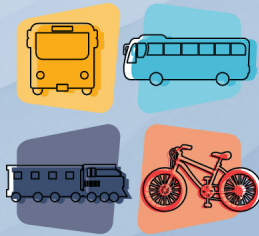


# USING THE "HOW WE MOVE" CARDS

## INSTRUCTIONS

Each *How We Move* card represents a mode of transportation and tells a story of how people move from place to place. The image and facts on the card provide more information about that specific mode, including how many people it can carry, how far it can move in a day, and if/how it pollutes the environment.

Through investigation and discussion of the cards, students can explore different modes of transportation, identify patterns, and deepen their understanding of how people move. Using the images, facts, and descriptions, students can identify patterns, categories, and sequence the cards by history, speed, and pollution.



# USING THE "HOW WE MOVE" CARDS

## INSTRUCTIONS

### History:

- Separate the cards into categories according to whether they are still in use or not.
- Sequence the cards by which was likely used first, historically (e.g., walking, then canoe, then train, etc.).

### Speed:

- Separate the cards into categories such as "low speed," "medium speed," and "high speed."
- Sequence the cards according to which is the fastest.

### GHG Intensity:

- Separate the cards into categories such as "low," "medium," and "high" based on their greenhouse gas emission intensity.
- Sequence the cards according to which is the highest GHG intensity mode.



# USING THE "HOW WE MOVE" CARDS

## CARD LEGEND

**Capacity:** The number of people that can safely, efficiently, and comfortably be carried.

**Speed:** The distance traveled in a day varies by mode. For ships, rail, and airplanes, travel times of 12+ hours per day are possible, which extends their daily range. For other modes, travel times are shorter, which reduces their daily range. Speed measurements can vary by mode as well, making comparisons a little trickier. Miles per hour, miles before refueling, and miles per day are some measurements included in these cards.

**Greenhouse Gas Intensity:** The greenhouse gas emissions per passenger mile. A large vessel like a train or plane might create a lot of emissions in total, but if it carries more people, the level of emissions per passenger can be lowered. Think about why each mode is "low," "high," or something else.



In the United States, millions of people travel billions of miles. How do we get where we need to be? How do we choose whether to walk, ride, drive, or fly to our destination? When and why is a particular mode used? How do these modes differ by capacity, speed, and emissions? Explore the How We Move Cards to investigate and consider the answers to these questions and more.



**1** Humans start to walk when they are between 12 and 18 months old. People who train for marathons can walk as far as 20-30 miles in a day.



**Capacity:** one person  
**Speed:** 10 miles/day  
**Greenhouse Gas Intensity:** Zero

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**2** Horses were domesticated around 6,000 years ago. In 1840 in North America, around four million horses were employed for agricultural work and travel.



**Capacity:** one person  
**Speed:** 35 miles/day  
**Greenhouse Gas Intensity:** Near zero

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**3** Karl von Drais created a steerable, two-wheeled contraption in 1817—one of the earliest attempts at inventing a bicycle. Today, millions of people ride bicycles around the world for travel and leisure.



**Capacity:** one person  
**Speed:** 20 miles/day  
**Greenhouse Gas Intensity:** Near zero

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**4** In 1913, the United States produced some 485,000 of the world total of 606,124 motor vehicles. In 2021, only 8% of households in the nation reported they did not own at least one vehicle—and the vast majority of vehicles are gasoline-powered.



**Capacity:** 5 people  
**Speed:** 65 mph / 300 miles on one tank of gas  
**Greenhouse Gas Intensity:** High

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**5** Diesel is the primary power behind transit and school buses nationwide. One public transit system can have thousands of buses; LA Metro's fleet included 2,036 buses in 2023.



**Capacity:** 70 people  
**Speed:** 50 MPH / 300 miles on one tank  
**Greenhouse Gas Intensity:** Medium

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**6** Light rail transit is increasingly common in many urban areas. The light rail vehicles are usually powered by electric lines overhead and driven by an on-board operator.



**Capacity:** 130-200 people per car  
**Speed:** 35-55 mph for up to 20 hours/day  
**Greenhouse Gas Intensity:** Very Low

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**7** The 171-mile high speed rail line from Merced to Fresno to Bakersfield will connect the three largest cities in California's Central Valley, a region of about 6 million people.



Source: California High-Speed Rail Authority <https://hsr.ca.gov/>

**Capacity:** 1,100 passengers  
**Speed:** 110-220 MPH  
**Greenhouse Gas Intensity:** Very Low

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**8** The SPARTAN Superway is an initiative at San José State University to establish solar powered automated rapid transit ascendant network ("SPARTAN") systems for urban environments.



**Capacity:** 8 passengers per car  
**Speed:** ~23MPH (line speed)  
**Greenhouse Gas Intensity:** Very Low

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**9** As of 2023, there are estimated to be over 300 cruise ships operating around the world, carrying hundreds of thousands of passengers to far-off destinations.



**Capacity:** ~4,000 passengers  
**Speed:** 480 nautical miles/day  
**Greenhouse Gas Intensity:** Very High

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**10** A pedal rickshaw (or 'becak' in Indonesian) is a traditional transportation that can comfortably carry one or two people.



**Maximum Capacity:** Two adults and one child  
**Speed:** 20 miles/day  
**Greenhouse Gas Intensity:** Near zero

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**11** Electric vehicles (EV) have a smaller carbon footprint than gasoline cars, even when accounting for the electricity used for charging. The EV market has grown rapidly in recent years.



**Maximum Capacity:** 5 people  
**Speed:** 60 mph / up to 300 miles on a single charge  
**Greenhouse Gas Intensity:** Low

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**12** On April 12th of 1961, the first human—Soviet citizen Yuri Gagarin—went into space. In recent years, the once far-fetched idea of space tourism has started to become a reality.



**Maximum Capacity:** 5-7 people  
**Speed:** 25,000 miles per hour  
**Greenhouse Gas Intensity:** Extremely High: ~5 tons per passenger

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**13** Jumbo jets like the Boeing 747 were first introduced in the 1960s and have become an iconic form of air travel.



**Maximum Capacity:** 366 passengers  
**Speed:** 7,000 nautical miles without refueling  
**Greenhouse Gas Intensity:** Very High: ~109 lbs per passenger

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**14** Animal-drawn carts were first used in ancient Sumeria, as early as 3000 BCE. Photo shows a depiction of a donkey-drawn cart from the Sumerian panel of the Standard of Ur.



**Maximum Capacity:** Up to 4 people  
**Speed:** up to 20 miles/day  
**Greenhouse Gas Intensity:** Near Zero

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**15** Many indigenous peoples throughout North America have traditionally traveled on dugout canoes in oceans, lakes, and rivers. Photo depicts a contemporary seagoing dugout from a tribe in the Pacific Northwest.



**Maximum Capacity:** Up to 20 people  
**Speed:** 60 miles/day  
**Greenhouse Gas Intensity:** Near Zero

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