1) A bag contains 3 orange balls, 5 green balls, and 6 blue balls.

   a. If a ball is drawn at random, what is the probability it is blue?

   b. If two balls are drawn, what is the probability that the first is orange and the second is green?

   c. If two balls are drawn, what is the probability that one is orange and the other is green?

2) DECIBEL (dB) SCALE

The decibel level , *D*, of sound is given by the equation

$D = 10\log\left(\frac{I}{10^{-12}}\right)$ where *I* is intensity in watts per square meter.

decibels		watts/m^2
0	barely audible	10^{-12}
10		10^{-11}
20		10^{-10}
30	soft whisper	10^{-9}
40		10^{-8}
50	average home	10^{-7}
60	normal conversation	10^{-6}
70		10^{-5}
80		10^{-4}
90	heavy-traffic	10^{-3}
100	noisy-kitchen	10^{-2}
110		10^{-1}
120	amplified rock music (3 m away)	10^{0}
130	pain level	10^{1}
140	jet plane (30 m away)	10^{2}

   a. How many times more intense is a amplified rock music (3 m away) than a soft whisper?

   b. Find, to 2 significant digits, the intensity of 53.5 dB.

3) Solve for x if:

$$(\log_3 4)(\log_4 5)(\log_5 6)\ \ldots\ (\log_{29} 30)(\log_{30} 31) = \frac{1}{\log_{31} x}$$

4) Solve for (x, y) if: $\begin{cases} 2^x \cdot 8^{2y} = 256 \\ 4^{2x} \cdot \left(\frac{1}{8}\right)^y = 32 \end{cases}$

5) The symbol $\sum$ means SUM. For example,

$$\sum_{n=3}^{8} n^2 = 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 = 199$$

is the sum of the squares of integers starting from 3, and ending with 8.

a. Compute: $\sum_{n=2}^{5} 3^n$ b. Compute: $\sum_{n=1}^{12} (-1)^n \frac{1}{n}$

6) An arrow is to be shot from a hill 60 meters above sea level. The arrow's height, h, in meters above sea level at any time, with t in seconds, is found by the equation:

$$h = -4.9t^2 + 35t + 60$$

a. After how many seconds (2 dec.)will the arrow hit the ground (at sea level)?

b. Find the maximum height reached and the time it reaches that maximum.

7)

A quadratic equation written in **general form** is written without any parentheses and set equal to zero:

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$$

If $B = 0$ and $AC \neq 0$, the equation can be rewritten in **standard form**:

$$\frac{(x+h)^2}{a^2} \pm \frac{(y-k)^2}{b^2} = 1$$

Expand each equation, which is written in standard form, and write it in general form:

a. Convert $\frac{(x-3)^2}{25} + \frac{(y+7)^2}{25} = 1$ to general form.

b.Convert $9x^2 + 16y^2 + 162x + 96y + 729 = 0$ to standard form. (Complete square.)

8) Compute:

a. $\log_3 5 \cdot \log_5 10 \cdot \log_{10} 13 \cdot \log_{13} 81$

b. $\sum_{n=1}^{12} \log\left(1 + \frac{1}{n}\right)$ (Give your answer as log of a single number.)

[Hint: Write $\left(1 - \frac{1}{n}\right)$ as a single fraction and apply the laws of logarithms before taking the sum.)

9) (From Contempory Precalculus) A person's typing speed is modeled by the function $W = 80\ 1 - e^{-0.085t}$, where W is the number of words per minute this person can type after t weeks of practice.

a) Approximately how many weeks did it take to increase this person's typing speed to 50 words per minute? Give rounded answer in whole weeks.

b) Is there an upper limit to this person's typing speed? Explain.

10) Given that $y = f(x)$ is a function whose domain is [–4,10] and range is [–2,15], determine the domain and range of each of the following functions:

a) $g(x) = 3f(x)$ c) $j(x) = f(x-4)$

b) $h(x) = -f(3x)$ d) $k(x) = |f(x)| - 2$

11) Robin is running around the circular track $x^2 + y^2 = 10000$ at 3.5 meters per second. Robin starts at (0, 100) and runs in a counterclockwise direction. After 30 minutes of running, what are Robin's coordinates? (PEA)

12) **NC** Let $g(x) = x^2 - 4x$.

Simplify completely: $\dfrac{g(3+h) - g(3-h)}{2h}$

13) In a study on remembering, subjects were asked to recall nonsense syllables after t seconds. A model for remembering was found to be: $P = 92 - 25\ln(t)$ for $t \geq 1$, where P is the percent of subjects that remembered a syllable after t seconds. According to the model, how many seconds have passed when 30% of the subjects remembered the syllable? Give answer to one decimal place.

14) Prove the following. Write your solution clearly and show all steps.

$$\frac{1}{\log_5(a)} + \frac{1}{\log_3(a)} = \frac{1}{\log_{15}(a)}$$

15) Determine the domain for each function :

a. $f(x) = \log_6\ x^2 - 25$

b. $g(x) = \dfrac{1}{\log_b(3x+1)}$

16) **NC** Solve over the real numbers.

a. $x^2 - 12x + 32 = 0$ b. $\dfrac{1}{(x+2)^2} - 12\left(\dfrac{1}{x+2}\right) + 32 = 0$

c. $\log_2 x^{\ 2} - 12\ \log_2 x\ + 32 = 0$