Discussion of the Given Problem

The problem provided involves calculating the rate of change of the surface area of a cube when the rate of change of its side length is known. Here is the step-by-step solution:

1. **Define Variables:**
    - Let x be the length of the edge of the cube.
    - Let s be the surface area of the cube at any time t.
2. **Given Data:**
    - The rate of change of the side of the cube: $\frac{dx}{dt} = 6$ cm/sec.
    - The side length of the cube at the specific time: $x = 5$ cm.
3. **Surface Area of a Cube:**
    - The surface area s of a cube with side length x is given by $s = 6x^2$.
4. **Differentiate with Respect to Time:**
    - Differentiating $s = 6x^2$ with respect to t gives:

$$\frac{ds}{dt} = 12x \cdot \frac{dx}{dt}$$

5. **Substitute Known Values:**
    - Substitute $x = 5$ cm and $\frac{dx}{dt} = 6$ cm/sec into the differentiated equation:

$$\frac{ds}{dt} = 12 \cdot 5 \cdot 6 = 360 \text{ cm}^2/\text{sec}$$

6. **Conclusion:**
    - The rate of change of the surface area is $360 \text{ cm}^2/\text{sec}$.

Similar Questions

1. **Example 1:**
    - The rate of change of the side of a cube is 4 cm/sec. How fast is its surface area changing when the length of its edge is 7 cm?
2. **Example 2:**

- The rate of change of the side of a cube is 5 cm/sec. How fast is its surface area changing when the length of its edge is 3 cm?

3. **Example 3:**
    - The rate of change of the side of a cube is 8 cm/sec. How fast is its surface area changing when the length of its edge is 6 cm?
4. **Example 4:**
    - The rate of change of the side of a cube is 2 cm/sec. How fast is its surface area changing when the length of its edge is 10 cm?
5. **Example 5:**
    - The rate of change of the side of a cube is 3 cm/sec. How fast is its surface area changing when the length of its edge is 4 cm?
6. **Example 6:**
    - The rate of change of the side of a cube is 7 cm/sec. How fast is its surface area changing when the length of its edge is 8 cm?

Keys for Similar Questions

1. **Solution for Example 1:**
    - Given: $\frac{dx}{dt} = 4$ cm/sec, $x = 7$ cm.
    - $\frac{ds}{dt} = 12 \cdot 7 \cdot 4 = 336 \text{ cm}^2/\text{sec.}$
2. **Solution for Example 2:**
    - Given: $\frac{dx}{dt} = 5$ cm/sec, $x = 3$ cm.
    - $\frac{ds}{dt} = 12 \cdot 3 \cdot 5 = 180 \text{ cm}^2/\text{sec.}$
3. **Solution for Example 3:**
    - Given: $\frac{dx}{dt} = 8$ cm/sec, $x = 6$ cm.
    - $\frac{ds}{dt} = 12 \cdot 6 \cdot 8 = 576 \text{ cm}^2/\text{sec.}$
4. **Solution for Example 4:**
    - Given: $\frac{dx}{dt} = 2$ cm/sec, $x = 10$ cm.
    - $\frac{ds}{dt} = 12 \cdot 10 \cdot 2 = 240 \text{ cm}^2/\text{sec.}$
5. **Solution for Example 5:**
    - Given: $\frac{dx}{dt} = 3$ cm/sec, $x = 4$ cm.
    - $\frac{ds}{dt} = 12 \cdot 4 \cdot 3 = 144 \text{ cm}^2/\text{sec.}$

6. **Solution for Example 6:**

   - Given: $\frac{dx}{dt} = 7$ cm/sec, $x = 8$ cm.
   - $\frac{ds}{dt} = 12 \cdot 8 \cdot 7 = 672 \text{ cm}^2/\text{sec.}$