

Agriculture
Break Even Worksheet

Name

Key

1. Ed is starting a custom harvesting business to harvest wheat. He bought a combine and grain head for \$453,000 and calculates his costs for fuel and supplies to be \$12 an acre. He plans on charging \$24 an acre to harvest. How many acres would Ed have to harvest before he breaks even?

$$\begin{aligned} \text{Expenses} &= 453000 + 12x \\ \text{Revenue} &= 24x \end{aligned}$$

$$\begin{array}{r} 453000 + 12x = 24x \\ -12x \quad -12x \\ \hline 453000 = 12x \\ \underline{12} \quad \underline{12} \\ x = 37750 \\ \text{acres} \end{array}$$

2. A nursery sells 8-foot pine trees for \$230. The nursery can buy the trees wholesale from a tree farm for \$160. The fixed costs for the nursery are \$2100 per month.

- Write an equation for the revenue R in terms of the number of trees sold.
- Write an equation for the nursery's expenses in terms of the number of trees.
- How many trees would the nursery have to sell to break even?

$$\begin{aligned} \text{A) } R &= 230x \\ \text{B) } E &= 160x + 2100 \\ \text{C) } 30 \text{ trees} \end{aligned}$$

$$\begin{array}{r} 230x = 160x + 2100 \\ -160x \quad -160x \\ \hline 70x = 2100 \\ \underline{70} \quad \underline{70} \\ x = 30 \end{array}$$

3. Steve wants to start a landscaping business. He invests \$425 in equipment (lawn mower, weed trimmer, and leaf blower). He estimates using \$5 worth of fuel on each yard he mows. Bob charges his customers \$45 to mow and trim their yards. How many yards must Bob mow and trim in order to begin making a profit?

$$\begin{aligned} E &= 425 + 5x \\ R &= 45x \end{aligned}$$

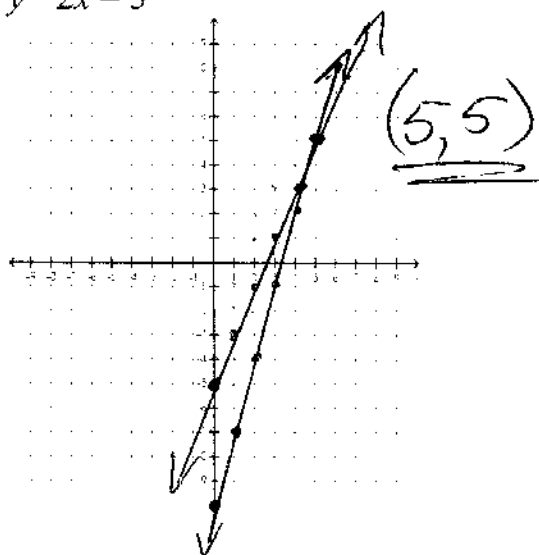
Steve must
mow 4 yards

$$\begin{array}{r} 425 + 5x = 45x \\ -5x \quad -5x \\ \hline 425 = 40x \\ \underline{40} \quad \underline{40} \\ x = 3.125 \end{array}$$

4. Solve by graphing

$$y = 3x - 10$$

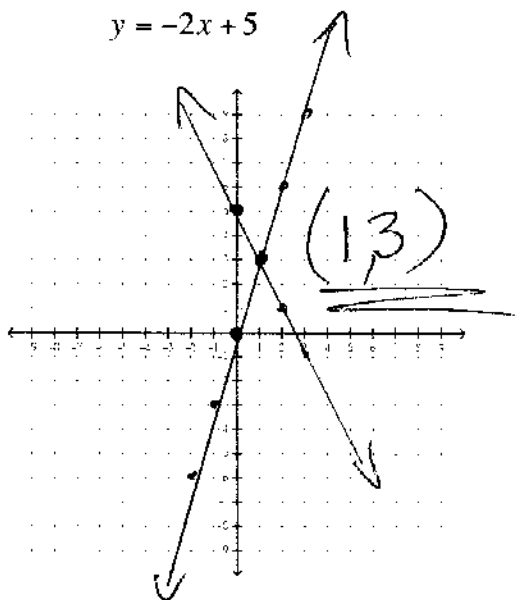
$$y = 2x - 5$$



5. Solve by graphing.

$$y = 3x$$

$$y = -2x + 5$$



6. Solve by substitution.

$$y = -x - 5$$

$$-x + 2y = 14$$

$$-x + 2(-x - 5) = 14$$

$$-x - 2x - 10 = 14$$

$$-3x - 10 = 14$$

$$-3x = 24$$

$$x = -8$$

$$y = -(-8) - 5$$

$$y = 8 - 5$$

$$y = 3$$

$$(-8, 3)$$

7. Solve by substitution

$$-3x + 2y = -5$$

$$y = 2x - 10$$

$$-3x + 2(2x - 10) = -5$$

$$-3x + 4x - 20 = -5$$

$$x - 20 = -5$$

$$x = 15$$

$$y = 2(15) - 10$$

$$30 - 10$$

$$y = 20$$

$$(15, 20)$$

8. Solve by substitution.

$$y = x + 3$$

$$6x - 5y = -12$$

$$6x - 5(x + 3) = -12$$

$$6x - 5x - 15 = -12$$

$$x - 15 = -12$$

$$x = 3$$

$$y = 3 + 3 = 6$$

$$(3, 6)$$

9. Solve by substitution.

$$y = 3x - 9$$

$$8x + 3y = 7$$

$$8x + 3(3x - 9) = 7$$

$$8x + 9x - 27 = 7$$

$$17x - 27 = 7$$

$$17x = 34$$

$$x = 2$$

$$y = 3(2) - 9$$

$$y = 6 - 9 = -3$$

$$(2, -3)$$

10. You decide to market your own custom computer software. You must invest \$3,255 for computer hardware, and spend \$2.90 to buy and package each disk. If each program sells for \$13.75, how many copies must you sell to break even?

$$E = 3255 + 2.90x$$

$$R = 13.75x$$

$$\begin{array}{r} 3255 + 2.90x = 13.75x \\ -2.90x \quad -2.90x \\ \hline 3255 = 10.85x \\ \underline{10.85} \quad \underline{10.85} \\ x = 300 \\ \text{programs} \end{array}$$

11. Alicia bakes specialty cakes to sell for \$15 each. Her monthly fixed costs are \$1200 and her cake ingredients cost \$2.50 each.

- Write an equation for the Revenue R in terms of the number of cakes, x .
- Write an equation for the Expenses E in terms of the number of cakes, x .
- Find the number of cakes Alicia has to sell each month to break even.

A) $R = 15x$

B) $E = 1200 + 2.50x$

C) 96 cakes

$$\begin{array}{r} 15x = 1200 + 2.50x \\ -2.50x \quad -2.50x \\ \hline 12.50x = 1200 \\ \underline{12.50} \quad \underline{12.50} \\ x = 96 \text{ cakes} \end{array}$$

12. Henry plans to sell wood shelves at a craft fair for \$30 each. The craft booth costs \$100 to rent and Henry estimates his expenses to be \$12 a shelf. How many shelves does Henry need to sell to break even?

$$R = 30x$$

$$E = 100 + 12x$$

6 shelves

$$\begin{array}{r} 30x = 100 + 12x \\ -12x \quad -12x \\ \hline 18x = 100 \\ x = 5.5 \end{array}$$