# CheggSolutions - Thegdp

```html

## Mechanics of Materials

### Topic: Mohr's Circle Analysis

---

**Given Data and Introduction**

Given the Mohr's Circle for stress, it is required to find:

1. Major principal stress (\(\sigma_1\))
2. Average normal stress (\(\sigma_{\text{avg}}\))
3. Maximum shear stress (\(\tau_{\text{max}}\))

Mohr's Circle is a graphical representation used to determine the principal stresses, maximum shear stresses, and average normal stresses in a given stress state.

---

**Step-by-Step Solution**

#### Step 1: Identifying Key Points on the Mohr's Circle

From the Mohr's Circle diagram provided:

- The center of the circle is located on the \(\sigma\)-axis, at point (30, 0).
- The radius of the circle is the distance from the center to either of the extreme points on the circle, which is 30 MPa.

**Explanation:**
The provided information suggests that the Mohr's Circle is centered at (30, 0) on the \(\sigma\)-axis and has a radius of 30 MPa.

**Supporting Statement:**
Identifying the center and radius of the circle is vital in order to determine the principal and shear stresses correctly.

---

#### Step 2: Calculating the Average Normal Stress (\(\sigma_{\text{avg}}\))

The average normal stress is given by the center of Mohr's Circle, which is:

\(\sigma_{\text{avg}} = \sigma_{\text{center}}\)

Since the center is at (30, 0):

**\(\sigma_{\text{avg}} = 30 \text{ MPa}\)**

**Explanation:**
The center of Mohr's Circle corresponds to the average normal stress on the plane.

**Supporting Statement:**
The average normal stress is determined directly from the location of the center on the \(\sigma\)-axis.

---

#### Step 3: Determining the Major Principal Stress (\(\sigma_1\))

The major principal stress is the maximum stress on the Mohr's Circle, which is found by:

\(\sigma_1 = \sigma_{\text{avg}} + \text{Radius}\)

Given \(\sigma_{\text{avg}} = 30 \text{ MPa}\) and \(\text{Radius} = 30 \text{ MPa}\):

**\(\sigma_1 = 30 + 30 = 60 \text{ MPa}\)**

**Explanation:**
The major principal stress is calculated by adding the circle's radius to the center value.

**Supporting Statement:**
The major principal stress represents the maximum normal stress on the plane and is calculated using the circle's center and radius.

---

#### Step 4: Calculating the Maximum Shear Stress (\(\tau_{\text{max}}\))

The maximum shear stress in Mohr's Circle is represented by the radius of the circle:

\(\tau_{\text{max}} = \text{Radius}\)
```

Given the radius is 30 MPa:

**$\tau_{\text{max}} = 30 \text{ MPa}$**

**Explanation:**
The maximum shear stress value is equivalent to the circle's radius.

**Supporting Statement:**
The radius of Mohr's Circle provides the maximum shear stress value.

---

**Final Solution**

1. Major Principal Stress ($\sigma_1$): **60 MPa**
2. Average Normal Stress ($\sigma_{\text{avg}}$): **30 MPa**
3. Maximum Shear Stress ($\tau_{\text{max}}$): **30 MPa**

---

**Conclusion**

The major principal stress is 60 MPa, the average normal stress is 30 MPa, and the maximum shear stress is 30 MPa, as derived from the provided Mohr's Circle analysis.

```
```