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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Fractions**  |
| 1. Fraction | A mathematical expression representing the **division** of one integer by another.Fractions are written as **two numbers separated by a horizontal line**. | $\frac{2}{7}$ is a ‘proper’ fraction.$\frac{9}{4}$ is an ‘improper’ or ‘top-heavy’ fraction. |
| 2. Numerator | The **top** number of a fraction. | In the fraction $\frac{3}{5}$, 3 is the numerator. |
| 3. Denominator | The **bottom** number of a fraction. | In the fraction $\frac{3}{5}$, 5 is the denominator. |
| 4. Unit Fraction | A fraction where the **numerator is one** and the denominator is a positive integer. | $\frac{1}{2},\frac{1}{3},\frac{1}{4} etc. $are examples of unit fractions. |
| 5. Reciprocal | The reciprocal of a number is **1 divided by the number**.The reciprocal of $x$ is $\frac{1}{x}$**When we multiply a number by its reciprocal we get 1**. This is called the ‘multiplicative inverse’. | The reciprocal of $5$ is $\frac{1}{5}$The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$, because $$\frac{2}{3}×\frac{3}{2}=1$$ |
| 6. Mixed Number | A number formed of both an **integer part** and a **fraction part**. | $3\frac{2}{5}$ is an example of a mixed number. |
| 7. Simplifying Fractions | **Divide the numerator and denominator by the highest common factor**. | $$\frac{20}{45}=\frac{4}{9}$$ |
| 8. Equivalent Fractions | Fractions which represent the **same value**. | $$\frac{2}{5}=\frac{4}{10}=\frac{20}{50}=\frac{60}{150} etc.$$ |
| 9. Comparing Fractions | To compare fractions, they each need to be rewritten so that they have a **common denominator**.**Ascending** means **smallest to biggest**.**Descending** means **biggest to smallest**. | Put in to ascending order : $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$.Equivalent: $\frac{9}{12}, \frac{8}{12}, \frac{10}{12}, \frac{6}{12}$Correct order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$ |
| 10. Fraction of an Amount | **Divide** by the **bottom**, **times** by the **top** | Find $\frac{2}{5} $of £60$$60÷5=12$$$$12 ×2=24$$ |
| 11. Adding or Subtracting Fractions | Find the **LCM of the denominators** to find a common denominator.Use equivalent fractions to change each fraction to the **common denominator**.Then just **add or subtract the numerators** and keep the **denominator the same**. | $$\frac{2}{3}+\frac{4}{5}$$Multiples of 3: 3, 6, 9, 12, **15**..Multiples of 5: 5, 10, **15**..LCM of 3 and 5 = 15$$\frac{2}{3}=\frac{10}{15}$$$$\frac{4}{5}=\frac{12}{15}$$$$\frac{10}{15}+\frac{12}{15}=\frac{22}{15}=1\frac{7}{15}$$ |
| 12. Multiplying Fractions | **Multiply** the **numerators** together and **multiply** the **denominators** together. | $$\frac{3}{8}×\frac{2}{9}=\frac{6}{72}=\frac{1}{12}$$ |
| 13. Dividing Fractions | **‘Keep it, Flip it, Change it – KFC’**Keep the first fraction the sameFlip the second fraction upside downChange the divide to a multiplyMultiply by the reciprocal of the second fraction. | $$\frac{3}{4}÷\frac{5}{6}=\frac{3}{4}×\frac{6}{5}=\frac{18}{20}=\frac{9}{10}$$ |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Indices**  |
| 1. Square Number | The number you get when you **multiply a number by itself**. | **1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225…**$$9² = 9 × 9 = 81$$ |
| 2. Square Root | The **number you multiply by itself** to get another number.The reverse process of squaring a number. | $$\sqrt{36}=6$$because $6×6=36$ |
| 3. Solutions to $x^{2}= ….$ | **Equations** involving **squares** have **two solutions**, one **positive** and one **negative**. | Solve $x^{2}=25$$$x=5 or x=-5$$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**. | 1, 8, 27, 64, 125…$$2^{3}=2×2×2=8$$ |
| 5. Cube Root | The **number you multiply by itself and itself again** to get another number.The reverse process of cubing a number. | $$\sqrt[3]{125}=5$$because $5×5×5=125$ |
| 6. Powers of… | The powers of a number are that **number raised to various powers**. | The powers of 3 are:$3^{1}=3$ $3^{2}=9$ $3^{3}=27$ $3^{4}=81$ etc. |
| 7. Multiplication Index Law | When **multiplying** with the same base (number or letter), **add the powers**.$$a^{m}×a^{n}=a^{m+n}$$ | $$7^{5}×7^{3}=7^{8}$$$$a^{12}×a=a^{13}$$$$4x^{5}×2x^{8}=8x^{13}$$ |
| 8. Division Index Law | When **dividing** with the same base (number or letter), **subtract the powers**.$$a^{m}÷a^{n}=a^{m-n}$$ | $$15^{7}÷15^{4}=15^{3}$$$$x^{9}÷x^{2}=x^{7}$$$$20a^{11}÷5a^{3}=4a^{8}$$ |
| 9. Brackets Index Laws | When raising a power to another power, multiply the powers together.$$(a^{m})^{n}=a^{mn}$$ | $$(y^{2})^{5}=y^{10}$$$$(6^{3})^{4}=6^{12}$$$$(5x^{6})^{3}=125x^{18}$$ |
| 10. Notable Powers | $p=p^{1}$ $p^{0}=1$  | $$99999^{0}=1$$ |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Standard Form**  |
| 1. Standard Form | $$A × 10^{b}$$$$where 1\leq A<10, b=integer$$ | 8400 = 8.4 x $10^{3}$0.00036 = 3.6 x $10^{-4}$ |
| 2. Multiplying or Dividing with Standard Form | Multiply: **Multiply the numbers** and **add the powers**.Divide: **Divide the numbers** and **subtract the powers**. | $$\left(1.2×10^{3}\right)×\left(4×10^{6}\right)=8.8×10^{9}$$$$\left(4.5×10^{5}\right)÷\left(3×10^{2}\right)=1.5×10^{3}$$ |
| 3. Adding or Subtracting with Standard Form | **Convert** in to **ordinary** numbers, **calculate** and then **convert back** in to standard form | $$2.7×10^{4}+4.6×10^{3}$$$$=27000+4600=31600$$$$=3.16×10^{4}$$ |

**Knowledge Organiser**