

All solutions are to be placed in the space provided; use proper mathematical notation.

Solve the following equations. (k - 36 marks)

1. $2^x = 128$

2. $81 = (-3)^x$

3. $7^{w-2} = 49$

4. $3^{2y+3} = 3^{y+5}$

5. $4^t = 8^{t+1}$

6. $5 = 25^{\frac{x}{2}}$

7. $(-8)^{1-2x} = (-32)^{1-x}$

8. $36^{t-2} = 216^{-2t}$

9. $25^{2-c} = 125^{2c-4}$

10. $4^{\frac{x}{4}} = \frac{1}{8}$

11. $4^{x+3} + 4^x = 260$

12. $2^{a+5} + 2^a = 1056$

13. $6^{x+1} + 6^{x+2} = 7$

14. $5^{4-x} = \frac{1}{5}$

APPLYING WHAT YOU KNOW...MODELLING MATH

1. The half-life of ruthenium-106 is 1 year, so the decay of ruthenium-106 is described by the exponential equation $A_L = A_o \left(\frac{1}{2}\right)^t$, where t is the elapsed time, in years. If an original sample of ruthenium-106 had a mass of 128 mg, and there are 2 mg left, what is the elapsed time? (2 marks)

2. The biological half-life of thyroid hormone T4 is about 6.5 days. If a dose of T4 was not followed by repeat doses (4 marks)
 - a) what fraction of the original dose would remain in the body after 19.5 days?

 - b) how long would it take until only 6.25% of the original dose would remain in the body?

EXTENDING

3. Solve the following equations. (4 marks)

$$2^{x^2+2x} = 2^{x+6}$$