Polynomials

Explain how to add and subtract polynomials.

$(x+2)+(x+5)$ combine like terms

$x+2+x+5 = 2x+7$

Explain how to multiply two polynomials.

FOIL

multiply

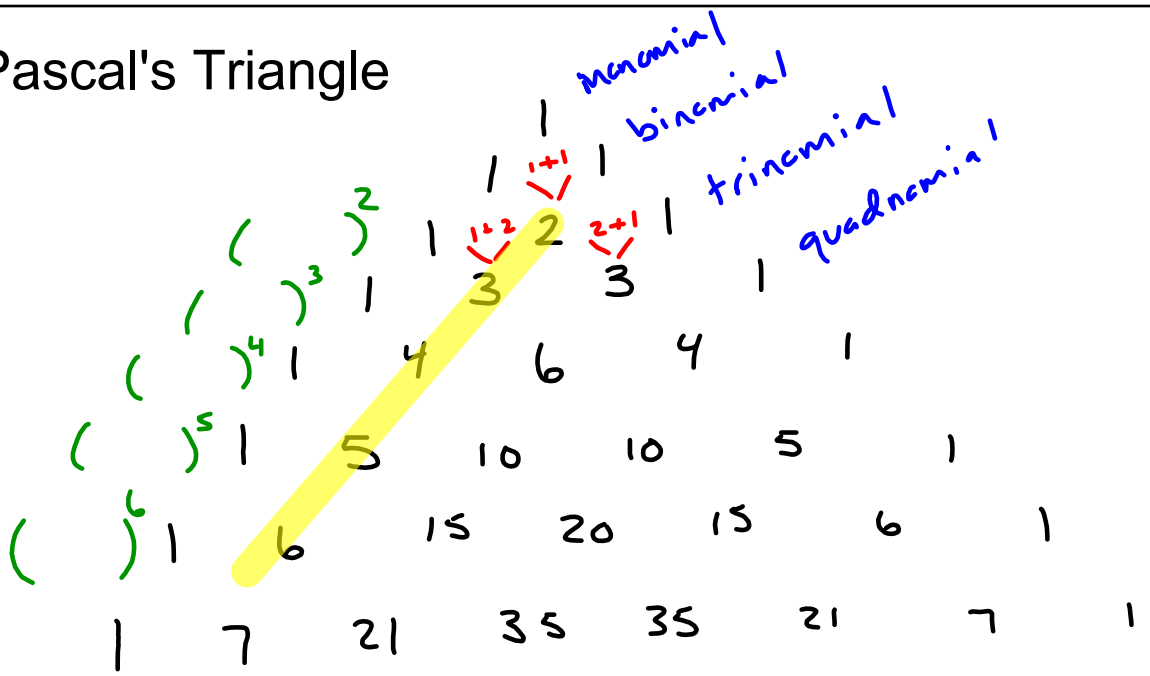
$(x+2)(x+5)$

$x^2+5x+2x+10$

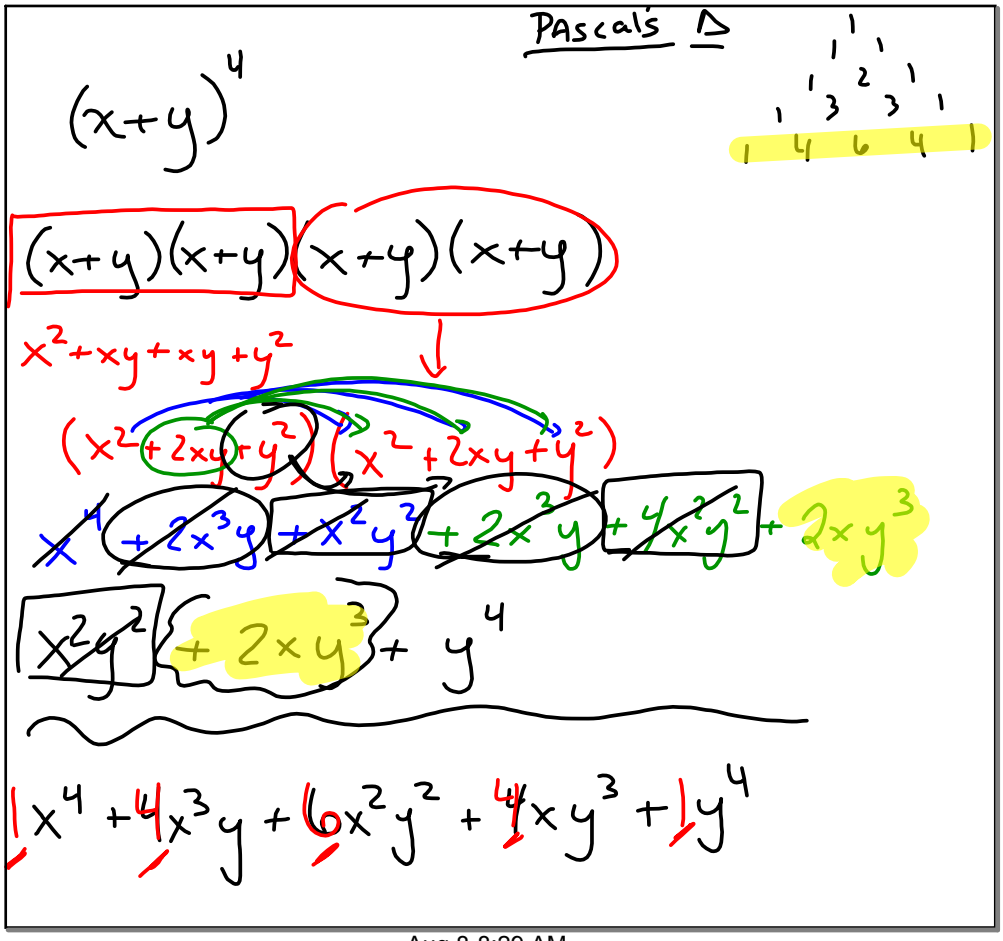
$x^2+7x+10$

Aug 7-6:57 PM

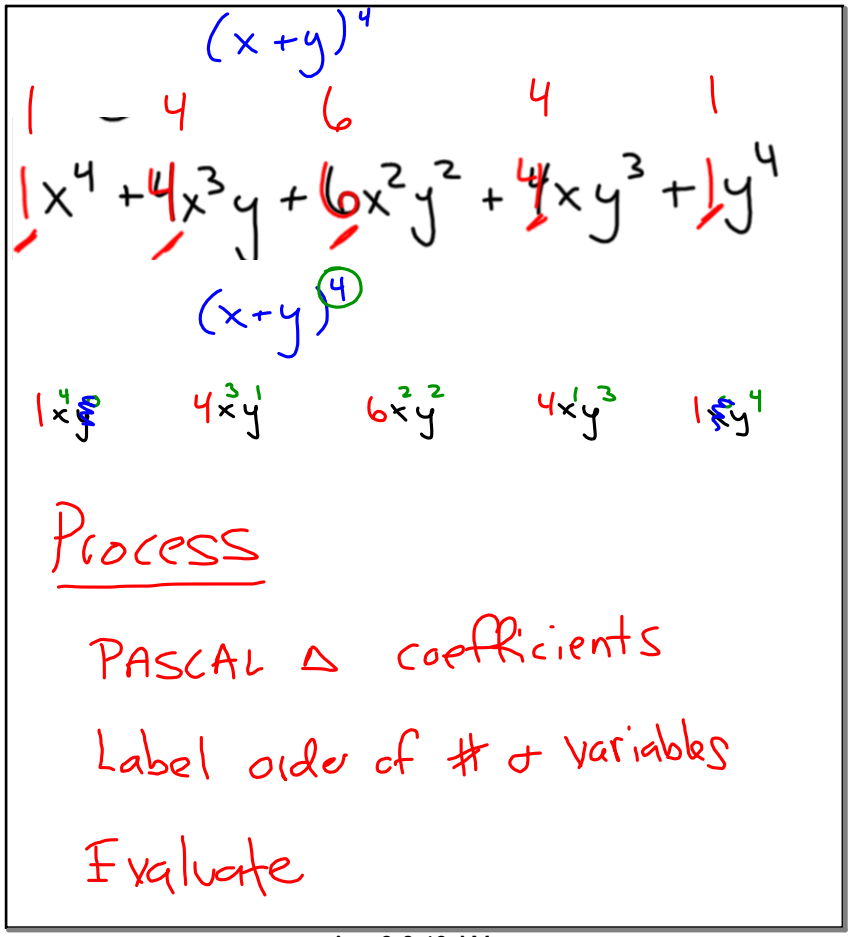
Pascal's Triangle



Aug 7-7:04 PM



Aug 8-8:29 AM



Aug 8-8:40 AM

$(x+2)^4$

$1x^4(2)^0 \quad 4x^3(2)^1 \quad 6x^2(2)^2 \quad 4x^1(2)^3 \quad 1x^0(2)^4$

$x^4 + 4x^3 \cdot 2 + 6x^2 \cdot 4 \quad 4x \cdot 8 \quad 1 \cdot 1 \cdot 16$

$x^4 + 8x^3 + 24x^2 + 32x + 16$

Aug 8-8:44 AM

$(x+2)^7$

more practice section 3-3 textbook

( )^0 1
( )^1 1 1
( )^2 1 2 1
( )^3 1 3 3 1
( )^4 1 4 6 4 1
( )^5 1 5 10 10 5 1
( )^6 1 6 15 20 15 6 1
1 7 21 35 35 21 7 1

$1x^7(2)^0 \quad 7x^6(2)^1 \quad 21x^5(2)^2 \quad 35x^4(2)^3 \quad 35x^3(2)^4 \quad 21x^2(2)^5 \quad 7x^1(2)^6 \quad 1x^0(2)^7$

$1 \cdot x^7 \cdot 1 \quad 7 \cdot x^6 \cdot 2 \quad 21 \cdot x^5 \cdot 4 \quad 35 \cdot x^4 \cdot 8 \quad 35x^3 \cdot 16 \quad 21x^2 \cdot 32 \quad 7 \cdot x \cdot 64 \quad 1 \cdot 1 \cdot 2^7$

$x^7 + 14x^6 + 84x^5 + 280x^4 + 560x^3 + 672x^2 + 448x + 128$

Aug 8-8:50 AM

Polynomials

Explain how to add and subtract polynomials.

FOIL

$(x+3)+(x+5)$ combine like terms

$x+3+x+5$

$2x+8$

Explain how to multiply two polynomials.

$(x+3)(x+5)$

$x^2+5x+3x+15$

$x^2+8x+15$

what if...

$(x+3)-(x+5)$

$x+3-x-5$

$=-2$

Aug 7-6:57 PM

$(x+2)^4$

$(x+2)(x+2)(x+2)(x+2)$

$x^2+2x+2x+4$

$(x^2+4x+4)(x^2+4x+4)$

$x^4+4x^3+4x^2+4x^3+16x^2+16x$

$+4x^2+16x+16$

$x^4+8x^3+24x^2+32x+16$

Aug 8-9:33 AM

Grading

DoK

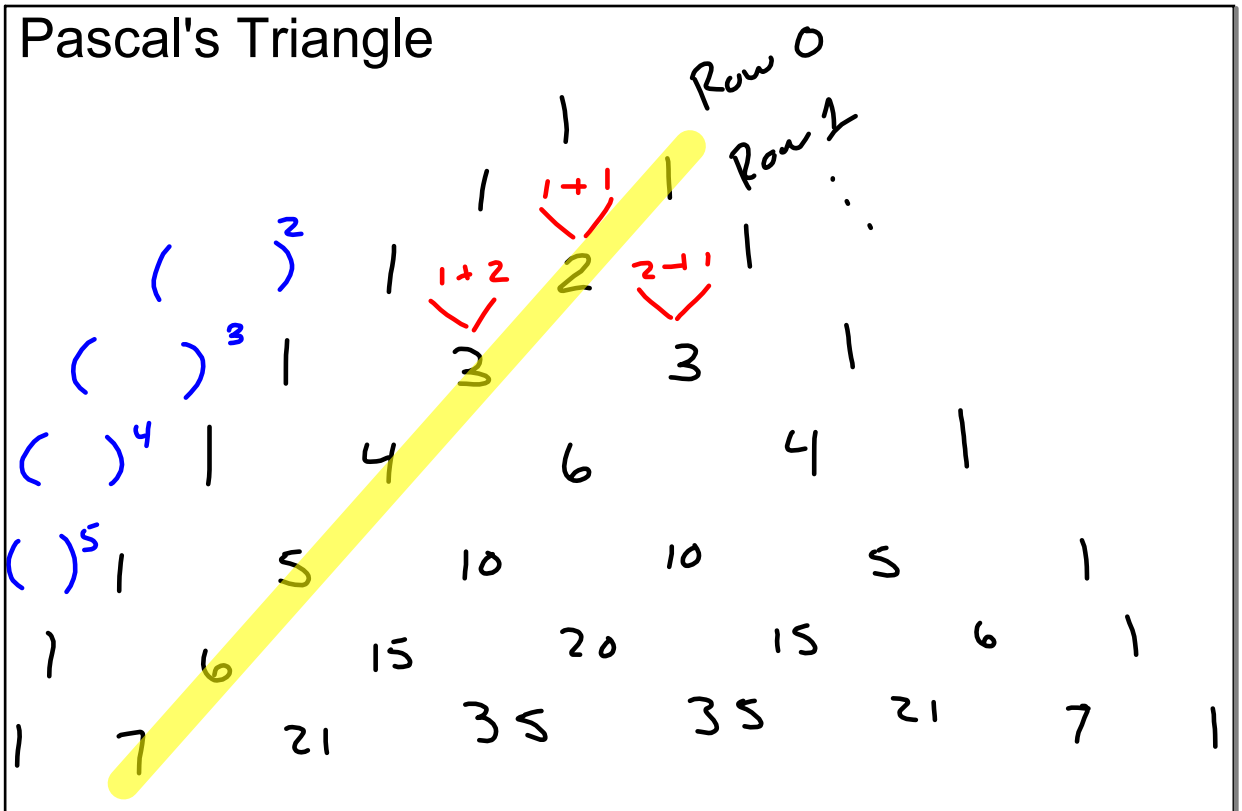
Level 1 70

Level 2 80

Level 3-4 90

Aug 8-9:25 AM

Pascal's Triangle



Aug 7-7:04 PM

$(x+y)^4$

$[(x+y)(x+y)][(x+y)(x+y)]$

$x^2+xy+xy+y^2$

$(x^2+2xy+y^2)(x^2+2xy+y^2)$

$x^4+2x^3y+x^2y^2+2x^3y+4x^2y^3+2xy^3+x^2y^2+2xy^3+y^4$

$x^4+4x^3y+6x^2y^2+4xy^3+y^4$

Aug 8-9:44 AM

$(x+y)^4$

PASCAL Δ

$1\,x^4(y)^0$	$4\,x^3(y)^1$	$6x^2(y)^2$	$4x^1(y)^3$	$1\,x^0(y)^4$
$1\cdot x^4\cdot 1$	$4\cdot x^3\cdot y$	$6\cdot x^2\cdot y^2$	$4\cdot x\cdot y^3$	$1\cdot 1\cdot y^4$
x^4	$+4x^3y$	$+6x^2y^2$	$+4xy^3$	$+y^4$

$(x+2)^4$

Aug 8-9:51 AM

$(x+2)^4$

$1\ x^4(2)^0$	$4\ x^3(2)^1$	$6\ x^2(2)^2$	$4\ x^1(2)^3$	$1\ x^0(2)^4$
$1 \cdot x^4 \cdot 1$	$4 \cdot x^3 \cdot 2$			

$x^4 + 8x^3$

Aug 8-9:59 AM

Polynomials

Explain how to add and subtract polynomials.

$x+2+x+2 = 2x+4$ combine like terms

$(x+2) + (x+2)$

Explain how to multiply two polynomials.

$(x+2)-(x+2)$

$x+2-x-2$

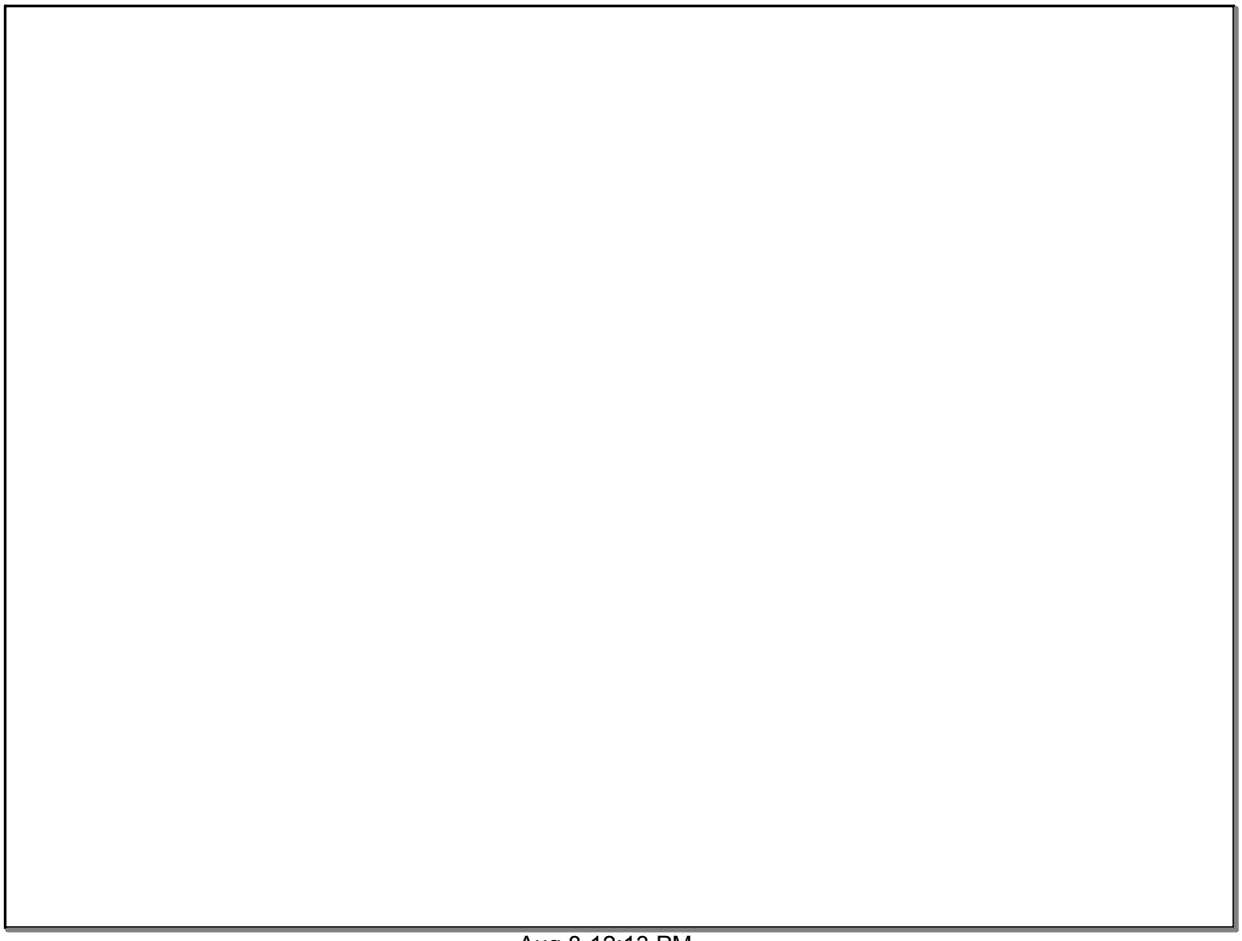
$=0$

$(x+2)(x+2)$ FOIL

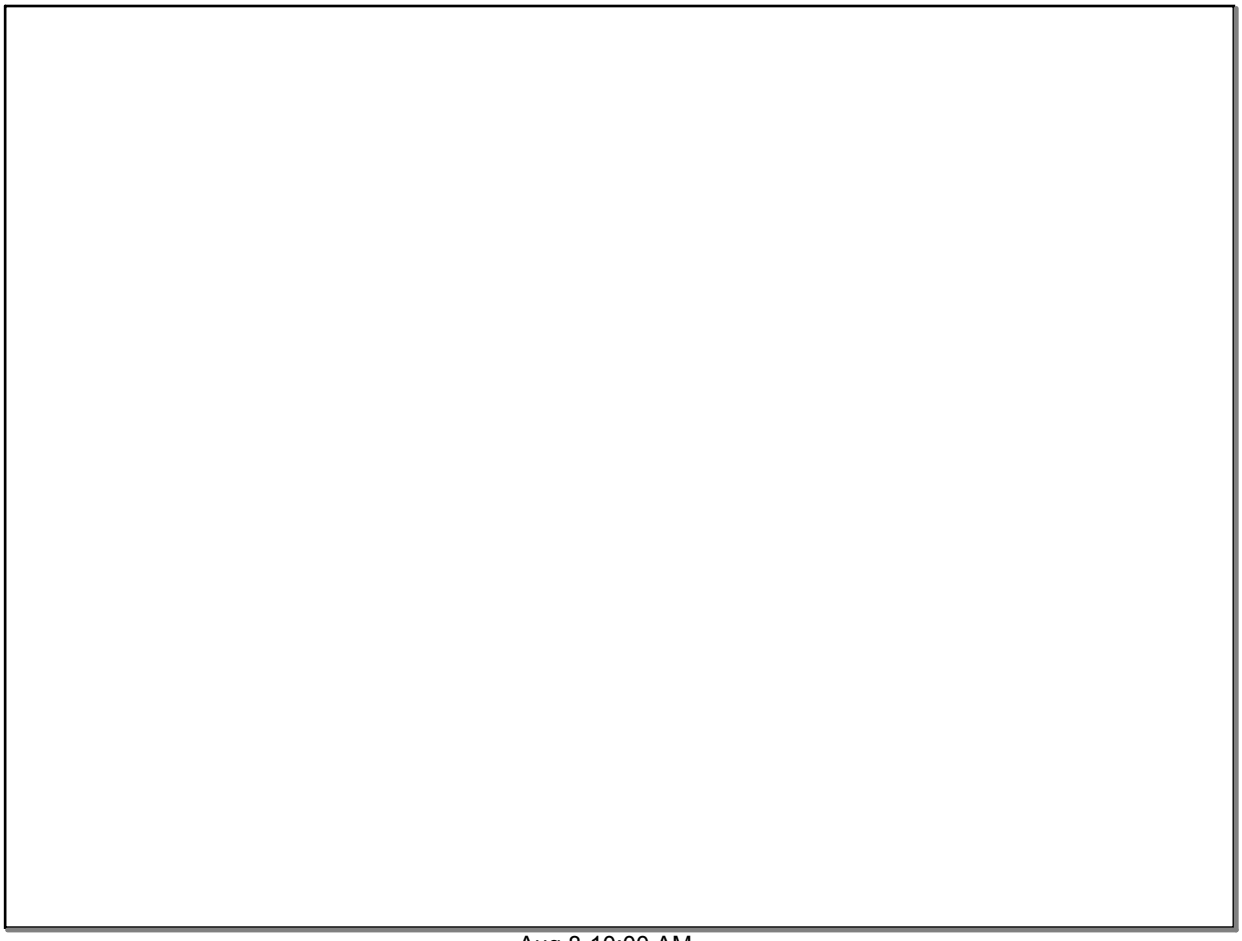
$x^2+2x+2x+4$

x^2+4x+4

Aug 7-6:57 PM



Aug 8-12:13 PM



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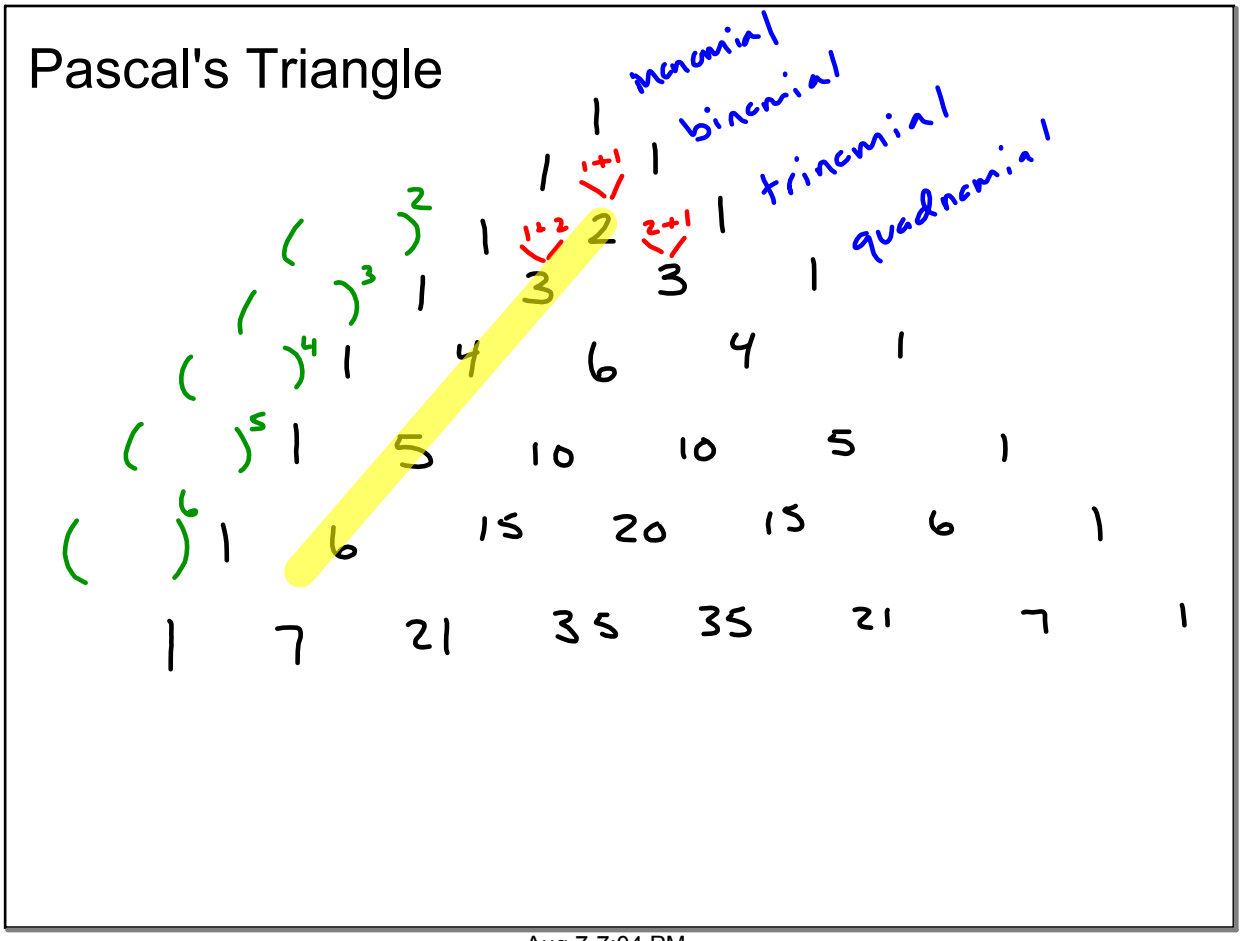
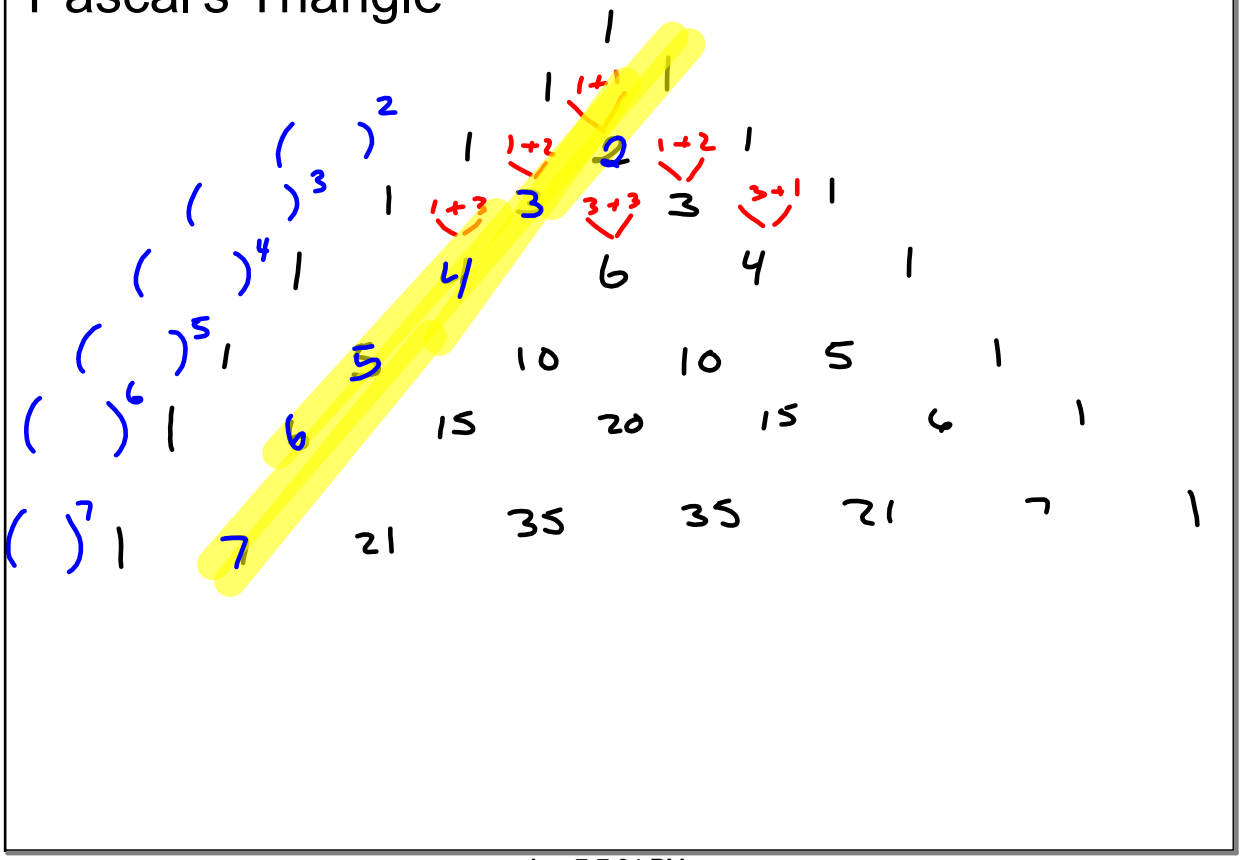
Pascal's Triangle

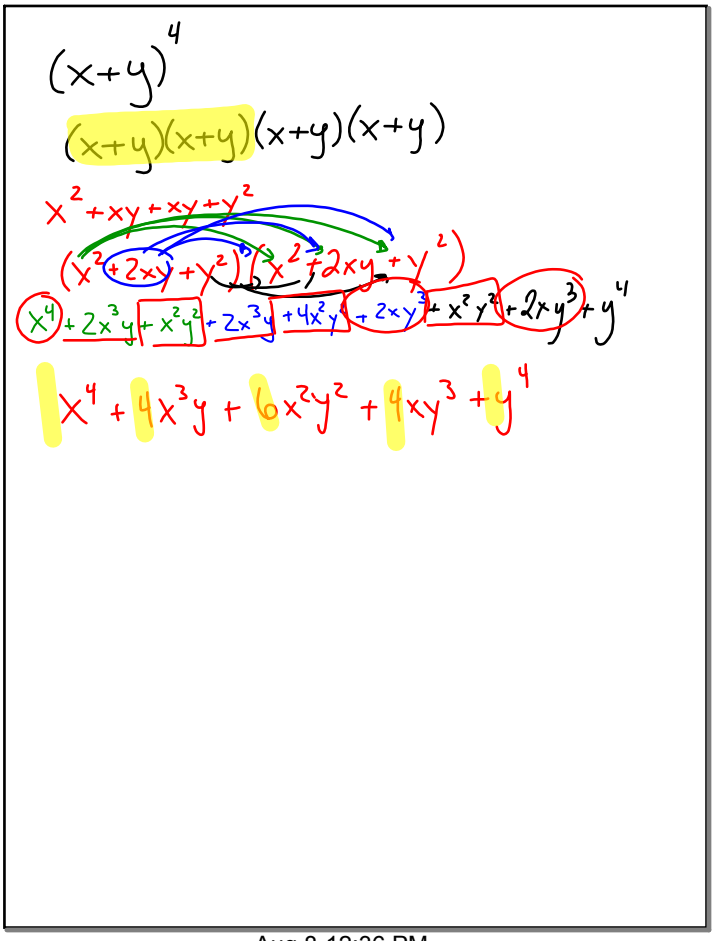


Aug 7-7:04 PM

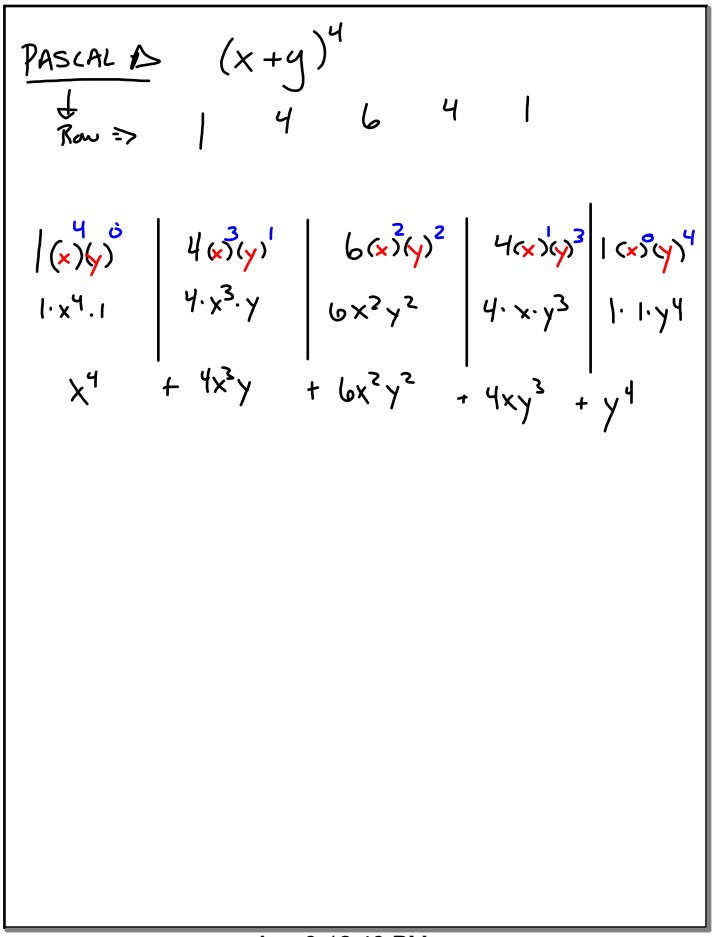
Pascal's Triangle



Aug 7-7:04 PM



Aug 8-12:36 PM



Aug 8-12:43 PM

$(x+2)^4$

$1(x)^4(2)^0$ | $4(x)^3(2)^1$ | $6(x)^2(2)^2$ | $4(x)^1(2)^3$ | $1(x)^0(2)^4$

$1 \cdot x^4 \cdot 1$ | $4 \cdot x^3 \cdot 2$ | $6 \cdot x^2 \cdot 4$ | $4 \cdot x \cdot 8$ | $1 \cdot 1 \cdot 16$

x^4 | $+8x^3$ | $+24x^2$ | $+32x$ | $+16$

Aug 8-12:52 PM

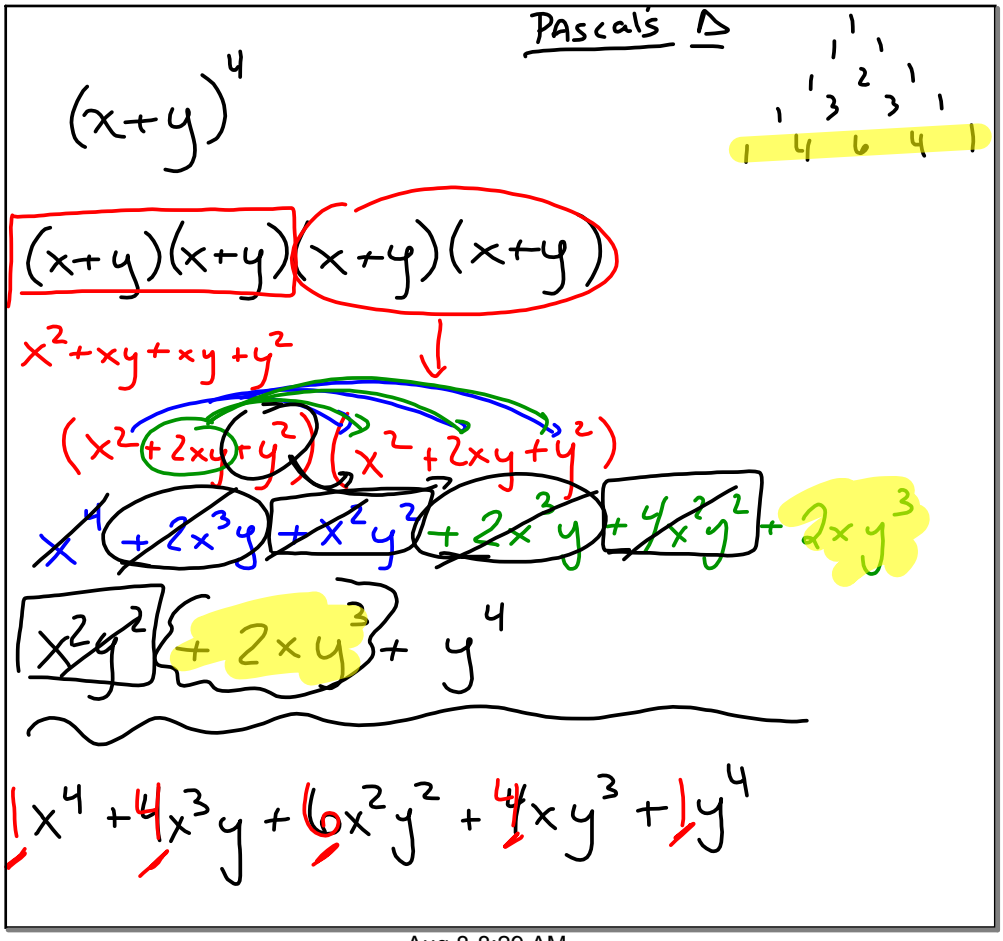
$(-2x-3)^5$

$1(-2x)^5(-3)^0$ 5 10 10 5 1

More practice

3-3

Aug 8-12:57 PM



Aug 8-8:29 AM

$(x+y)^4$

1 4 6 4 1

$1x^4+4x^3y+6x^2y^2+4xy^3+1y^4$

$(x+y)^4$

$1x^4y^0 \quad 4x^3y^1 \quad 6x^2y^2 \quad 4x^1y^3 \quad 1x^0y^4$

Process

PASCAL Δ coefficients

Label order of # & variables

Evaluate

Aug 8-8:40 AM

$(x+2)^4$

$1x^4(2)^0 \quad 4x^3(2)^1 \quad 6x^2(2)^2 \quad 4x^1(2)^3 \quad 1x^0(2)^4$

$x^4 + 4x^3 \cdot 2 + 6x^2 \cdot 4 \quad 4x \cdot 8 \quad 1 \cdot 1 \cdot 16$

$x^4 + 8x^3 + 24x^2 + 32x + 16$

Aug 8-8:44 AM

$(x+2)^7$

more practice section 3-3 textbook

( )⁰ 1

( )¹ 1 1

( )² 1 2 1

( )³ 1 3 3 1

( )⁴ 1 4 6 4 1

( )⁵ 1 5 10 10 5 1

( )⁶ 1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

$1x^7(2)^0 \quad 7x^6(2)^1 \quad 21x^5(2)^2 \quad 35x^4(2)^3 \quad 35x^3(2)^4 \quad 21x^2(2)^5 \quad 7x^1(2)^6 \quad 1x^0(2)^7$

$1 \cdot x^7 \cdot 1 \quad 7 \cdot x^6 \cdot 2 \quad 21 \cdot x^5 \cdot 4 \quad 35 \cdot x^4 \cdot 8 \quad 35x^3 \cdot 16 \quad 21x^2 \cdot 32 \quad 7 \cdot x \cdot 64 \quad 1 \cdot 1 \cdot 2^7$

$x^7 + 14x^6 + 84x^5 + 280x^4 + 560x^3 + 672x^2 + 448x + 128$

Aug 8-8:50 AM

$(x-3)^3$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$1(x)^3(-3)^0 \mid 3(x)^2(-3)^1 \mid 3(x)^1(-3)^2 \mid 1(x)^0(-3)^3$

$1 \cdot x^3 \cdot 1 \mid 3 \cdot x^2 \cdot (-3) \mid 3 \cdot x \cdot 9 \mid 1 \cdot 1 \cdot -27$

$x^3 \quad -9x^2 \quad +27x \quad -27$

$x^3 - 9x^2 + 27x - 27$

Aug 8-9:05 AM

$(x-1)^5$

$1(x)^5(-1)^0 \mid 5(x)^4(-1)^1 \mid 10(x)^3(-1)^2 \mid 10(x)^2(-1)^3 \mid 5(x)^1(-1)^4 \mid 1(x)^0(-1)^5$

$1 \cdot x^5 \cdot 1 \mid 5 \cdot x^4 \cdot -1 \mid 10 \cdot x^3 \cdot 1 \mid 10 \cdot x^2 \cdot -1 \mid 5 \cdot x \cdot 1 \mid 1 \cdot 1 \cdot -1$

$x^5 \; -5x^4 \; +10x^3 \; -10x^2 \; +5x \; -1$

$(-3)^{2..4..6..8} = +$

$(-3)^{1..3..5..7} = -$

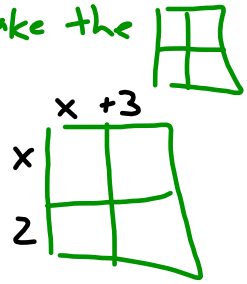
Aug 11-8:23 AM

Division of polynomials

expand the polynomial

$(x+3)(x+2)$

FOIL
Distribute
make the



$x^2+2x+3x+6$

x^2+5x+6

what does (x+3) and (x+2) describe about the polynomial x^2+5x+6?

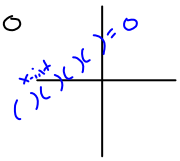
they are the factors.

Aug 11-8:32 AM

* Possible Roots ← this also mean FACTOR.

solve for x
x-int.

$4x^4-21x^3+18x^2+19x-6=0$
q p



Rational Root Theorm:

$\pm p/q$ will list all possible roots (all x=__)

p => factor of the constant

q => the factor of the leading coefficient

$4x^4-21x^3+18x^2+19x-6=0$
FACTOR FACTOR

p => (-6) : $\pm 1, \pm 2, \pm 3, \pm 6$

1·6
2·3
~~3·2~~

q => (4) : $\pm 1, \pm 2, \pm 4$

1·4
2·2
~~4·1~~

$\frac{6}{4} : \frac{3}{2}$

$\pm \frac{p}{q} : \pm \frac{1,2,3,6}{1,2,4}$

$\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm \frac{3}{4}, \pm 6$

Aug 11-8:39 AM

$(x-1)^3$ $(-1)^{2..4..6...8} = +$ $(-1)^{3...5...7...9} = -$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$(x)(x)(-1)$ $(-1)(-1)$

$1(x)^3(-1)^0$ | $3(x)^2(-1)^1$ | $3(x)^1(-1)^2$ | $1(x)^0(-1)^3$

$1 \cdot x^3 \cdot 1$ | $3 \cdot x^2 \cdot -1$ | $3 \cdot x \cdot 1$ | $1 \cdot 1 \cdot -1$

x^3 | $-3x^2$ | $+3x$ | -1

$x^3 - 3x^2 + 3x - 1$

Aug 11-9:12 AM

$(x-2)^4$

$(x-2)$

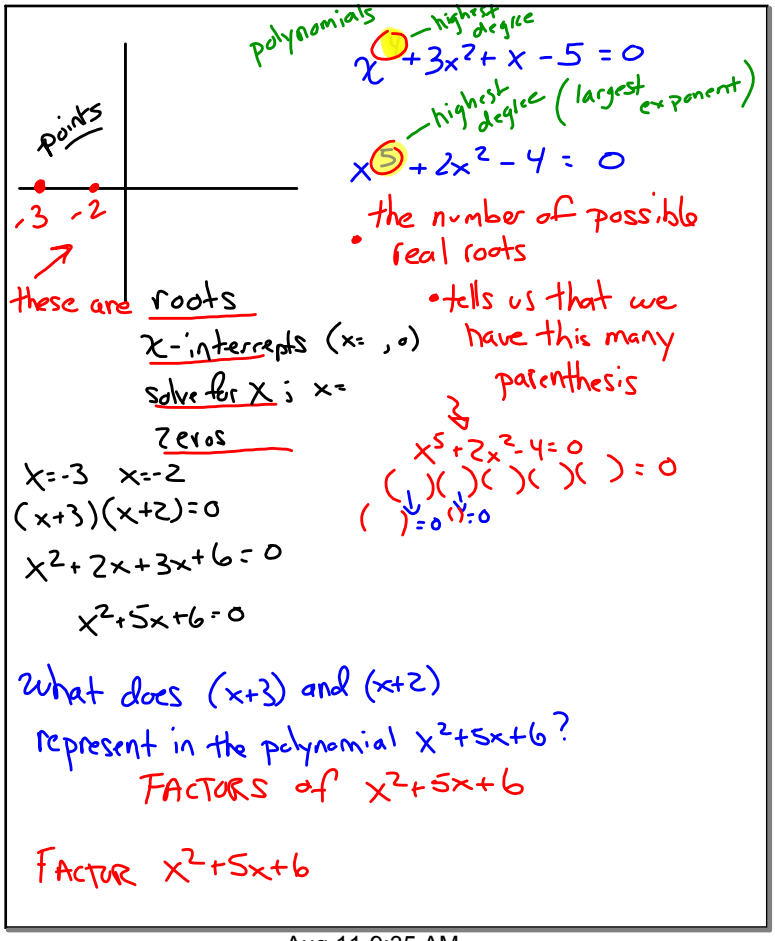
$1(x)^4(-2)^0$ | $4(x)^3(-2)^1$ | $6(x)^2(-2)^2$ | $4(x)^1(-2)^3$ | $1(x)^0(-2)^4$

$1 \cdot x^4 \cdot 1$ | $4 \cdot x^3 \cdot -2$ | $6 \cdot x^2 \cdot 4$ | $4 \cdot x \cdot -8$ | $1 \cdot 1 \cdot 16$

x^4 | $-8x^3$ | $+24x^2$ | $-32x$ | $+16$

$x^4 - 8x^3 + 24x^2 - 32x + 16$

Aug 11-9:28 AM



Aug 11-9:35 AM

$(x^2+5x+6) \div (x+2)$

FACTORS

$x+2 \;\overline{)\; x^2+5x+6}$ $\quad x+3$

$-(x^2+2x)$

$0+3x+6$

$-(3x+6)$

$0+0$ = no remainder

$(x+2)(x+3)$

Aug 11-9:47 AM

Rational Root Theorem

$\pm p/q$

p => FACTOR of the constant

q => Factors of the leading coefficient.

coefficient w/ largest exponent

$4x^5 + 2x^4 + 3x^3 - 4x^2 + x + 6 = 0$

q p

Factors (6) / Factor (4) $\Rightarrow \frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2, \pm 4}$

$\frac{2}{4} = \frac{1}{2}$, $\frac{6}{2} = 3$, $\frac{6}{4} = \frac{3}{2}$

FACTOR of (6)
1·6
2·3
~~3·2~~

$P/q = \pm \frac{1, 2, 3, 6}{1, 2, 4}$

$P/q = \pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm \frac{3}{4}, \pm 6$

Factors of 4
1·4
2·2

Aug 11-9:50 AM

$(x-2)^3$

Pascal's triangle:

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

x - 2

$1(x)^3(-2)^0$ | $3(x)^2(-2)^1$ | $3(x)^1(-2)^2$ | $1(x)^0(-2)^3$

$1 \cdot x^3 \cdot 1$ | $3 \cdot x^2 \cdot -2$ | $3 \cdot x \cdot 4$ | $1 \cdot 1 \cdot -8$

x^3 | $-6x^2$ | $+12x$ | -8

$x^3 - 6x^2 + 12x - 8$

Aug 11-12:11 PM

$(x-3)^4$

$1(x)^4(-3)^0$ $4(x)^3(-3)^1$ $6(x)^2(-3)^2$ $4(x)^1(-3)^3$ $1(x)^0(-3)^4$

x^4 $4 \cdot x^3 \cdot -3$ $6x^2 \cdot 9$ $4x \cdot -27$ $1 \cdot 1 \cdot 81$

$-12x^3$ $54x^2$ $-108x$ 81

$x^4 - 12x^3 + 54x^2 - 108x + 81$

Aug 11-12:25 PM

polynomial

$(x+3)(x+2)$

$x^2+3x+2x+6$

x^2+5x+6

$(x+3)(x+2)$

$x=-3$ $x=-2$

-3 -2

What are these points?

( )( )

Zeros

x-intercepts $(-3,0)$ and $(-2,0)$

Solve for x $x=-3$ $x=-2$

roots

FACTORS

What does $(x+3)$ and $(x+2)$ represent in the polynomial x^2+5x+6?

( ) = 0

Aug 11-12:32 PM

$8 \div 4 = 2$

$4(2) = 8$ FACTORS

$18 \div 3 = 6$

$3(6) = 18$

Aug 11-12:38 PM

$$(x+2)\overline{)\,x^2+5x+6}$$

$(x+3)$

$-(x^2+2x)$

$0+3x+6$

$-(3x+6)$

$0+0$ no remainde

Aug 11-12:39 PM

$8 \div 4 = 2$

$(4)(2) = 8$

these are FACTORS of 8

$18 \div 3 = 6$

$3(6) = 18$

Aug 11-9:44 AM

possible real roots

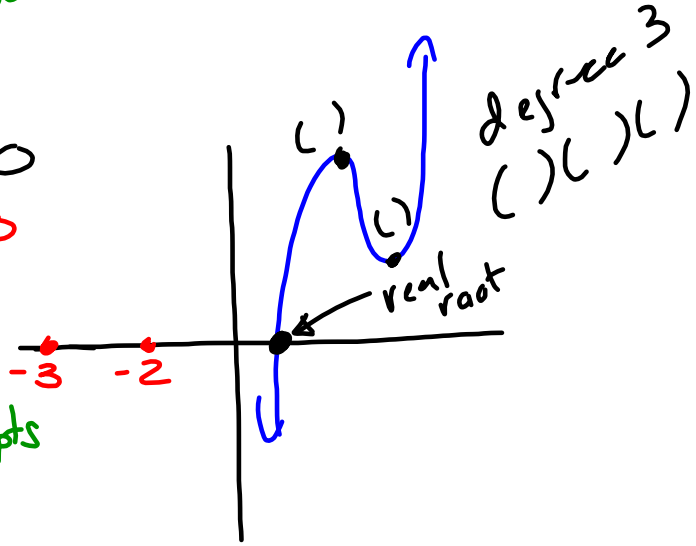
$x^2 + 5x + 6 = 0$

$(x+3)(x+2) = 0$

$x+3=0$ $\quad x+2=0$

$x=-3$ $\quad x=-2$

x-intercepts



Aug 11-8:43 AM

Rational Root Theorem

$\pm \frac{p}{q}$ q = the factors of the leading coefficient

p = the factors of the constant

$4x^5 - 3x^4 + 2x^3 + x^2 - 6x + 10 = 0$

1·4
2·2

1·10
2·5
~~5·2~~

$\pm \frac{p}{q} = \frac{\pm 1, 2, 5, 10}{\pm 1, 2, 4}$

$\frac{2}{4} = \frac{1}{2}$ $\frac{10}{4} = \frac{5}{2}$

$\pm p/q = \pm 1, \pm 1/2, \pm 1/4, \pm 2, \pm 5, \pm 5/2, \pm 5/4, \pm 10,$

x=

Aug 11-12:42 PM

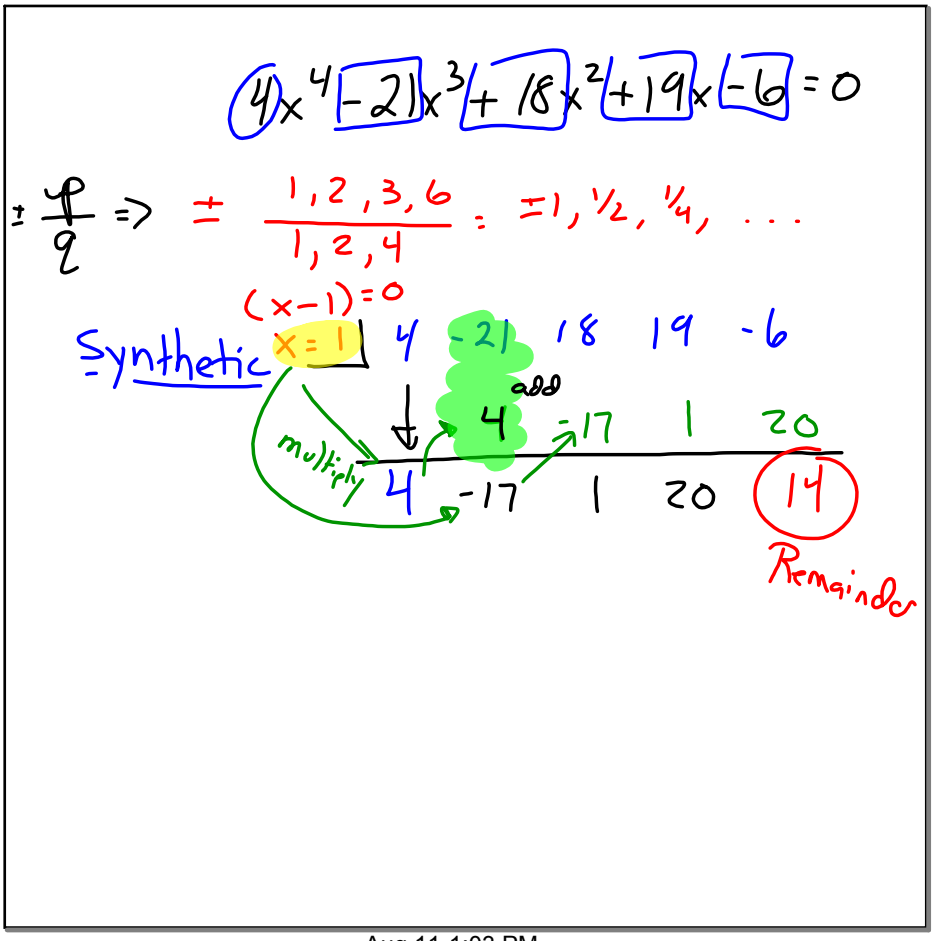
36

1. 36
2. 18
3. 12
4. 9
6. 6

144

1. 144
2. 72
3. 48
4. 36
6. 24
8. 18
9. 16
12. 12

Aug 11-1:01 PM



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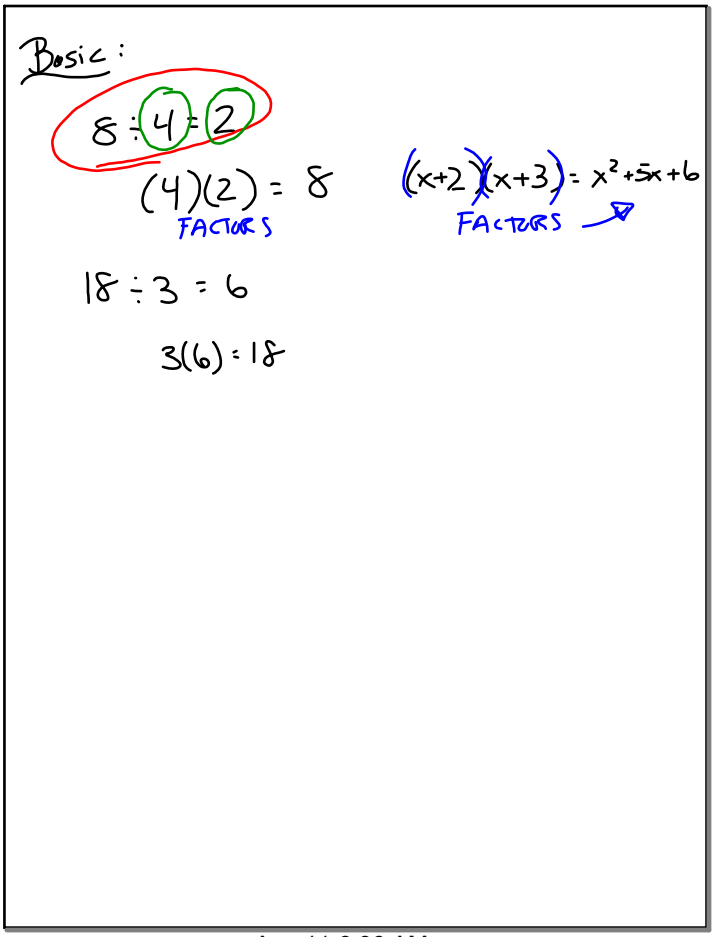

Aug 11-8:36 AM

How to use Pascal's Triangle

Aug 7-7:04 PM

Practice problems

Aug 7-7:04 PM