

# EMT112 Practice Problems

## Indices, Surds and Logarithms

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1. Evaluate.

(a)  $(\frac{2}{3})^{-2}$  (b)  $(121)^{\frac{3}{2}}$  (c)  $\frac{1}{2^{-1}}$  (d)  $(\frac{125}{27})^0$

2. Express in terms of the simplest possible surds.

(a)  $\sqrt{288}$  (b)  $\sqrt{450}$  (c)  $\sqrt{72}$  (d)  $\sqrt{12}$

3. Simplify:

(a)  $\sqrt{2}(3 - \sqrt{2})$  (b)  $(\sqrt{2} - 1)(\sqrt{2} + 1)$  (c)  $(2\sqrt{5} + 3)(3\sqrt{5} - 2)$

4. Rationalise denominators and simplify.

(a)  $\frac{1}{\sqrt{5}}$  (b)  $\frac{3}{2-\sqrt{3}}$  (c)  $\frac{2}{3+2\sqrt{5}}$  (d)  $\frac{1}{2\sqrt{3}+\sqrt{2}}$

5. Evaluate.

(a)  $\log_4 64$  (b)  $\log 1000$  (c)  $\log_{121} 11$  (d)  $5^{\log_5 25}$

6. Simplify.

(a)  $\log 3 + \log 4$  (b)  $\frac{\log 9}{\log 3}$  (c)  $\log(x+1) - \log(x^2 - 1)$

7. Solve the equations.

(a)  $3^{x-1} = 7$  (b)  $\log_2 x + \log_x 2 = 2$  (c)  $\log_2 x = \log_4(x+6)$

8. Simplify.

(a)  $\frac{100x^2y^4}{5x^3y^2}$  (b)  $\frac{y^4(x^3y^{-2})^2}{2x^{-1}}$  (c)  $\sqrt[3]{-8x^6}$  (d)  $(\frac{M^{1/5}}{3N^{-1/2}})^2$

9. Solve for  $x$ .

(a)  $e^{x+4} = 10$  (b)  $Pe^{kx} = Q$  (c)  $121e^{-0.112x} = 88$

10. Solve.

(a)  $2(2^{2x}) - 5(2^x) + 2 = 0$  (b)  $3^{2x+1} - 26(3^x) - 9 = 0$