



HUMAN FACTORS & ERGONOMICS



STUDENT LESSON
PLANS

University of Rhode Island



GRIP STRENGTH



University of Rhode Island

GRIP STRENGTH OVERVIEW

PURPOSE

To understand why the strength of your grip and the shape of your hand are important considerations for products such as smartphones, water bottles and car steering wheels.

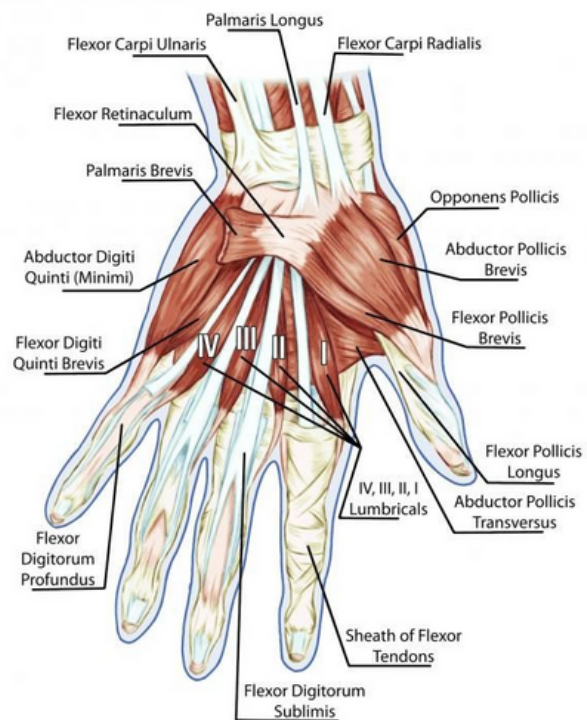
BACKGROUND INFORMATION

The hand is made up of three major types of bones: phalanges, metacarpal bones and carpal bones. The phalanges are comprised of 14 bones that are found in the fingers of each hand and also in the toes of each foot. Each finger has three phalanges (the distal, middle, and proximal); while the thumb only has two. The metacarpal bones are comprised of five bones that compose the middle part of the hand. The carpal bones make up the eight bones that create the wrist.

Numerous muscles, ligaments, tendons and sheaths can be found within the hand. The muscles can contract which allow movement of the bones in the hand. The ligaments are fibrous tissues that help bind together the joints in the hand. The sheaths are tubular structures that surround part of the fingers and the tendons connect the muscles in the arm or hand to the bone.

APPLICATION TO HF&E

Companies must design products that can accommodate a wide variety of people. Understanding average human grip strength helps those companies design smartphones to not be too heavy or water bottles that are filled up to not feel awkward in someone's hand. Grip strength is an important measurement that plays a key role in the development of handheld products.

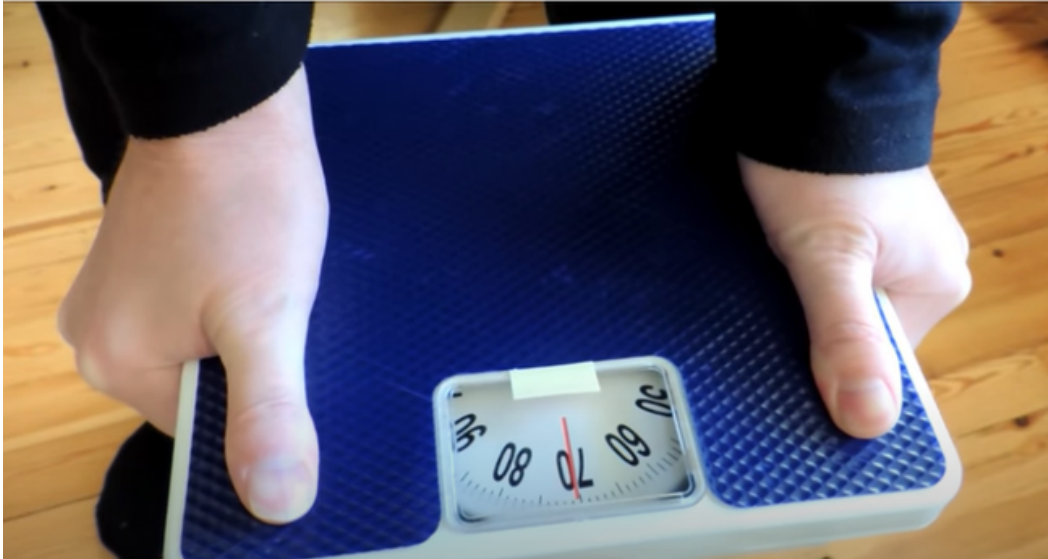




LESSON PLAN GRADES K - 3

University of Rhode Island

GRIP STRENGTH TEACHER MATERIALS



YOUTUBE LINK

"How to measure hand grip strength with bathroom scale / Hand grip strength test"

<https://www.youtube.com/watch?v=IMkGnPOtiHM>

KEY TAKEAWAYS

- Video shows how you can use one of both of your hands and a bathroom scale to test the amount of force or grip strength you have in that hand

REFLECTION

1. Were you surprised by your grip strength?
2. When are some times that your grip strength is tested?
3. Do you see why it would be important for a water bottle company to understand grip strength? If so, why?
4. How would you design a product that would be used frequently in someone's hand?

GRIP STRENGTH TEACHER MATERIALS

LENGTH OF COMPLETION

30 minutes

BILL OF MATERIALS

Bathroom Scale (\$14.99 on Amazon)

Grip Strength Tester (\$19.99 on Amazon)

PROCEDURE

1. Show students the video from the previous page of how to test grip strength using either a bathroom scale or grip strength tester.
2. Divide students into pairs (Student A and Student B)
3. Student A will begin the exercise by holding the bathroom scale with two hands and squeezing as hard as he can with the left hand
4. Student B will record the results
5. Repeat with Student A using their right hand
6. Student B will record the results
7. Repeat with Student A using both their left and right hand at the same time
8. Student B will record the results
9. Repeat steps 3 - 8 a total of 3 times
10. Repeat process with Student B performing the exercise and Student A recording the results
11. Upon completion, average the grip strength results for the left hand, right hand and both hands



GRIP STRENGTH STUDENT HANDOUT

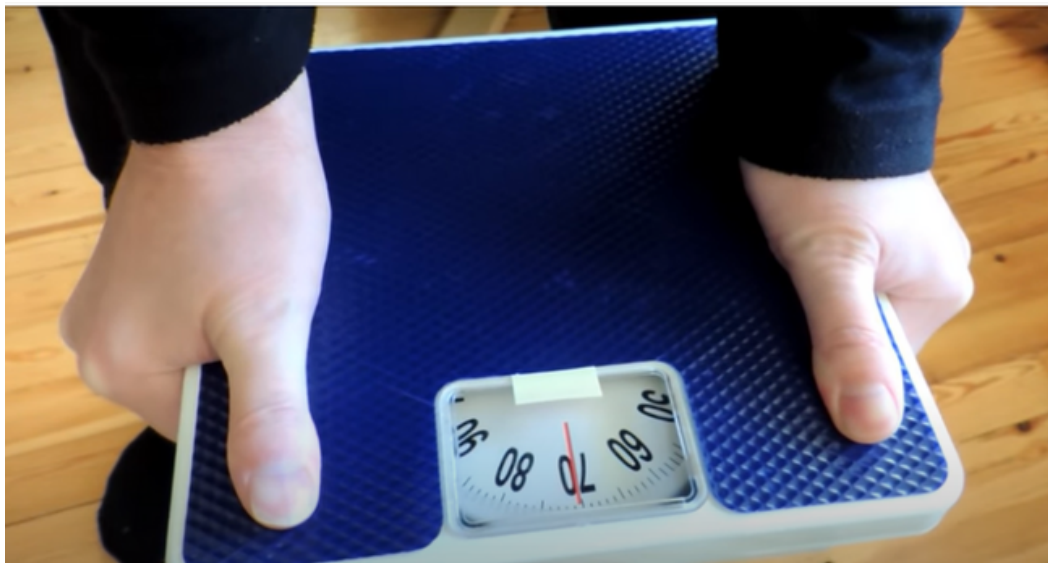
LENGTH OF COMPLETION

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REFLECTION

1. Were you surprised by your grip strength?
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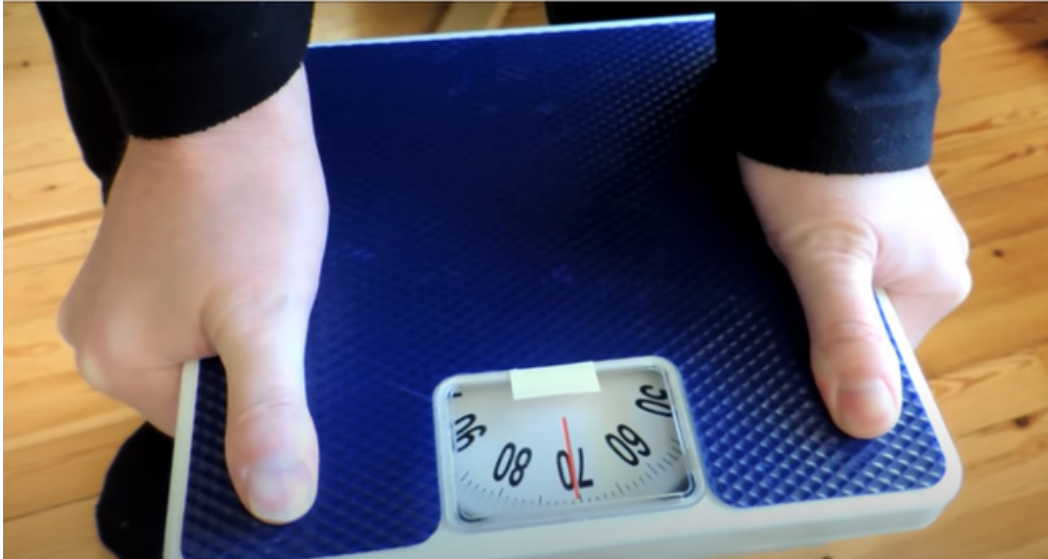


LESSON PLAN GRADES 4 - 6



University of Rhode Island

GRIP STRENGTH TEACHER MATERIALS



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KEY TAKEAWAYS

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BILL OF MATERIALS

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10. Repeat process with Student B performing the exercise and Student A recording the results
11. Upon completion, average the grip strength results for the left hand, right hand and both hands



GRIP STRENGTH STUDENT HANDOUT

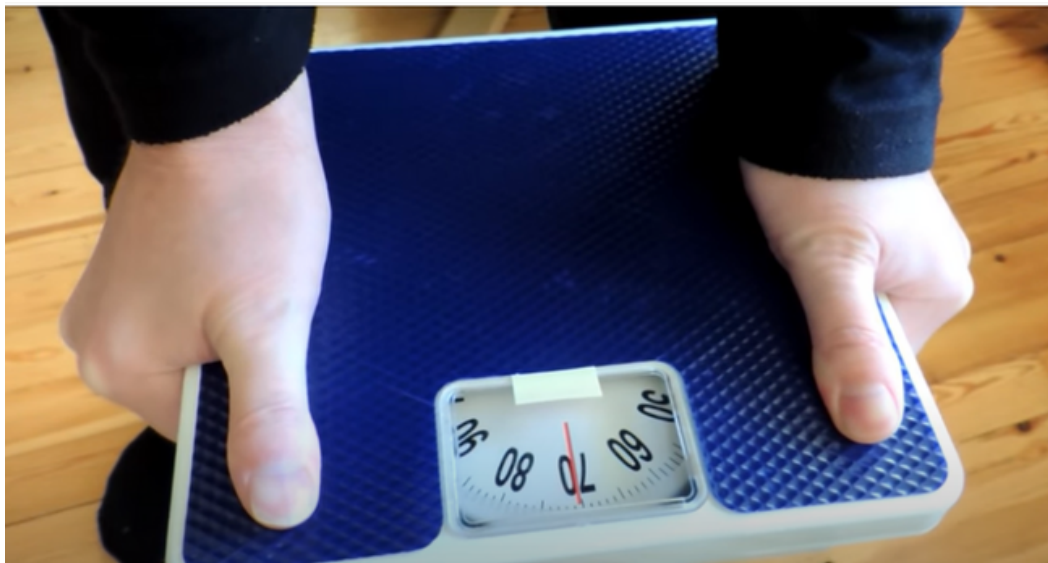
LENGTH OF COMPLETION

30 minutes

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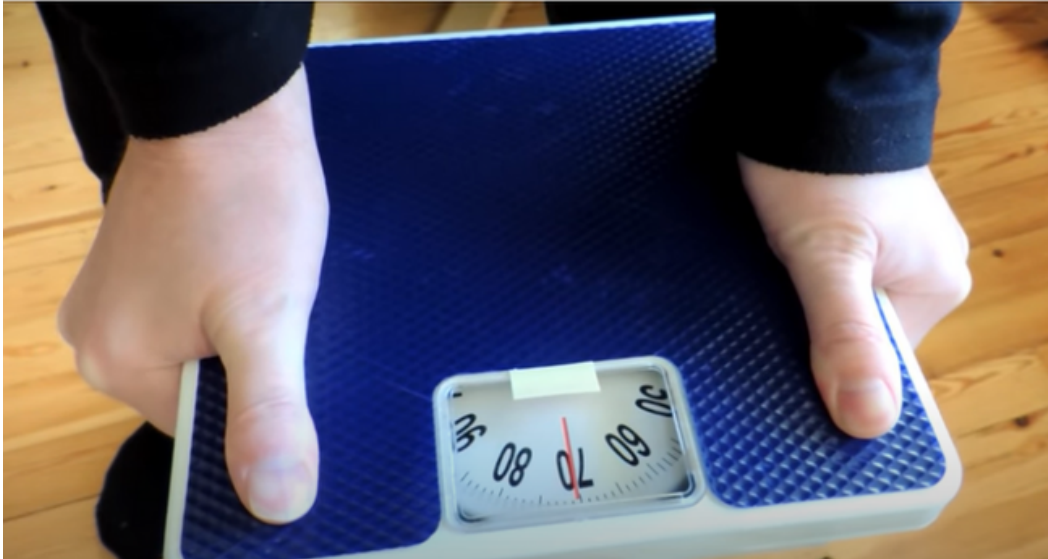
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LESSON PLAN GRADES 7 - 9

University of Rhode Island

GRIP STRENGTH TEACHER MATERIALS



YOUTUBE LINK

"How to measure hand grip strength with bathroom scale / Hand grip strength test"

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KEY TAKEAWAYS

- Video shows how you can use one of both of your hands and a bathroom scale to test the amount of force or grip strength you have in that hand

REFLECTION (5TH GRADE - 8TH GRADE)

1. Were you surprised by your grip strength?
2. When are some times that your grip strength is tested?
3. Do you see why it would be important for a water bottle company to understand grip strength? If so, why?
4. How would you design a product that would be used frequently in someone's hand?

GRIP STRENGTH TEACHER MATERIALS

LENGTH OF COMPLETION

30 minutes

BILL OF MATERIALS

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10. Repeat process with Student B performing the exercise and Student A recording the results
11. Upon completion, average the grip strength results for the left hand, right hand and both hands



GRIP STRENGTH STUDENT HANDOUT

LENGTH OF COMPLETION

30 minutes

BILL OF MATERIALS

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LESSON PLAN GRADES 10 - 12



University of Rhode Island

GRIP STRENGTH TEACHER MATERIALS



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KEY TAKEAWAYS

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