7. Bill weighs 120 pounds and is gaining ten pounds each month. Phil weighs 150 pounds and is gaining 4 pounds each month. How many months, m, will it take for Bill to weigh the same as Phil? $x = months$ $y = weight$

$\underline{B}$
$$y = 10x + 120$$
$$10x + 120 = 4x + 150$$
$$-4x \qquad -4x$$
$$6x + 120 = 150$$
$$-120 \quad -120$$
$$\frac{6x}{6} = \frac{30}{6}, \quad x = 5$$

$\underline{P}$
$$y = 4x + 150$$

B	P
$10(5) + 120$	$4(5) + 150$
$50 + 120$	$20 + 150$
$170.$	$170.$

8. A full 355 mL can of Coke is leaking at a rate of 5 mL per minute into an empty can. How long will it take for the two cans to have the same amount, a, of Coke? $x = minute$, $y = mL$

$\underline{Full}$
$$y = -5x + 355$$
$$-5x + 355 = 5x$$
$$+5x \qquad +5x$$
$$\frac{355}{10} = \frac{10x}{10}$$
$$35.5 = x.$$

$\underline{Empty}$
$$y = 5x$$

F	E
$-5 \cdot 35.5 + 355$	$5(35.5)$
$-177.5 + 355$	177.5
177.5	

9. On Saturday, you bowl at Mar Vista Bowl, where renting shoes costs $2 and each game bowled is $3.50. On Sunday, you bowl at Pinz where the shoe rental is $5 and each game bowled is $3.25. If you spent the same amount each day, how many games, g, were bowled? $x = games$, $y = cost$

$\underline{M}$
$$y = 3.5x + 2$$
$$3.5x + 2 = 3.25x + 5$$
$$-3.25x \qquad -3.25x$$
$$.25x + 2 = 5$$
$$-2 \quad -2$$
$$\frac{.25x}{.25} = \frac{3}{.25} \quad \boxed{x = 12}$$

$\underline{P}$
$$y = 3.25x + 5$$

M	P
$3.5(12) + 2$	$3.25(12) + 5$
$42 + 2$	$39 + 5$
44	44

10. At one store a trophy costs $12.50. Engraving costs $0.40 per letter. At another store, the same trophy costs $14.75. Engraving costs $0.25. How many letters, e, must be engraved for the costs to be the same? $x = letters$, $y = cost$

$$y = .40x + 12.50 \qquad y = .25x + 14.75$$
$$.40x + 12.50 = .25x + 14.75$$
$$-.25x \qquad\qquad -.25x$$
$$.15x + 12.50 = 14.75$$
$$-12.50 \quad -12.50$$
$$\frac{.15x}{.15} = \frac{2.25}{.15}$$
$$x = 15$$

$$.40(15) + 12.50$$
$$6 + 12.50 = 18.50$$
$$.25(15) + 14.75$$
$$3.75 + 14.75 = 18.50$$

11. You are seeking to be emancipated from your parents. You are looking for an apartment. There are two final choices. Apartment A has a $1000 security deposit and costs $1200 each month. Apartment B has a $1500 and costs $1175 each month. How many months, m, will it take for the costs to be the same?

$\underline{A}$
$$y = 1200x + 1000$$
$$1200x + 1000 = 1175x + 1500$$
$$-1175x \qquad -1175x$$
$$25x + 1000 = 1500$$
$$-1000 \quad -1000$$
$$\frac{25x}{25} = \frac{500}{25}$$
$$x = 20$$

$\underline{B}$
$$y = 1175x + 1500$$

A	B
$1200(20) + 1000$	$1175(20) + 1500$
$24000 + 1000$	$23500 + 1500$
25000	25000

12. Lenny makes $55,000 and is getting annual raises of $2,500. Karl makes $62000, with annual raises of $2,000. How many years, y, will it take for Lenny and Karl to make the same salary?

$\underline{L}$
$$y = 2500x + 55000$$

$\underline{K}$
$$y = 2000x + 62000$$

$$2500x + 55000 = 2000x + 62000$$
$$-2000x \qquad\qquad -2000x$$
$$500x + 55000 = 62000$$
$$-55000 \quad -55000$$
$$\frac{500x}{500} = \frac{7000}{500}$$
$$x = 14$$

$\underline{L}$
$$2500(14) + 55000$$
$$35000 + 55000 = 90000$$

$\underline{K}$
$$2000(14) + 62000$$
$$28000 + 62000 = 90000$$

13. In 1987, 34.7 million households owned a dog, and 27.7 million owned a cat. Since then, dog ownership has decreased by 0.025 million households per year, and cat ownership has increased by 0.375 million households per year. How many years, y, will it take for them to be equal?

$\underline{D}$
$$y = -.025x + 34.7$$

$\underline{C}$
$$y = .375x + 27.7$$

$$-.025x + 34.7 = .375x + 27.7$$
$$-.375x \qquad\qquad -.375x$$
$$-.4x + 34.7 = 27.7$$
$$-34.7 \quad -34.7$$
$$\frac{-.4x}{-.4} = \frac{-7}{-.4}$$
$$x = 17.5$$

$\underline{D}$
$$-.025(17.5) + 34.7 = 34.2625$$
$$-.4375 + 34.7 = 34.2625$$

$\underline{C}$
$$.375(17.5) + 27.7 = 34.2625$$
$$6.5625 + 27.7 = 34.2625$$

14. In 2000, Ohio's population was 11.4 million and increasing by 0.5 million each year. Michigan's population was 9.9 million, increasing by 0.6 million each year. When will the two states have the same population? Let y represent the number of years.

$\underline{O}$
$$y = .5x + 11.4$$

$\underline{M}$
$$y = .6x + 9.9$$

$$.5x + 11.4 = .6x + 9.9$$
$$-.6x \qquad -.6x$$
$$-.1x + 11.4 = 9.9$$
$$-11.4 \quad -11.4$$
$$\frac{-.1x}{-.1} = \frac{-1.5}{-.1}$$
$$\boxed{x = 15}$$

$\underline{O}$
$$.5(15) + 11.4$$
$$7.5 + 11.4 = 18.9$$

$\underline{M}$
$$.6(15) + 9.9$$
$$9 + 9.9 = 18.9$$