

Solve each system using any method. Show all steps, circle your solution, and check it with both equations after you have solved all three systems.

1.
$$\begin{cases} x-2y=-10 & \textcircled{1} \\ 4x+y=-4 & \textcircled{2} \end{cases}$$

Step 1: $x-2y=-10$
 $4x+y=-4 \xrightarrow{\times 2} 8x+2y=-8$

Step 2: $9x = -18$
 $x = -2$

Step 3: $4(-2)+y=-4$
 $-8+y=-4$
 $y=4$

Step 4: $-2-2(4)=-10$
 Check $-2-8=-10 \checkmark$

$4(-2)+4=-4$
 $-8+4=-4 \checkmark$

Solution: $(-2, 4)$

2.
$$\begin{cases} 2x-2y=5 & \textcircled{1} \\ -3x+3y=7 & \textcircled{2} \end{cases}$$

Step 1: $2x-2y=5 \xrightarrow{\times 3} 6x-6y=15$
 $-3x+3y=7 \xrightarrow{\times 2} -6x+6y=14$

Step 2: $0=29$
 Always False \rightarrow Parallel Lines

No Solution

3.
$$\begin{cases} 5x+6y=14 & \textcircled{1} \\ 3x+5y=7 & \textcircled{2} \end{cases}$$

Step 1: $5x+6y=14 \xrightarrow{\times 3} 15x+18y=42$
 $3x+5y=7 \xrightarrow{\times (-5)} -15x+(-25y)=-35$

Step 2: $-7y=7$
 $y=-1$

Step 3: $3x+5(-1)=7$
 $3x+(-5)=7$
 $3x=12$
 $x=4$

Step 4: $5(4)+6(-1)=14$
 Check $20+(-6)=14 \checkmark$

$3(4)+5(-1)=7$
 $12+(-5)=7 \checkmark$

Solution: $(4, -1)$

For each problem, write and solve a system of equations to find the price of each item. Make sure you define your variables and answer in a complete sentence!

4. Two pairs of shorts and 2 tank-tops cost \$91.
One pair of shorts and 3 tank-tops cost \$80.50.

$$\begin{array}{l}
 S = \text{\# of } \$ (\text{cost of 1 pair of shorts}) \\
 T = \text{\# of } \$ (\text{cost of 1 tank-top})
 \end{array}
 \left\{
 \begin{array}{l}
 2S + 2T = 91 \quad (1) \\
 S + 3T = 80.50 \quad (2)
 \end{array}
 \right.$$

$\xrightarrow{\text{step 1:}} 2S + 2T = 91$
 $\xrightarrow{\times(-2)} -2S + (-6T) = -182$

 $\text{step 2: } -4T = -91$
 $T = 17.50$

step 3: (2) $S + 3(17.50) = 80.50$
 $S + 52.5 = 80.5$
 $S = 28$

step 4: Check (1) $2(28) + 2(17.50) = 91$
 $56 + 35 = 91 \checkmark$

(2) $28 + 3(17.50) = 80.50$
 $28 + 52.50 = 80.50 \checkmark$

A pair of shorts costs \$28 and a tank-top costs \$17.50.

5. Four hats and 4 scarves cost \$72.
Three hats and 2 scarves cost \$46.

$$\begin{array}{l}
 H = \text{\# of } \$ (\text{cost of 1 hat}) \\
 S = \text{\# of } \$ (\text{cost of 1 scarf})
 \end{array}
 \left\{
 \begin{array}{l}
 4H + 4S = 72 \quad (1) \\
 3H + 2S = 46 \quad (2)
 \end{array}
 \right.$$

$\xrightarrow{\text{step 1:}} 4H + 4S = 72$
 $\xrightarrow{\times(-2)} -6H + (-4S) = -92$

 $\text{step 2: } -2H = -20$
 $H = 10$

step 3: (2) $3(10) + 2S = 46$
 $30 + 2S = 46$
 $2S = 16$
 $S = 8$

step 4: Check (1) $4(10) + 4(8) = 72$
 $40 + 32 = 72 \checkmark$

(2) $3(10) + 2(8) = 46$
 $30 + 16 = 46 \checkmark$

Each hat costs \$10 and each scarf costs \$8.

6. One belt and 2 sweaters cost \$35.
Three belts and 1 sweater cost \$55.

$$\begin{array}{l}
 B = \# \text{ of } \$ \text{ for 1 belt} \\
 W = \# \text{ of } \$ \text{ for 1 sweater}
 \end{array}
 \left\{
 \begin{array}{l}
 B + 2W = 35 \text{ (1)} \\
 3B + W = 55 \text{ (2)}
 \end{array}
 \right.
 \begin{array}{l}
 \text{Step 1:} \\
 \xrightarrow{\quad} B + 2W = 35 \\
 \xrightarrow{\times(-2)} \underline{-6B + (-2W) = -110} \\
 \text{Step 2: } -5B = -75 \\
 B = 15
 \end{array}
 \begin{array}{l}
 \text{Step 3: (2) } 3(15) + W = 55 \\
 45 + W = 55 \\
 W = 10 \\
 \text{Step 4: (1) } 15 + 2(10) = 35 \\
 \text{check } 15 + 20 = 35 \checkmark \\
 \text{(2) } 3(15) + 10 = 55 \\
 45 + 10 = 55 \checkmark
 \end{array}$$

Each belt costs \$15 and each sweater costs \$10.

7. Three CDs and 2 DVDs cost \$67.
Two CDs and 4 DVDs cost \$90.

$$\begin{array}{l}
 C = \# \text{ of } \$ \text{ for 1 CD} \\
 D = \# \text{ of } \$ \text{ for 1 DVD}
 \end{array}
 \left\{
 \begin{array}{l}
 3C + 2D = 67 \text{ (1)} \\
 2C + 4D = 90 \text{ (2)}
 \end{array}
 \right.
 \begin{array}{l}
 \text{Step 1:} \\
 \xrightarrow{\times(-2)} -6C + (-4D) = -134 \\
 \xrightarrow{\quad} \underline{2C + 4D = 90} \\
 \text{Step 2: } -4C = -44 \\
 C = 11 \\
 \text{Step 3: (1) } 3(11) + 2D = 67 \\
 33 + 2D = 67 \\
 2D = 34 \\
 D = 17 \\
 \text{Step 4:} \\
 \text{check (1) } 3(11) + 2(17) = 67 \\
 33 + 34 = 67 \checkmark \\
 \text{(2) } 2(11) + 4(17) = 90 \\
 22 + 68 = 90 \checkmark
 \end{array}$$

Each CD costs \$11 and each DVD costs \$17.