TAKE HOME EXAM solutions

CHAPTER 1

1) a) Simplify $8r - 3s - 5r$

$= \boxed{3r - 3s}$

b) distribute $8r - (3s - 5r)$

$8r - 3s + 5r$

$= \boxed{13r - 3s}$

2) a) $2x(x-1) - x^2$ for $x = -2$

Simplify expression $2x^2 - 2x - x^2 = x^2 - 2x$

then substitute $= (-2)^2 - 2(-2)$

$= 4 + 4 = \boxed{8}$

b) $\frac{5}{3}(3x-6) - (6-4x)$ for $x = 5$

simplify $5x - 10 - 6 + 4x = 9x - 16$

then substitute $9 \cdot 5 - 16 = 45 - 16 = \boxed{29}$

3) sometimes, always or never true

a) $1 + 5x - 6 = 6x - 5 - x$

$5x - 5 = 5x - 5$

$+5 \quad +5$

$5x = 5x$

$-5x \quad -5x$

$0 = 0$

since all terms cancel out the equation is always true

b) $-x + 2(5x-1) = 2(3x+4) + x$

$-x + 10x - 2 = 6x + 8 + x$

$9x - 2 = 7x + 8$

$-7x \qquad -7x$

$2x - 2 = 8$

$+2 \qquad +2$

$\frac{2x}{2} = \frac{10}{2}$

$\boxed{x = 5}$

since there is only one answer (value for x) this equation is sometimes true (only when $x = 5$)

4) Solve the inequality. Graph solution.

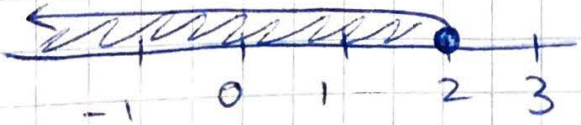
a) $8 + 4k \leq 16$

$-8 \qquad -8$

$\frac{4k}{4} \leq \frac{8}{4}$

$\boxed{k \leq 2}$

FULL CIRCLE



interval notation:

$(-\infty, 2]$

b) $5(2b+2) < 2 + 12b$

$10b + 10 < 2 + 12b$

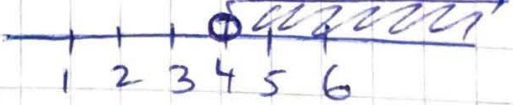
$-12b \qquad -12b$

$-2b + 10 < 2$

$-10 \qquad -10$

$\frac{-2b}{-2} < \frac{-8}{-2}$

$b > 4$ open circle



int. notation $(4, \infty)$

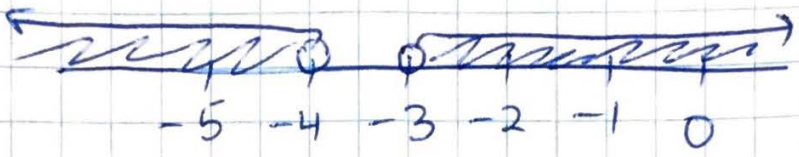
in inequalities when dividing by a negative number switch the inequality symbol !!!

5) a) $10x - 3 < 43$ or $7x + 11 > -10$

$+3 \quad +3 \qquad\qquad -11 \quad -11$

$\frac{10x}{10} < \frac{-40}{10}$ or $\frac{7x}{7} > \frac{-21}{7}$

$x < -4$ or $x > -3$



The word OR means to "combine" solution.

interval notation: $(-\infty, -4) \cup (-3, \infty)$

b) $-8 \leq 2x - 4 < 6$

this is the same as

$-8 \leq 2x - 4$ and $2x - 4 < 6$

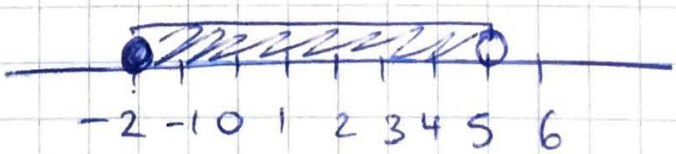
$+4 \quad +4 \qquad\qquad +4 \quad +4$

$\frac{-4}{2} \leq \frac{2x}{2}$ $\qquad$ $\frac{2x}{2} < \frac{10}{2}$

$-2 \leq x$ $\qquad$ $x < 5$ open circle

$x \geq -2$ Full circle

In inequalities solutions always have variable on the left →



int. not: $[-2, 5)$

6) a) $|2x+5|=9$

the "inside" of an absolute value can be either positive or negative

$2x+5=9$ or $2x+5=-9$

$-5\ -5$ $\quad -5\ -5$

$\frac{2x}{2}=\frac{4}{2}$ $\quad \frac{2x}{2}=\frac{-14}{2}$

$\boxed{x=2}$ $\quad \boxed{x=-7}$

b) $\frac{1}{3}|3x-6|-2=5$

$+2\ +2$

$3\cdot\frac{1}{3}|3x-6|=7\cdot 3$

Isolate the absolute value FIRST!!!

$|3x-6|=21$

once isolated create two equations

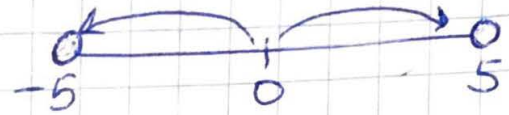
$3x-6=21$ $\quad 3x-6=-21$

$+6\ +6$ $\quad +6\ +6$

$\frac{3x}{3}=\frac{27}{3}$ $\quad \frac{3x}{3}=-\frac{15}{3}$

$\boxed{x=9}$ $\quad \boxed{x=-5}$

7) a) $|4x+3| < 5$ "distance from 0 is less than 5



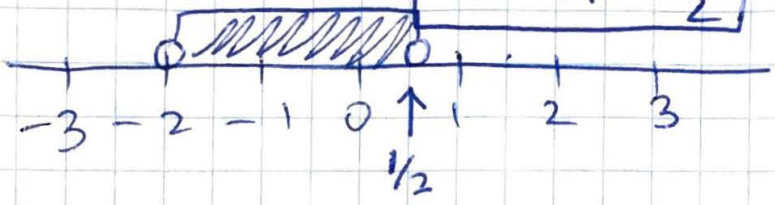
$4x+3 < 5$ and $4x+3 > -5$

$-3 \quad -3 \qquad\qquad -3 \quad -3$

$\frac{4x}{4} < \frac{2}{4}$ and $\frac{4x}{4} > \frac{-8}{4}$

$x < \frac{1}{2}$ and $x > -2$

$-2 < x < \frac{1}{2}$ or $(-2, \frac{1}{2})$



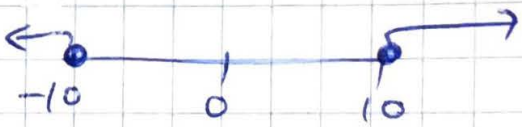
b) $|2x+6| \geq 10$ "distance from 0 is greater than

$2x+6 \geq 10$ or $2x+6 \leq -10$

$-6 \quad -6 \qquad\qquad -6 \quad -6$

$\frac{2x}{2} \geq \frac{4}{2}$ or $\frac{2x}{2} \leq \frac{-16}{2}$

$x \geq 2$ or $x \leq -8$



int. notation

$(-\infty, -8] \cup [2, \infty)$