Engineering Mechanics – Dynamics

University Mechanical Engineering · Vocabulary in context

Word	Example
dynamics /daɪˈnæmɪks/	Study **dynamics** to relate motion to the forces causing it.
• **particle** /ˈpɑːtɪkl/	Modelling the ball as a **particle** means we ignore its size and any rotation.
position vector /pəˈzɪʃn ˈvektə/	Draw the **position vector** from the origin to the box.
velocity /vəˈlɒsɪti/	The ball's **velocity** is 5 m/s to the left. 5 m/s
acceleration /əkˌseləˈreɪʃn/	The car speeds up quickly, so its **acceleration** is large.
trajectory /trəˈdʒektəri/	The ball's **trajectory** is a curve.
projectile motion /prəˈdʒektaɪl ˈməʊʃn/	One model of **projectile motion** ignores air resistance.
polar coordinates /ˈpəʊlə kəʊˈɔːdɪnəts/	Use **polar coordinates** to give position as distance and angle.
angular velocity /ˈæŋgjʊlə vəˈlɒsɪti/	The wheel turns with an **angular velocity** of 3 rad/s. 3 rad/s
normal force /ˈnɔːml fɔːs/	The **normal force** acts perpendicular to the contact surface.
friction /ˈfrɪkʃn/	**Friction** between the tyres and the road stops the car sliding.
free-body diagram /fri: ˈbɒdi ˈdaɪəgræm/	Draw a **free-body diagram** with an arrow for each force.

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equation of motion	Use the **equation of motion** to relate net force and acceleration.
work /wɜːk/	You do **work** when you push a box across the floor.
kinetic energy /kɪˈnetɪk ˈenədʒi/	A fast car has a lot of **kinetic energy**.
potential energy /pəˈtenʃl ˈenədʒi/	Raising the box increases its gravitational **potential energy**.
spring constant /sprɪŋ ˈkɒnstənt/	A stiffer spring has a larger **spring constant**.
energy method	Use the **energy method** to find speed after a drop.
linear momentum /ˈlɪnɪə məʊˈmentəm/	**Linear momentum** is mass times velocity.
impulse /ˈɪmpʌls/	A kick gives the ball an **impulse**.
coefficient of restitution /ˌkəʊɪˈfɪʃənt ɒv rɪstɪˈtjuːʃn/	Find the **coefficient of restitution** from approach and separation speeds.
steady flow	In **steady flow**, conditions at each fixed point stay constant.
rigid body /ˈrɪdʒɪd ˈbɒdi/	A wheel can be treated as a **rigid body**.
slider-crank mechanism	A **slider-crank mechanism** turns rotation into back-and-forth motion.
instant centre	At the **instant centre**, instantaneous velocity is zero.
rolling without slipping /ˈrəʊlɪŋ wɪˈðaʊt ˈslɪpɪŋ/	This wheel moves by **rolling without slipping** on the road.

Word	Example
rotating frame /rəʊˈteɪtɪŋ freɪm/	The observer uses a **rotating frame** attached to the wheel.
mass moment of inertia	A flywheel's **mass moment of inertia** depends on its mass distribution.
torque /tɔːk/	Net **torque** changes angular momentum.
angular acceleration /ˈæŋgjʊlə əkˌseləˈreɪʃn/	A wheel that spins faster and faster has an **angular acceleration**.
angular momentum /ˈæŋgjʊlə məʊˈmentəm/	A spinning ice skater has **angular momentum**.
tipping	In **tipping**, the box rotates about an edge of its base.

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