5.4 Les exposants négatifs et les inverses

$x^0 = 1$

$(☺)^0 = 1$

Rapel encore: $\frac{(x^a)}{(x^b)} = x^{a-b}$

positive

* $\boxed{3^{-2}} = 3^{0-2} = \frac{3^0}{3^2} = \boxed{\frac{1}{3^2}} = \frac{1}{9}$

Vérifie: $2^{-2} = 0.25$ *et* $2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

* Si x est un nombre non-nul et n est un nombre rationnel alors,

$$\boxed{x^{-n} = \frac{1}{x^n}} \quad \text{et} \quad \boxed{\frac{1}{x^{-n}} = x^n}$$

ex.

a) $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

b) $1000^{-2} = \frac{1}{1000^2} = \frac{1}{1\,000\,000}$

c) $\frac{1}{3^{-4}} = 3^4 = 81$

d) $4^{-1/2} = \frac{1}{4^{1/2}} = \frac{1}{\sqrt{4}} = \boxed{\frac{1}{2}}$

e) $(-27)^{-1/3} = \frac{1}{(-27)^{1/3}} = \frac{1}{\sqrt[3]{-27}} = \boxed{\frac{1}{-3}}$

f) $16^{-3/4} = \frac{1}{16^{3/4}} = \frac{1}{(\sqrt[4]{16})^3} = \frac{1}{2^3} = \boxed{1/8}$

g) $27^{-2/3} = \frac{1}{27^{2/3}} = \frac{1}{(\sqrt[3]{27})^2} = \frac{1}{3^2} = \boxed{\frac{1}{9}}$

h) $\left(\frac{2}{5}\right)^{-3} = \left(\frac{5}{2}\right)^3 = \boxed{\frac{125}{8}}$

* Un racourci

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^{n}$$

si $a \neq 0$
$b \neq 0$

ex. Simplifie

a) $\left(\frac{25}{36}\right)^{-1/2} = \left(\frac{36}{25}\right)^{1/2}$

$= \sqrt{\frac{36}{25}}$

$= \frac{6}{5}$

b) $(0.04)^{-3/2} = \left(\frac{4}{100}\right)^{-3/2}$

$= \left(\frac{100}{4}\right)^{3/2} = 25^{3/2}$

$= \left(\sqrt{25}\right)^{3} = 5^{3} = \boxed{125}$

c) $32^{-0.6} = 32^{-3/5}$

$0.6 = \frac{6}{10} = \frac{3}{5}$

$= \frac{1}{32^{3/5}} = \frac{1}{\left(\sqrt[5]{32}\right)^{3}}$

$= \frac{1}{2^{3}} = \boxed{\frac{1}{8}}$

pratique: photocopie #(3-8)ace, 9, 10, 13, 14, 16, 18, 20