

**W4 – 7.1/7.2 – Solving Exponential Equations****MHF4U****1) Write each expression with base 2.**

**a)**  $4^6$

**b)**  $8^3$

**c)**  $\left(\frac{1}{8}\right)^2$

**d)** 14

**2) Write each expression as a power of 4.**

**a)**  $(\sqrt{16})^3$

**b)**  $\sqrt[3]{16}$

**c)**  $\sqrt{64} \times (\sqrt[4]{128})^3$

**3) Solve each equation**

**a)**  $2^{4x} = 4^{x+3}$

**b)**  $3^{w+1} = 9^{w-1}$

**c)**  $4^{3x} = 8^{x-3}$

**d)**  $125^{2y-1} = 25^{y+4}$

**4)** Consider the equation  $10^{2x} = 100^{2x-5}$

**a)** Solve this equation by expressing both sides as powers of a common base.

**b)** Solve the same equation by taking the common logarithm of both sides.

**5)** Solve  $2^{3x} > 4^{x+1}$

**6)** Solve for  $t$ . Round answers to 2 decimal places.

**a)**  $2 = 1.07^t$

**b)**  $100 = 10(1.04)^t$

**c)**  $15 = \left(\frac{1}{2}\right)^{\frac{t}{4}}$

**7)** Solve each equation. Round answers to 3 decimal places.

**a)**  $2^x = 3^{x-1}$

**b)**  $5^{x-2} = 4^x$

**c)**  $7^{2x+1} = 4^{x-2}$

**8)** Solve  $2^{2x} + 2^x - 6 = 0$  using the quadratic formula (or by factoring). Clearly identify any extraneous roots.

**9)** Solve  $8^{2x} - 2(8^x) - 5 = 0$  using the quadratic formula. Clearly identify any extraneous roots.

**10)** Use the decay equation for polonium-218,  $A(t) = A_0 \left(\frac{1}{2}\right)^{\frac{t}{3.1}}$ ,  $A$  is the amount remaining after  $t$  minutes and  $A_0$  is the initial amount.

**a)** How much will remain after 90 seconds from an initial sample of 50 mg?

**b)** How long will it take for this sample to decay to 10% of its initial amount of 50 mg?

**11)** A 20-mg sample of thorium-233 decays to 17 mg after 5 minutes.

**a)** What is the half-life of thorium-233?

**b)** How long will it take this sample to decay to 1 mg?