Week 30 Revision Sheet: Logs/Indices 5th Yr Higher Level

Q1. Simplify $3^n + 3^n + 3^n$.	**Q2.** Solve the equation $5^x = \frac{1}{5\sqrt{5}}$
Q3. Solve the equation $2^{2y+1} - 5(2^y) + 2 = 0$.	**Q4.** Solve $2^{2x+2} - 33(2^x) + 8 = 0$
Q5. Solve the equation: $\log_4(6x+1) - 2 = 2\log_4 x$	**Q6.** Solve the equation: $\log_2(x+2) + \log_2(x-2) = 5$
Q7. Solve the equation: $\log_2(3x-1) = 3$	**Q8.** Solve the simultaneous equations: $2\log y = \log 2 + \log x$ and $2^y = 4^x$
Q9. Solve $3^x = 1000$	**Q10.** Solve the equation: $\log_a(x-6) + \log_a(x-4) = \log_a x$
Q11. Solve the equation: $\log_3(x^2 - 10) - \log_3 x = 2\log_3 3$	**Q15.** The population of a city grows according to the law $P = 40000(1.03)^n$, where n is the time in years and P is the population size. (i) What type of function is this? (ii) Estimate the size of the population in 12 years time (iii) What was the initial population of the city before the city started growing? (iv) Determine when the population with have doubled (to the nearest half-year).
Q12. Solve the equation $2^n = 31$.	
Q13. Solve the equation $e^{2x} = 3$.	
Q14. A bacteria colony starts with a size of A and grows exponentially. It doubles in size in 10 minutes. Write the size, Q(t), of the colony after t minutes in the form $Q(t) = Ae^{bt}$ giving the value of b, correct to four decimal places.	

Answers:

Q1. 3^{n+1}	Q2. $x = -\frac{3}{2}$
Q3. $y = \pm 1$	Q4. x = -2 or 3
Q5. $x = \frac{1}{2}$	Q6. x = 6
Q7. $x = 3$	Q8. $x = \frac{1}{2}, y = 1$
Q9. x = 6.29	Q10. x = 8
Q11. x = 10	Q12. n = 4.954
Q13. $x = \frac{\ln 3}{2}$	Q14. 0.0693
Q15. (ii) 57,030 (iii) 40,000 (iv) 23.5yrs	