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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Growth and Decay**  |
| 1. Exponential Growth | When we **multiply** a number **repeatedly** by the **same number** ($\ne 1)$, resulting in the number **increasing by the same proportion** each time.The original amount can grow very quickly in exponential growth. | $1, 2, 4, 8, 16, 32, 64, 128…$ is an example of exponential growth, because the numbers are being multiplied by 2 each time. |
| 2. Exponential Decay | When we **multiply** a number **repeatedly** by the **same number** ($0<x<1)$, resulting in the number **decreasing by the same proportion** each time.The original amount can decrease very quickly in exponential decay. | $1000, 200, 40, 8…$ is an example of exponential decay, because the numbers are being multiplied by $\frac{1}{5}$ each time. |
| 3. Compound Interest | Interest paid on the **original amount and the accumulated interest**. | A bank pays 5% compound interest a year. Bob invests £3000. How much will he have after 7 years.$$3000×1.05^{7}=£4221.30$$ |
| 4. Exponential Graph | The equation is of the form $y=a^{x}$**,** where $a $is a number called the **base**.If $a>1$ the graph **increases**.If $0<a<1$, the graph **decreases**.The graph has an **asymptote** which is the **x-axis**.The **y-intercept** of the graph $y=a^{x}$ is $(0,1)$**s** | Image result for exponential function definition math |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Compound Measures**  |
| 1. Metric System | A system of measures based on:* the metre for length
* the kilogram for mass
* the second for time

**Length: mm, cm, m, km****Mass: mg, g, kg****Volume: ml, cl, l** | $$1kilometres=1000 metres$$$$1 metre=100 centimetres$$$$1 centimetre=10 millimetres$$$$1 kilogram=1000 grams$$ |
| 2. Imperial System | A system of weights and measures originally developed in England, usually based on human quantities **Length: inch, foot, yard, miles****Mass: lb, ounce, stone****Volume: pint, gallon** | $$1lb=16 ounces$$$$1 foot=12 inches$$$$1 gallon=8 pints$$ |
| 3. Metric and Imperial Units | Use the **unitary method** to convert between metric and imperial units. | $$5 miles≈8 kilometres$$$$1 gallon≈4.5 litres$$$$2.2 pounds≈1 kilogram$$$$1 inch=2.5 centimetres$$ |
| 4. Speed, Distance, Time | **Speed = Distance ÷ Time****Distance = Speed x Time****Time = Distance ÷ Speed**Image result for speed distance time triangleRemember the correct units. | Speed = 4mphTime = 2 hoursFind the Distance.$$D = S × T = 4 × 2 = 8 miles$$ |
| 5. Density, Mass, Volume | **Density = Mass ÷ Volume****Mass = Density x Volume****Volume = Mass ÷ Density**Image result for dmv triangleRemember the correct units. | Density = 8kg/m³Mass = 2000gFind the Volume.$$V = M ÷ D = 2 ÷ 8 = 0.25m³$$ |
| 6. Pressure, Force, Area | **Pressure = Force ÷ Area****Force = Pressure x Area****Area = Force ÷ Pressure**Image result for pressure triangleRemember the correct units. | Pressure = 10 PascalsArea = 6cm²Find the Force$$F=P×A=10×6=60 N$$ |
| 7. Distance-Time Graphs | You can find the **speed** from the **gradient** of the line (Distance ÷ Time)The steeper the line, the quicker the speed.A **horizontal** line means the object is not moving (**stationary**). |  |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Proportion**  |
| 1. Direct Proportion | If two quantities are in direct proportion, **as one increases**, the **other increases** by the **same percentage**.If $y$ is directly proportional to $x$, this can be written as $y ∝ x$An equation of the form $y=kx $represents direct proportion, where $k$ **is the constant of proportionality**. |  |
| 2. Inverse Proportion | If two quantities are inversely proportional, **as one increases**, the **other decreases** by the **same percentage**.If $y$ is inversely proportional to $x$, this can be written as $y ∝\frac{1}{x}$An equation of the form $y=\frac{k}{x}$ represents inverse proportion. |  |
| 3. Using proportionality formulae | **Direct**: **y = kx** or **y**$ ∝ $**x****Inverse**: **y =** $\frac{k}{x}$ or **y** $∝$$\frac{1}{x}$1. **Solve to find k** using the pair of values in the question.2. **Rewrite the equation** using the k you have just found.3. **Substitute the other given value** from the question in to the equation to **find the missing value**. | p is directly proportional to q.When p = 12, q = 4. Find p when q = 20.1. p = kq12 = k x 4so k = 32. p = 3q3. p = 3 x 20 = 60, so p = 60 |
| 4. Direct Proportion with powers | Graphs showing **direct proportion** can be written in the form $y=kx^{n}$Direct proportion graphs will always start at the origin. |  |
| 5. Inverse Proportion with powers | Graphs showing **inverse proportion** can be written in the form $y=\frac{k}{x^{n}}$Inverse proportion graphs will never start at the origin. |  |

**Knowledge Organiser**