IES MURILLO

Maths 3rd ESO

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)

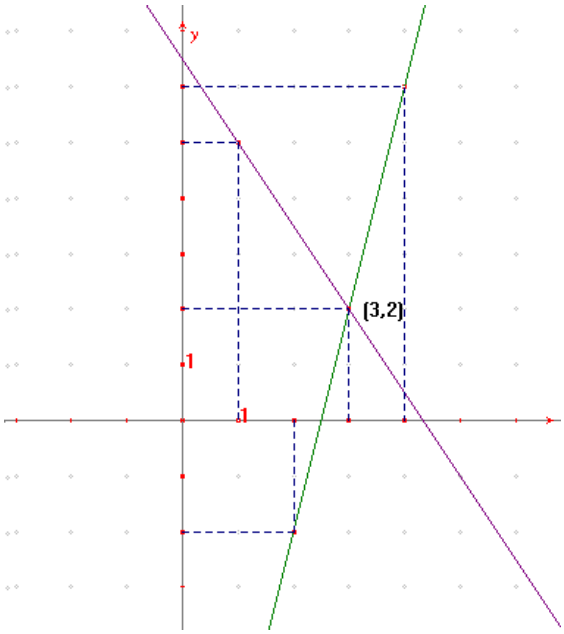
SOLUTION

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



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

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

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

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

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

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

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

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

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

Solution: The numbers are 3 and 7