1. Find the rate of change of the area of a circle with respect to its radius r when:

    (i) $r = 5$ cm

    (ii) $r = 7$ cm.

2. The radius of a circle is increasing uniformly at the rate of 5 cm/s. Find the rate at which the area of the circle is increasing when the radius is 15 cm.

3. An edge of a variable cube is increasing at the rate of 8 cm/s. How fast is the volume of the cube increasing when the edge is 12 cm long?

4. A balloon, which always remains spherical has a variable radius. Find the rate at which its volume is increasing with the radius when the later is 15 cm.

5. The total cost $C(x)$ in ` associated with the production of x units of an item is given by $C(x) =$
    $0.006x^3 - 0.002x^2 + 17x + 4125$.

 Find the marginal cost when 15 units are produced.

6. The rate of change of the circumference of a circle with respect to its radius r at $r = 12$ cm is:

    (i) 10π

    (ii) 2π

    (iii) 12π

    (iv) 24π

7. Show that the function given by $f(x) = 8x + 19$ is strictly increasing on R.

8. Show that the function given by $f(x) = e^{3x}$ is strictly increasing on R.

9. Find the slope of the tangent to the curve $y = 5x^3 - 2x^2$ at $x = 2$.

10. Find the slope of the tangent to the curve $y = \dfrac{4x-3}{3x-2}, x \neq \dfrac{2}{3}$ at $x = 5$.

11. Find the slope of the tangent to curve $y = 4x^4 - 2x^2 + 1$ at the point whose x-coordinate is 2.

12. Find the slope of the tangent to the curve $y^2 = x^3 - 3x + 2$ at the point whose x-coordinate is 3 and y-coordinate is 4.

13. Find the maximum profit that a company can make, if the profit function is given by
$p(x) = 18 - 24x - 6x^2$.