

Solving Equations In More Than One Unknown: You must have as many **different** equations as there are unknowns. To solve two equations in two unknowns the idea is to **eliminate one of the unknowns and then solve for the one unknown that is left**. If you have more than two equations then solve one of the equations for one of the unknowns and substitute into the other equations. Now you have one fewer equations in one fewer unknowns. Repeat, etc.

Ex: Solve $2x - y = 4$, $x + 2y = -3$.

Soln: $y = 2x - 4$ so $x + 2(2x - 4) = 5x - 8 = -3$ so $x = 1$ and $y = -2$.

Another way: Multiply the first equation by 2 and add the two equations together to get $5x = 5$, etc.

Algebra 3 Homework Problems

(NO CALCULATORS)

Let $f(x) = x^3 - 3$.

- a) What is $f(x^{-1})$? b) What is $f(x)^{-1}$? c) What is $f^{-1}(x)$? d) What is $f^{-1}(24)$?
- e) Starting on January 1 what month will it be when exactly one-fifth of the year has passed?
- f) Place each of the digits 2, 4, 5, 6, and 9 in exactly one box to make the smallest possible difference. What is that difference? $\begin{array}{r} \square \square \square \\ - \square \square \end{array}$
- g) In a class of 20 students, 8 girls were absent due to a basketball team trip. Fifty percent of the students present are girls. Given that no boys are absent, what percent of the total class is boys?
- h) The calorie count of a blueberry muffin was reduced by 8% to 230 calories. What was the previous calorie count?
- i) Find the greatest common factor of 9,009 and 14,014.
- j) What is the largest prime divisor of 855?
- k) What is $\frac{1}{2}\%$ of 100? Express your answer as a decimal.
- l) Which of the fractions $\frac{13}{40}$, $\frac{17}{52}$, $\frac{21}{64}$, and $\frac{25}{76}$ is the smallest?
- m) Are $55_{(7)}$, $555_{(7)}$, $4285_{(12)}$, $4285_{(16)}$, $4258_{(16)}$, $4258_{(9)}$ even or odd?
- n) A sequence of positive integers is obtained by starting with three digits d_1, d_2 , and d_3 . The fourth term of the sequence is the units digit of $d_1 + d_2 + d_3$. Each succeeding term is the units digit of the sum

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of the three previous terms. What numbers belong in the first, second, and third positions respectively to complete the sequence? $_, _, _, 1, 1, 1$

o) What is the value of x in $222^x - 111^x = 111^x \cdot 7$?

p) If $\frac{1}{x} + \frac{1}{y} = 3$ and $\frac{1}{x} - \frac{1}{y} = -7$ what is the value of $x + y$? Express your answer as a common fraction.

q) How many 2-digit numbers are not divisible by 13?

II. SOLVE

r) $2(x+3) > 3(x-1) + 6$ s) $x^2 > 9$ t) $\frac{1}{x} + \frac{3}{4x} > \frac{7}{8}$

u) $\frac{x}{4} + \frac{2}{3} < \frac{2x}{3} - \frac{1}{6}$ v) $x^2 + 2x - 24 > 0$ w) $x^2 - 6 < x$

x) $2x - y = 4, \quad x + y = 5$ y) $5x + 2y = 3, \quad 2x + 3y = -1$

z) The sum of two numbers is 28 and their difference is 12. Find the numbers.

aa) Two years ago a man was six times as old as his son. In 18 years he will be twice as old as his son. What is the sum of their present ages?

ab) Hal purchased 15 plants at a nursery, some at \$3 and the rest at \$5. The total cost was \$55. How many \$5 plants did he buy?

ac) Find the sum of all the values of x which satisfy $x^2 + 1998x = 1999$ (**THINK!**).

ad) The pattern AABBBCCCCAABBBCCCC... continually repeats. What is the 369th letter in this pattern?

ae) A wholesaler purchased a pair of jeans from the manufacturer for \$40. The wholesaler then tried to sell the jeans for 140% of the purchase price. When customers wouldn't pay that price, the jeans were placed on sale at a 20% discount off the selling price. At the end of the season, a final reduction of 50% off the lowered selling price was given. How many dollars was in the final price of the jeans? Express your answer to the nearest cent.

af) Solve for x : $\left(\frac{1}{4}\right)^{2x+8} = (16)^{2x+5}$.

ag) What is the remainder when the sum of the first 102 counting numbers is divided by 5250?

ah) What is the positive difference in the sums of the letters in the words MATH and COUNTS, if each letter is assigned a value as follows: A = 1, B = -2, C = 3, D = -4, ..., Y = 25, Z = -26?