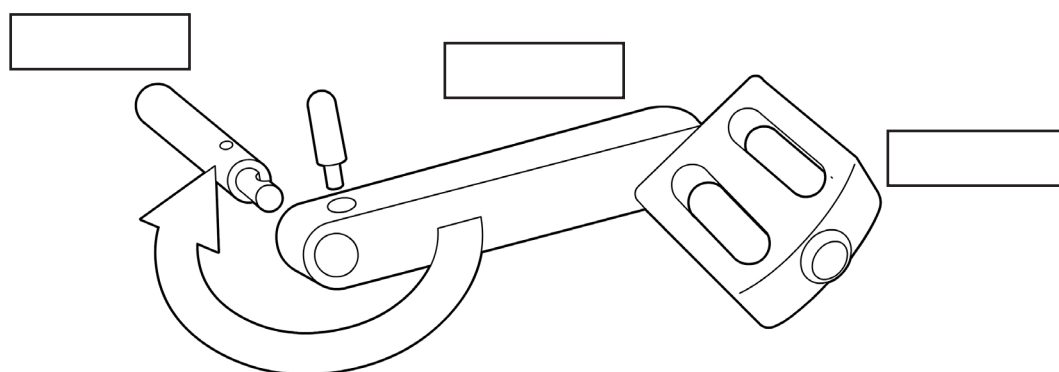


The Crank

Name: _____

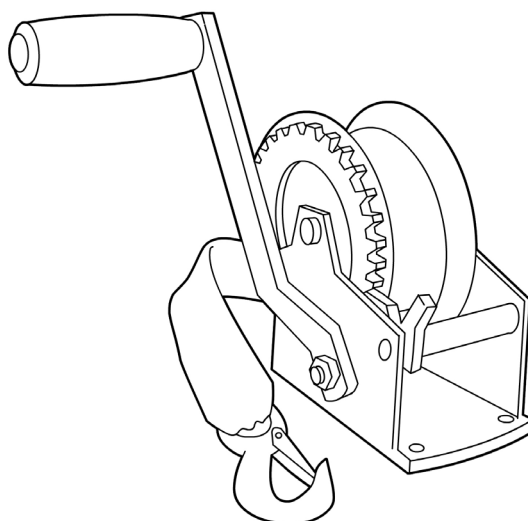
A crank is a type of second class lever. It is a simple mechanism that consist of an arm attached on one end to a shaft (or axle) that can turn and on the other end, the arm has a handle or pedal. The purpose of a crank is to change *rotary* motion into *linear* motion to do a task. An example of a crank can be seen in a bicycle pedal.

Label this diagram using these labels: Shaft or Axle, Crank, Pedal.



Because it is attached to an angle at a 90° angle, the crank can pivot in a complete circle around the axle or shaft. At the other end of the crank, the pedal is attached to the lever of the crank at a 90° angle.

When you turn the pedal-crank-system, you increase the turning force of the angle. This gives the system more mechanical advantage (MA) which allows the system to do more work with less effort. The bicycle pedal system is attached to many other parts, including the wheels. As the pedal and crank turn, the axle turns which ultimately turns the wheels and allows the bicycle to move forward. Another example of this is the winch (pictured).



This picture on the previous page shows a hand-operated winch, but there are many types, for example, off-road vehicles use motorised winches. Winches are used to lift or pull a load. For example, this hand-operated winch might be used to lift a bucket out of a well, whereas the winch of an off-road vehicle might be used to pull the vehicle out of a muddy pit.

The system is very similar to a bicycle pedal, except that there is a cable or rope which is wound around the axle. If the handle and crank are turned, the axle also turns and either reels the rope in or reels it out.

ACTIVITY: Make your own winch

You will need: a polystyrene cup, 20cm of stiff metal wire, 50cm of string, clear adhesive glue, an eraser.

1. Measure 10cm on the wire, make a mark. Measure another 5cm and mark it. At the first mark, bend the wire at 90° to the long end. At the second mark, bend the wire 90° the part just bent.
2. Measure 2cm from the top (wide end) of the cup and gently push the 10cm section of wire through the cup so it comes out of the other side.
3. Tie the string around the wire and glue it to the wire so that it cannot move. Wait for the glue to dry.
4. Tie the other end of the string to the eraser (the eraser will be the load).
5. When the glue is dry, use the crank to wind up the string onto the wire inside the cup. Turn the cup upside down and use the crank to lift and lower the eraser.



Answer sheet

Label this diagram using these labels: Shaft or Axle, Crank, Pedal.

