EXAM UNIT 6 (EQUATIONS SYSTEMS)

Name:..

1) Solve the following system by three different methods: graphing, addition and substitution. (3 points)

$$\left.\begin{array}{l} 4x - y = 10 \\ 3x + 2y = 13 \end{array}\right\}$$

2) Solve the following system:
$$\left.\begin{array}{l} x + \dfrac{y-2}{4} = 1 \\ x - \dfrac{3}{2}y = 5 \end{array}\right\}$$
(1.5 points)

3) Classify these systems depending on the number of solutions. In order to solve them use the most convenient method in each one: (2.5 points)

a.
$$\left.\begin{array}{l} x + 5y = 7 \\ 2x + 10y = 14 \end{array}\right\}$$

b.
$$\left.\begin{array}{l} x + 2y = 19 \\ x - y = 1 \end{array}\right\}$$

4) In a farm, there are ducks and horses. If there are 450 animals and a total of 1160 legs, how many ducks and how many horses are there in the farm? (1.5 points)

5) Find a pair of numbers using the following conditions:
   - If you add both numbers, the result will be 10.
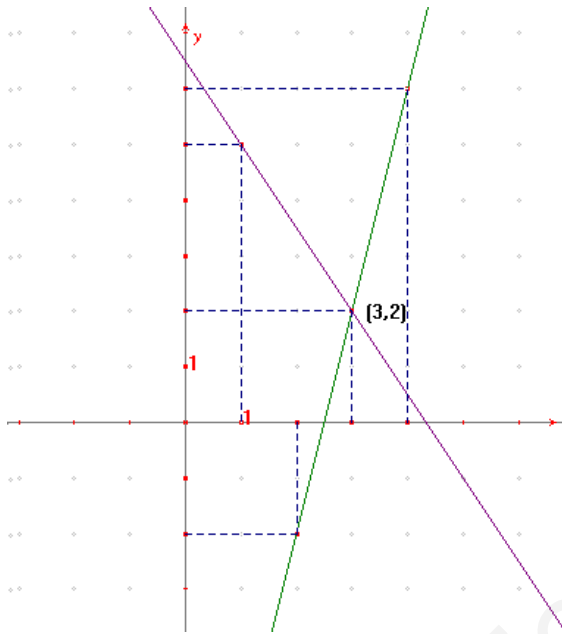   - If you add one with two times the other, the result will be 17. (1.5 points)

SOLUTION

1) Solve the following system by three different methods: graphing, addition and substitution.

Graphing: $\left.\begin{array}{l} 4x - y = 10 \\ 3x + 2y = 13 \end{array}\right\} \rightarrow \left.\begin{array}{l} y = 4x - 10 \\ y = \dfrac{13 - 3x}{2} \end{array}\right\}$

x	y
2	-2
4	6

x	y
3	2
1	5

(3,2)

Addition:

$\left.\begin{array}{l} 4x - y = 10 \\ 3x + 2y = 13 \end{array}\right\} \rightarrow \left.\begin{array}{l} 8x - 2y = 20 \\ 3x + 2y = 13 \end{array}\right\}$

$11x = 33 \Rightarrow x = \dfrac{33}{11} = 3$

$4x - y = 10 \Rightarrow 12 - y = 10 \Rightarrow y = 2$

Substitution:

$\left.\begin{array}{l} 4x - y = 10 \\ 3x + 2y = 13 \end{array}\right\} \rightarrow \left.\begin{array}{l} y = 4x - 10 \\ 3x + 2(4x - 10) = 13 \end{array}\right\}$

$3x + 8x - 20 = 13 \Rightarrow 11x = 33 \Rightarrow x = 3$

$y = 4x - 10 = 12 - 10 = 2$

Solution: x = 3, y = 2

2) Solve the following system: $\left.\begin{array}{l} x + \dfrac{y-2}{4} = 1 \\ x - \dfrac{3}{2}y = 5 \end{array}\right\} \rightarrow \left.\begin{array}{l} \dfrac{4x}{4} + \dfrac{y-2}{4} = \dfrac{4}{4} \\ \dfrac{2x}{2} - \dfrac{3y}{2} = \dfrac{10}{2} \end{array}\right\} \rightarrow \left.\begin{array}{l} 4x + y = 6 \\ 2x - 3y = 10 \end{array}\right\}$

Substitution: $y = 6 - 4x \Rightarrow 2x - 3(6 - 4x) = 10 \Rightarrow 2x - 18 + 12x = 10$

$14x = 10 + 18 \Rightarrow 14x = 28 \Rightarrow x = \dfrac{28}{14} = 2$

$y = 6 - 4x \Rightarrow y = 6 - 4 \times 2 = 6 - 8 = -2$

Solution: x = 2, y = -2

3) Classify these systems depending on the number of solutions. In order to solve them use the most convenient method in each one:

a. $\left.\begin{array}{l} x + 5y = 7 \\ 2x + 10y = 14 \end{array}\right\} \begin{array}{l} \times(-2) \rightarrow -2x - 10y = -14 \\ \qquad\qquad 2x + 10y = 14 \end{array}\left.\begin{array}{l} \\ \end{array}\right\} \Rightarrow 0x = 0$ Infinite number of

solutions. Consistent, dependent system

b. $\left.\begin{array}{l} x+2y=19 \\ x-y=1 \end{array}\right\} \times (-1) \rightarrow \left.\begin{array}{l} x+2y=19 \\ -x+y=-1 \end{array}\right\} \rightarrow 3y=18 \Rightarrow y=\dfrac{18}{3}=6$

$x-y=1 \Rightarrow x-6=1 \Rightarrow x=7$

Consistent, independent system, one solution x = 7 , y = 6

4) In a farm, there are ducks and horses. If there are 450 animals and a total of 1160 legs, how many ducks and how many horses are there in the farm?

Number of ducks: x ; Number of horses: y

$\left.\begin{array}{l} x+y=450 \\ 2x+4y=1160 \end{array}\right\} \rightarrow y=450-x \Rightarrow 2x+4(450-x)=1160$

$2x+1800-4x=1160 \Rightarrow -2x=1160-1800 \Rightarrow -2x=-640 \Rightarrow x=320$

$y=450-x=450-320=130$

Solution: There are 320 ducks and 130 horses in the farm.

6) Find a pair of numbers using the following conditions:
   - If you add both numbers, the result will be 10.
   - If you add one with two times the other, the result will be 17.

Numbers: x and y

$\left.\begin{array}{l} x+y=10 \\ x+2y=17 \end{array}\right\} \times(-1) \rightarrow \left.\begin{array}{l} -x-y=-10 \\ x+2y=17 \end{array}\right\} y=17-10 \Rightarrow y=7 \Rightarrow x+7=10 \Rightarrow x=3$

Solution: The numbers are 3 and 7