DIVISION of POLYNOMIALS

Recap: When we divide monomials, we keep the base then subtract the exponents.

Ex1.Simplify:

$\frac{25x^8}{-5x^3}$ $= -5x^{8-3}$

$= -5x^5$

Ex2. Simplify:

$\frac{-32x^3y^4z^5}{-64x^2yz^3}$ $= \frac{1x^{3-2}\cdot y^{4-1}\cdot z^{5-3}}{2}$

$= \frac{x\cdot y^3\cdot z^2}{2}$

Lesson: When we divide a polynomial by a monomial, we divide each term by the monomial.

Ex1. Simplify:

$\frac{12x^2-36x}{3x}$ $= \frac{12x^2}{3x} - \frac{36x}{3x}$

$= 4x^{2-1} - 12x^{1-1}$

$= 4x - 12x^0$

$= 4x - 12$

Ex2. Simplify:

$(15x^3y^2 - 5xy) \div 5xy$

$= \frac{15x^3y^2-5xy}{5xy}$

$= \frac{15x^3y^2}{5xy} - \frac{5xy}{5xy}$

Recall $= x^0 = 1$

$= 3x^{3-1}\cdot y^{2-1} - 1\cdot x^{1-1}\cdot y^{1-1}$

$= 3x^2y - 1\cdot x^0\cdot y^0$

$= 3x^2y - 1$

Simplify the following algebraic expressions:

i) $(-7x^3 + 6x^2) \div (-x^2)$

$= \frac{(-7x^3+6x^2)}{(-x^2)}$

$= \frac{(-7x^3)}{(-x^2} + \frac{6x^2}{-x^2}$

$= 7x^{3-2} + -6x^{2-2}$

$= 7x - 6x^0$

$= 7x - 6$

ii) $(5b^2 - 10b - 20) \div (-5)$

$= \frac{5b^2-10b-20}{-5}$

$= \frac{5b^2}{-5} - \frac{10b}{-5} - \frac{20}{-5}$

$= -b^2 - -2b - -4$

$= -b^2 + 2b + 4$

iii)

$\frac{5ab + 20ac - 20ad}{5a}$ $= \frac{5ab}{5a} + \frac{20ac}{5a} - \frac{20ad}{5a}$

$= b + 4c - 4d$

iv)

$\frac{14x^2y^3z - 28x^3y^2z^2 + 35xyz}{7xyz}$

$= \frac{14x^2y^3z}{7xyz} - \frac{28x^3y^2z^2}{7xyz} + \frac{35xyz}{7xyz}$

$= 2xy^2 - 4x^2yz + 5$

APPLICATIONS of POLYNOMIALS

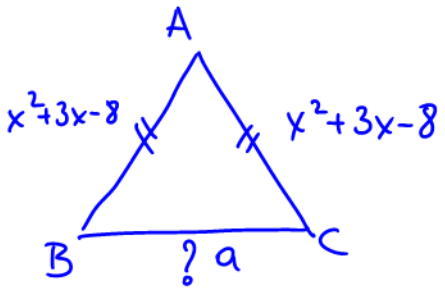
1. In an isosceles triangle, two of the sides have length x^2+3x-8. The perimeter of the triangle is $4x^2+8x+5$. Find a polynomial to represent the length of the third side.

$2(x^2+3x-8)+a=(4x^2+8x+5)$

$a=(4x^2+8x+5)-2(x^2+3x-8)$

$a=4x^2+8x+5-2x^2-6x+16$

$a=2x^2+12x+21$



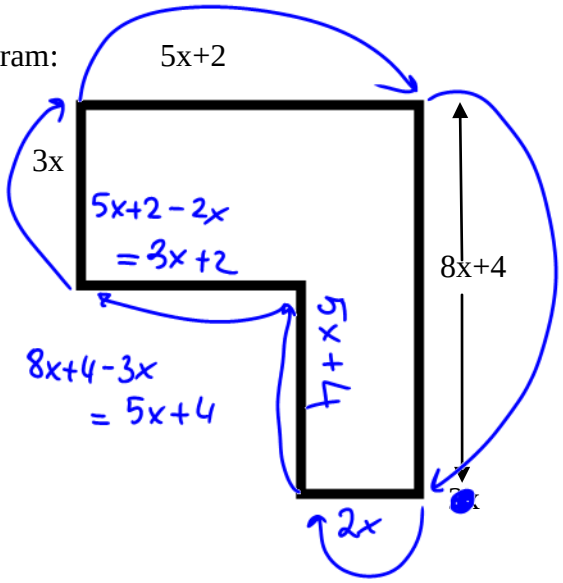
2. For the shape on the right, find:

a) The polynomials to represent the missing sides. Label the diagram:

b) The **perimeter** of the whole shape

$P=3x+(5x+2)+(8x+4)+2x+(5x+4)+(3x+2)$

$=26x+12$



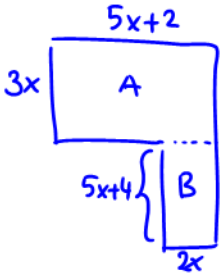
c) The **area** of the whole shape

Total Area = A + B

$=3x(5x+2)+2x(5x+4)$

$=15x^2+6x+10x^2+8x$

$=25x^2+14x$



3. A rectangular back yard has a length of $3x^2-2x+4$ metres and a width of $4x$ metres. The owner has put down stones to create a square sitting area measuring $3x$ metres on all sides.

a) Calculate the area of the yard that is still grass (has not been covered by stones).

Grass = Total Area − Stone

$=4x(3x^2-2x+4)-(3x)(3x)$

$=12x^3-8x^2+16x-9x^2$

$=12x^3-17x^2+16x$

b) $12(2)^3-17(2)^2+16(2)$

$=12\cdot 8-17\cdot 4+32$

$=96-68+32$

$=60\ m^2$