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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Coordinates and Linear Graphs**  |
| 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. Midpoint of a Line | Method 1: **add the x coordinates and divide by 2**, **add the y coordinates and divide by 2**Method 2: Sketch the line and find the values half way between the two x and two y values.  | Find the midpoint between (2,1) and (6,9)$\frac{2+6}{2}=4$ and $\frac{1+9}{2}=5$So, the midpoint is (4,5) |
| 3. Linear Graph | **Straight line** graph.The general equation of a linear graph is$$y=mx+c$$where $m$ **is the gradient** and $c$ **is the y-intercept**.The **equation** of a linear graph can contain an **x-term**, a **y-term** and a **number**. | Example:Image result for linear graphOther examples:$x=y$ $y=4$ $x=-2$ $y=2x-7$ $y+x=10$ $2y-4x=12$  |
| 4. Plotting Linear Graphs | Method 1: **Table of Values**Construct a table of values to calculate coordinates.Method 2: **Gradient-Intercept Method** (use when the equation is in the form $y=mx+c$)1. Plots the y-intercept2. Using the gradient, plot a second point.3. Draw a line through the two points plotted.Method 3: **Cover-Up Method** (use when the equation is in the form $ax+by=c$)1. Cover the $x$ term and solve the resulting equation. Plot this on the $x-axis.$2. Cover the $y$ term and solve the resulting equation. Plot this on the $y-axis.$3. Draw a line through the two points plotted. | Image result for gradient intercept methodImage result for cover up method straight line graphs |
| 5. Gradient | The gradient of a line is how **steep** it is.**Gradient =** $$\frac{Change in y}{Change in x}=\frac{Rise}{Run}$$The gradient can be positive (sloping upwards) or negative (sloping downwards) |  |
| 6. Finding the Equation of a Line given a point and a gradient | **Substitute** in the **gradient (m)** and **point (x,y)** in to the equation $y=mx+c$ and **solve for c**. | Find the equation of the line with gradient 4 passing through (2,7).$$y=mx+c$$$$7=4×2+c$$$$c=-1$$$$y=4x-1$$ |
| 7. Finding the Equation of a Line given two points | Use the two points to **calculate the gradient**. Then **repeat the method above** using the gradient and either of the points. | Find the equation of the line passing through (6,11) and (2,3)$$m=\frac{11-3}{6-2}=2$$$$y=mx+c$$$$11=2×6+c$$$$c=-1$$$$y=2x-1$$ |
| 8. Parallel Lines | If two lines are **parallel**, they will have the **same gradient**. The value of m will be the same for both lines. | Are the lines $y=3x-1$ and $2y-6x+10=0$ parallel?Answer:Rearrange the second equation in to the form $y=mx+c$$$2y-6x+10=0\rightarrow y=3x-5$$Since the two gradients are equal (3), the lines are parallel. |
| 9. Perpendicular Lines | If two lines are **perpendicular**, the **product** of their **gradients** will always equal **-1**.The gradient of one line will be the **negative reciprocal** of the gradient of the other line.You may need to rearrange equations of lines to compare gradients (they need to be in the form $y=mx+c)$ | Find the equation of the line perpendicular to $y=3x+2$ which passes through (6,5)Answer:As they are perpendicular, the gradient of the new line will be $-\frac{1}{3}$ as this is the negative reciprocal of 3.$$y=mx+c$$$$5=-\frac{1}{3}×6+c$$$$c=7$$$$y=-\frac{1}{3}x+7$$Or$$3x+x-7=0$$ |

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| **Topic/Skill**  | **Definition/Tips****Topic: Non-linear Graphs**  | **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:$x=y$ $y=4$ $x=-2$ $y=2x-7$ $y+x=10$ $2y-4x=12$  |
| 3. Quadratic Graph | A ‘**U-shaped**’ curve called a **parabola**.The equation is of the form$y=ax^{2}+bx+c$, where $a$, $b$ and $c$ are numbers, $a\ne 0$. If $a<0$**,** the parabola is **upside down**. | Image result for quadratic graph definition math |
| 4. Cubic Graph | The equation is of the form $y=ax^{3}+k$, where $k$ **is an number**.If $a>0$, the curve is **increasing**.If $a<0$, 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 $y=\frac{A}{x}$, where $A$ **is a number** and $x\ne 0$.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 $y=a^{x}$**,** 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**. | Image result for exponential function definition math |

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| **Topic/Skill**  | **Definition/Tips****Topic: Equation of a Circle and Tangent**  | **Example** |
| 1. Equation of a Circle | The equation of a **circle**, **centre (0,0),** **radius r**, is:$$x^{2}+y^{2}=r^{2}$$ | $$x^{2}+y^{2}=25$$ |
| 2. Tangent | A straight **line** that **touches** a circle at **exactly one point**, never entering the circle’s interior.A **radius** is **perpendicular** to a **tangent** at the **point of contact**. | Image result |
| 3. Gradient | **Gradient** is another word for **slope**.$$G= \frac{Rise}{Run}= \frac{Change in y}{Change in x}= \frac{y\_{2}-y\_{1}}{x\_{2}-x\_{1}}$$ | Image result for gradient maths example |
| 4. Circle Theorem 5 | **A tangent is perpendicular to the radius at the point of contact.** | $y=5cm $(Pythagoras’ Theorem) |

**Knowledge Organiser**