

High School Review

Here are some notes and examples of basic math concepts that you should be familiar with 😊

Note: I am trying to write every single step to make sure everyone understands, you are welcome to jump some steps.

Distributive Property

$$a(b+c) = ab+ac$$

$$\text{Ex 1: } 4(2+7b) = 4(2) + 4(7b) = 8+28b$$

$$\text{Ex 2: } 6(6z+6w+7) = 6(6z)+6(6w)+6(7) = 36z+36w+42$$

Factoring

$$ab+ac = a(b+c)$$

$$\text{Ex 1: } 15w+20 = 5(3w)+5(4) = 5(3w+4)$$

$$\text{Ex 2: } 110r+77+121t = 11(10r)+11(7)+11(11t) = 11(10r+7+11t)$$

Linear Equations

$$\begin{aligned}\text{Ex 1: Find } k \text{ given } 9k-2 &= 8 \\ \Rightarrow 9k &= 8+2 \\ \Rightarrow k &= \frac{10}{9}\end{aligned}$$

$$\begin{aligned}\text{Ex 2: Find } p \text{ given } 9 &= \frac{2-p}{8} \\ \Rightarrow 9 \times 8 &= 2-p \\ \Rightarrow 72 &= 2-p \\ \Rightarrow p &= 2-72 \\ \Rightarrow p &= -70\end{aligned}$$

$$\begin{aligned}\text{Ex 3: Find } w \text{ given } 12w-2 &= 4+4(w+2) \\ \Rightarrow 12w-2 &= 4+4w+8 \\ \Rightarrow 12w-4w &= 4+8+2 \\ \Rightarrow 8w &= 14 \\ \Rightarrow w &= \frac{14}{8} \\ \Rightarrow w &= \frac{7}{4}\end{aligned}$$

Exponents

$$a^m = \underbrace{a \dots a}_{m \text{ times}}$$

$$a^{1/n} = \sqrt[n]{a}$$

Exponent Properties

$$1) a^0 = 1$$

$$3) a^{m+n} = a^m a^n$$

$$5) (ab)^m = a^m b^m$$

$$2) (a^m)^n = (a^n)^m = a^{mn}$$

$$4) a^{-m} = \frac{1}{a^m}$$

$$6) (a^m)^{1/n} = (a^{1/n})^m = a^{m/n}$$

Ex1: Reduce the following to a p/q form where $p, q \in \mathbb{Z}, q \neq 0$
 ↪ integers!

$$a) \frac{3^{-2}}{2^{-3}} = \frac{2^3}{3^2} = \frac{8}{9}$$

$$b) (-8)^{-1/3} = \frac{1}{(-8)^{1/3}} = \frac{1}{\sqrt[3]{(-8)}} = -\frac{1}{2}$$

$$c) 4^{-1} + 3^{-1} = \frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

Ex2: Express the following in positive exponents.

$$a) (x^{1/2})^{-3} = x^{\frac{1}{2} \times -3} = x^{-3/2} = \frac{1}{x^{3/2}}$$

$$b) (x^{-2}y^3)^0 = 1$$

$$c) \frac{a^2x^{-3}}{b^2y^{-2}} = \frac{a^2y^2}{b^2x^3}$$

$$d) \left(\frac{x^{-1}y^3}{2x^0y^{-5}} \right)^{-2} = \left(\frac{y^3y^5}{2(1)x} \right)^{-2} = \left(\left(\frac{y^{3+5}}{2x} \right)^{-1} \right)^2 = \left(\frac{2x}{y^8} \right)^2 = \frac{4x^2}{y^{16}}$$

Division

Ex: Given the values a and b , express a in the form $a = bq + r$ where $0 \leq r < b$
 ↪ $r, q \in \mathbb{Z}$
 ↪ integers!

$$a) a = 3496, b = 69$$

$$\begin{array}{r} 50 \\ 69 \overline{) 3496} \\ \underline{345} \\ 46 \\ \underline{0} \\ 46 \end{array}$$

$$\therefore 3496 = 69 \times 50 + 46$$

b) $a = 1688, b = 150$

$$\begin{array}{r} 11 \\ 150 \overline{) 1688} \\ \underline{150} \\ 188 \\ \underline{150} \\ 38 \end{array}$$

$\therefore 1688 = 150 \times 11 + 38$

c) $a = 397, b = 73$

$$\begin{array}{r} 5 \\ 73 \overline{) 397} \\ \underline{365} \\ 32 \end{array}$$

$\therefore 397 = 73 \times 5 + 32$

EXTRA PRACTICE!

Try all of these to make sure you got all of these concepts down. Find the solutions below.

Ex1: Solve for x .

a) $\frac{4}{7}x + \frac{9}{28} = \frac{1}{2}x + \frac{3}{4}$

c) $\frac{2}{3}x + \frac{5}{8} = \frac{1}{4}x + \frac{3}{4}$

b) $\frac{1}{3}x + \frac{2}{5} = \frac{2}{9}x + \frac{1}{2}$

d) $\frac{1}{2}x + \frac{11}{15} = \frac{1}{3}x + \frac{4}{5}$

Ex2: Use the properties of exponents to write the given expression in the form p/q where $p, q \in \mathbb{Z}$.

a) $\frac{2^2 3^2 5^7}{5^9 3 \sqrt{4}}$

c) $\frac{2^3 5^4 3^2}{5^3 2^3 \sqrt{9}}$

b) $\frac{3^2 5^4 2^3}{5^3 3^5 \sqrt{4}}$

d) $\frac{3^3 2^3 5^4}{5^7 2 \sqrt{9}}$

Ans: Ex1: a) $x = 6$ b) $x = \frac{9}{10}$ c) $x = \frac{3}{10}$ d) $x = \frac{2}{5}$

Ex2: a) $\frac{6}{25}$ b) $\frac{20}{27}$ c) $\frac{15}{16}$ d) $\frac{36}{125}$