

# Solutions

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4. Simplify, then evaluate each expression. Express answers in rational form.

a) $2^{-3}(2^7)$	c) $\frac{5^4}{5^6}$	e) $(4^{-3})^{-1}$
$= 2^{-3+7}$	$= 5^{4-6}$	$= 4^{-3(-1)}$
$= 2^4$	$= 5^{-2}$	$= 4^3$
$\Rightarrow 16$	$= \frac{1}{5^2}$	$\Rightarrow 64$
	$\Rightarrow \frac{1}{25}$	

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5. Simplify, then evaluate each expression. Express answers in rational form.

b) $(9 \times 9^{-1})^{-2}$	d) $\frac{(5^3)^{-2}}{5^{-6}}$	f) $9^7(9^3)^{-2}$
$= (9^{1+(-1)})^{-2}$	$= \frac{5^{3(-2)}}{5^{-6}}$	$= 9^{7+3(-2)}$
$= (9^0)^{-2}$	$= \frac{5^{-6}}{5^{-6}}$	$= 9^{7-6}$
$= 9^0$	$= \frac{5^{-6}}{5^{-6}}$	$= 9^1$
$\Rightarrow 1$	$= 5^0$	$\Rightarrow 9$
	$\Rightarrow 1$	

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6. Simplify, then evaluate each expression. Express answers in rational form.

b) $8(8^2)(8^{-4})$	d) $\frac{4^{-10}}{(4^{-4})^3}$	f) $13^{-5} \times \left(\frac{13^2}{13^8}\right)^{-1}$
$= 8^{1+2+(-4)}$	$= \frac{4^{-10}}{4^{-4(3)}}$	$= 13^{-5} \times (13^{2-8})^{-1}$
$= 8^{-1}$	$= \frac{4^{-10}}{4^{-12}}$	$= 13^{-5} \times 13^{-6(-1)}$
$= \frac{1}{8}$	$= 4^{-10-(-12)}$	$= 13^{-5} \times 13^6$
$\Rightarrow \frac{1}{8}$	$= 4^2$	$= 13^{-5+6}$
	$\Rightarrow 16$	$= 13^1$
		$\Rightarrow 13$

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7. Evaluate. Express answers in rational form.

a) $16^{-1} - 2^{-2}$	c) $\left(-\frac{2}{3}\right)^{-1} + \left(\frac{2}{5}\right)^{-1}$	e) $5^{-3} + 10^{-3} - 8(1000^{-1})$
$= \frac{1}{16} - \frac{1}{2^2}$	$= \left(-\frac{3}{2}\right)^1 + \left(\frac{5}{2}\right)^1$	$= \frac{1}{5^3} + \frac{1}{10^3} - \frac{8}{1000}$
$= \frac{1}{16} - \frac{1}{4}$	$= -\frac{3}{2} + \frac{5}{2}$	$= \frac{1}{125} + \frac{1}{1000} - \frac{8}{1000}$
$= \frac{1}{16} - \frac{4}{16}$	$= \frac{2}{2}$	$= \frac{8}{1000} + \frac{1}{1000} - \frac{8}{1000}$
$= \frac{-3}{16}$	$= 1$	$= \frac{1}{1000}$

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8. Evaluate. Express answers in rational form.

b) $16^{-1}(2^5)$	d) $\frac{(-9)^{-2}}{(3^{-1})^2}$	e) $(8^{-1})\left(\frac{2^{-3}}{4^{-1}}\right)$	f) $\frac{(-5)^3(-25)^{-1}}{(-5)^{-2}}$
$= \frac{1}{16}(32)$	$= \frac{\left(-\frac{1}{9}\right)^2}{\left(\frac{1}{3}\right)^2}$	$= \frac{1}{8}\left(\frac{\left(\frac{1}{2}\right)^3}{\left(\frac{1}{4}\right)^1}\right)$	$= \frac{-125\left(-\frac{1}{25}\right)^1}{\left(-\frac{1}{5}\right)^2}$
$= \frac{32}{16}$	$= \frac{1}{81} \div \frac{1}{9}$	$= \frac{1}{8}\left(\frac{1}{8} \div \frac{1}{4}\right)$	$= \frac{-125\left(-\frac{1}{25}\right)}{\left(\frac{1}{25}\right)}$
$= 2$	$= \frac{1}{81} \times \frac{9}{1}$	$= \frac{1}{8}\left(\frac{1}{8} \times \frac{4}{1}\right)$	$= \frac{125}{25} \div \frac{1}{25}$
	$= \frac{1}{9}$	$= \frac{1}{8}\left(\frac{1}{2}\right)$	$= \frac{125}{25} \times \frac{25}{1}$
		$= \frac{1}{16}$	$= 125$

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