Standard Servo Operation

Introduction:

This project introduced you to servo motors and their methods of operation. Servo motors are simply DC motors that have a servo controller that directs the position of the motor. It is essentially a DC (direct current motor) with gears. You were also introduced to **PWM signals** and their importance since the servo motors can only function with PWM signals. The **differences** between the continuous and the standard servo were explored and as to how they are programmed.

The continuous servo sets the **speed and direction** of movement, where certain pulse widths trigger either a **clockwise or counterclockwise** rotation. Task 1 involves the continuous servo whereas Task 2 involves the standard servo.

Standard servo's function **differently** than continuous servos!!! A standard servo can only move from 0° - 180° degrees as opposed to a 360° movement by the continuous. Standard servo's move based on the **position, not the speed or direction**. For example, if we were to say the following:

```
myServo.write(20);
```

The **continuous motor** would move clockwise with a steady speed (not fastest). Remember that **both the direction and speed** is set by the continuous servo!!! **"20"** will trigger the clockwise rotation, but the speed will be a little slower since it is away from the "0" pulse width that sets the speed at the highest.

What about the standard servo? The standard servo would move to the **position set at 20**. What does that mean? Let's take a closer look at the **position chart of a standard servo**:

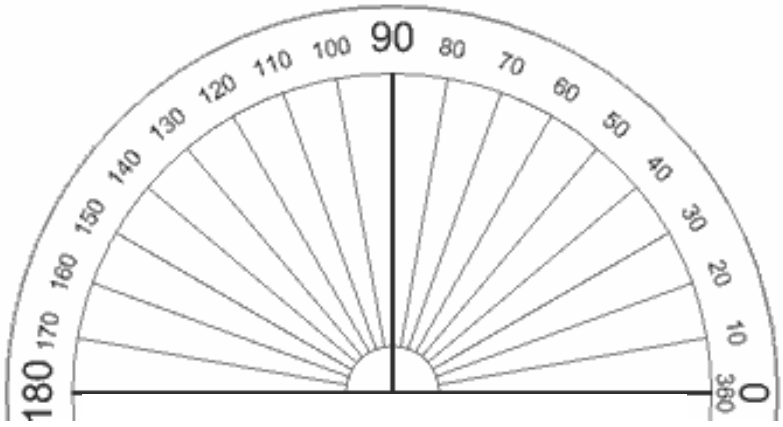


Fig 1-1 Position Scale of a Standard Servo modeling a 180° angle

The position scale of a standard servo's available range of motion is shown above, with **0 - 180° as the scale factor.** Using the example provided, the "20" would mean that **the standard servo would turn to the 20° mark**. Still confused? Let's look at another example on the next page:

Example:

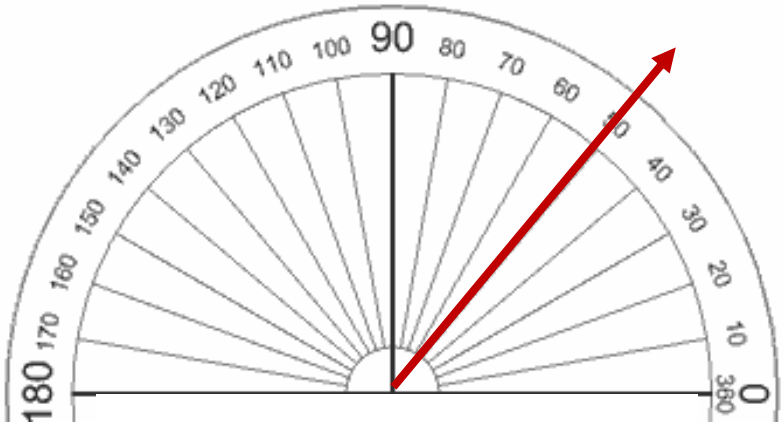
Program the standard servo to rotate to the 50° position.

Solution:

The answer will be simply:

```
myServo.write(50);
```

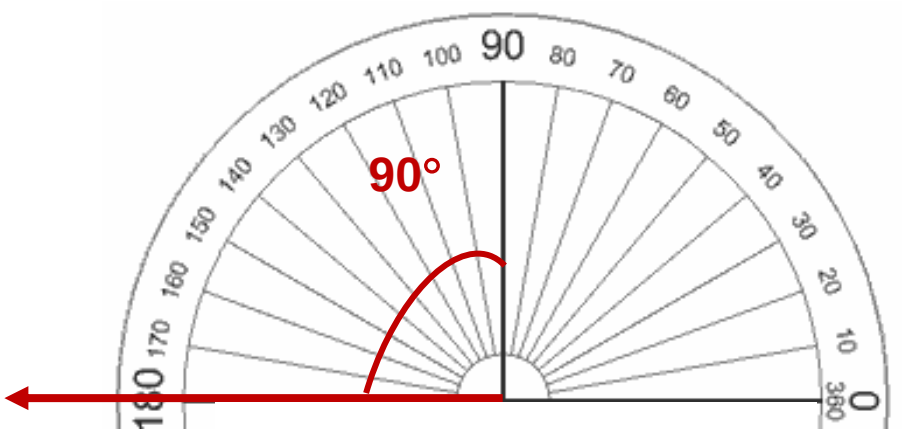
The "50" is basically setting where the standard servo will be positioned to as shown:



Task 2 asks us to program the standard servo to rotate **counterclockwise** for 45° for 5 seconds. Before we discuss how we can do this, please **do the following**:

Take a jumper wire and **wrap it around** two holes as shown above. The reason we do this is because we can use it as the indicator point. **Note that 90° is denoted as the neutral or starting position, hence the 0° on the diagram.**

Let's say we want to move 90° counterclockwise. Where would we end up? At 180° as shown:



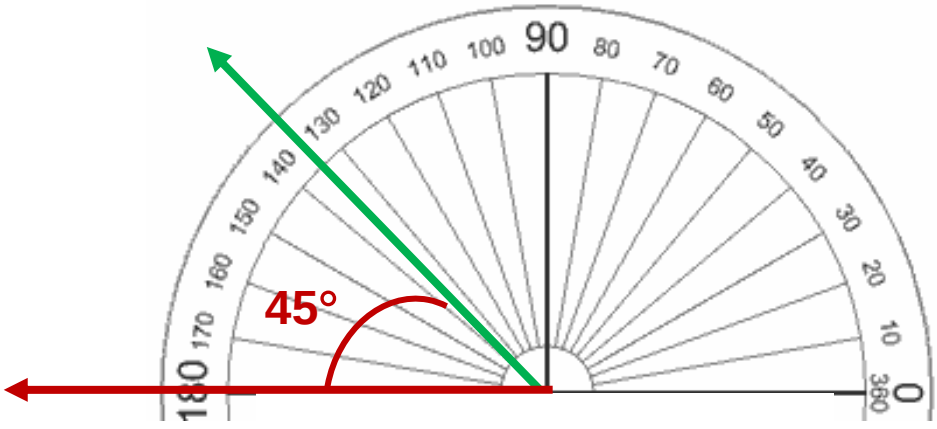
From the neutral position set at 90°, we go **left** since that is counterclockwise **for 90°**. What is the position at that point? We can compute by the following:

$$90° + 90° = \mathbf{180}°$$

Since the position is **180°**, we simply say:

```
myServo.write(180);
```

Now let's say we have to move 45° clockwise from this position. Here's how:



We go towards the **right** since that is the direction of clockwise for 45°. What is the new position? **It's at 135°!!! Here's how:**

$$180° - 45° = \mathbf{135}°$$

Since the position has been determined, we simply say:

```
myServo.write(135);
```

Standard servos are a **little tricky**, but reading this document should help alleviate some troubles encountered when programming the standard servo for position based movements. If you are still having trouble with this concept, let a TA know so that we can help you solve this problem.