

Chapter 7, Lesson 2, Part 2

[Click for Video](#)

Problem 20 in Set III show you how Problem 7 works.

20. This exercise is about the simultaneous equations

$$x + 4y = 20$$

$$x - 4y = 4$$

Show that each of the following methods for solving these equations results in the same solution.

- a) Adding the equations.
- b) Subtracting the second equation from the first.
- c) Subtracting the first equation from the second.

$$x + 4y = 20$$

$$x - 4y = 4$$

a) Add the equations.

$$x + 4y = 20$$

$$\underline{+ x - 4y = 4}$$

$$\underline{2x = 24}$$

$$2 \quad 2$$

$$x = 12$$

$$12 + 4y = 20$$

$$\begin{array}{r} -12 \end{array} \quad \begin{array}{r} -12 \end{array}$$

$$\underline{4y = 8}$$

$$4 \quad 4$$

$$y = 2$$

b) Instead of checking, we are solving the problem in different way. Subtract the second equation from the first.

$$\begin{array}{r} x + 4y = 20 \\ \underline{-x + 4y = -4} \end{array}$$

$$\begin{array}{r} \underline{8y = 16} \\ 8 \quad 8 \end{array}$$

$$y = 2$$

$$x + 4(2) = 20$$

$$\begin{array}{r} x + 8 = 20 \\ -8 \quad -8 \end{array}$$

$$x = 12$$

The solution of a is the same as b:
(12,2).

b) Instead of checking, we are solving the problem in different way. Subtract the second equation from the first.

$$\begin{array}{r} x + 4y = 20 \\ \underline{-x + 4y = -4} \end{array}$$

$$\begin{array}{r} \underline{8y = 16} \\ 8 \quad 8 \end{array}$$

$$y = 2$$

$$x + 4(2) = 20$$

$$\begin{array}{r} x + 8 = 20 \\ -8 \quad -8 \end{array}$$

$$x = 12$$

The solution of a is the same as b:
(12,2).

c) What happens if we subtract the first equation from the second?

$$\begin{array}{r} x - 4y = 4 \\ \underline{-x - 4y = -20} \end{array}$$

$$\begin{array}{r} \underline{-8y = -16} \\ -8 \quad -8 \end{array}$$

$$y = 2$$

$$x - 4(2) = 4$$

$$\begin{array}{r} x - 8 = 4 \\ +8 \quad +8 \end{array}$$

$$x = 12$$

All three methods lead to the same solution: (12,2).

Homework

7. This exercise is about the simultaneous equations

$$\begin{aligned}3x + y &= 21 \\ 3x - y &= 9\end{aligned}$$

Show that each of the following methods for solving these equations results in the same solution.

- Adding the equations.
- Subtracting the second equation from the first.
- Subtracting the first equation from the second.

Solve the following simultaneous equations by subtraction. Show your steps and check your answers.

8. $\begin{aligned}3x + 8y &= 20 \\ 3x + y &= 13\end{aligned}$

9. $\begin{aligned}4x + 5y &= 3 \\ x + 5y &= -18\end{aligned}$

10. $\begin{aligned}9x + 7y &= 51 \\ 9x - 3y &= 81\end{aligned}$

11. $\begin{aligned}6x - y &= 15 \\ 2x - y &= 5\end{aligned}$

12. $\begin{aligned}11x - 5y &= 23 \\ 11x + y &= -31\end{aligned}$

Solve the following simultaneous equations by either addition or subtraction. Check your answers.

13. $\begin{aligned}12x + y &= 4 \\ 8x - y &= -64\end{aligned}$

14. $\begin{aligned}5x + y &= 21 \\ 5x + 9y &= 9\end{aligned}$

15. $\begin{aligned}2x + 17y &= 50 \\ -2x + 3y &= -50\end{aligned}$

16. $\begin{aligned}3x - 4y &= 12 \\ 10x - 4y &= 61\end{aligned}$