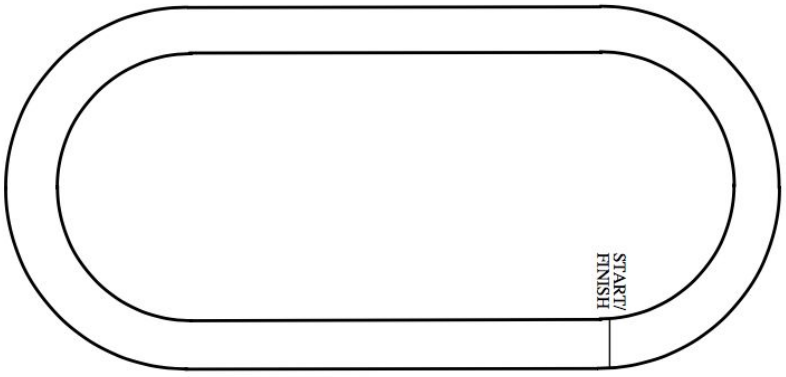
1. **(GT3.4; CA)** The diagram shows a running track. The perimeter of the inside line is 400 meters and the length of each straight section is 100 meters.
*(Cirrito 9.7, p309)*




   a. Find the radius of each of the semi-circular parts of the inner track.
   b. If the width of the land shown is 1 meter, find the perimeter of the outer boundary of the lane.

2. **(F2.2, F2.10; CI)** Given the function $f(x) = x^2 + 2x,\ \{x \in R \mid x \geq -1\}$,
*(Cirrito 5.4, p.148)*
   a. Find the inverse function, $f^{-1}(x)$.
   b. Consider the function $x + 2y - 12 = 0$, determine the intersection between this line and $f^{-1}(x)$.

3. **(F2.3, F2.11; CI)** Given the function $f(x) = cos(x),\ -2\pi \leq x \leq 2\pi$,
*(Cirrito 6.1, 6.2; p.167,177)*
   a. Sketch *f* and label three points on the graph.

   The function *h*(*x*) is defined as $h(x) = 4f\left(\frac{1}{2}(x - \frac{\pi}{4})\right)$.
   b. State the domain and range, the *x*- and *y*-intercepts of *h*(*x*) and sketch *h*(*x*).
   c. Evaluate $h^{-1}(-4)$.

4. **(NA1.1; CI)** The sum of the first 8 terms of a geometric series is 17 times the sum of its first 4 terms. Find the common ratio. *(Cirrito 8.2.4, p.264)*

5. **(NA1.5; CI)** If log $a$ = -5, log $b$ = 3 and log $c$ = 4, evaluate each expression:
*(Cirrito 7.4, p.221)*
   a. $log\left(\frac{ab^3}{100}\right)$  b. $log\left(a^2b\sqrt{c^3}\right)$  c. $3^{b\,log_3 a}$

6. **(F2.5; CI)** Given the function $g(x) = 2e^{-x} - 1$;
*(Cirrito 5.3.3, p.131)*
   a. State the transformations that were applied to $y = e^x$.
   b. Find the asymptote(s) and intercept(s) of $g$ and sketch.
   c. Find the equation of the inverse of $g(x)$ and sketch $g^{-1}(x)$.
   d. **(CA)** Find the equation of the line that is tangent to $f(x)$ at $x$ = -ln2. What is the significance of the slope of the tangent line?

7. **(GT3.6; CI)** Let $sin(\theta) = \frac{\sqrt{5}}{3}$, where $\theta$ is acute.
*(Cirrito 10.2, p.327)*
   a. Find $cos(\theta)$.
   b. Given the fact that $cos(2\theta) = 2cos^2\theta - 1$, determine the value of $cos(2\theta)$.

8. **(GT3.5; CA)** Given $\Delta$ABC wherein side $b$ = 24 cm, $\angle$BAC = 47° and $\angle$ABC = 83°.
*(Cirrito 9.5.1, p.290)*
   a. Solve $\Delta$ABC.
   b. Find the altitude of $\Delta$ABC, using side $a$ as the "base" of the triangle.