

CALCULATING SPEED, DISTANCE, AND DURATION

RATIONALE

Calculating speed, distance, and duration from environmental cues provides students with foundational learning skills to problem solve and better understand the world around them.

ESSENTIAL QUESTION

How can we determine how fast and how far we are going and how long it will take to get to our destination?

MATERIALS

- Computer, laptop, or tablet
- Internet connection

LEARNING OBJECTIVES

After this lesson, learners will be able to:

- Explain to others what a knot is
- Calculate how fast a wa'a is traveling
- Calculate the distance to a destination
- Calculate how long a voyage will take

OPENING DISCUSSION

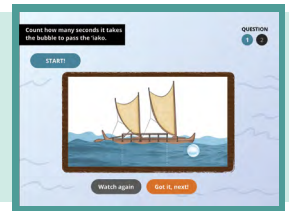
<https://ksdigitalfiles.ksbe.edu/assets/waa/content/speeddistanceduration/story.html>
(Select the "Overview" button)



Ask haumāna how a driver knows how fast they are going in their car. Explain that although early Hawaiians didn't have odometers in their voyaging wa'a, they were still able to tell how fast they were going, how far away they were from their destination, and how long their voyage would (roughly) take. They determined all of this by carefully observing their surroundings and using math. Tell haumāna that today we will try using the same techniques. Explain how speed is measured a bit differently when on the ocean, and introduce knots and nautical miles.

ACTIVITY IDEA #1: Measuring Your Speed, Distance, and Duration

<https://ksdigitalfiles.ksbe.edu/assets/waa/content/speeddistanceduration/story.html> (Select the "Measuring Your Speed, Distance, and Duration Activity" button)



SPEED

Go to the site and introduce the Speed, Distance, and Duration activity. Explain how you can estimate the speed at which we're going, by counting how many seconds it takes a bubble to pass from the front 'iako to the back 'iako of a wa'a, then divide 25 by that number. Try it out with the kids in the activity. Make sure to ask them why calculating speed might be important when sailing.

DISTANCE

Explain that we can estimate the distance we have traveled (or the distance we will travel) by multiplying our speed by the time that's elapsed. Reiterate that nautical miles are slightly different than land miles. Try it out with the kids in the activity. Ask them why calculating distance might be important when sailing.

DURATION

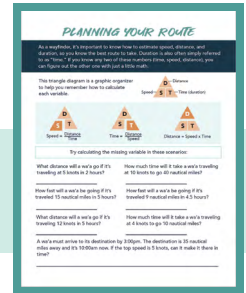
Explain that we can estimate the amount of time a voyage will take (duration) if we know the distance

to our destination as well as the speed we're going. To calculate duration, simply divide the distance by the speed. Ask them why calculating duration might be important when sailing.



ACTIVITY IDEA #2: Planning Your Route

https://ksdigitalfiles.ksbe.edu/assets/waa/content/speeddistanceduration_activity/planningyourroute.pdf



Introduce the review worksheet. Review how we calculate speed, distance, and duration and how we only need two variables to calculate the third missing one. Explain how it's important for wayfinders to have these skills when planning their routes.



SUPPLEMENTAL LINKS

<https://www.ksbe.edu/digital/holomoana/>

<http://www.hokulea.com/kau-ka-pea-holo-ka-waa/>

<https://kaiwakiloumoku.ksbe.edu/moananuiakea>

(Learning standards are on the next page)



Kamehameha Schools®



POSSIBLE LEARNING STANDARDS CONNECTIONS

E Ola! <https://blogs.ksbe.edu/eola/>

Nā Hopena A'o: <https://www.hawaiipublicschools.org/DOE%20Forms/NaHopenaAoE3.pdf>

'Ike kūpuna: ancestral experiences, insights, perspectives, knowledge, and practices.

Problem-solving

Transfer Goal A: Students will independently use their learning to apply mathematical knowledge to solve problems in a new situation. Overarching Understanding: Mathematics allows us to solve problems and make sense of the world.

- **Essential Question:** How does math help me to make sense of the world?
- **Problem Solving:** Appropriate strategies used in the problem solving process demonstrates mathematical knowledge to arrive at a correct answer or reasonable solution.

Strengthened Sense of Excellence

- Utilize creativity and imagination to problem solve and innovate.
- Assess and make improvements to produce quality work

Strengthened Sense of Hawai'i

- Use Hawaiian words appropriate to their task
- Learn and apply Hawaiian traditional world view and knowledge in contemporary settings

CCSS: <http://www.corestandards.org/read-the-standards/>

Math

Represent and solve problems involving multiplication and division

• CCSS.MATH.CONTENT.3.OA.A.3

Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Solve problems involving measurement and conversion of measurements

• CCSS.MATH.CONTENT.4.MD.A.2

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Understand ratio concepts and use ratio reasoning to solve problems

• CCSS.MATH.CONTENT.6.RP.A.3.B

Solve unit rate problems including those involving unit pricing and constant speed.

— KS DIGITAL HOLOMOANA —

Calculating Speed, Distance, and Duration

<https://www.ksbe.edu/digital/holomoana/>