4.1 Properties of Exponents

Study 4.1 # 1 - 95, 99, 103, 107

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4.1 Properties of Exponents

$2^3 = 2 \cdot 2 \cdot 2 = 8$

3 factors of 2

$2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

$\square$ factors of 2

$b^5 = b \cdot b \cdot b \cdot b \cdot b$

$\square$ factors of b

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4.1 Properties of Exponents

$$2^4 2^3 = (2 \cdot 2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2) = 2^7 = 128$$

4 factors of 2 3 factors of 2

$$2^4 2^3 = 2^{(4+3)} = 2^7 = 32$$

$$b^5 b^3 = b^{5+3} = b^8$$

4.1 Properties of Exponents

$$b^m b^n = b^{\square}$$

$$\boxed{b^m b^n = b^{m+n}}$$

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4.1 Properties of Exponents

$a^3 a^7 =$

$a^2 a^5 b b^2 =$

$a^3 b^2 a b^7 a^4 =$

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4.1 Properties of Exponents

$$a^3 a^7 = a^{10}$$

$$a^2 a^5 b\, b^2 = a^7 b^3$$

$$a^3 b^2 a\, b^7 a^4 = a^8 b^9$$

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4.1 Properties of Exponents

$2^3 \cdot 3^2 = 8 \cdot 9 = 72$

$(-2)^3 3^2 = -8 \cdot 9 = -72$

odd power of negative base is negative

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4.1 Properties of Exponents

$(-2)^4 3^2$

$16 \cdot 9 = 144$

even power of negative

base is positive

$-2^4 \cdot 3^2 = -16 \cdot 9$

$= -144$

even power of positive

base is positive

so $2^4 = 16$

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4.1 Properties of Exponents

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\frac{2^5}{2^3} = \frac{2\cdot 2\cdot 2\cdot 2\cdot 2}{2\cdot 2\cdot 2} = 2^2$$

$$\frac{a^4 b^2}{a^2 b} = a^{4-2} b^{2-1} = a^2 b$$

$$\frac{a^m}{a^n} = a^{m-n}$$

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4.1 Properties of Exponents

$$\frac{a^m}{a^n} = a^{m-n}$$

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4.1 Properties of Exponents

$$(ab)^m = a^m b^m$$

$$(ab)^3 = ab \cdot ab \cdot ab = a^3 b^3$$

$$(abc)^2 = a^2 b^2 c^2$$

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4.1 Properties of Exponents

$$(ab)^m = a^m b^m$$

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4.1 Properties of Exponents

$$(a^m)^n = a^{mn}$$

$(a^2)^3 = a^2 \cdot a^2 \cdot a^2 = a^6$

$(a^2)^5 = a^{10}$

$a^2\ a^2\ a^2\ a^2\ a^2$

$$(a^m)^n = a^{mn}$$

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4.1 Properties of Exponents

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

$$\left(\frac{a}{b}\right)^3 = \frac{a}{b}\cdot\frac{a}{b}\cdot\frac{a}{b} = \frac{a^3}{b^3}$$

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4.1 Properties of Exponents

$$\left(\frac{a^2 b}{c}\right)^3 = \frac{(a^2 b)^3}{c^3} = \frac{a^6 b^3}{c^3}$$

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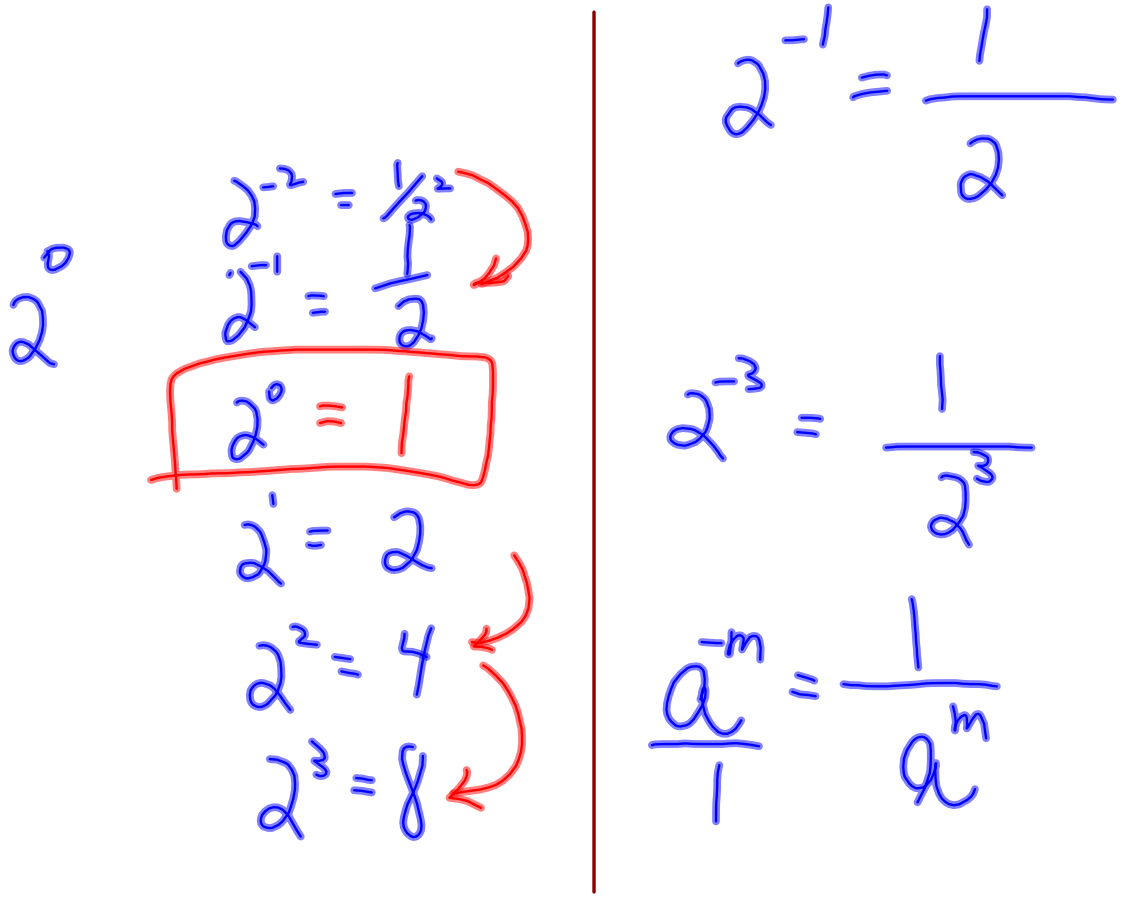
4.1 Properties of Exponents



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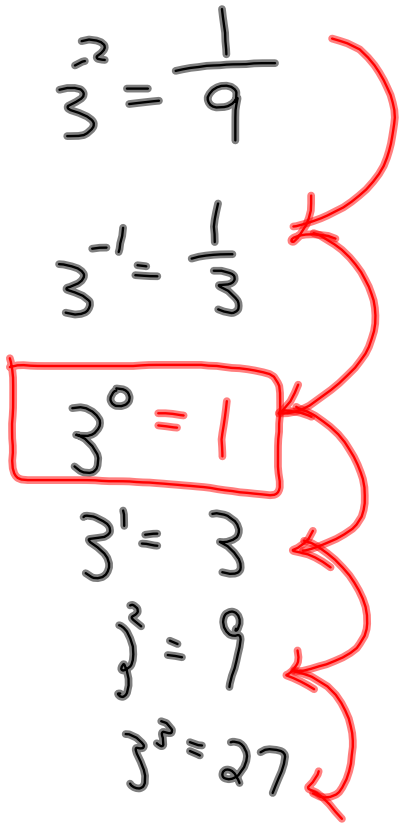
4.1 Properties of Exponents



$10^0 = 1$

$5^0 = 1$

$(-3)^0 = 1$

$\left(-\frac{1}{2}\right)^0 = 1$

4.1 Properties of Exponents

$a^0 = 1$ Definition $a \neq 0$

0^0 ✗ $= 1$

$(2 \cdot 3^2 \cdot 5)^0 = 1$

$\left(\frac{a^2 b}{c^{-1} d^6}\right)^0 = 1$

$(2-2)^0$ $\not\exists$

4.1 Properties of Exponents

$\left(\frac{a^2 b}{c^{-1} d^6}\right)^0 = 1$ $\quad a, b, c, d \neq 0$

$2^{-1} 2^4 = 2^3 = 8$

$a^{-1} a^4 = a^3$ $\quad \frac{1}{a} \cdot a^4 = \frac{a^4}{a} = a^3$

$a^{-1+4} = a^3$

$b b^{-4} = b^{1-4} = b^{-3} = \frac{1}{b^3}$

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4.1 Properties of Exponents

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

$$(a^m)^n = a^{mn}$$

$$(5^{-1})^{-2} = 5^2 = 25$$

$$\frac{\frac{1}{2^{-1}} + \frac{1}{3^{-1}}}{\frac{2^1}{1} + 3 = 5}$$

$$(130^{-1})^{-1} = 130$$

4.1 Properties of Exponents

22. $(4b^{-9})(5b^{4}) = 20b^{-5} = \frac{20}{b^{5}}$

26. $(4b^{3}c^{7})^{2}(2b^{5}c^{4})^{3}$

$(4^{2}b^{6}c^{14})(2^{3}b^{15}c^{12})$

$16 \cdot 8\, b^{21} c^{26}$

$128\, b^{21} c^{26}$

$(a^{m})^{n} = a^{mn}$

$(b^{3})^{2} = b^{3} \cdot b^{3} = b^{6}$

$(c^{7})^{2} = c^{7} \cdot c^{7}$

4.1 Properties of Exponents

$$\frac{7b^{-4}}{6b^{-8}} = \frac{7b^{8}}{6b^{4}} = \frac{7}{6}b^{4}$$

or

$$\frac{7b^{-4}}{6b^{-8}} = \frac{7}{6}b^{-4-(-8)} = \frac{7}{6}b^{4}$$

$$\frac{a^{m}}{a^{n}} = a^{m-n}$$

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4.1 Properties of Exponents

42. $\dfrac{(16b^{-2}c)(2^5b^4c^{-5})}{(15b^5c^{-1})(8b^{-7}c^{-2})} = \dfrac{\cancel{16}\,(\cancel{25})\,c\,b^4\,c\,b^7\,c^2}{\cancel{15}\,(\cancel{8})\,b^2c^5b^5}$

$\dfrac{10\,b^{11}c^4}{3\,b^7c^5} = \dfrac{10\,b^4}{3c}$

4.1 Properties of Exponents

$$a^m a^n = a^{m+n}$$

$$\frac{a^s}{a^r} = a^{s-r}$$

$$\frac{(16b^{-2}c)(25b^4c^{-5})}{(15b^5c^{-1})(8b^{-7}c^{-2})}$$

$$\frac{\overset{2}{\cancel{16}}(\overset{5}{\cancel{25}})}{\underset{3}{\cancel{15}}(\underset{1}{\cancel{8}})} \; b^{\cancel{-2}+4\cancel{-5}\cancel{+7}} \quad c^{1-5+1+2}$$

$$\frac{10}{3} b^4 c^{-1} = \frac{10b^4}{3c}$$

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4.1 Properties of Exponents

$10^3 = 1000$

$2.3(10^3) =$

2.300.

2,300

$2.3(10^{-3})$

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