Mathematics of Flight

Glide Slope

Glide Slope

The rate at which an aircraft descends is referred to as the slope of descent. It is defined the same as the slope in graphing:

$$\text{Slope} = \frac{\text{Change in the vertical (y) axis}}{\text{Change in the horizontal (x) axis}} = \frac{\text{rise}}{\text{run}}$$

Since the aircraft is descending, rise refers to the amount of descent. The glide slope is often given as a percent.

Glide Slope

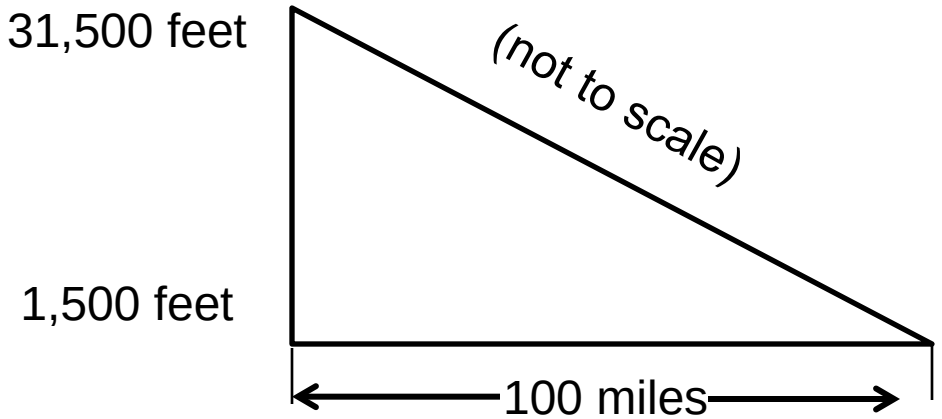
Example:

Find the approximate slope of descent, expressed as a percent, if an aircraft is flying at 31,500 feet, headed for a landing site 100 miles away. The elevation of the landing site is 1,500 feet.

Glide Slope

Solution:

$$\text{Slope} = \frac{\text{Change in the vertical (y) axis}}{\text{Change in the horizontal (x) axis}} = \frac{\text{rise}}{\text{run}}$$



Glide Slope

Solution:
The aircraft will descend 31,500 ft. − 1,500 ft. = 30,000 feet over 100 miles.

Ratios compare like units. To create the ratio of the slope, 100 miles must be converted to feet.

$$100 \text{ miles} \times \frac{5{,}280 \text{ ft/mile}}{1 \text{ mile}} = 528{,}000 \text{ feet}$$

$$\text{Slope} = \frac{\text{Change in the vertical (y) axis}}{\text{Change in the horizontal (x) axis}} = \frac{\text{rise}}{\text{run}}$$

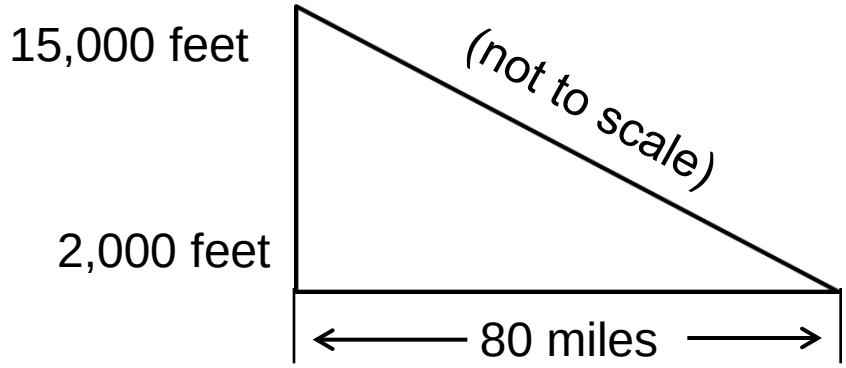
The ratio of the slope is: $\frac{30{,}000 \text{ feet}}{528{,}000 \text{ feet}}$ or 0.0568 or 5.68%

Glide Slope

Exercise 1:
Find the approximate slope of descent, expressed as a percent, if an aircraft is flying at 15,000 feet, planning to land 80 miles away. The elevation of the landing site is 2,000 feet.

Solution:
Using a diagram, we can determine the slope:

$$\text{slope} = \frac{\text{Change in the vertical (y) axis}}{\text{Change in the horizontal (x) axis}} = \frac{\text{rise}}{\text{run}}$$



The aircraft will descend 15,000 feet – 2,000 feet = 13,000 feet over 80 miles.

Glide Slope

Exercise 1:

The aircraft will descend 15,000 feet − 2,000 feet = 13,000 feet over 80 miles.

To create the ratio of the slope, 80 miles must be converted to feet.

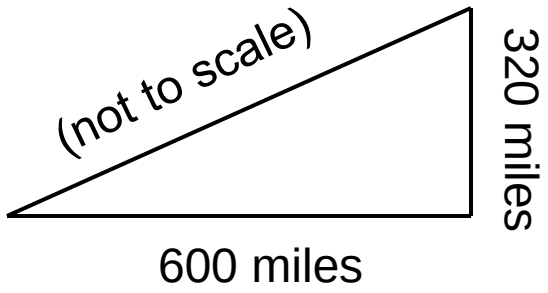
$$80 \text{ miles} \times \frac{5{,}280 \text{ ft/mile}}{1 \text{ mile}} = 422{,}400 \text{ feet}$$

The ratio of the slope is: $\frac{13{,}000 \text{ feet}}{422{,}400 \text{ feet}}$ or 0.03077 or 3.08% (rounded)

Glide Slope

Exercise 2:

Find the approximate slope of ascent, expressed as a percent of launched space shuttle orbiter. When the space shuttle orbiter reached an altitude of 320 miles, it had covered 600 miles over the ocean.



Solution:

The orbiter will ascend 320 miles over 600 miles.

The ratio of the slope is: $\frac{320 \text{ miles}}{600 \text{ miles}}$ or 0.5333 or 53.33%

More Resources

Additional Resources
are available online at
www.nationalmuseum.af.mil/education/teacher/index.asp