

SHARP

Worksheet 1 – Logs, Annuities and Finance

Exponents

1. Simplify the following:

a) $\frac{x^3y^2}{z^{-1}} \div \frac{(x^{-2}y^3)^2}{z^{-3}y^2}$

b) $\frac{(\sqrt[3]{x^5} \times y^4)^{\frac{1}{2}}}{x^3y^2} \times \frac{(\sqrt{x^4y^3})^5}{x^{-1}}$

c) $\frac{\sqrt{72}}{\sqrt{32}-\sqrt{18}}$

d) $\left(\frac{\left(\frac{1}{x} + \frac{1}{y}\right)^{-1}}{\frac{1}{x}}\right)^{-1}$

e) $\frac{1}{x^2y} \div \frac{1}{x^{-2}y^3} \times \frac{(x^3y^{-2})^{-1}}{\frac{1}{x^3y^{-2}}}$

2. Solve for x:

a) $7 \cdot 3^{2x-1} = \frac{7}{243}$

b) $2^{2x+1} + 4^x = 48$

c) $\frac{5 \cdot 3^{-3x} - 3^{-3x}}{5} = 64 \frac{4}{5}$

d) $2 \cdot 5^{2x} - \frac{3 \cdot 5^{3x}}{4 \cdot 5^x} = \frac{25}{4}$

e) $3^x = 50$ correct to two decimal places through trial and error.

Basic Log Laws

3. Simplify the following:

a) $\log_a 4 + \log_a \frac{1}{4} - \log_a 8$

b) $\log_2 16 + \log_3 9 - \log_5 1$

c) $\frac{\log_3 54 - \log_3 18}{\log_3 81 - \log_3 1}$

d) $\frac{\log_a 3 + \log_a 8}{\log_a 9} + \frac{\log_a 16 - \log_a 9}{\log_a 3}$

e) $\log_a 3 + \log_a 9 - \log_3 a$

10. *A business buys an aircon for the office for R 15 000. They want to replace it in 7 years-time.*
- What will the value of the aircon be if the rate of depreciation is 6.5% p.a.?*
 - What will the new aircon cost in 7-years if the inflation rate is 7.8% p.a.?*
 - What should the business pay every month into their sinking fund to purchase a new aircon if the bank offers them a rate of 9.4% compounded monthly?*
11. *Harry and Marge want to buy a house for R 1 250 000. Their bank offers them an interest rate of 9.3% compounded monthly over 20 years. Harry and Marge want to know whether it is worth it to pay a deposit of R 30 000 or to spend the money on more expensive furniture. What would you tell them to do? Show all working out.*
12. *Sipho decides to buy a restaurant through Invest-me Bank. The bank offers Sipho an interest rate of 14.7% compounded monthly. If Sipho pays the bank back in monthly instalments of R 6 700 over 10 years, how much did the restaurant cost altogether if Sipho paid a deposit of R 50 000?*
13. *Another bank, Invest-4-You offers Sipho a rate of 11.4% compounded monthly with the amount to be paid back monthly over 15 years with no deposit. Which bank's offer should Sipho accept and why? Show all calculations.*
14. *Pranisha owns a coffee shop. The fridges cost her R 23 800. If Pranisha has to replace the fridges in 10 years-time what should her monthly instalment be if the bank offers her an interest rate of 13% compounded monthly to start saving for her new fridges? The inflation rate is 7.6% p.a. and is the same as the depreciation rate.*
15. *Andreas takes an R 120 000 loan from the bank in order to travel around the world for 6 months. If he pays the bank back in monthly instalments of R 3 000 at an interest rate of 6.8% compounded monthly, how long will it take Andreas to pay back the loan?*
16. *What effective rate does the bank offer per year if they advertise their loans at 6.8% compounded quarterly?*