Name: _____

Chapter 7 Practice Test

Complete each question. Show all of your work for full marks.

Slope – Intercept Equation: $y = mx + b$

1. Verify that $(2,-1)$ is a solution to the linear system: $\begin{aligned} 2x + y &= 3 \\ 4x + 3y &= 5 \end{aligned}$

$2(2) + (-1) \stackrel{?}{=} 3$ $\qquad$ $4(2) + 3(-1) \stackrel{?}{=} 5$

$4 - 1 = 3$ ✓ $\qquad$ $8 - 3 = 5$ ✓

2. Solve the following systems of linear equations by **graphing**.

① $3x + y = -1$

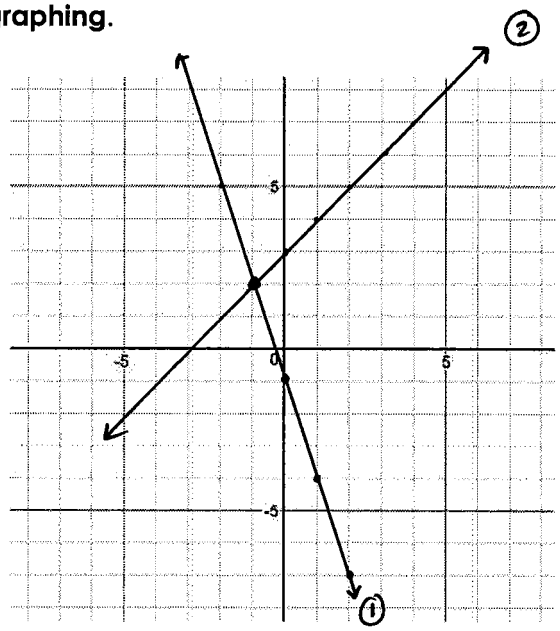
a) $y = x + 3$ ②

① $3x + y = -1$

$-3x \quad -3x$

$y = -3x - 1$

solution $(-1, 2)$



① $2x - 4y = 8$

b) $y = 2x + 1$ ②

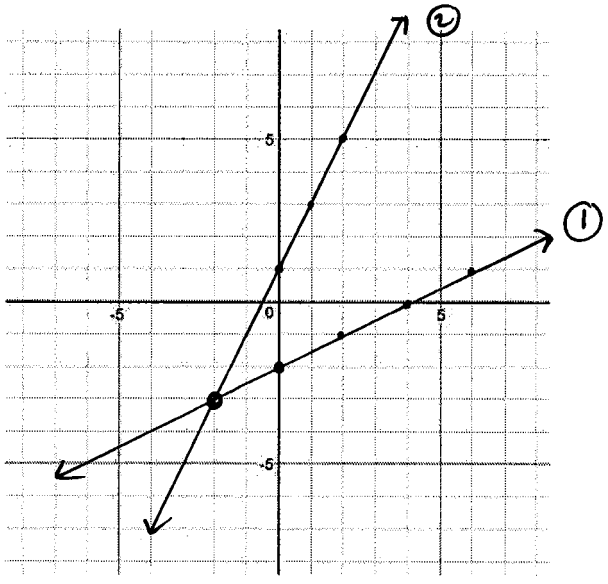
① $2x - 4y = 8$

$-2x \quad -2x$

$\frac{-4y}{-4} = \frac{-2x}{-4} + \frac{8}{-4}$

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

solution $(-2, -3)$

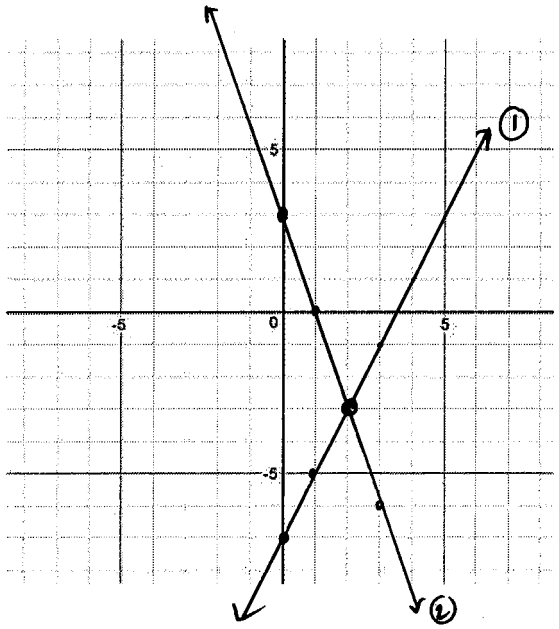


c) ① $2x-y=7$
② $3x+y=3$

① $2x-y=7$
$-2x \quad -2x$
$\frac{-y}{-1} = \frac{-2x}{-1} + \frac{7}{-1}$
$y = 2x-7$

② $3x+y=3$
$-3x \quad -3x$
$y = -3x+3$

solution: $(2,-3)$



3. Solve the following systems of linear equations by **substitution**.

a) ① $-2x+3y=24$
② $4x+y=-6$ rewrite equation ② for "y"

② $4x+y=-6$
$-4x \quad -4x$
$y = -4x-6$ } sub into ①

$-2x+3(-4x-6)=24$
$-2x-12x-18=24$
$+18 \quad +18$
$\frac{-14x}{-14} = \frac{42}{-14}$
$x=-3$

$y=-4(-3)-6$
$=12-6$
$y=6$

b) ① $x-y=3$ rewrite ① for "x"
② $2x+y=9$

① $x-y=3$
$+y \quad +y$
$x = 3+y$

② $2(3+y)+y=9$
$6+2y+y=9$
$-6 \quad -6$
$\frac{3y}{3} = \frac{3}{3}$
$y=1$

$x=3+1$
$x=4$

c) ① $-3x-4y=-2$
② $x+2y=3$ rewrite ② for "x"

② $x+2y=3$
$-2y \quad -2y$
$x = 3-2y$

① $-3(3-2y)-4y=-2$
$-9+6y-4y=-2$
$+9 \quad +9$
$\frac{2y}{2} = \frac{7}{2}$
$y=\frac{7}{2}$

$x=3-2(\frac{7}{2})$
$x=3-7$
$x=-4$

d) ① $x+4y=6$
② $2x-3y=1$ rewrite ① for "x"

① $x+4y=6$
$-4y \quad -4y$
$x = 6-4y$

② $2(6-4y)-3y=1$
$12-8y-3y=1$
$-12 \quad -12$
$\frac{-11y}{-11} = \frac{-11}{-11}$
$y=1$

$x=6-4(1)$
$x=6-4$
$x=2$

e) ① $2x-5y=12$
② $x+10y=-9$ rewrite ② for "x"

② $x + 10y = -9$
$-10y \quad -10y$
$x = -9 - 10y$

① $2(-9-10y) - 5y = 12$
$-18 - 20y - 5y = 12$
$+18 \qquad +18$
$\frac{-25y}{-25} = \frac{30}{-25}$ $\quad y = \frac{30}{-25} = \frac{-6}{5}$

$x = -9 - 10\left(\frac{-6}{5}\right)$
$= -9 + 12$
$x = 3$

4. Solve the following linear systems of linear equations by elimination.

a) $2(5x+10y=20) = 10x+20y = 40$ ①
$5(2x+3y=6) = 10x+15y = 30$ ②

$10x + 20y = 40$
$-(10x + 15y = 30)$
$\frac{5y}{5} = \frac{10}{5}$
$y = 2$

② $2x + 3(2) = 6$
$2x + 6 = 6$
$-6 \quad -6$
$\frac{2x}{2} = \frac{0}{2}$
$x = 0$

b) $2(4a-5b=13) = 8a - 10b = 26$
$3a + 10b = -4$

$8a - 10b = 26$
$+(3a + 10b = -4)$
$\frac{11a}{11} = \frac{22}{11}$
$a = 2$

$4(2) - 5b = 13$
$8 - 5b = 13$
$-8 \quad -8$
$\frac{-5b}{-5} = \frac{5}{-5}$
$b = -1$

c) ① $2x-9=-5y$ rewrite first
② $-2y+3x=4$

① $2x - 9 = -5y$
$+9 \quad +9$
$+5y \quad +5y$

$3(2x + 5y = 9) \Rightarrow 6x + 15y = 27$
$2(3x - 2y = 4) \Rightarrow 6x - 4y = 8$

$6x + 15y = 27$
$-(6x - 4y = 8)$
$\frac{19y}{19} = \frac{19}{19}$
$y = 1$

$2x - 9 = -5(1)$
$+9 \quad +9$
$2x = -5 + 9$
$\frac{2x}{2} = \frac{4}{2}$
$x = 2$

d) ① $5x+2y=-11$
② $3x+2y=-9$

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

$5(-1) + 2y = -11$
$-5 + 2y = -11$
$+5 \quad +5$
$\frac{2y}{2} = \frac{-6}{2}$
$y = -3$

e) $3\left(x-\frac{1}{3}y=\frac{4}{3}\right) \Rightarrow 3x-y=4$

$6\left(\frac{5}{6}x+\frac{1}{2}y=\frac{3}{2}\right) \Rightarrow 5x+3y=9$

$3(3x-y=4) \Rightarrow 9x-3y=12$

$5x+3y=9 \quad +(5x+3y=9)$

$\frac{14x}{14}=\frac{21}{14}$

$x=\frac{21}{14}=\frac{3}{2}$

$x=3/2$

$3x-y=4$

$3\left(\frac{3}{2}\right)-y=4$

$\frac{9}{2}-y=4$

$+y \quad +y-4$

-4

$\frac{9}{2}-\frac{4}{1}\cdot\frac{x^2}{x^2}=y$

$\frac{9}{2}-\frac{8}{2}=y$

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

5. Solve the following **word problems**. Be sure to write a Let x = statement and y = statement. Write a system of linear equations to model the situation. Solve by method of your choice.

a) At a sale, all DVD's are on sale at one price and all Xbox games at another price. Three DVD's and 2 Xbox games cost $72. One DVD and 3 Xbox games cost $52. Find the cost of a DVD and an Xbox game.

let x = cost of 1 DVD let y = cost of 1 Xbox game

① $3x+2y=72$

② $x+3y=52$

② $x+3y=52$

$-3y \quad -3y$

$x=52-3y$

① $3(52-3y)+2y=72$

$156-9y+2y=72$

$-156 \qquad -156$

$\frac{-7y}{-7}=\frac{-84}{-7}$

$y=12$

$x=52-3(12)$

$x=52-36$

$x=16$

So, 1 DVD costs $16 and 1 Xbox game costs $12.

b) A video game club charges and annual fee and an hourly fee. In one year, Jill played a total of 15 hours and paid $235. That same year, Karl played for 18 hours and paid $262. Find the annual fee and the hourly fee.

let x = annual fee let y = hourly fee

Jill : ① $x+15y=235$

Karl : ② $x+18y=262$

① $x+15y=235$

$-15y \quad -15y$

$x=235-15y$

$(235-15y)+18y=262$

$-235 \qquad -235$

$\frac{3y}{3}=\frac{27}{3}$

$y=9$

$x=235-15(9)$

$=235-135$

$x=100$

The annual fee is $100 and the hourly fee is $9.

addition subtraction

c) The sum of two numbers is 64. Their difference is 14. Find the two numbers.

let x = 1st number let y = 2nd number

sum: ① $x + y = 64$

difference: ② $x - y = 14$

$$\begin{array}{r} x+y = 64 \\ +(x-y = 14) \\ \hline \frac{2x}{2} = \frac{78}{2} \end{array}$$

$x = 39$

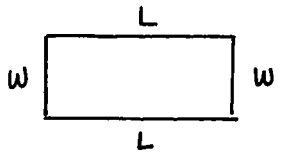
$39 + y = 64$

$-39 \quad -39$

$y = 25$

The two numbers are 39 and 25.

d) The perimeter of a rectangle is 384m. The length is 82m longer than the width. Find the length and the width.



let L = length of rectangle let w = width of rectangle

perimeter: ① $2L + 2w = 384$

length: ② $L = 82 + w$

$2(82+w) + 2w = 384$

$164 + 2w + 2w = 384$

$-164 \quad -164$

$\frac{4w}{4} = \frac{220}{4}$

$w = 55$

$L = 82 + 55$

$L = 137$

The rectangle's width is 55m and it's length is 137m.

e) A playoff football game drew 36 500 fans. Depending on seat location, some seats sold for $35 and some for $20. The total income from ticket sales was $940 000. Determine the number of $35 tickets and $20 tickets sold?

let x = # of $35 tickets sold let y = # of $20 tickets sold

total fans: ① $x + y = 36500$

total income: ② $35x + 20y = 940000$

① $x + y = 36500$

$-y \quad -y$

$x = 36500 - y$

② $35(36500 - y) + 20y = 940000$

$1277500 - 35y + 20y = 940000$

$-1277500 \quad -1277500$

$\frac{-15y}{-15} = \frac{337500}{-15}$

$y = 22500$

$x = 36500 - 22500$

$x = 14000$

There were 14000 - $35 tickets sold and 22,500 - $20 tickets sold.

f) The final exam consists of multiple choice and written questions. The total number of questions on the exam is 85. Jane scored 80% on the multiple choice section and 70% on the written section. Jane scored a total of 61 point on the test. Determine the number of multiple choice and written questions on the final exam?

let x = # m.c. questions let y = # of written questions

① $x + y = 85$ ② $0.80x + 0.70y = 61$

① $x + y = 85$
$-y \quad -y$
$x = 85 - y$

② $0.80(85 - y) + 0.70y = 61$
$68 - 0.8y + 0.70y = 61$
$-68 \qquad -68$
$\frac{-0.1y}{-0.1} = \frac{-7}{-0.1}$
$y = 70$

$x = 85 - 70$
$x = 15$

There were 15 m.c. questions and 70 written answer questions on the exam.

g) Six thousand dollars was invested in two savings accounts for one year. One bond delivered interest at 3%. The other earned 2% per year. The total interest earned was $145. How much money was invested in each saving account?

let x = amount invested at 3% let y = amount invested at 2%

① $x + y = 6000$ ② $0.03x + 0.02y = 145$

① $x + y = 6000$
$-y \quad -y$
$x = 6000 - y$

② $0.03(6000 - y) + 0.02y = 145$
$180 - 0.03y + 0.02y = 145$
$-180 \qquad -180$
$\frac{-0.01y}{-0.01} = \frac{-35}{-0.01}$
$y = 3500$

$x = 6000 - 3500$
$x = 2500$

Amount invested at 3% was $2500; amount invested at 2% was $3500.

6. **Without graphing or solving**, determine the number of solutions to the equations below (one, infinite or none). Justify your choice.

a) ① $5x - 3y - 12 = 0$
② $y = \frac{5}{3}x + 2$

rewrite
$5x - 3y - 12 = 0$
$+3y \qquad +3y$
$\frac{5x}{3} - \frac{12}{3} = \frac{3y}{3}$
$\frac{5}{3}x - 4 = y$

No solution — parallel lines

lines have same slope, diff. y-intercept

b) ① $5x - 3y = 12$
② $10x - 6y - 24 = 0$

Infinite Solutions — lines are coincident

① $5x - 3y = 12$
$-12 + 3y \qquad -12 + 3y$
$\frac{5x}{3} - \frac{12}{3} = \frac{3y}{3}$
$\frac{5}{3}x - 4 = y$

② $10x - 6y - 24 = 0$
$+6y \qquad +6y$
$\frac{10x}{6} - \frac{24}{6} = \frac{6y}{6}$
$\frac{5}{3}x - 4 = y$

same slope, same y-int.

c) ① $2x + y = 5$
② $4x + y = 9$

① $2x + y = 5$
$-2x \qquad -2x$
$y = -2x + 5$

② $4x + y = 9$
$-4x \qquad -4x$
$y = -4x + 9$

One solution — diff. slopes