121 TEST 1 ONLINE FALL '15

(1) $5x+1 = -2x-111$

$7x = -112$

$x = \frac{-112}{7} = \boxed{-16 = x}$

(2) $\frac{1}{5}x - \frac{1}{10} = \frac{1}{30}$

$\frac{x}{5}\cdot\frac{6}{6} - \frac{1}{10}\cdot\frac{3}{3} = \frac{1}{30}$

$6x - 3 = 1$

$6x = 4$

$x = \frac{4}{6} = \boxed{\frac{2}{3} = x}$

(3) $7x^2 = 9$

$x^2 = \frac{9}{7}$

$\sqrt{x^2} = \sqrt{\frac{9}{7}}$

$|x| = \sqrt{\frac{9}{7}}$

$x = \pm\sqrt{\frac{9}{7}} = \boxed{\underset{\text{OK}}{\pm\frac{3}{\sqrt{7}}} = \underset{\text{BETTER}}{\pm\frac{3\sqrt{7}}{7}} = x}$

(4)

121 TEST 1

(4) $3x^2 - 12x + 13 = 0$

$a=3,\ b=-12,\ c=13$

$b^2-4ac = (-12)^2 - 4(3)(13)$

$= 144 - 156$

$= -12$

$\sqrt{b^2-4ac} = i\sqrt{12} = 2i\sqrt{3}$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \dfrac{12 \pm 2i\sqrt{3}}{2(3)} = \dfrac{2(6 \pm i\sqrt{3})}{2(3)}$

$= \boxed{\dfrac{6 \pm i\sqrt{3}}{3} = x}$

$2\overline{)12}$

$2\overline{)6}$

3

$\sqrt{12}$

$= \sqrt{2\cdot 2\cdot 3}$

$= \sqrt{2\cdot 2}\,\sqrt{3}$

$= 2\sqrt{3}$

(5a) $25x^2 + 30x + 9 = 0$

$a=25,\ b=30,\ c=9$

$b^2-4ac = 30^2 - 4(25)(9)$

$= 900 - 900 = 0$

1 real (repeated) root

(5b) $5x^2 - 8x + 8 = 0$

$a=5,\ b=-8,\ c=8$

$b^2-4ac = (-8)^2 - 4(5)(8)$

$= 64 - 160 = -96$

2 nonreal solutions

121 TEST 1

(6) $x^2+8x-17=0$

$x^2+8x = 17$

$x^2+8x+4^2 = 17+16$

$(x+4)^2 = 33$

$\sqrt{(x+4)^2} = \sqrt{33}$

$|x+4| = \sqrt{33}$

$x+4 = \pm\sqrt{33}$

$\boxed{x = -4 \pm \sqrt{33}}$

(7) Line thru (2,5) & (3,-7)

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-7-5}{3-2} = \frac{-12}{1} = -12$

$y = m(x-x_1)+y_1$

$\boxed{y = -12(x-2)+5}$ STOP!

For those who make it harder:

$y = -12x+24+5$

$y = -12x+29$

(8) Thru (-3,5) & $\perp$ to $y = 7x-11$

$m = 7 \Rightarrow m_\perp = -\frac{1}{7}$

$\boxed{y = -\frac{1}{7}(x-(-3))+5}$

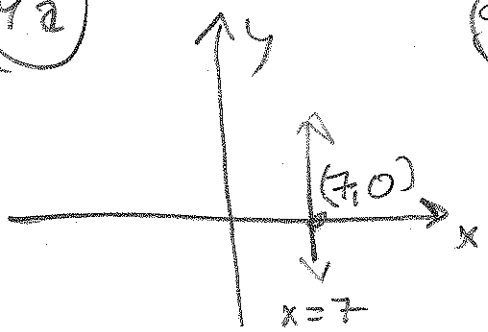
Preferred

$y = -\frac{1}{7}x - \frac{3}{7} + \frac{35}{7}$

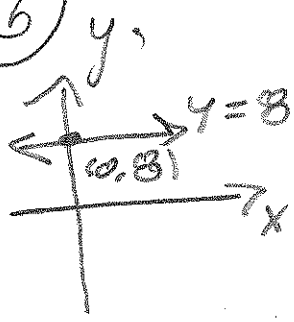
$y = -\frac{1}{7}x + \frac{32}{7}$

121 TEST 1

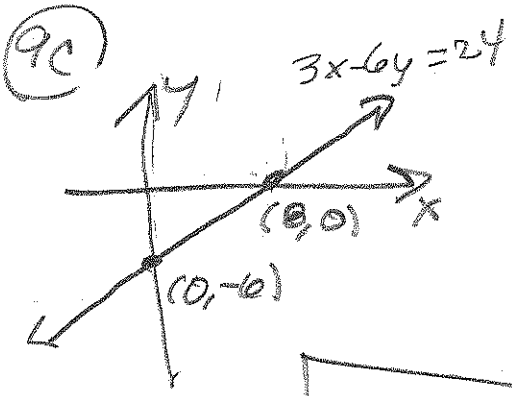
(9a)



(9b)



(9c)



(10) $2x-4 \leq 5x+34$

$-3x \leq 38$

$\frac{-3x}{-3} \geq \frac{38}{-3}$

$\left\{ x \mid x \geq -\frac{38}{3} \right\}$

$= \left[-\frac{38}{3}, \infty \right)$

(11) $|3x+7| < -2$ $\quad \emptyset$

Hard Way:

$3x+7 < -2$ and $3x+7 > 2$

$3x < -9$ and $3x > -5$

$\left\{ x \mid x < -3 \text{ and } x > -\frac{5}{3} \right\}$

$= \emptyset$ (No overlap!)

AND

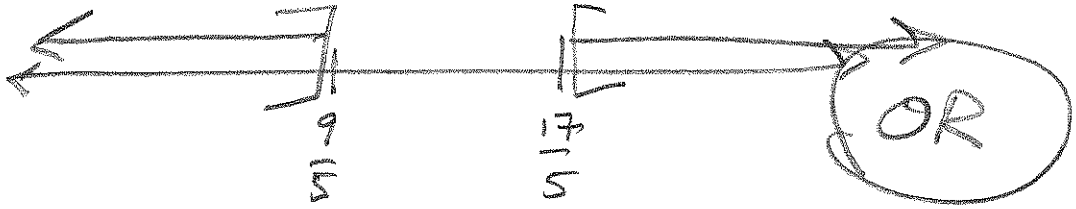
121 TEST 1

(12) $|5x-13| \geq 4$

$5x-13 \geq 4$ OR $5x-13 \leq -4$

$5x \geq 17$ $\quad$ $5x \leq 9$

$$\left\{x \mid x \geq \frac{17}{5} \text{ OR } x \leq \frac{9}{5}\right\} =$$



$$= (-\infty, \tfrac{9}{5}] \cup [\tfrac{17}{5}, \infty)$$

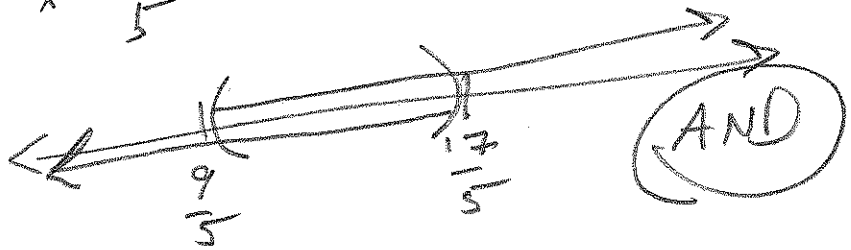
(13) $|5x-13| < 4$

$5x-13 < 4$ AND $5x-13 > -4$

$5x < 17$ AND $5x > 9$

$$\left\{x \mid x < \frac{17}{5} \text{ AND } x > \frac{9}{5}\right\}$$

$=$



$= (\frac{9}{5}, \frac{17}{5})$

(14) Let x = Volume of 20% NO_3 solution (L)

y = " " 50% " " " "

Then $x + y = 50$ and

$.2x + .5y = .37(50)$

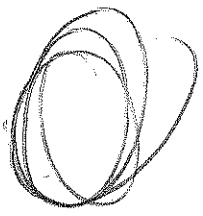
(15) Let x = # of hours John works.

Then y = " " " Bob "

$y = x + 2$, since John starts 2 hours late. This gives

$\frac{1}{9}x + \frac{1}{15}y = 1$ OR

$\frac{1}{9}x + \frac{1}{15}(x+2) = 1$ are both OK.



Bonus Work #1 & #2 solved

What's the solution?

(1) $.2x + .5(50-x) = .37(50)$

$.2x + 25 - .5x = 18.5$

$-.3x = -6.5$

$x = \frac{-6.5}{-.3} = \frac{-65}{-3} = 21.\overline{6}$ ℓ 20%

$y = 50 - x = 50 - 21.6$

$= 28.\overline{3}$ ℓ 50%

(2) $\left(\frac{1}{9}x + \frac{1}{5}(x+2) = 1\right)(45)$

$5x + 9(x+2) = 45$

$8x + 6 = 45$

$8x = 39$

$x = \frac{39}{8}$ hrs for John $= 4.875$ hrs John

$\Rightarrow y = \frac{39}{8} + 2 = \frac{39+16}{8} = \frac{55}{8}$

$= 6.875$ hrs for Bob

$$
\begin{array}{r}
4.875 \\
8\overline{)\,39.0000} \\
32.0000 \\
\hline
7.0000 \\
6.4000 \\
\hline
.6000 \\
.5600 \\
\hline
.0400
\end{array}
$$

121 TEST 1

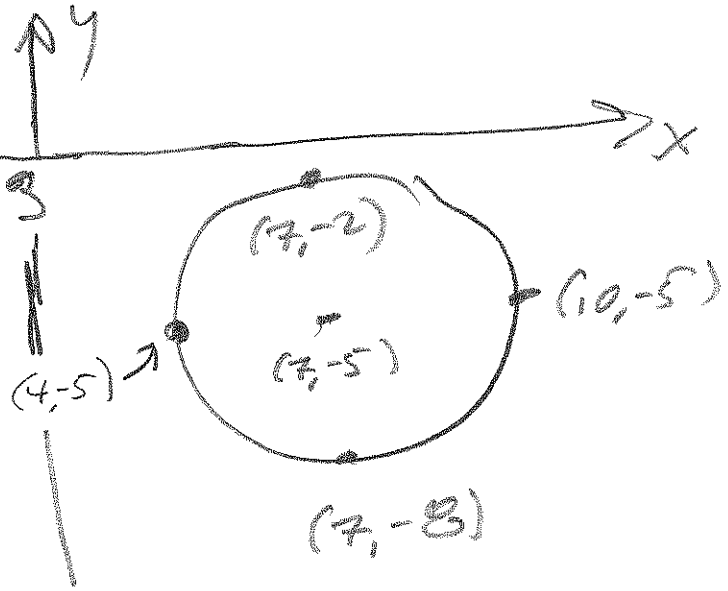
BONUS $x^2+y^2-14x+10y=-65$ ⟶

$x^2-14x \quad +y^2+10y \quad = -65$

$x^2-14x+7^2+y^2+10y+5^2 = -65+49+25$

$(x-7)^2+(y+5)^2=9$

$(h,k)=(7,-5)$, $r=3$



BONUS $(h,k)=(5,-6)$

$(x,y)=(8,-2)$

$r=\sqrt{(8-5)^2+(-2-(-6))^2}$

$=\sqrt{3^2+4^2}$

$=\sqrt{9+16}$

$=\sqrt{25}$

$=5$

$(x-h)^2+(y-k)^2=r^2$

$\Rightarrow (x-5)^2+(y-(-6))^2=5^2$