### Key Equations

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| Definition of momentum |  |
| Impulse |  |
| Impulse-momentum theorem |  |
| Average force from momentum |  |
| Instantaneous force from momentum (Newton’s second law) |  |
| Conservation of momentum |  |
| Generalized conservation of momentum |  |
| Conservation of momentum in two dimensions | multiline equation line 1 p sub f comma x equals p sub one comma i comma x plus p sub two comma i comma x line 2 p sub f comma y equals p sub one comma i comma y plus p sub two comma i comma y |
| External forces |  |
| Newton’s second law for an extended object |  |
| Acceleration of the center of mass |  |
| Position of the center of mass for a system  of particles |  |
| Velocity of the center of mass |  |
| Position of the center of mass of a continuous object |  |
| Rocket equation |  |