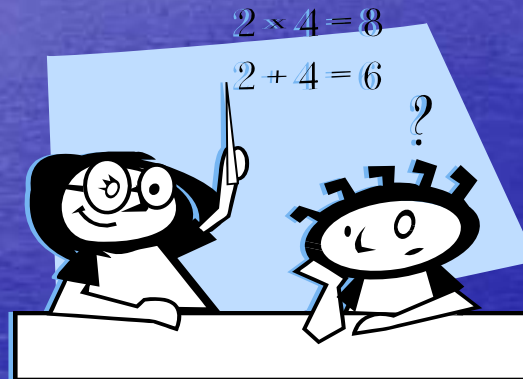


Center For Academic Achievement Math Tutorials

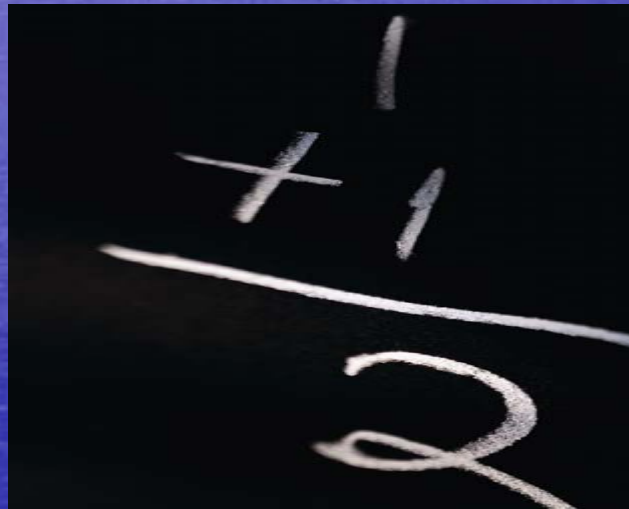


A quick view on basic college math problems
and services offered at the CAA

Math Tutoring is Available for....

- All OLLU students, faculty, and staff
- All basic math courses such as college algebras I and II, introduction to statistics, pre-calculus, and some math courses for students training to be teachers
- Some basic test preparations

Topic # 1: Algebra Basics



Common Problems

Slides 3-9

Factoring A Common Factor

Largest Common Factor- The largest value for two or more integers that is divisible and can be factored out of both/all terms.

$$4x^3 - 6x^2 + 12x$$

1. Find the largest common factor for the three coefficients (leading numbers) for 4, 6, and 12. Answer: **2**
2. Find the largest common factor for the three variables (letters) for x^3 , x^2 , and x .
Answer: **x**
3. Now combine these two answers to factor out/divide a **$2x$** from each term.
Answer: **$4x^3 - 6x^2 + 12x = 2x(2x^2 - 3x + 6)$**

Factoring A Common Factor With Multiple Variables

$$6x^3y^2 + 15x^2y^5 - 30x^7y^4z$$

1. Find the greatest common factor for the three coefficients 6, 15, and 30.
Answer: 3
2. Find the greatest common factor between the three variables of x -- x^3 , x^2 , and x^7 . **Answer: x^2**
3. Find the greatest common factor between the three variables of y -- y^2 , y^5 , and y^4 . **Answer: y^2**
4. The variable z is only in one term and cannot be factored by all the terms. Since there is no common term we skip this variable.
5. Now combine all of these answers to factor out/divide the entire factor from each term. **Answer: $6x^3y^2 + 15x^2y^5 - 30x^7y^4z = 3x^2y^2(2x + 5y^3 - 10x^5y^2z)$**

Factoring The Difference of Two Squares

$$16y^2 - 9$$

1. Use the formula $a^2 - b^2 = (a - b)(a + b)$
2. Write $16y^2 - 9$ as a difference of squares. Break each term individually and determine what factor can be squared to get each answer.
Answer: To get the term $16y^2$, we can factor out $(4y)^2$ because $4y \times 4y = 16y^2$. And to get the term 9 factored with squares, we can use 3×3 , or 3^2 .
3. Now by using the formula we can plug in the squares.
Answer: $(4y)^2 - 3^2 = (4y - 3)(4y + 3)$.
4. Finally, add this answer back to the beginning problem to summarize the completed factor.
Answer: $16y^2 - 9 = (4y - 3)(4y + 3)$.

Factoring By Grouping

$$3a^3 + 3a^2 - 27a - 27$$

1. Take out a common factor for the first two terms of $3a^3 + 3a^2$
Answer: $3a^2 (a + 1)$
2. Also take out a common factor for the last two terms of $-27a-27$
Answer: $-27(a + 1)$
3. Factor out a common factor for each of these two terms and combine the remaining terms.
Answer: $3a^2 (a + 1) -27(a + 1) = (3a^2 - 27) (a + 1)$
4. Factor a common factor to simplify the terms $(3a^2 - 27)$.
Answer: $(3a^2 - 27) = 3 (a^2 - 9) (a + 1)$
5. Factor the difference of squares of the term a^2-9 .
Answer: $(a - 3) (a + 3)$
6. Combine the factored terms in their simplest form.
Answer: $3 (a - 3)(a + 3)(a + 1)$

Solving Equations

$$2y^2 - 5y - 3 = 0$$

1. Factor the problem using the method for trinomials. You will need to use a guess and check method to determine what factors can be multiplied to equal the above problem.

Answer: $(2y + 1)(y - 3) = 0$

2. Set each individual factor equal to zero.

Answer: $2y + 1 = 0$; $y - 3 = 0$

3. Solve each of the two linear equations.

Answer: $y = -(1/2)$; $y = 3$

Solving Equations

$$\frac{3}{4}x + \frac{5}{6} = 5x - \frac{125}{3}$$

1. Look at the denominators 4, 6, and 3. Multiply the by the lowest common multiple or 12.

Answer: $12 \left(\frac{3}{4}x + \frac{5}{6} \right) = 12 \left(5x - \frac{125}{3} \right)$

2. Distribute twelve into each of the terms and multiply.

Answer: $12 \left(\frac{3}{4}x \right) + 12 \left(\frac{5}{6} \right) = 12 \left(5x \right) - 12 \left(\frac{125}{3} \right)$

3. Simplify

Answer: $3(3x) + 2(5) = 60x - 500 \rightarrow 9x + 10 = 60x - 500$

4. Solve the remaining equation for x

Answer: (subtract 9x) $10 = 51x - 500 \rightarrow$ (add 500) $510 = 51x \rightarrow$
(divide by 51) $x = \frac{510}{51} = 10$

Simplifying Expressions

$$\left(\frac{2}{3}x^{-3}\right) (15x^7)$$

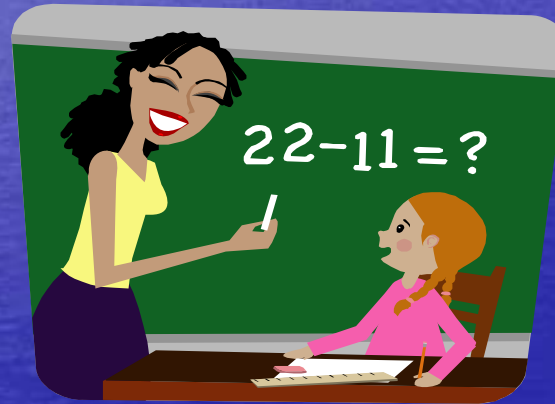
1. Multiply the terms so that the coefficients are grouped together and the variables are grouped together.

Answer: $\left(\frac{2}{3}\right) (15)$ and $(x^{-3})(x^7)$

2. Simplify using the first law of exponents. (When you multiply exponents they are added together, but remember one exponent is negative)

Answer: $\frac{30}{3} x^{-3+7} \rightarrow \frac{30}{3} x^{7-3} \rightarrow 10x^4$

Topic # 2: Statistics Basics



Slides 12-14

Standard Deviation

Find the standard deviation of 4, 9, 11, 12, 17, 5, 8, 12, and 14.

**

Use the formula

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

- First determine the mean or average (this is the x with a bar portion).

Answer: 10.222

2. Now subtract the mean individually from each of the numbers in the question and square the result. This is the portion with the parenthesis.

x	4	9	11	12	17	5	8	12	14
(x - \bar{x}) ²	38.7	1.49	0.60	3.16	45.9	27.3	4.94	3.16	14.3

3. Now add up these results (this is the 'sum' in the formula)

Answer: **139.55**

2. Divide by n-1. n is the number of values; 8

Answer: **17.44**

And finally, square root this: **4.18**

Z-Score

Find the z-score corresponding to a raw score of 132 from a normal distribution with mean 100 and standard deviation 15.

***Use the Formula

$$z = \frac{(x - \mu)}{\sigma}$$

1. Identify each value in the formula.

Answer: The raw score value is the x , the lower case μ with a mark is the mean, and the lower case symbol is the standard deviation.

2. Plug in each value and solve for z

Answer: $z = \frac{(132 - 100)}{15} = 2.133$

Probability

There are 90 college students. Out of 30 males, 5 are freshman and 25 are non-freshman. Out of 60 females, 10 are freshman and 50 are non-freshman. What is the probability of choosing a female or a freshman?

1. First determine the probability of choosing a female
Answer: 60/90
2. Then determine the probability of choosing a freshman (you need to add both male and female values).
Answer: 15/90
3. Finally you also need to subtract the values that they have in common, such as the number of freshman females.
Answer: 10/90
4. Now use the formula $p = p(A) + p(B) - p(A \& B)$

$$\text{Answer: } P = 60/90 + 15/90 - 10/90 = 65/90$$

Thank you for stopping by....
Please bring ANY other
Questions to the C.A.A
located inside Flores Lounge

