Name: Key Date: _____

SOLVING LINEAR EQUATIONS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Solve each of the following linear equations. If the equation is inconsistent, state so. If the equation is an identity, also state so. Reduce any non-integer answers to fractions in simplest form.

(a) $7x+5=2x-35$

$-2x \quad -2x$

$\Rightarrow 5x+5=-35$

$-5 \quad -5$

$\Rightarrow \frac{5x}{5}=\frac{-40}{5}$

$\Rightarrow \boxed{x=-8}$

(b) $\frac{x}{3}-7=-5$

$+7 \quad +7$

$\Rightarrow 3\cdot\frac{x}{3}=2\cdot 3$

$\Rightarrow \boxed{x=6}$

(c) $4x+5=4x-1$

$-4x \quad -4x$

$5 \neq -1$

inconsistent

(d) $\frac{5(x-3)}{2}-1=14$

$+1 \quad +1$

$2.\ \frac{5(x-3)}{2}=15\cdot 2$

$\Rightarrow 5(x-3)=30$

$\Rightarrow 5x-15=30$

$+15 \quad +15$

$\frac{5x}{5}=\frac{45}{5}$

$\boxed{x=9}$

(e) $3(x-1)+2=x+9$

$\Rightarrow 3x-3+2=x+9$

$\Rightarrow 3x-1=x+9$

$-x \quad -x$

$\Rightarrow 2x-1=9$

$+1 \quad +1$

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

$\boxed{x=5}$

(f) $4x-(2x-1)=x+5+x-6$

$\Rightarrow 4x-2x+1=2x-1$

$\Rightarrow 2x+1=2x-1$

$-2x \quad -2x$

$\Rightarrow 1 \neq -1$

inconsistent

(g) $5(2x-6)+2(4x+3)=8x-9$

$\Rightarrow 10x-30+8x+6=8x-9$

$\Rightarrow 18x-24=8x-9$

$-8x \quad -8x$

$\Rightarrow 10x-24=-9$

$+24 \quad +24$

$\Rightarrow \frac{10x}{10}=\frac{16}{10}$

$\boxed{x=\frac{8}{5}}$

(h) $\frac{2x+5}{6}=\frac{x}{18}$ (Cross multiply to begin)

$\Rightarrow 18(2x+5)=6x$

$\Rightarrow 36x+90=6x$

$-36x \quad -36x$

$\Rightarrow \frac{90}{-30}=\frac{-30x}{-30}$

$\boxed{x=-3}$

(i) $\frac{10x-4}{2}+7=5(x+1)$

$\Rightarrow \frac{10x-4}{2}+7=5x+5$

$-7 \quad -7$

$\Rightarrow \frac{10x-4}{2}=5x-2$

$\Rightarrow 5x-2=5x-2$

identity

(j) $18-2(x+7)=\frac{8x-20}{2}-2$

$\Rightarrow 18-2x-14=4x-10-2$

$\Rightarrow 4-2x=4x-12$

$+2x \quad +2x$

$\Rightarrow 4=6x-12$

$+12 \quad +12$

$\Rightarrow \frac{16}{6}=\frac{6x}{6}$

$\boxed{x=\frac{8}{3}}$

APPLICATIONS

(x) (add) (x) $5(x+2)$

2. Laura is thinking of a number such that the sum of the number and five times two more than the number is 26 more than four times the number. Determine the number Laura is thinking of.

$26+4x$

$\therefore x+5(x+2)=26+4x$

$\Rightarrow x+5x+10=26+4x$

$\Rightarrow 6x+10=26+4x$

$-4x \quad -4x$

$2x+10=26$

$-10 \quad -10$

$\Rightarrow \frac{2x}{2}=\frac{16}{2}$

$\Rightarrow \boxed{x=8}$

(x) $(8x-3)$

3. As if #2 wasn't confusing enough, Laura is now trying to come up with a number where three less than 8 times the number is equal to half of 16 times the number after it was increased by 1. She can't seem to find a number that works. Explain why.

$\frac{16(x+1)}{2}$

$\therefore 8x-3=\frac{16(x+1)}{2}$

$\Rightarrow 8x-3=\frac{16x+16}{2}$

$\Rightarrow 8x-3=8x+8$

$-8x \quad -8x$

$-3 \neq 8$

inconsistent

4. When finding the intersection of two lines from both Algebra I and Geometry, you first "set the linear equations equal" to each other. Find the intersection point of the two lines whose equations are shown below. Be sure to find both the x and y coordinates.

$y=5x+1$ and $y=2x-11$

set the equations equal to each other

$\Rightarrow 5x+1=2x-11$

$-2x \quad -2x$

$\Rightarrow 3x+1=-11$

$-1 \quad -1$

$\Rightarrow \frac{3x}{3}=\frac{-12}{3}$

$\Rightarrow \boxed{x=-4}$

plug in -4 to either equation

$y=5(-4)+1$ or $y=2(-4)-11$

$y=-20+1$ $\quad y=-8-11$

$\boxed{y=-19}$ $\quad y=-19$ ✓

$\therefore$ the point of intersection is $\boxed{(-4,-19)}$

REASONING

5. Explain why you cannot find the intersection points of the two lines shown below. Give both an algebraic reason and a graphical reason.

$y=4x+1$ and $y=4x+10$

$4x+1=4x+10$

$-4x \quad -4x$

$1 \neq 10$

inconsistent

the two lines are in slope-intercept form $y=mx+b$. They have the same slope (4) but different y-intercepts ($1 \neq 10$). Therefore, they are parallel lines and do not intersect.