

MATH

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# Stem

On a Shoestring

## Jump Rope Math

This activity uses a jump rope to teach math basics like speed, time, distance and velocity.

The activity expands from grades 1-6 by incorporating worksheets, trendlines and graphing.

### QUICK GUIDE:

Prep Time:	5-10 minutes
Activity Time:	30 minutes - 1 hour
Est. Cost:	\$0- \$10 depending on group size
Age range:	1-6 grades

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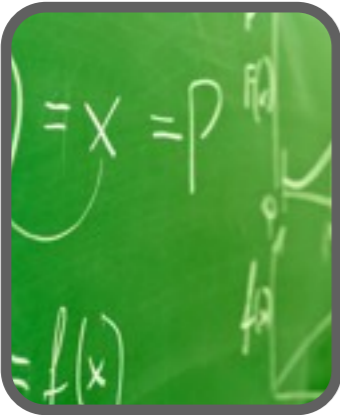
On a Shoestring

# Jump Rope Math

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Learn math while jumping rope!

This activity helps students learn measurements, calculate rate of speed and create trend lines.

# Jump Rope Math



Directions

## Things You Need

Measurement tools such as measuring tapes, yard sticks or rulers

Masking Tape

Timer (watch with second hand, stopwatch or a phone app)

Jump Rope

Several math skills can be learned with this activity. Divide students into groups of three. One student will jump rope, one will be the timer and one will measure. Students can rotate with each round.

Start by marking starting point with a piece of masking tape. Hand each team three worksheets (one for each person). Have students measure each other's height and record. Begin by measuring how far a student can go forward by jumping rope for a set period of time. Measure the distance for 5 seconds, 10 seconds, etc. Have one student mark the area where their partner's heel lands and then both partners can use a measurement tool to find out how far the jump was in inches, feet, yards, etc. Students could then use simple conversions between different units of length.

Variations:

1. Compare distance when jumping rope with both feet together or one foot in front of the other.
2. Determine rate of speed: how many feet/inches can be covered per second?
3. Create a trend line and predict how much distance could be covered if the jump roper jumped for 1 minute, 2 minutes, 10 minutes, etc....
4. Calculate how many inches are in a foot, a yard, and a mile.
5. Compare distance between team members of different height. Does it create a variable?

# Worksheet

Team Member Name \_\_\_\_\_ Height \_\_\_\_\_

Hopping (both feet together)

TIME	INCHES	FEET	YARDS
5 Seconds			
10 Seconds			

# Worksheet

Team Member Name \_\_\_\_\_ Height \_\_\_\_\_

Skipping (one foot in front of the other)

TIME	INCHES	FEET	YARDS
5 Seconds			
10 Seconds			

# The Scientific Method

The Scientific Method is a way to ask questions and achieve answers by making observations, performing tests and doing experiments.

Q

Question

How do you determine rate of speed (velocity)?

R

Research

How to make predictions using a trend line.

H

Hypothesis

By taking speed/distance measurements for 5 seconds and 10 seconds, you can predict how far the same student can jump in 30 seconds or even several minutes.

T

Test

Compare the predictions with actual jumpint. Did the predictions hold true?

A

Analyze

Does the height of the jumper make a difference in how far they travel? What about method of jumping?

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# Key Terms

Click on key terms below to learn more:

**VELOCITY:** The velocity of an object is the rate of change of its position with respect to a frame of reference, and is a function of time.

**SPEED:** the rate at which an object covers distance. A fast-moving object has a high speed and covers a relatively large distance in a given amount of time, while a slow-moving object covers a relatively small amount of distance in the same amount of time.

**DISTANCE:** a numerical description of how far apart objects are.

**LENGTH:** In most systems of measurement, the unit of length is a fundamental unit, from which other units are defined. Length may be distinguished from height, which is vertical extent. Length is a measure of one dimension, whereas area is a measure of two dimensions (length squared) and volume is a measure of three dimensions (length cubed).

Definitions above are sourced from Wikipedia.

Other science terminology resources to explore:



[The Science Dictionary](#)

[American Heritage Science Dictionary](#)

## Books about Careers

### Police Officer Books:

Ready, Dee. Police Officers Help, Capstone Press Publishing, 1997 Grades Kindergarten – 5th

Adamson, Heather. A Day in the Life of a Police Officer, Mankato, MN.: Capstone Publishing, 2004 Grades 1st – 3rd

White, Nancy. Police Officers to the Rescue, New York, NY: Bearport Publishing, 2012 Grades 1st – 6th

### Firefighter Books:

Goldish, Meish. Smoke Jumpers, New York, NY.: Bearport Publishing, 2014 Grades Pre K – 3rd

Goldish, Meish. Firefighters to the Rescue, New York, NY.: Bearport Publishing, 2014 Grades 1st- 6th

Goldish, Meish. City Firefighters, New York, NY.: Bearport Publishing, 2014 Grades 2nd – 7th

White, Nancy. Aviation Firefighters, New York, NY.: Bearport Publishing, 2014 Grades 2nd – 7th

### Engineering Books:

Parmalee, Thomas. Genetic Engineering, Edina, MN.: ABDO Publishing, 2008 Grades 6th – 8th

Farrell, Courtney. Green Jobs, North Mankato, MN.: ABDO Publishing, 2011 Grades 9th – 12th

Hamen, Susan E. Engineering, Edina, MN.: ABDO Publishing, 2011 Grades 9th – 12th

### Scientist:

Hanson, Anders. Scientist's Tools, Minneapolis, MN.: ABDO Publishing, 2011 Grades 3rd – 5th

McMullin, Ruth. EXPEDITIONS Scientist in the Field (Science Adventures from Nature and Science Magazine), Natural History Press, 1969 Grades 6th – 8th

### Chef Books:

Butterworth, Christine; Gaggiotti, Lucia. How Did That Get in My Lunchbox?: The Story of Food, Somerville, MA.: Candlewick Pub., 2011 Grades 3rd – 5th

Laurentiis, Giada De. Naples! (Recipe for Adventure #1), Grosset & Dunlap Publishing, 2013 Grades 5th – 8th

### Pilot/ Aviation Books:

Simons, Lisa M.B. The Kids' Guide to Military Vehicles, Mankato, MN.: Capstone Press Publishing, 2010 Grades Kindergarten – 1st

Anderson, Jameson; Whigham, Rod; Barnett, Charles. Amelia Earhart: Legendary Aviator, Mankato, MN. Capstone Press Publishing, 2010 Grades 3rd – 4th

Hamilton, John & Sue. UAVs: Unmanned Aerial Vehicles, Minneapolis, MN.: ABDO Publishing, 2012 Grades 6th – 8th

### **Veterinarian Books:**

Salzmann, Mary Elizabeth. Veterinarian's Tools, Minneapolis, MN.: ABDO Publishing, Grades 3rd – 5th

Riddle, John. Veterinarian, Broomall, PA.: Mason Crest Publishing, 2003 Grades 3rd – 8th

Thomas, William Veterinarian, Pleasantville, NY.: Gareth Stevens Publishing, 2009 Grades 6th – 8th

### **Dentist Books:**

Stockham, Jessica. Dentist, Childs Plan Intl. Publishing, 2011 Grades Pre K – 3rd

Salzmann, Mary Elizabeth. Dentist's Tools, Minneapolis, MN.: ABDO Publishing, 2011 Grades 3rd – 5th

### **Energy Books:**

Wheeler, Jill C. Eye on Energy Series, Edina, MN.: ABDO Publishing, 2008 Grades 3rd – 6th

Orme, Helen, Energy for the Future, New York, NY.: Bearport Publishing, 2009 Grades 3rd – 5th

Society of Petroleum Engineers. Oil and Natural Gas, DK Publishing, Inc., 2007 Grades 6th – 8th

Marcovitz, Hal. Energy Security, Edina, MN.: ABDO Publishing, 2011 Grades 6th– 8th

### **Architecture Books:**

Stern, Steven L. Building Greenscapes, New York, NY.: Bearport Publishing, 2010 Grades 3rd – 6th

Sandler, Michael Freaky Strange Buildings, New York, NY.: Bearport Publishing, 2012 Grades 3rd – 6th

Stevenson, Neil. Architecture, New York, NY.: DK Publishing, 1997 Grades 6th – 8th

### **City Planning Books:**

Leardi, Jeanette. Making Green Cities, New York, NY.: Bearport Publishing, 2010 Grades 3rd – 6th

Macaulay, David. City: A Story of Roman Planning and Construction, Houghton Mifflin Harcourt, 1983 Grades 6th – 8th

Chapnick, Samantha. Around New York City with Kids, New York, NY. Fodor's Travel Publishing, 2011 Grades 3rd – 6th

### **Computers and Gaming Books:**

Petrie, Kristin. Computers, Edina, MN.: ABDO Publishing, 2009 Grades 3rd – 5th

Ray, Michael. Gaming: From Atari to Xbox, New York, NY.: Britannica Publishing, 2012 Grades 6th – 12th

Wilkinson, Colin. Gaming: Playing Safe and Playing Smart, New York, NY.: Rosen Central Publishing, Grades 6th – 12th



# Standards

## Grade 1

Standard 4: Measurement - The student will develop and use measurement skills in a variety of situations.

1. Linear Measurement: Measure objects with one-inch tiles and with a standard ruler to the nearest inch. 2. Time a. Tell time on digital and analog clocks on the hour and half-hour.

## Grade 2

Standard 4: Measurement - The student will use appropriate units of measure in a variety of situations.

1. Linear Measurement a. Measure objects using standard units (e.g., measure length to the nearest foot, inch, and half inch). b. Select and use appropriate units of measurement in problem solving and everyday situations. 2. Time a. Tell time on digital and analog clocks on the quarter-hour.

## Grade 3

Standard 4: Measurement - The student will use appropriate units of measure to solve problems.

1. Measurement a. Choose an appropriate measurement instrument and measure the length of objects to the nearest inch or half-inch and the weight of objects to the nearest pound or ounce. \*b. Choose an appropriate measurement instrument and measure the length of objects to the nearest meter or centimeter and the weight of objects to the nearest gram or kilogram. \*d. Develop and use strategies to choose an appropriate unit and measurement instrument to estimate measure.

## Grade 4

Standard 4: Measurement - The student will solve problems using appropriate units of measure in a variety of situations.

1. Measurement a. Estimate the measures of a variety of objects using customary units. b. Establish benchmarks for metric units and estimate the measures of a variety of objects (e.g., mass: the mass of a raisin is about 1 gram, length: the width of a finger is about 1 centimeter). c. Select appropriate customary and metric units of measure and measurement instruments to solve application problems involving length, weight, mass, area, and volume. d. Develop and use the concept of area of different shapes using grids to solve problems. 2. Time and Temperature a. Solve elapsed time problems.

## Grade 5

Standard 4: Measurement - The student uses appropriate units of measure to solve problems in a variety of contexts.

1. Measurement a. Compare, estimate, and determine the measurement of angles. b. Develop and use the formula for perimeter and area of a square and rectangle to solve application problems. c. Convert basic measurements of volume, mass and distance within the same system for metric and customary units (e.g., inches to feet, hours to minutes, centimeters to meters).

Standard 5: Data Analysis - The student will use data analysis, statistics and probability to interpret data in a variety of contexts.

1. Data Analysis a. Compare and translate displays of data and justify the selection of the type of table or graph (e.g., charts, tables, bar graphs, pictographs, line graphs, circle graphs, Venn diagrams). \*b. Formulate questions, design investigations, consider samples, and collect, organize, and analyze data using observation, measurement, surveys, or experiments (e.g., how far can 5th graders throw a softball based on where it first hits the ground?). 2. Probability a. Determine the probability of events occurring in familiar contexts or experiments and express probabilities as fractions from zero to one (e.g., find the fractional probability of an event given a biased spinner). b. Use the fundamental counting principle on sets with up to four items to determine the number of possible combinations (e.g. create a tree diagrams to see possible

combinations). 3. Central Tendency: Determine the range (spread), mode (most often), and median (middle) of a set of data.

## **Grade 6**

Standard 4: Measurement - The student will use measurements within the metric and customary systems to solve problems in a variety of contexts.

2. Convert, add, or subtract measurements within the same system to solve problems

(e.g.,  $9' 8'' + 3' 6''$ ,  $150 \text{ minutes} = \_\_ \text{ hours and } \_\_ \text{ minutes}$ ,  $6 \text{ square inches} = \_\_ \text{ square feet}$ ).

Standard 5: Data Analysis - The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

1. Data Analysis: Organize, construct displays, and interpret data to solve problems (e.g., data from student experiments, tables, diagrams, charts, graphs).

2. Probability: Use the fundamental counting principle on sets with up to five items to determine the number of possible combinations.

3. Central Tendency: Find the measures of central tendency (mean, median, mode, and range) of a set of data (with and without outliers) and understand why a specific measure provides the most useful information in a given context.

# Career Connect

This activity is a great start to understanding the basics of calculating rate of speed (velocity).

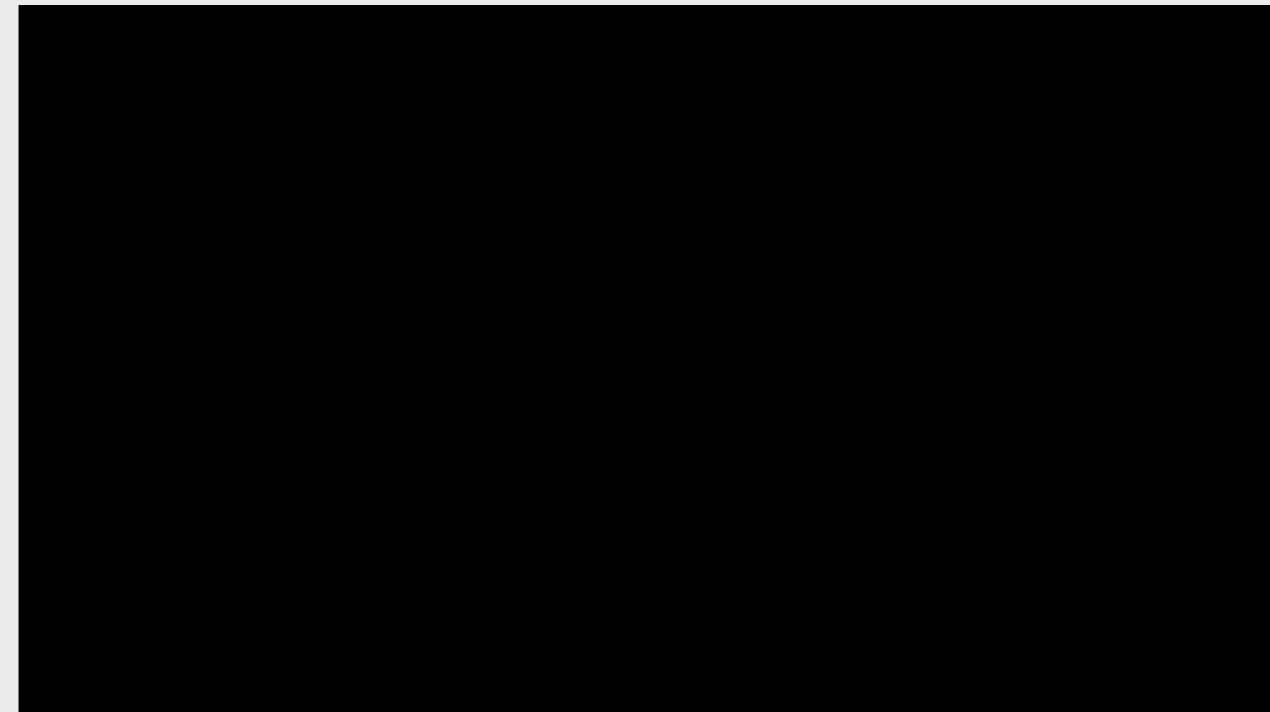
There are numerous jobs in the aviation and aerospace industries that are fun and exciting. All require good math skills! Click on the video to see Matt Esker's story



**Matt Esker**  
**Sooner Flight Academy**

Matt Esker is the Director of Sooner Flight Academy in Norman, Oklahoma.

Career Connect Video: Matt Esker



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Thank you!

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