

Yet More, Yet More Practice Of Differentiation & Indices

1. Simplify:

(a) $\frac{5\sqrt{5}}{\sqrt{125}}$. 1

(b) $(2 + \sqrt{3})(\sqrt{3} - 1)(3 + \sqrt{3})$. $2(3 + 2\sqrt{3})$

(c) $(a + \sqrt{b})(a - \sqrt{b})$. $a^2 - b$

(d) $\frac{1}{1-\sqrt{5}}$. $-\frac{1+\sqrt{5}}{4}$

(e) $\frac{3-\sqrt{5}}{\sqrt{5+5}}$. $1 - \frac{2}{5}\sqrt{5}$

(f) $\frac{1}{a+\sqrt{b}}$. $\frac{a-\sqrt{b}}{a^2-b}$

(g) $25^{\frac{1}{2}} - \frac{5^{-4}}{5^{-5}}$. 0

(h) $\frac{2xy^2}{\sqrt{xy^{\frac{3}{2}}}}$. $2\sqrt{x}\sqrt{y}$

(i) $\left(\frac{1}{(x^{\frac{1}{2}})^{\frac{3}{2}}}\right)^2$. $x^{-\frac{3}{2}}$

2. Write $\sqrt{45} \times 2\sqrt{18}$ in the form $a\sqrt{10}$, where a is to be determined. $a = 18$

3. Write $\frac{\sqrt{20}}{2}$ in the form \sqrt{a} where a is to be determined. [This kind of simplification is useful in solving quadratics by the formula.] $a = 5$

4. Differentiate the following with respect to x .

(a) $y = \frac{1}{x^4}$. $-\frac{4}{x^5}$

(b) $y = \frac{5}{x^3} - \frac{1}{2x} + 1$. $-\frac{1}{2x^2} - \frac{15}{x^4}$

(c) $y = \sqrt[4]{x}$. $\frac{1}{4x^{\frac{3}{4}}}$

(d) $y = (\sqrt[3]{x})^4$. $\frac{4}{3}x^{\frac{1}{3}}$

(e) $y = \frac{x^{\frac{3}{2}}+x}{\sqrt{x}}$. $1 + \frac{1}{2\sqrt{x}}$

5. The following question refers to the curve $y = x^{-1} + 2$.

(a) Sketch it.

(b) Where does curve cross x -axis? $(-\frac{1}{2}, 0)$

(c) Differentiate with respect to x . $-\frac{1}{x^2}$

(d) Find the gradient of the curve where it crosses the x -axis. -4

6. The following question refers to the curve $y = \sqrt{x} - 1$.

(a) Differentiate with respect to x . $\frac{1}{2\sqrt{x}}$

(b) Find the point where the gradient is 2. $\frac{1}{16}$

(c) If $y = x^{\frac{3}{2}} - x^{\frac{1}{2}}$, find the gradient of the curve when $x = 4$. $\frac{11}{4}$