Independent Practice with
Common Log Word Problems

1 (a) $\log x = 2$

$10^2 = x$

$\boxed{100 = x}$

(b) $15 = 10^x$

$\log_{10} 15 = x$

$\boxed{1.18 = x}$

(c) $\frac{\cancel{5}(10)^{2x}}{\cancel{5}} = \frac{60}{5}$

$(10)^{2x} = 12$

$\log_{10} 12 = 2x$

$1.079 = 2x$

$\boxed{.54 = x}$

(d) $10^{3x-1} = 100{,}000$

$\log_{10} 100{,}000 = 3x-1$

$5 = 3x-1$

$6 = 3x$

$\boxed{2 = x}$

2 $C(t) = 100(10^{-.00005255t})$

(a) half-life of carbon-14?

$50 = 100(10^{-.00005255t})$

$\frac{1}{2} = 10^{-.00005255t}$

$\log_{10} \frac{1}{2} = -.00005255t$

$-.301 = -.00005255t$

$\boxed{5728.45 = t}$ years

(b) 10% of carbon-14:

$10 = 100(10^{-.00005255t})$

$.1 = 10^{-.00005255t}$

$\log_{10} .1 = -.00005255t$

$-1 = -.00005255t$

$\boxed{19{,}029 \text{ years} = t}$

$\boxed{3}$ $V(t) = 450(10^{.021t})$

ⓐ $V(0) = 450(10^{.021(0)})$

plug in 0

$= 450(10^{0})$

$= 450(1)$

✓ $= 450$

ⓑ $2010 - 2006 = 4$ years since 2006

$V(4) = 450(10^{.021(4)})$

$= 546.02$

ⓒ $1{,}000 = 450(10^{.021t})$

$\frac{20}{9} = 10^{.021t}$

$\log_{10} \frac{20}{9} = .021t$

$.347 = .021t$

$16.5 = t$

so $2006 + 16.5 = 2022$ (half way through the year)

$\boxed{4}$ $R(t) = 750(10^{.033t})$

ⓐ $R(0) = 750(10^{.033(0)}) = 750(10^0) = 750(1) = 750$

because $10^0 = 1$

ⓑ $1{,}000 = 750(10^{.033t})$

$1.33 = 10^{.033t}$

$\log_{10} 1.33 = .033t$

$\boxed{3.75 = t}$

$\boxed{5}$ $S(t) = 200(10^{-.046t})$

ⓐ $S(0) = 200(10^{-.046(0)}) = 200(10^0) = 200(1) = 200$

ⓑ $5 = 200(10^{-.046t})$

$.025 = 10^{-.046t}$

$\log_{10} .025 = -.046t$

$\boxed{t = 34.8}$

$\boxed{6}$ $D(t) = 500(10^{-.07t})$

ⓐ $500(10^{-.07(5)}) = \boxed{223 \text{ mg}}$

ⓑ $.05 \times 500 = 25$ so:

$25 = 500(10^{-.07t})$

$.05 = 10^{-.07t}$

$\log_{10} .05 = -.07t$

$\boxed{t = 18.6}$