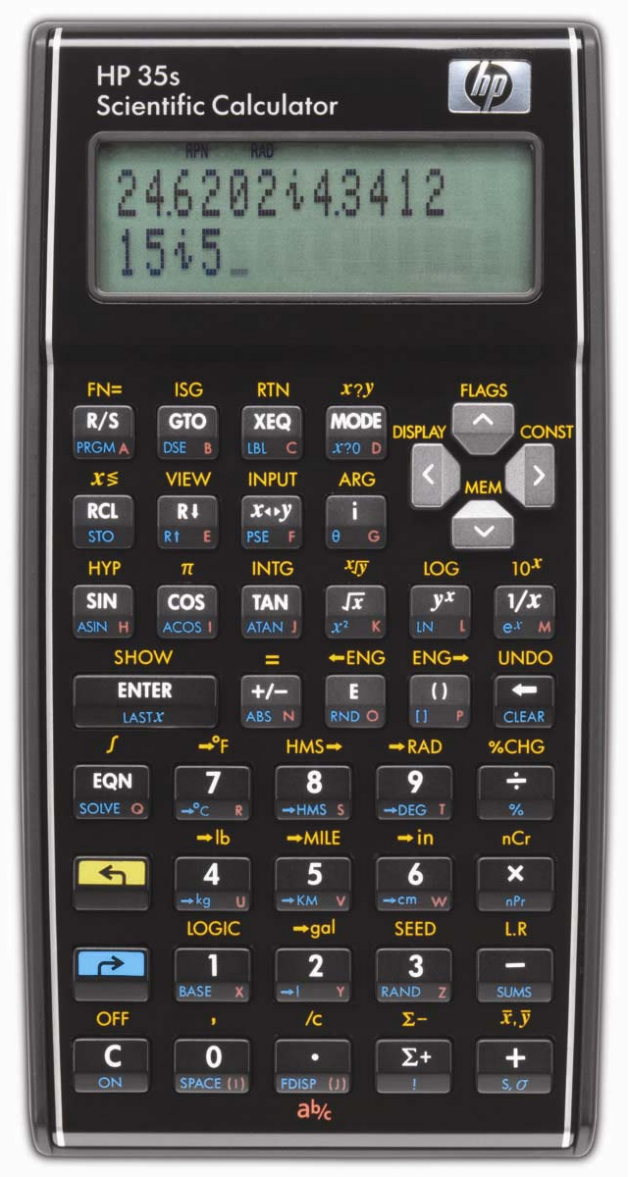
hp calculators



Other applications

Practice solving problems

- Application 1: Aerodynamics

  Example 1: Turn radius and Turn rate

- Application 2: Electrical Engineering

  Example 1: Parallel Resistors

- Application 3: Civil Engineering

  Example 1: Rainfall runoff

General applications

This training aid will illustrate the application of the HP 35s calculator to several problems in other areas. These examples are far from exhaustive, but do indicate the incredible flexibility of the HP 35s calculator.

Practice solving problems

Application 1: Aerodynamics

Example 1: An airplane is in a steady coordinated turn with a true airspeed of 250 mph at a 40 degree bank angle. What is the turn radius in feet and the turn rate in degrees per second?

The equations are:

Turn Radius = Velocity ^{2} ÷ (g x TAN (angle))

Turn Rate = g x TAN (angle) ÷ Velocity

Where g is 32.2 feet per second per second

Solution: First, convert the speed to feet per second for unit consistency.

In RPN mode:

2 5 0 ENTER 5 2 8 0 ×	
6 0 ÷ 6 0 ÷	
ENTER	(Save for next calculation)
↗ x^2 3 2 · 2 ENTER 4 0 TAN × ÷	(Radius in feet)
$x \leftrightarrow y$ 3 2 · 2 ENTER 4 0 TAN ×	(Rate of turn in degrees
$x \leftrightarrow y$ ÷ ↗ →DEG	per second)

In algebraic mode:

↗ x^2 2 5 0 × 5 2 8 0	
÷ 6 0 ÷ 6 0 › ÷ ( )	
3 2 · 2 × TAN 4 0 ENTER	(Radius in feet)
↗ →DEG 3 2 · 2 × TAN 4 0 ÷	
( ) 2 5 0 × 5 2 8 0	(Rate of turn in degrees
÷ 6 0 ÷ 6 0 ENTER	per second)

Figure 1

Answer: The turn radius is just under 4976 feet and the rate of turn is approximately 4.22 degrees per second. Figure 1 (RPN mode) shows the radius on the second level of the stack and the rate on the bottom level.

Application 2: Electrical Engineering

Example 1: Three resistors of 200 ohms, 500 ohms and 220 ohms are in parallel. What is the equivalent resistance?

Solution: In RPN mode: 2 0 0 1/x 5 0 0 1/x + 2 2 0 1/x + 1/x

In algebraic mode: 1/x 1/x 2 0 0) + 1/x 5 0 0) + 1/x 2 2 0 ENTER

Figure 2

Answer: The equivalent resistance is 86.6 ohms

Application 3: Civil Engineering

Example 1: Runoff of rainfall from an area to an outlet will be at maximum when the water from the most remote point contributes to the flow. What is that time if the slope is 0.25 per foot per foot, the rain intensity is 0.8 inches per hour and the distance from the most remote area is 800 feet. Use a coefficient of 2.1 for grass.

The formula is: $\text{Time} = C \times (D \div (S \times I^{2}))^{1/3}$

Where C is the grass coefficient, D is the distance from the most remote area, S is the slope, and I is the rainfall intensity.

Solution: In RPN mode: 2 . 1 ENTER 8 0 0 ENTER
0 . 2 5 ENTER 0 . 8 x^2 × ÷ 3 $\sqrt[x]{y}$ ×

In algebraic mode: 2 . 1 × $\sqrt[x]{y}$ 3) 8 0 0 ÷
( ) 0 . 2 5 × x^2 0 . 8 ENTER

Figure 3

Answer: The time until maximum is just under 36 minutes.