

SPINOFFS

Spinoffs are relatively short learning modules inspired by the LTAs. They can be easily implemented to support student learning in courses ranging from prealgebra through calculus. The Spinoffs typically give students an opportunity to use mathematics in a real world context.

LTA - SPINOFF 16A

Modeling The Space Shuttle Landing:
The Cubic Spline

LTA - SPINOFF 16B

Modeling The Space Shuttle Landing:
The Circular Pull-Up

LTA - SPINOFF 16C

Knots and Machs

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SPINOFF 16C

Knots and Machs

This Spinoff deals with the different units that measure speed and converting from one unit to another. The speed or velocity of an aircraft can be reported in miles per hour (mph), kilometers per hour (kph), or knots. Here are some facts that relate these three ways to measure speed: 225 mph is equivalent to 361.91 kph, which is equivalent to 195 knots. **Note:** For all questions, use a scientific calculator and round your final answers to two decimal places.

- 1) 1 mph is equivalent to how many kph?
- 2) 1 kph is equivalent to how many mph?
- 3) 1 mph is equivalent to how many knots?
- 4) 1 knot is equivalent to how many mph?
- 5) 1 kph is equivalent to how many knots?
- 6) 1 knot is equivalent to how many kph?
- 7) If an aircraft is traveling at 308 mph, what is its speed in kph? (Hint: You can use your answer to Exercise 1.)
- 8) Just before re-entry into the earth's atmosphere, the Space Shuttle is traveling at 27,400 kph. Express this speed in mph.
- 9) Approximately 30 seconds before touchdown, the Shuttle is traveling at 350 mph. At this rate, how long (in seconds) would it take to travel 100 feet?
- 10) The Space Shuttle lands on the runway at a speed of 340 kph. Express this speed in knots.
- 11) Find the Space Shuttle's landing speed in mph.
- 12) Using your answer to Exercise 11, how far would the Space Shuttle travel in one minute?
- 13) The speed of sound is approximately 741 mph. Find this speed in feet per second.
- 14) The speed of sound is called Mach 1. What speed (in mph) does Mach 2 represent?
- 15) Five and a half minutes before touchdown, the Shuttle has a speed of Mach 2.5. How fast is it going in miles per hour?

16) What Mach number represents the re-entry speed (given in Exercise 8) of the Space Shuttle?