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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Trigonometry**  |
| 1. Exact Values for Angles in Trigonometry |

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|  | **0°** | **30°** | **45°** | **60°** | **90°** |
| **sin** | **0** | $$\frac{1}{2}$$ | $$\frac{\sqrt{2}}{2}$$ | $$\frac{\sqrt{3}}{2}$$ | **1** |
| **cos** | **1** | $$\frac{\sqrt{3}}{2}$$ | $$\frac{\sqrt{2}}{2}$$ | $$\frac{1}{2}$$ | **0** |
| **tan**  | **0** | $$\frac{1}{\sqrt{3}}$$ | **1** | $$\sqrt{3}$$ | **----** |

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| 2. Sine Rule | Use with **non right angle triangles**.Use when the question involves **2 sides and 2 angles**.For missing side:$$\frac{a}{\sin(A)}=\frac{b}{\sin(B)}$$For missing angle:$$\frac{\sin(A)}{a}=\frac{\sin(B)}{b}$$There is an **ambiguous case** (where there are two potential answers)To find the two angles, use **sine** to find one, and then **subtract your answer from 180** to find the other answer. | $$\frac{x}{\sin(85)}=\frac{5.2}{\sin(46)}$$$$x=\frac{5.2×\sin(85)}{\sin(46)}=3.75cm$$$$\frac{\sin(θ)}{1.9}=\frac{\sin(85)}{2.4}$$$$\sin(θ)=\frac{1.9×\sin(85)}{2.4}=0.789$$$$θ=sin^{-1}\left(0.789\right)=52.1°$$ |
| 3. Cosine Rule | Use with **non right angle triangles**.Use when the question involves **3 sides and 1 angle**.For missing side:$$a^{2}=b^{2}+c^{2}-2bccosA$$For missing angle:$$\cos(A=\frac{b^{2}+c^{2}-a^{2}}{2bc})$$ | $$x^{2}=9.6^{2}+7.8^{2}-(2×9.6×7.8×\cos(85))$$$$x=11.8$$$$\cos(θ=\frac{7.2^{2}+8.1^{2}-6.6^{2}}{2×7.2×8.1})$$$$θ=50.7°$$ |
| 4. Graphs of Trigonometric Functions |  |  |
| 5. Area of a Triangle | Use when given the **length of two sides and the included angle**.$$Area of a Triangle=\frac{1}{2}ab\sin(C) $$ | trig area example$$A=\frac{1}{2}ab\sin(C)$$$$A=\frac{1}{2}×7×10×\sin(25)$$$$A=14.8$$ |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Pythagoras’ Theorem**  |
| 1. Pythagoras’ Theorem | For any **right angled triangle**:$$a^{2}+b^{2}=c^{2}$$Used to find **missing lengths**.a and b are the shorter sides, c is the **hypotenuse** (**longest side**). |  |
| 2. 3D Pythagoras’ Theorem | Find missing lengths by **identifying right angled triangles**.You will often have to find a missing length you are not asked for before finding the missing length you are asked for. | Can a pencil that is 20cm long fit in a pencil tin with dimensions 12cm, 13cm and 9cm? The pencil tin is in the shape of a cuboid.Hypotenuse of the base = $\sqrt{12^{2}+13^{2}}=17.7$Diagonal of cuboid = $\sqrt{17.7^{2}+9^{2}}=19.8cm$No, the pencil cannot fit. |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Accuracy**  |
| 1. Place Value | The **value** of where a **digit** is within a number. | In 726, the value of the 2 is 20, as it is in the ‘tens’ column. |
| 2. Place Value Columns | The names of the columns that **determine the value of each digit**.The ‘ones’ column is also known as the ‘units’ column. | Image result for place value columns |
| 3. Rounding | To make a number simpler but keep its value close to what it was.If the **digit to the right** of the rounding digit is **less than 5, round down**. If the **digit to the right** of the rounding digit is **5 or more, round up**. | 74 rounded to the nearest ten is 70, because 74 is closer to 70 than 80.152,879 rounded to the nearest thousand is 153,000.  |
| 4. Decimal Place | The **position** of a digit to the **right of a decimal point**. | In the number 0.372, the 7 is in the second decimal place.0.372 rounded to two decimal places is 0.37, because the 2 tells us to round down.Careful with money - don’t write £27.4, instead write £27.40 |
| 5. Significant Figure | The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number.The **first significant figure** of a number **cannot be zero**.In a number with a decimal, trailing zeros are not significant. | In the number 0.00821, the first significant figure is the 8.In the number 2.740, the 0 is not a significant figure.0.00821 rounded to 2 significant figures is 0.0082.19357 rounded to 3 significant figures is 19400. We need to include the two zeros at the end to keep the digits in the same place value columns. |
| 6. Truncation | A method of approximating a decimal number by **dropping all decimal places** past a certain point **without rounding**. | 3.14159265… can be truncated to 3.1415 (note that if it had been rounded, it would become 3.1416) |
| 7. Error Interval | A **range of values** that a number could have taken before being rounded or truncated.An error interval is written using inequalities, with a **lower bound** and an **upper bound**.Note that the lower bound inequality can be ‘equal to’, but the upper bound cannot be ‘equal to’. | 0.6 has been rounded to 1 decimal place. The error interval is:$$0.55\leq x<0.65$$The lower bound is 0.55The upper bound is 0.65 |
| 8. Estimate | To find something **close to the correct answer**. | An estimate for the height of a man is 1.8 metres. |
| 9. Approximation | When using approximations to estimate the solution to a calculation, **round each number in the calculation to 1 significant figure**.$≈ $means ‘approximately equal to’ | $$\frac{348+692}{0.526}≈\frac{300+700}{0.5}=2000$$‘Note that dividing by 0.5 is the same as multiplying by 2’ |

**Knowledge Organiser**