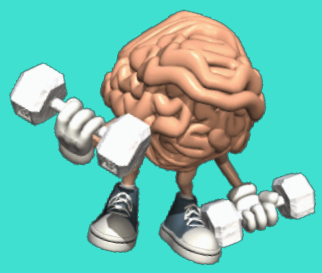
Warm Up



1) Solve the following systems using Substitution :

a) $3x - 4y = 19$
$x + 4y = 1$

b) $3x + y = 3$
$x = y - 1$

this is the warm up

a) ① $3x - 4y = 19$

② $\boxed{x} + 4y = 1$ ⇒ ③ $x = -4y + 1$

↓ sub x into equ ①

$3(x) - 4y = 19$

$3(-4y+1) - 4y = 19$

$-12y + 3 - 4y = 19$

$-16y + 3 - 3 = 19 - 3$

$\frac{-16y}{-16} = \frac{16}{-16}$

$\boxed{y = -1}$

↓ sub into equ ③

$x = -4y + 1$

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

$x = +4 + 1$

$\boxed{x = 5}$

(x, y)

$(5, -1)$

this is the warm up

b) ① $3x + y = 3$

② $x = y - 1$

→ sub equ ② into ①

$3(x) + y = 3$

$3(y - 1) + y = 3$

$3y - 3 + y = 3$

$4y - 3 = 3$ (+3 +3)

$\frac{4y}{4} = \frac{6}{4}$ Reduce

$\boxed{y = \frac{3}{2}}$

↓ Sub into Equ ②

$x = y - 1$

$x = \frac{3}{2} - 1$

$x = \frac{3}{2} - \frac{2}{2}$

$\boxed{x = \frac{1}{2}}$

$\frac{3}{2} - \frac{1 \times 2}{1 \times 2}$

$\frac{3}{2} -$

(x, y)

$\left(\frac{1}{2}, \frac{3}{2}\right)$

pg 425

8) ① $\frac{x}{3} - \frac{y}{2} = 2 \cdot 6$ → ③ $2x - 3y = 12$ $\Rightarrow \frac{2x}{2} = \frac{3y}{2} + \frac{12}{2}$

⑤ $\boxed{x = \frac{3}{2}y + 6}$

② $\frac{5x}{6} + \frac{3y}{4} = 1 \cdot 12$ → ④ $10x + 9y = 12$

↓ sub equ ⑤

$\frac{5}{6}\left(\frac{3}{2}y + 6\right) + \frac{3}{4}y = 1$

$\frac{15 \div 3}{12 \div 3}y + \frac{30}{6} + \frac{3}{4}y = 1$

Reduce

$\frac{5}{4}y + \frac{3}{4}y + 5 = 1$

$\frac{8}{4}y + 5 = 1$

Reduce

$2y + 5 = 1$ -5 -5

$\frac{2y}{2} = \frac{-4}{2}$

$\boxed{y = -2}$

$x = \frac{3}{2}y + 6$

$= \frac{3}{2}(-2) + 6$

$= \frac{-6}{2} + 6$

$= -3 + 6$

$\boxed{x = 3}$

10)

$x \Rightarrow$ Responding bears

$y \Rightarrow$ Non responding bears

Book

① $x + y = 186$

② $y = x + 94$ Sub into 1

$y - x = 94$

$x + (y) = 186$

$x + (x+94) = 186$

$x + x + 94 = 186$

$2x + 94 = 186$

$2x + \cancel{94} - \cancel{94} = 186 - 94$

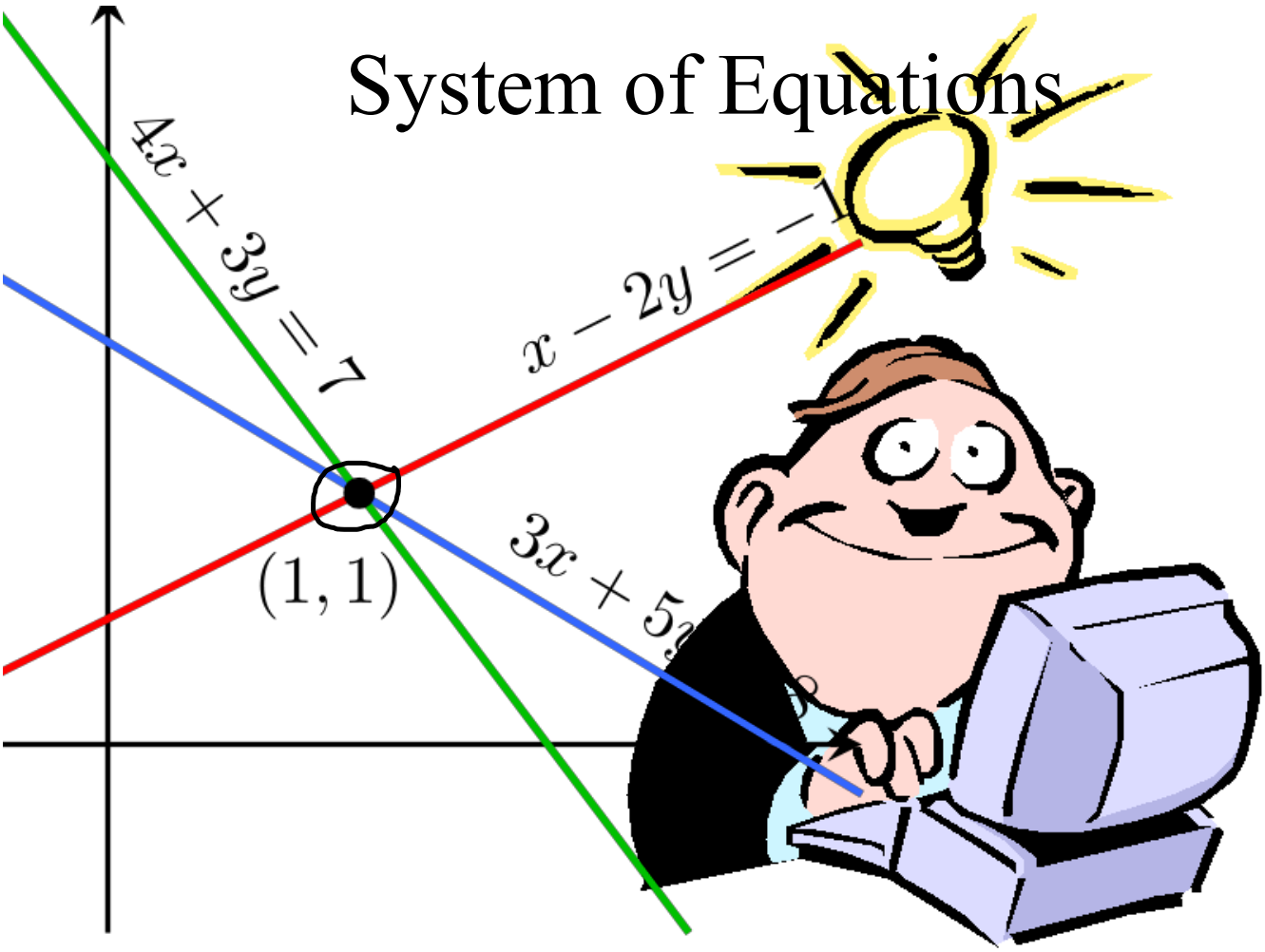
$\frac{\cancel{2}x}{\cancel{2}} = \frac{92}{2}$

$\boxed{x = 46} \rightarrow y = x + 94$

$46 + 94$

140

System of Equations



You try

Elimination using Addition

Consider the system

$$
\begin{array}{rl}
① & x - 2y = 5 \\
+ \; ② & 2x + 2y = 7 \\
\hline
①+② & 3x \quad = 12
\end{array}
$$

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

$$\boxed{x = 4}$$

↓ sub into equation ①

$$(x) - 2y = 5$$

$$4 - 2y = 5 - 4$$

$$\frac{-2y}{-2} = \frac{1}{-2}$$

$$\boxed{y = -\frac{1}{2}}$$

$$(x, y)$$

$$\left(4, \frac{-1}{2}\right)$$

Elimination using Addition

Same process as before
You can choose to eliminate either x or y

① $x + 3y = 14$
+ ② $-x + 4y = 7$

①+②

$\frac{7y}{7} = \frac{21}{7}$

$\boxed{y = 3}$

↓sub into equ ①

$x + 3(y) = 14$

$x + 3(3) = 14$

$x + 9^{-9} = 14^{-9}$

$\boxed{x = 5}$

x, y
(5, 3)

Who would you eliminate??

Do you add or subtract?

You Try

Solve the system of equations

Example 1)

$$\begin{aligned} ① \quad 2x + y &= 5 \\ + \; ② \quad 3x - y &= 15 \end{aligned}$$

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{20}{5}$$

$$\boxed{x = 4}$$

↓ sub equ ①

$2(x) + y = 5$

$2(4) + y = 5$

$8^{-8} + y = 5^{-8}$

$$\boxed{y = -3}$$

(x, y)

$(4, -3)$

Example 2)

$$\begin{cases} 6y + x = 11 \\ + \; 2y - x = 5 \end{cases}$$

$$\frac{8y}{8} = \frac{16}{8}$$

$$\boxed{y = 2}$$

↓ sub into eq ①

$6y + x = 11$

$6(2) + x = 11$

$12^{-12} + x = 11^{-12}$

$$\boxed{x = -1}$$

$(-1, 2)$

Elimination Using Subtraction

$$6x + 11y = -5$$
$$-(6x + 9y = -3)$$

Careful you are subtraction all of the second
(switch all signs on the second equation)

$$6x + 11y = -5$$
$$+\ -6x - 9y = +3$$
$$2y = -2$$
$$\frac{2y}{2} = \frac{-2}{2}$$
$$\boxed{y = -1}$$

↓ Sub equ ①

$$6x + 11(y) = -5$$
$$6x + 11(-1) = -5$$
$$6x - 11^{+11} = -5^{+11}$$
$$\frac{6x}{6} = \frac{6}{6}$$
$$(x = 1)$$

May want to change signs and add

x, y
(1, -1)

You Try

Use subtraction to eliminate

a)

① $7x + 7y = 0$

② $-(7x - y = 24)$

$7x + 7y = 0$

Rewrite → $+\ -7x + y = -24$

$\frac{8y}{8} = \frac{-24}{8}$

$\boxed{y = -3}$

↓ sub into Eqn ①

$7x + 7y = 0$

$7x + 7(-3) = 0$

$7x - 21 = 0$

$+21 \quad +21$

$7x - 21 = 0$

$\frac{7x}{7} = \frac{21}{7}$

$\boxed{x = 3}$

x, y

$(3, -3)$

b)

$7x + 6y = -10$

$-(9x + 6y = -30)$

Rewrite → $7x + 6y = -10$

$-9x - 6y = 30$

$\frac{-2x}{-2} = \frac{+20}{-2}$

$\boxed{x = -10}$

↓ sub ①

$7x + 6y = -10$

$7(-10) + 6y = -10$

$-70 \quad +70 \quad +70$

$6y = 60$

$\frac{6y}{6} = \frac{60}{6}$

$\boxed{y = 10}$

$(-10, 10)$

Math 10 (Numbers Relations & Functions) Name_____

Elimination

Date_____

Solve each system by elimination.

1) $2x + 8y = 8$
$-3x - 8y = -4$

2) $-x + 4y = 7$
$x + 4y = 25$

3) $-9x + 8y = 15$
$-9x + 6y = 27$

4) $-x - 5y = -3$
$-x + 3y = 13$

5) $-5x + 2y = 9$
$6x - 2y = -8$

6) $5x + 5y = 30$
$5x + 2y = 12$

7) $-10x + 8y = -28$
$9x + 4y = 14$

8) $-6x + y = -15$
$-12x - 3y = -15$

9) $-5x + 10y = -10$
$-7x - 5y = -14$

10) $-5x + 10y = 5$
$10x - 4y = 6$

11) $7x - 2y = 24$
$3x + 9y = 30$

12) $-3x - 2y = 2$
$-5x - 3y = 6$

13) $3x - 6y = 30$
$-10x - 9y = -13$

14) $7x - 10y = 0$
$-9x - 4y = 0$

15) $-10x + 7y = 12$
$-3x + 6y = -12$

16) $-3x + 4y = 2$
$-5x + 3y = 29$

17) $-10x - 6y = -14$
$8x + 5y = 11$

18) $-3x - 2y = 8$
$-8x - 7y = 18$