1. a. $I = -\Delta S = S_{initial} - S_{final} = 20 * -(1 / 20) Log[1 / 20] - 1 Log[1] = Log[20] \approx 4.32$, where Log represents the logarithm using the base 2.
1. b. $I_{denomiatior} = -\Delta S = S_{initial} - S_{final} = 4 * -(1 / 4) Log[1 / 4] - 1 Log[1] = Log[4] = 2$, where Log represents the logarithm using the base 2; so, ratio $\approx 4.32 / 2 = 2.16$.
1. c. smallest wordsize = 2.16, which, with rounding to nearest larger natural number, is similar to codon basis that is observed in nature (wordsize = 3).

2. a. 0.5 (0.5) 0.5 (0.5) 0.5 = 1 / 32
b. identical to solution for a
c. 1 / 32 + 1 / 32 = 1 / 16
d. 1 - 1 / 16 = 15 / 16

3. $V = L^3$ and $S = 6 L^2$
Let L represent diameter D; then, D = 6 (V / S). Other choices for representing D will lead to other, analogous solutions.

4. a. $T = \pi D^2 / 4 = 0.032 M^{1.00}$, so $D = ((4(0.032) / \pi) M)^{1/2} = 0.202 M^{0.5}$ [km] or $202 M^{0.5}$ [m]

b. $(D / W) R = 202 M^{0.5} / (0.33 M^{0.21}) (3.61 M M^{-0.27}) = 2208 M^{0.02}$

5. a. r = Log[N(t) / N(0)] / t = Log[2] / 7 = 0.099 $days^{-1}$ for Brittle and Log[1 / 2] / 10 = -0.069 per day for Chrispy, where Log represents the logarithm using the base e.

b. Solve $2 e^{0.099 t} = 10 e^{-0.069 t}$ for t to obtain t = 9.56 days; then, use t = 9.56 with either $2 e^{0.099 t} = 10 e^{-0.069 t}$ to obtain N(9.56) = 5.15 kg.

c. Solve $2 e^{0.099 t} = 2 (10 e^{-0.069 t})$ for t to obtain t = 13.68 days.

6.If Q_i small, then seek food; if Q_i large, then relax.

7. a. f(G) = p = 0.5 = q = f(g)
b. The GG and Gg individuals will comprise 80% among all matings; among these,
GG x GG will comprise (1 / 4) (1 / 4) = 0.0625
GG x Gg will comprise 2 (1 / 4) (3 / 4) = 0.3750
Gg x Gg will comprise (3 / 4) (3 / 4) = 0.5625
So, among all matings,
GG x GG will constitute 0.0625 (0.8) = 0.05
GG x Gg will constitute 0.3750 (0.8) = 0.30
Gg x Gg will constitute 0.5625 (0.8) = 0.45.
In the next generation,
GG receive the 0.05 from GG x GG directly + 0.30 / 2 from GG x Gg + 0.45 / 4 from Gg x Gg = 0.3125;
Gg receive 0.30 / 2 from GG x Gg + 0.45 / 2 from Gg x Gg = 0.375

Gg receive 0.45 / 4 from Gg x Gg + 0.20 from gg = 0.3125.

8.
Aplantae comfortabolium
 Arbour ingtostudii
  Barkus biggerthanitsbitus
  Elastic similaritus
   Leavus aloneii
   Xylem phloemus

9. Assume that the probability for yielding either gender = 1 / 2; then the probability for obtaining 3 females and 2 males equals the ways to choose 3 females from 5 children C[5, 3] times $(1 / 2)^5$ = 10 / 32.

10. a. P(100 bp) = 0.995 for AA and 0.999 for AT.

b. P(AAA in 100 bp) = 0.699 and P(AAT in 100 bp) = 0.797 in DNA sequences with unbiased composition comprising 100 nucleotide bases.

c. P(n) for k bp subsequences is minimal for the constant case (within a or within b comparisons); P(n) decreases as k increases (comparing a to b).