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| **7 Mechanical principles** |  |
| Criteria | Range | Resource identified |
| 7.1 Principles of motion and mechanics in engineering and manufacturing systems | Newton’s three laws of motion | <https://www.bbc.co.uk/bitesize/guides/zqs47p3/revision/1> |
| <https://en.wikipedia.org/wiki/Newton%27s_laws_of_motion> |
| types of forces (concurrent, non-concurrent, co-planar, non-contact) | <https://knowledge4civil.wordpress.com/2016/12/14/forces-and-classification/> |
| simply supported beams (loading, load distribution (point, uniformly distributed, combination of point and uniformly distributed), reaction forces, loaded components, shear force, bending moments) | <https://pressbooks.bccampus.ca/powr4406/chapter/beam-reactions-and-diagrams/> |
| <https://www.bbc.co.uk/bitesize/guides/ztjpb82/revision/1> |
| <https://www.youtube.com/watch?v=sxkEgZ9IueQ> |
| <https://www.youtube.com/watch?v=pbyFNJTivrk> |
| <https://www.youtube.com/watch?v=Xvg38nlxkOU> |
| https://calcresource.com/statics-simple-beam.html |
| 7.2 Principles of forces and energy | Principle of conservation of momentum | <https://www.bbc.co.uk/bitesize/guides/zc9bv9q/revision/2> |
|   | <https://s-cool.co.uk/a-level/physics/momentum-and-impulse/revise-it/principle-of-the-conservation-of-momentum> |
|   | https://www.khanacademy.org/science/physics/linear-momentum/momentum-tutorial/a/what-is-conservation-of-momentum |
|   | principle of conservation of energy | <https://www.bbc.co.uk/bitesize/guides/z4yj6sg/revision/1> |
|   | https://www.khanacademy.org/science/physics/work-and-energy/work-and-energy-tutorial/a/what-is-conservation-of-energy |
|   | D’Alembert’s principle | <https://en.wikipedia.org/wiki/D%27Alembert%27s_principle> |
|   | https://www.vedantu.com/physics/dalemberts-principle |

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|   | potential and kinetic energy | <https://www.bbc.co.uk/bitesize/guides/zhvv2sg/revision/1> |
|   | <https://taraenergy.com/blog/potential-and-kinetic-energy-explained/> |
|   | gravitational force | <https://www.bbc.co.uk/bitesize/guides/z8wx6sg/revision/3> |
|   | <https://en.wikipedia.org/wiki/Gravity> |
|   | frictional resistance | <https://www.bbc.co.uk/bitesize/guides/zttfyrd/revision/4> |
|   | <https://www.theschoolrun.com/homework-help/friction-and-resistance> |
|   | mechanical work | <https://www.bbc.co.uk/bitesize/guides/z8pk3k7/revision/1> |
|   | [https://en.wikipedia.org/wiki/Work\_(physics)](https://en.wikipedia.org/wiki/Work_%28physics%29) |
|   | power | <https://www.bbc.co.uk/bitesize/guides/zp8jtv4/revision/2> |
|   | types of power sources (mechanical, electrical, renewable). | <https://www.bbc.co.uk/bitesize/guides/z8k9v9q/revision/1> |
|   | <https://www.energy.gov/energy-sources> |