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# Tips for M1 questions

- Draw a fully labelled force diagram
- Clearly signpost your mechanics
- Remember your units and rounding (state 3sf)

| Type of question | What must I remember? |
|---|---|
| Constant acceleration | Learn the 5 SUVAT equations<br><br>State clearly which equation you have substituted into<br><br>State clearly which direction you have taken as positive<br><br>Constant speed means a = 0<br><br>Remember rounding and 3sf |
| Greatest height | v = 0 |
| Two part constant acceleration | When splitting a time period into two parts, consider which parts may be the same and how they are linked<br><br>$s = s_1 + s_2$<br><br>$t = t_1 + t_2$<br><br>$v_1 = u_2$ |
| Using Newton II | Draw a fully labelled force diagram<br><br>State which direction you have resolved in (R↗)<br><br>Forces – Forces = mass x acceleration<br>NOT Force = Force<br><br>If a force is in the opposite direction you are resolving to, it is negative<br><br>If sin α = 3/5, then draw a triangle<br><br>Weight is not the same as mass |
| Particles on a slope | Resolve parallel and perpendicular to the slop<br><br>“Contact force” is the resultant of the normal reaction and friction |

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| Velocity / time graphs | Gradient = acceleration<br><br>Area under the graph = total distance travelled |
| Distance / time graphs | Gradient = velocity<br><br>Label both of your axes including the units<br><br>Label key values with vertical and horizontal dotted lines |
| Using Newton III | Draw a fully labelled force diagram<br><br>Pairs of forces are equal in size and type<br><br>Pairs of forces act in opposite directions<br><br>Pairs of forces act of different objects |
| Momentum | Draw a diagram showing the particles before and after<br><br>If momentum is conserved, state "conservation of momentum" followed by the formula:<br><br>$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$<br><br>"Coalesce" means that after the collision, the particles move as one (combined mass with the same velocity |
| Combining and splitting forces | Given components of a force:<br><br>The magnitude of a force means you should use Pythagoras'<br><br>The direction a force is applied in usually involves using $\tan^{-1}$ (o/a). However, be careful. Draw a diagram to make sure<br><br>Draw the forces together and use the sine or cosine rule |
| Non-constant acceleration | Given s as a function of t, differentiate to get v as a function of t<br><br>Given v as a function of t, differentiate to get a as a function of t<br><br>s → v → a (differentiate)<br><br>a → v → s (integrate)<br><br>When integrating, remember the +c which you can work out given some initial condition |
| Pulleys | Resolve each particle separately but state which particle you have resolved with respect to |

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| | These are usual simultaneous equations questions<br><br>Tension is the same (opposite direction) as long as the string is inextensible<br><br>The acceleration is the same (opposite direction) as long as the string remains taut |
| Friction | If friction is limiting, $f = \mu R$<br><br>If the particle is moving on a rough surface, friction is limiting<br><br>If friction is not limiting, $f \leq \mu R$<br><br>Friction always acts in the opposite direction to motion |
| Internal and external forces | Draw a fully labelled force diagram, clearly showing which forces are acting on which particle<br><br>Resolve the system (remember that tension in a string is not included as the string is not accelerating)<br><br>Resolve each particle separately (consider which forces are acting on which particle) |