $x < -1$

$\{x < -1$ or $x > 10\}$



6) $\left|\frac{1}{2}x - 4\right| < -1$

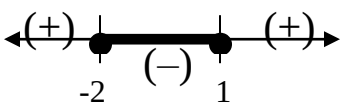
Since an absolute value always produces a positive, it can never be < -1, therefore: Ø



Solve each inequality using sign analysis. Your options for any problems that are not "pre-factored" are: 1) factor (GCF, regular, grouping) 2) quadratic substitution and 3) p's & q's.

7) $(x + 2)(x - 1) \leq 0$

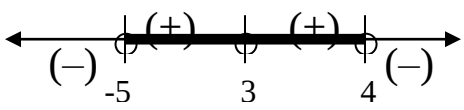
Test (0): $(0+2)(0-1)$
$(+)(-) = (-)$



$\{-2 \leq x \leq 1\}$

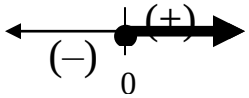
8) $(4 - x)(x - 3)^2(x + 5) > 0$

Test (0): $(4-0)(0-3)^2(0+5)$
$(+)(+)(+) = (+)$



$\{-5 < x < 4, x \neq 3\}$

9) $x^3 + 9x \geq 0$
$x(x^2 + 9) \geq 0$
$x = 0, x^2 = -9$
$x = \pm 3i$

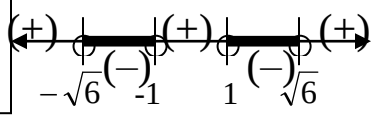


Test (1): $1(1^2 + 9)$
$(+)(+) = (+)$

$\{x \geq 0\}$

10) $x^4 - 7x^2 < -6$

$y^2 - 7y + 6 < 0$
$(y - 6)(y - 1) < 0$
$y = 6, \quad y = 1$



$x^2 = 6$ $x^2 = 1$
$x = \pm\sqrt{6}$, $x = \pm 1$ $\{-\sqrt{6} < x < -1$ *or* $1 < x < \sqrt{6}\}$

11) $x^3 + 3x^2 - 13x - 15 \geq 0$

p/q: ±1, 3, 5, 15

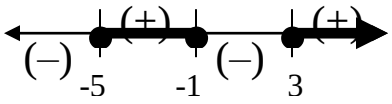
-1	1	3	-13	-15
		-1	-2	15
	1	2	-15	0

$x^2 + 2x - 15 = 0$

$(x + 5)(x - 3) = 0$

$x = -1, -5, 3$

Test (0):
$0^3 + 3(0)^2 - 13(0) - 15$
= (-)



{-5 ≤ x ≤ 1 or x ≥ 3}

12) $4x^3 - x^2 - 20x + 5 < 0$

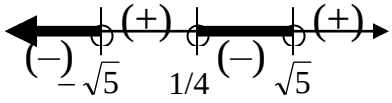
$x^2(4x - 1) - 5(4x - 1) < 0$

$(4x - 1)(x^2 - 5) < 0$

$x = 1/4, x^2 = 5$

$x = \pm\sqrt{5}$

Test (0):
$4(0)^3 - (0)^2 - 20(0) + 5$
= (+)



$\{x < -\sqrt{5} \quad or \quad 1/4 < x < \sqrt{5}\}$

Name the restrictions for each inequality. Do not solve! Also, as always, when in doubt…

13) $\dfrac{17}{(x-8)(x+2)^2} \leq 0$

$x \neq$ -2, 8

14) $\dfrac{2y+5}{3y^2 - 9y}$ $\quad 3y(y - 3)$ > 0

$y \neq$ 0, 3

15) $\dfrac{r}{3r^2 + 31r - 22}$ $\quad (r + 11)(3r - 2)$ ≥ 0

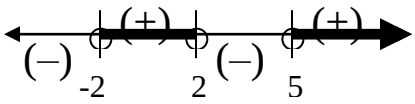
$r \neq$ -11, 2/3

Solve each rational inequality using sign analysis. Don't forget to include the restrictions on your number line.

16) $\dfrac{(x-2)(x+2)}{x-5} > 0$

roots: ±2
$x \neq 5$

Test (0): $\dfrac{(-)(+)}{(-)} = (+)$

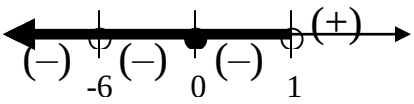


{-2 < x < 2 or x > 5}

17) $\dfrac{x^2}{(x-1)(x+6)^2} \leq 0$

root: 0
$x \neq 1, -6$

Test (2): $\dfrac{(+)}{(+)(+)} = (+)$

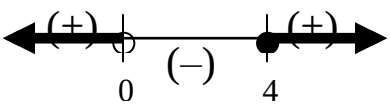


{x < 1, x ≠ 6} or {x < -6 or -6 < x < 1}

18) $\dfrac{7x - 28}{x} \geq 0$

root: 4
$x \neq 0$

$\dfrac{7(x - 4)}{x}$ $\quad$ Test (1): $\dfrac{(+)(-)}{(+)} = (-)$

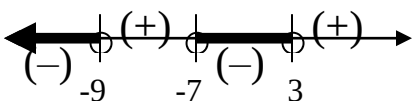


{x < 0 or x ≥ 4}

19) $\dfrac{x+9}{x^2 + 4x - 21} < 0$

root: -9
$x \neq -7, 3$

$(x + 7)(x - 3)$ $\quad$ Test (0): $\dfrac{(+)}{(+)(-)} = (-)$



{x < -9 or -7 < x < 3}