Year 7 Design & Technology: Mechanical Systems - Student Revision Guide

Note: It is also advisable to look through the PowerPoints and Worksheets you have completed in class. This will help you see visual examples

1. Workshop Safety

Personal Protective Equipment (PPE):

- Always wear goggles when using tools or machines to protect your eyes.

- Use ear defenders when working with loud equipment.

- Wear an apron to protect your clothes and body.

- Tie back long hair and remove loose jewelry – Entanglement.

Safe Practices:

- Keep your work area clean and tidy.

- Report any broken tools or unsafe conditions.

- Always follow your teacher's instructions.

- Keep hands and fingers away from moving parts.

Common Workshop Rules:

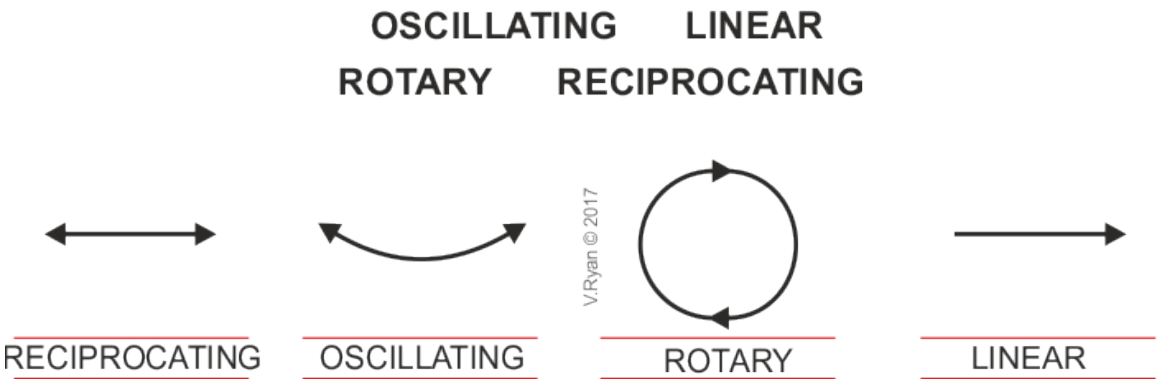
- No running in the workshop.

- Only enter with a teacher's permission.

- Carry tools safely – point down and close to your side.

- Check machines before use and never leave them unattended.

2. Motion and Movement



Types of Motion:

- Linear: Moves in a straight line (e.g., train on a track).

- Rotary: Moves in a circle around a central point (e.g., wheels).

- Reciprocating: Moves back and forth in a straight line (e.g., saw).

- Oscillating: Swings back and forth in a curve (e.g., pendulum).

Levers:

- Consist of a load, effort, and fulcrum (Pivot).

- 3 Types: (Look at OneNote for Examples)

- Class 1 (e.g., scissors)

- Class 2 (e.g., wheelbarrow)

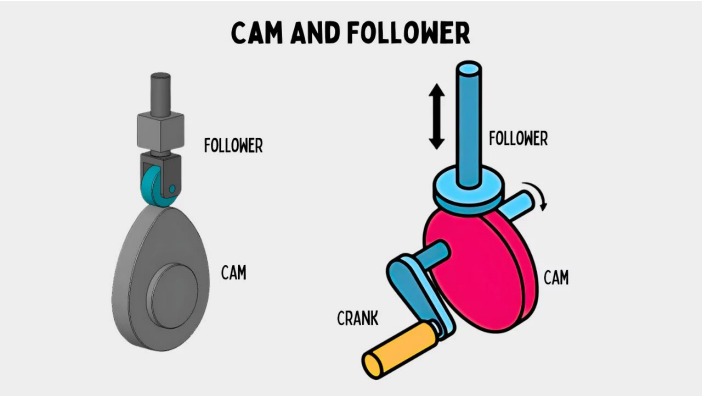
- Class 3 (e.g., tweezers)

Linkages: (Look at OneNote for Examples)

- Change direction or type of movement.

- Parallel motion, reverse motion, bell crank, crank and slider.

3. Cams and Followers



Cam Mechanisms:

- Convert rotary motion to reciprocating motion.

Key Terms:

- Rise: Follower moves up.

- Fall: Follower moves down.

- **Dwell:** Follower stays still.

Types of Cams:

- Eccentric: Smooth rise and fall.

- Snail: Gradual rise, sudden fall (one-way use).

- Pear: Smooth rise and fall, long dwell.

- **Heart:** Constant speed, no dwell.

Types of Followers:

- **Flat:** Good under load, high friction.

- **Knife Edge**: Accurate, low friction, wears quickly.

- **Roller**: Low friction, durable, good under high speed movement.

4. Gears, Pulleys and Drive Mechanisms

Gear Systems:

- Gear: Toothed wheel on a rotating shaft.

- Gear Train: Two or more gears working together.

- Idler Gear: Allows same direction rotation.

Special Gear Types:

- Compound Gears: Share axles, change speed.

- Bevel Gears: Change direction by 90°.

Pulley & Belt:

- Pulley is a grooved wheel with a belt.

- Belts transfer drive, can stretch or slip.

Chains & Sprockets:

- Sprockets interlock with chains.

- Chains offer a slip-free drive.

Friction & Lubrication:

- Friction slows down mechanisms and causes wear.

- Lubricants (oil/grease) reduce friction and improve performance.