

Pg 24-25 # 13, 14, 16, 19a, 20a

13. $A_t = A_0 \left(\frac{1}{2}\right)^t$

$2 = 128 \left(\frac{1}{2}\right)^t$

$2 = 2^7 (2^{-t})$

$2 = 2^{7-t}$

$7-t = 1$

$-t = -6$

$t = 6$

OR

$\frac{2}{128} = 2^{-t}$

$\frac{1}{64} = 2^{-t}$

$2^{-6} = 2^{-t}$

$-6 = -t$

$6 = t$

 $\therefore 6$ years have passed.

14. $A_t = A_0 \left(\frac{1}{2}\right)^{\frac{t}{28}}$

where t is the elapsed time in years.

a) $\frac{1}{4} = \frac{A_t}{A_0}$

$1 = 4 \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$\frac{1}{4} = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$\left(\frac{1}{2}\right)^2 = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$2 = \frac{4t}{28}$

$56 = t$

b) $1 = 8 \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$\frac{1}{8} = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$3 = \frac{t}{28}$

$t = 84$

c) $\frac{A_t}{A_0} = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$\frac{1}{32} = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$\left(\frac{1}{2}\right)^5 = \left(\frac{1}{2}\right)^{\frac{t}{28}}$

$5 = \frac{t}{28}$

$140 = t$

Pg 24-25 # 16, 19a, 20a

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16 $S = 0.8^d \times 100\%$
 $\frac{S}{100\%} = 0.8^d$

a) $0.64 = 0.8^d$

$0.8^2 = 0.8^d$

$d = 2$

∴ at a depth of 2 m
 64% of the sunlight
 reaches the diver.

b) $S = 0.8^{10} \times 100\%$
 $S \doteq 11\%$

∴ at a depth of 10 m, 11%
 of the sunlight reaches
 the diver.

19a) $\frac{27^x}{9^{2x-1}} = 3^{x+4}$

$\frac{3^{3x}}{3^{4x-2}} = 3^{x+4}$

$(3^2)^{2x-1}$

$\frac{3^{3x}}{3^{4x-2}} = 3^{x+4}$

$3^{3x-4x+2} = 3^{x+4}$

$3^{-x+2} = 3^{x+4}$

$-x+2 = x+4$
 $2-4 = 2x$
 $-2 = 2x$
 $-1 = x$

check $\frac{27^{-1}}{9^{-2-1}}$

$\frac{3^3}{9^3}$

$= \frac{27}{27}$

$= \frac{729}{27}$
 $= 27$

$\frac{27^{-1+4}}{3^3}$
 $= 3^3$
 $= 27$

20a) $2^{x^2+2x} = 2^{x+6}$

$x^2+2x = x+6$

$x^2+2x-x-6 = 0$
 $x^2+x-6 = 0$
 $(x-2)(x+3) = 0$
 $x = 2$ or $x = -3$

check $x=2$

$\frac{2^{5^{4+4}}}{2^8} = \frac{2^5}{2^{2+6}}$
 $= 2^8 = 2^8$

check $x=-3$

$\frac{2^{9-6}}{2^3} = \frac{2^5}{2^{-3+6}}$
 $= 2^3 = 2^3$