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| **Topic/Skill** | **Definition/Tips**  **Topic: Graphs and Graph Transformations** | **Example** |
| 1. Coordinates | Written in **pairs**. The **first** term is the **x-coordinate** (movement **across**). The **second** term is the **y-coordinate** (movement **up or down**) | A: (4,7)  B: (-6,-3) |
| 2. Linear Graph | **Straight line** graph.  The **equation** of a linear graph can contain an **x-term**, a **y-term** and a **number**. | Example:  Image result for linear graphOther examples: |
| 3. Quadratic Graph | A ‘**U-shaped**’ curve called a **parabola**.  The equation is of the form  , where , and are numbers, .  If **,** the parabola is **upside down**. | Image result for quadratic graph definition math |
| 4. Cubic Graph | The equation is of the form , where  **is an number**.  If , the curve is **increasing**.  If , the curve is **decreasing**. | Image result for cubic function definition mathImage result for cubic function definition math |
| 5. Reciprocal Graph | The equation is of the form , where  **is a number** and .  The graph has **asymptotes** on the **x-axis and y-axis**. | Image result for reciprocal graph |
| 6. Asymptote | A **straight line** that a graph **approaches** but **never touches**.  **Subject: Maths** | Image result for asymptote definition maths |
| 7. Exponential Graph | The equation is of the form **,** where is a number called the **base**.  If the graph **increases**.  If , the graph **decreases**.  The graph has an **asymptote** which is the **x-axis**. | Image result for exponential function definition math |
| 8. | Key Coordinates:  is never more than 1 or less than -1.  Pattern repeats every 360°. | Image result for sine graph gcse |
| 9. | Key Coordinates:  is never more than 1 or less than -1.  Pattern repeats every 360°. | cosine graph |
| 10. | Key Coordinates:  **Asymptotes** at and  Pattern repeats every 360°. | tan graph |
| 11. | **Vertical translation** up a units. | Image result for graph transformations vertical translation |
| 12. | **Horizontal translation** left a units. | Image result for graph transformations vertical translation |
| 13. | **Reflection** over the **x-axis**. | Image result for graph transformations reflections |
| 14. | **Reflection** over the **y-axis**. | Image result for graph transformations reflections |
| **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 is directly proportional to , this can be written as  An equation of the form represents direct proportion, where  **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 is inversely proportional to , this can be written as  An equation of the form represents inverse proportion. |  |
| 3. Using proportionality formulae | **Direct**: **y = kx** or **yx**  **Inverse**: **y =**  or **y**  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 = kq  12 = k x 4  so k = 3  2. p = 3q  3. p = 3 x 20 = 60, so p = 60 |
| 4. Direct Proportion with powers | Graphs showing **direct proportion** can be written in the form  Direct proportion graphs will always start at the origin. |  |
| 5. Inverse Proportion with powers | Graphs showing **inverse proportion** can be written in the form  Inverse proportion graphs will never start at the origin. |  |
| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Area Under Graph and Gradient of Curve** |
| 1. Area Under a Curve | To find the area under a curve, **split it up into simpler shapes** – such as rectangles, triangles and trapeziums – that approximate the area. |  |
| 2. Tangent to a Curve | A straight **line** that **touches** a curve at **exactly one point**. | Image result for tangent to a curve |
| 3. Gradient of a Curve | The **gradient of a curve** at a point is the same as the **gradient of the tangent** at that point.  1. Draw a tangent carefully at the point.  2. Make a right-angled triangle.  3. Use the measurements on the axes to calculate the rise and run (change in y and change in x)  4. Calculate the gradient. |  |
| 4. Rate of Change | The rate of change at a particular instant in time is represented by the **gradient of the tangent to the curve** at that point. | Image result for positive negative rate of change |
| 5. 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**). |  |
| 6. Velocity-Time Graphs | You can find the **acceleration** from the **gradient** of the line (Change in Velocity ÷ Time)  The steeper the line, the quicker the acceleration.  A **horizontal line** represents no acceleration, meaning a **constant velocity**.  The **area** under the graph is the **distance.** |  |

**Knowledge Organiser**