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Solving System of Equations by Substitution

- 1) The ratio of incomes of Hailey and Layla is **9:7**. They spend in the ratio of **4:3**. If they manage to save \$2000 each, find their incomes.
- 2) The sum of a two digit number and the number obtained by reversing the digits is 88. If the digits of the number differ by 6, find the number. Consider the fact that the digit at the units place is smaller than the digit at the tens place.
- 3) Five years ago, Ryan's age was ten more than twice the age of David. After five years, Ryan's age will be twice the age of David. Find their present ages.
- 4) If we add 1 to the numerator and subtract 3 from the denominator, the fraction reduces to 2. The same fraction becomes $\frac{1}{2}$ if we add 1 to the numerator and add 3 to the denominator. Find the fraction.
- 5) Cost of 5 meat meal box and 3 vegan meal box is \$35. Cost of 2 meat meal box and 4 vegan meal box is \$28. Find the cost of one meat meal box and the cost of one vegan meal box.



6) New York Public Library has a fixed charge for the first three days and an additional charge per day thereafter, for anyone who wants to lend a book. Jonathan paid \$27 for a few books for 7 days while Emily paid \$21 for the same set of books for 5 days. Find the fixed charge and the charge for each extra day.

For questions (7-10), solve the following pair of linear equations using the substitution method:

7) $3a = b + 2$
 $a - 8 = 5b$

8) $b + 3c + 5 = 0$
 $4b - c + 6 = 0$

9) $4x = y + 1$
 $5x + y = 17$

10) $5y = 3z - 1$
 $3y + 2z = 7$

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- Gary Schwartz

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- Kirk Riley

"I appreciate the effort that miss Nitya puts in to help my daughter understand the best methods and to explain why she got a problem incorrect. She is extremely patient and generous with Miranda."

- Barbara Cabrera


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**ANSWERS**

1)	Income of Hayley = \$18,000 Income of Layla = \$14,000
2)	71
3)	Ryan's present age = 45 years David's present age = 20 years
4)	The original fraction is $\frac{3}{5}$
5)	Cost of one meat meal box = \$4 Cost of one vegan meal box = \$5
6)	Fixed charge = \$17 Per day charge = \$2

7)	$a = \frac{111}{7}$ $b = \frac{-11}{7}$
8)	$b = 1$ $c = -2$
9)	$x = 2$ $y = 7$
10)	$y = 1$ $z = 2$



FUN FACT

1. To use the substitution method, the equations must be in the linear form.
2. The solution (x, y) is the point at which the line graphs formed by both the equations intersect.
3. (x, y) can have unique, infinite or no solutions for a pair of linear equations.

