protesting the cutbacks

austerity
budget
recession

union
↳ less personel for student w disabilities

↳ 60 yrs → 62 yrs
expense

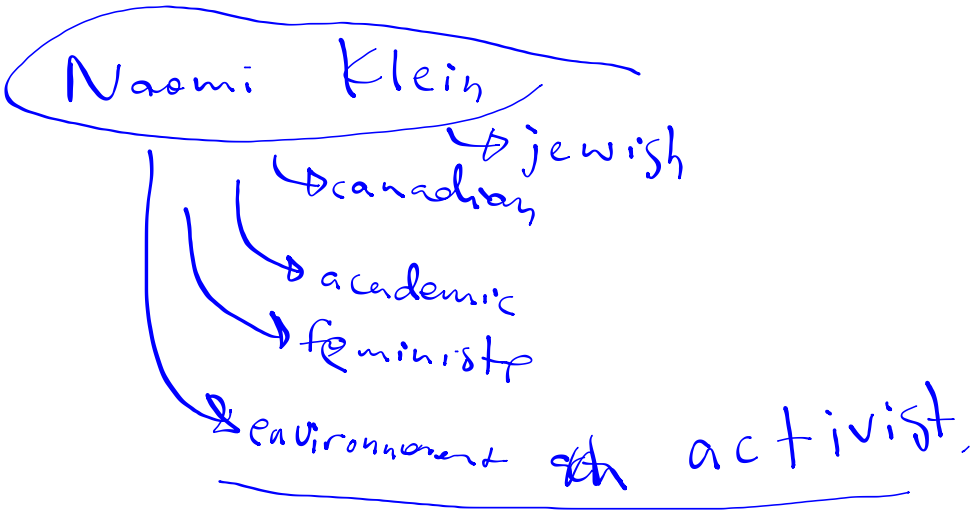
↳ salary freeze
expense

↳ gr 3-8 → bigger class sizes
"expense"
investment

↳ teachers work more hours

solutions to get money

- change of ideology
  ↳ maybe growth at all cost?
- cut government employees.
- privatize school
- increase taxes
- tax sports (become amenities)
- cut military expenses
- cut international aide
- weed
- optimize energy.
- tax the 1% wealthy
- tax oil companies


Naomi Klein
jewish
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environment
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# Factoring (and Algebraic Fractions)

## Unit 1: Factoring

Definition: Rewriting a mathimatical expression as a product (x) of its factors. * The value stays the same

$$12 = 3 \cdot 4$$

Recall: Simplify

$$\frac{6}{12} = \frac{6 \cdot 1}{6 \cdot 2} = \frac{1}{2}$$

# Unit 1: Factoring by Removing the Greatest common Factor
GCF

Step ①:
Identify the GCF. What does each term have in common?
GCF: $3x$

Step ②:
Bring the GCF out in front of brackets

Steps ③:
Divide each term with GCF and put result in brackets

ex. $\frac{3x^2}{3x} + \frac{6xy}{3x}$

$3x(x + 2y)$

GCF — result of divison

Check (can you go back to the original exp?)

ex. $3x(x + 2y)$

$3x^2 + 6xy$

Identifying the variable of GCF

$3x^2 + 4x^4$ GCF: $x^2$

↳ each term must have the same variable, and then pick the lowest exp value.

Factor:

$$\frac{10x^4y^3}{2x^2y} + \frac{4x^3y}{2x^2y} - \frac{2x^2y^2}{2x^2y}$$

1: GCF: $2x^2y$

2: Out Front $2x^2y(5x^2y^2 + 2x - y)$

3: Divison

$$2x^2y(5x^2y^2 + 2x - y)$$
$$10x^4y^3 + 4x^3y - 2x^2y^2$$

Factor

$12x^4 + 4x^5y + 8x^3z^2$

$4x^3$ $4x^2$ $4x^3$

1: GCF $4x^3$

2: Divide

3: Product

ANS $4x^3(3x + x^2y + 2z^2)$

Check:

$4x^3(3x + x^2y + 2z^2)$

$12x^4 + 4x^5y + 8x^3z^2$

## Strategy that usually applied!

When the 1st term of the exp is negative make sure your GCF is negative.

ex. $-3m^3n - 7m^3r + 8m^3rt$

$-m^3(3n + 7r - 8rt)$

1 GCF: $-m^3$
2. Divide
3. Product

$+2a^3b - 4a^2b + 16a^2bc^3$

Check

$-m^3(3n + 7r - 8rt)$

$-3m^3n - 7m^3r + 8m^3rt$

# Unit 2 : Factoring by Grouping

Use this factoring technique when there's no GCF and/or there's 4 or 6 terms (even amount of terms)

Step ①: Split the expression into 2 (balanced) even groups (i.e. 2 grs of 2 terms, 2 grs of 3 terms)

ex. $ab + bc + ad + cd$

Step ②: Factor out a GCF in both groups
i. GCF
ii. D
iii P

$b(a+c) + d(a+c)$

Step ③: Factor out the GCF of the 2 terms
i GCF $(a+c)$
ii P
iii P

$(a+c)(b+d)$

GCF ↑ result of division ↑

$(a+c)(b+d)$

$ab + ad + cb + cd$

$ab + bc + ad + cd$

Factor:

$$x^2 + ax + ab + bx$$

gcf $x$: D, P

$$x(x+a) + b(a+x)$$

gcf $b$: D, P

$$(x+a)(x+b)$$

gcf $(x+a)$: D, D

Check:

$$(x+a)(x+b)$$

$$x^2 + bx + ax + ab$$

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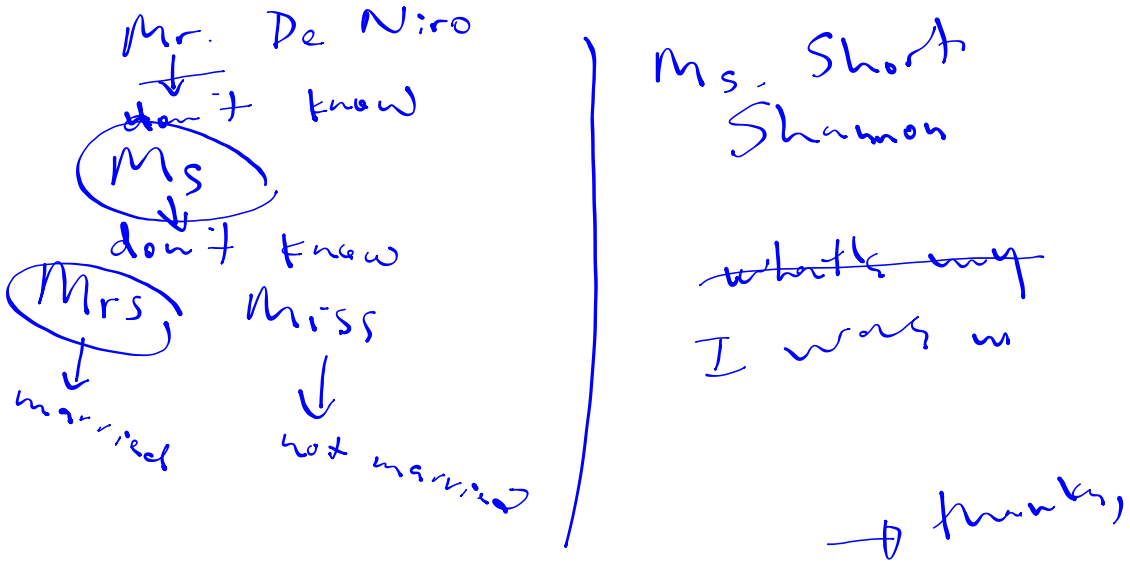
$$2ab - 4ac + 6ad + 8b - 16c + 24d$$


Mr. De Niro
don't know
Ms
don't know
Mrs
Miss
married
not married
Ms. Short
Shannon
I work in
thanks,

1st time
1. GCF 2a
2. Divide
3. Produce

$2ab - 4ac + 6ad + 8b - 16c + 24d$

$2a \quad -2a \quad +2a \quad +8 \quad -8 \quad +8$

$\frac{2a(b-2c+3d)}{(b-2c+3d)} + \frac{8(b-2c+3d)}{(b-2c+3d)}$

$(b-2c+3d)(2a+8)$

$(b-2c+3d)\,2(a+4)$

2nd time
i gcf: 8
ii D
iii P

3rd time
i. gcf $(b-2c+3d)$
ii. D
iii. P

Recall the strategy about if your 1st term (of any group) is negative!

Factor

e.x. $ac - ad - 4bc + 4bd$

$-4b$ $-4b$

$a(c-d) - 4b(c-d)$

$(c-d)$ $(c-d)$

gcf: $(c-d)$

$(c-d)(a-4b)$

gcf: $-4b$

D

P

gcf: a

D

P

ex. $f^2x^2 + g^2x^2 - ag^2 - af^2$

gcf $(c-d)$

D

P

Check

$(c-d)(a-4b)$

$ac - 4bc - ad + 4bd$

Careful sometimes the strategy doesn't work!

ex. $9ax^2 - 3bx - by + 3axy$

$\frac{9ax^2}{3x} \quad \frac{-3bx}{3x} \quad \frac{-by}{-y} \quad \frac{+3axy}{-y}$

i gcf $3x$

ii bring gcf out front

iii div

$3x(3ax - b) - y(b - 3ax)$ gcf $-y$

not the same! Rewrite and change the sign your gcf

$\frac{9ax^2}{3x} \quad \frac{-3bx}{3x} \quad \frac{-by}{y} \quad \frac{+3axy}{y}$ gcf $y$

$3x(3ax - b) + y(-b + 3ax)$

$3ax - b \qquad 3ax - b$

$(3ax - b)(3x + y)$

Tips : Always check for a GCF before grouping or after.

(not exhaustive)

- You may need to rearrange the terms to make groups with a gcf.

e.x. $4a^2x - 8px - 2a^2y - 20pz + 10a^2z + 4py$

$2\left(2a^2x - 4px - a^2y - 10pz + 5a^2z + 2py\right)$

$2\left(2a^2x + 5a^2z - a^2y - 10pz - 4px + 2py\right)$

$2\left(a^2(2x + 5z - y) - 2p(5z + 2x - y)\right)$

$2\left(a^2(2x + 5z - y) - 2p(2x + 5z - y)\right)$

gcf $-2p$

$2(2x + 5z - y)(a^2 - 2p)$