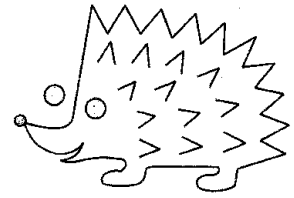


# Calculus

## Core Skills



Hedgehog Mathematical Sheets

1. Differentiate the following expressions:

a)  $a^5 + 5$     b)  $3b^4$     c)  $\frac{c^7}{3}$     d)  $2d^3 + \frac{4d^4}{9} + 6.873$

2. Find the first differential of these expressions:

a)  $a^{-4}$     b)  $\frac{1}{b^5}$     c)  $\frac{c^{-7}}{3}$     d)  $\frac{-d^{-11}}{5} + \frac{5}{d^2} - 5^3$

3. Find  $\frac{dy}{dx}$  for each of these equations:

a)  $y = x^{\frac{3}{2}}$     b)  $y = \sqrt{x^5}$     c)  $y = 5^5 \sqrt{x^2}$     d)  $y = \frac{2}{9} \sqrt[4]{x^3}$

4. Differentiate these equations:

a)  $y = x^{-\frac{3}{2}}$     b)  $y = \frac{1}{\sqrt{x}}$     c)  $y = \frac{-4}{\sqrt[5]{x^2}}$     d)  $y = -\frac{6}{7 \cdot \sqrt[2]{x^7}}$

5. Integrate the following expressions:

a)  $3a^2 + 5$     b)  $\frac{b^3}{3}$     c)  $\frac{4}{c^6}$     d)  $\frac{2d^{-3}}{5} + \frac{10d^4}{3}$

6. Solve these integrals:

a)  $y = \int 3x^2 dx$     b)  $y = \int_1^2 2\sqrt{x} dx$     c)  $y = \int_{1.5}^{2.5} \frac{1}{\sqrt[3]{x^2}} dx$

7. For the graph of  $y = x^3 - 2x^2 - 4x$ :

- Use calculus to find the  $x$  values of the turning points
- The graph crosses the  $x$  axis at zero; find the  $x$  values of the other two intersections, using surds in your answer.
- Find the area under the curve between  $x = 2$  and  $x = 3$ .