

Railway Engineering Mathematics

Tutorial Sheet 2

1. Evaluate the following by hand where possible, and using technology otherwise:

(a) 7^3

(e) $(-2)^6$

(b) 3^7

(f) -2^6

(c) 5^{-2}

(g) $(1.234)^8$

(d) $2^{5/2}$

(h) 2.345^{-5}

2. Express each of the following as a single power:

(a) $2^3 \times 2^5 \times 2^7$

(e) $(2^{-3})^4$

(b) $3^3 \times 3^{-4}$

(f) $3^{2/3} \times 3^{-2}$

(c) $4^6 \times \frac{4^{-7}}{4^{-5}}$

(g) $\frac{6^7 \times 6^{-7} \times \sqrt{6}}{6 \times \sqrt[3]{6^4}}$

(d) $\frac{5^5 \times 5^{-3}}{5^4 \times 5^{-2} \times 5^{-7}}$

(h) $\frac{5^{-8} \times 5^2 \times \frac{1}{\sqrt[3]{5^2}}}{5^{-2} \times (5^3)^4}$

3. Simplify the following:

(a) $y^5 \times y^8$

(e) $3x^2 \times 4x^7 \times 2x^{-3}$

(b) $\frac{x^{10}}{x^7}$

(f) $6x \times 7y^2 \times x^5$

(c) $x^3 \div x$

(g) $\frac{3y^4 \times 4y^2}{6x^2 \times y^8}$

(d) $(a^2)^3$

(h) $\frac{(3x^4)^2 \times 5\sqrt[3]{8x^2}}{15x^2 \times y^7}$

4. Change the following to the specified base:

(a) 25^3 to the base 5

(c) 9^4 to the base 3

(b) 8^6 to the base 2

(d) 81^5 to the base 3

5. Determine the value of y :

$$16^{\frac{1}{4}} \times 2^y = 8^{\frac{3}{4}}$$

6. A patient has a disease. They have 4^3 body cells affected on day 1. The number of affected cells doubles every day. The disease becomes serious when 2^{10} body cells are affected. On which day does the disease become serious?

7. The area of a rectangle is $125^{\frac{1}{4}} \text{ cm}^2$. The lengths of the rectangle are 5^{x+1} cm and $25^{\frac{1}{2}} \text{ cm}$. Work out the value of x .