| Topic/Skill | Definition/Tips | Example |
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| 1. Square Number | The number you get when you multiply a number by itself. | $\begin{gathered} 1,4,9,16,25,36,49,64,81,100,121, \\ 144,169,196,225 \ldots \\ 9^{2}=9 \times 9=81 \end{gathered}$ |
| 2. Square Root | The number you multiply by itself to get another number. <br> The reverse process of squaring a number. | $\sqrt{36}=6$ <br> because $6 \times 6=36$ |
| 3. Solutions to $x^{2}=\ldots$ | Equations involving squares have two solutions, one positive and one negative. | Solve $x^{2}=25$ $x=5 \text { or } x=-5$ <br> This can also be written as $x= \pm 5$ |
| 4. Cube Number | The number you get when you multiply a number by itself and itself again. | $\begin{aligned} & 1,8,27,64,125 \ldots \\ & 2^{3}=2 \times 2 \times 2=8 \end{aligned}$ |
| 5. Cube Root | The number you multiply by itself and itself again to get another number. <br> The reverse process of cubing a number. | $\begin{array}{r} \sqrt[3]{125}=5 \\ \text { because } 5 \times 5 \times 5=125 \end{array}$ |
| 6. Powers of... | The powers of a number are that number raised to various powers. | The powers of 3 are: $\begin{aligned} & 3^{1}=3 \\ & 3^{2}=9 \\ & 3^{3}=27 \\ & 3^{4}=81 \text { etc. } \end{aligned}$ |
| 7. <br> Multiplication Index Law | When multiplying with the same base (number or letter), add the powers. $a^{m} \times a^{n}=a^{m+n}$ | $\begin{gathered} 7^{5} \times 7^{3}=7^{8} \\ a^{12} \times a=a^{13} \\ 4 x^{5} \times 2 x^{8}=8 x^{13} \end{gathered}$ |
| 8. Division Index Law | When dividing with the same base (number or letter), subtract the powers. $a^{m} \div a^{n}=a^{m-n}$ | $\begin{gathered} 15^{7} \div 15^{4}=15^{3} \\ x^{9} \div x^{2}=x^{7} \\ 20 a^{11} \div 5 a^{3}=4 a^{8} \end{gathered}$ |
| 9. Brackets Index Laws | When raising a power to another power, multiply the powers together. $\left(a^{m}\right)^{n}=a^{m n}$ | $\begin{gathered} \left(y^{2}\right)^{5}=y^{10} \\ \left(6^{3}\right)^{4}=6^{12} \\ \left(5 x^{6}\right)^{3}=125 x^{18} \end{gathered}$ |
| 10. Notable Powers | $\begin{gathered} p=p^{1} \\ p^{0}=1 \\ \hline \end{gathered}$ | $99999^{0}=1$ |
| 11. Negative Powers | A negative power performs the reciprocal. $a^{-m}=\frac{1}{a^{m}}$ | $3^{-2}=\frac{1}{3^{2}}=\frac{1}{9}$ |
| 12. Fractional Powers | The denominator of a fractional power acts as a 'root'. <br> The numerator of a fractional power acts as a normal power. $a^{\frac{m}{n}}=(\sqrt[n]{a})^{m}$ | $\begin{gathered} 27^{\frac{2}{3}}=(\sqrt[3]{27})^{2}=3^{2}=9 \\ \left(\frac{25}{16}\right)^{\frac{3}{2}}=\left(\frac{\sqrt{25}}{\sqrt{16}}\right)^{3}=\left(\frac{5}{4}\right)^{3}=\frac{125}{64} \end{gathered}$ |



