

USING THE "HOW WE MOVE GOODS" CARDS

INSTRUCTIONS

Each *Moving Goods Card* represents a mode of transportation and tells a story of how people move goods. The image and facts on the card provide more information about that specific mode, including how much 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 about how goods are moved. Using the images, facts, and descriptions, students can identify patterns, categories, and sequence the cards by history, speed, and pollution.



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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.

Pollution:

- Separate the cards into categories such as "low pollution," "medium pollution," and "high pollution."
- Sequence the cards according to which is the highest polluting mode.



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CARD LEGEND

Maximum Capacity: The weight that can be carried at once (lbs = pounds). The technical term is Transportation Load Capacity.

Speed: The distance travelled 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 people, battery, and electric powered modes, travel times are shorter, which reduces their daily range.

Greenhouse Gas Intensity: The greenhouse gas emissions for each pound transported. A large vessel can create a lot of emissions in total, but if it carries a great amount of goods, the level of emissions per item can be lowered.

Pollution: The amount of air and water pollution resulting from this mode of transportation. Pollution includes greenhouse gasses, particulates, and toxic materials that spill into water. This value indicates the typical impact a shipment of goods using this mode would have. Fossil fuel-based modes and large-scale modes make more pollution ("High") than other modes like bicycles ("Zero").



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In the United States, 17,824,281 thousand tons of freight are moved each year. This is worth 2.3 billion male adult elephants in weight! How do goods—the food we eat, the medicine we need, the clothes we wear, the entertainment we use—get where they need to be? When and why is a particular mode used? Did your shoes come by cargo ship from abroad or by train across the country? How do these modes differ by capacity, speed, and emissions? Explore the "How We Move Goods" Cards to investigate and consider the answers to these questions and more.



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1 A truck transports packaging supplies from a plant in Kingsburg, CA to San José, CA.



Maximum Capacity: 80,000 lbs
Speed: 600 miles/day
Greenhouse Gas Intensity: Medium
Pollution: High

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2 A cargo bicycle delivers packages to homes and businesses in the city as a "last-mile" transport solution.



Maximum Capacity: 220 lbs
Speed: 30 miles/day
Greenhouse Gas Intensity: Zero
Pollution: Zero

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3 Fairtransport is a cargo transport company that uses sailing ships to transport fair-trade coffee, jam, wine, and other delicacies. Tres Hombres ship travels between South, Central & North America and Europe.



Source: Fairtransport <https://fairtransport.eu/en/>

Maximum Capacity: 88,000 lbs
Speed: 90 miles/day
Greenhouse Gas Intensity: Near zero
Pollution: Near zero

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4 A container ship arrives at the Port of Oakland from South Korea with up to 19,200 20-foot cargo containers.



Maximum Capacity: 250,000 tons / ~550,000,000 lbs
Speed: 400 miles/day
Greenhouse Gas Intensity: Low
Pollution: Medium

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5 Time sensitive goods, like produce and prescription medications, are delivered by a 747 cargo plane.



Maximum Capacity: 274,100 lbs
Speed: 8,700 miles/day
Greenhouse Gas Intensity: High
Pollution: High

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6 An electric van delivers a variety of goods ordered online to customers.



Maximum Capacity: 2,000 lbs
Speed: 200 miles/day
Greenhouse Gas Intensity: Low
Pollution: Low

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7 Diesel-powered rail transports grain exports from U.S. crop-producing areas to ports.



Maximum Capacity: 26,000,000 lbs
Speed: 300 miles/day
Greenhouse Gas Intensity: Low
Pollution: Medium

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8 UberEats provides food delivery services within a 20 miles radius. Deliveries within 2-3 miles are sometimes completed by cyclists.



Maximum Capacity: 15-20 lbs (per delivery)
Speed: 30 miles/day
Greenhouse Gas Intensity: Zero
Pollution: Zero

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9 UberEats provides food delivery services via car within 20 miles radius.



Maximum Capacity: 50 lbs (per delivery)
Speed: 180 miles/day
Greenhouse Gas Intensity: High
Pollution: High

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10 A pedal rickshaw (or 'becak' in Indonesian) is a traditional transportation often available for hire at open-air markets to carry food and household goods.



Maximum Capacity: 220 lbs
Speed: 30 miles/day
Greenhouse Gas Intensity: Zero
Pollution: Zero

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11 Nuro develops autonomous fully-electric vehicles and partners with businesses like Domino's, CVS, and Krogers to deliver groceries, food, and prescriptions.



Source: Nuro <https://www.nuro.ai/>

Maximum Capacity: 420 lbs with space for 20 grocery bags (per delivery)
Speed: 105 miles/day
Greenhouse Gas Intensity: Zero
Pollution: Zero

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12 Zipline designs, manufactures, and operates delivery drones. The company has established itself in Ghana, powering their national blood delivery network, and Rwanda, helping with Covid-19 vaccine distribution.



Source: Zipline <https://www.flyzipline.com/press-kit>

Maximum Capacity: 6-8 lbs (per delivery)
Speed: 1,440 miles/day (quickly-replaceable battery allows for rapid turnaround between flights)
Greenhouse Gas Intensity: Near zero
Pollution: Near zero

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13 Sled dogs are still used for transportation in some rural parts of Alaska, Canada and Greenland, though snowmobiles have steadily replaced this means of transport.



Maximum Capacity: 340 lbs (85 lbs per dog)
Speed: 90 miles/day
Greenhouse Gas Intensity: Near zero
Pollution: Near zero

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14 Westward-bound emigrants moved food, water, furniture, and household goods in covered wagons. Wagons were most commonly pulled by oxen.



Maximum Capacity: 1800 lbs
Speed: up to 20 miles/day
Greenhouse Gas Intensity: Near zero
Pollution: Near zero

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



Maximum Capacity: 5,000 lbs (2.5 tons)
Speed: 60 miles/day
Greenhouse Gas Intensity: Near zero
Pollution: Near zero

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16 13.54 million women in African nations are responsible for regular water collection trips by foot that take 30 minutes or longer.



Maximum Capacity: 40 lbs
Speed: 4 miles/day
Greenhouse Gas Intensity: Zero
Pollution: Zero

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