

An aerial photograph of Saint Paul, Minnesota, featuring the Mississippi River. A large concrete bridge with multiple arches spans the river. In the foreground, a white tugboat is pushing a long barge covered in white material. The background shows modern city buildings and a park area with a stone wall and a glass dome structure. The sky is blue with light clouds.

Saint Paul's Working River

Grade 3

Workbook



Saint Paul's Working River

This workbook was created through a partnership between the Saint Paul Port Authority and the Saint Paul Public School District's Social Studies Department and third grade teachers. The Port Authority is an economic development agency committed to creating quality job opportunities, expanding the tax base, and advancing sustainable development.

Through this work, the Port Authority manages four river terminals in the city of Saint Paul. The Port of Saint Paul supports 1,200+ living wage jobs, connects Minnesota farmers to the global market, and provides an efficient and economical transportation option for products that impact our daily lives.

For more information, go to sppa.com.



The Mississippi River

The Mississippi River is the second largest river in the United States. The name "Mississippi" comes from the Ojibwe word for "big river."

As a Liquid Highway, it is one of the busiest rivers in the world. It starts in northern Minnesota, runs through Saint Paul, and touches a total of 10 different states before ending in the Gulf of Mexico.

Crossword

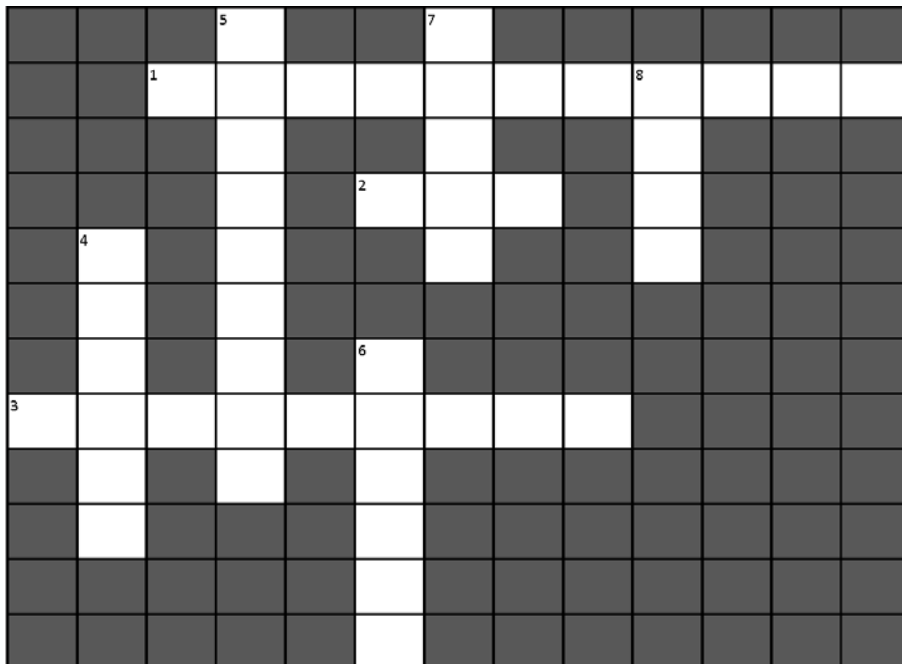
Across

1. Native American word for "big river."
2. How many states does the Mississippi River touch?
3. The state where the Mississippi River ends.

5. The second state the Mississippi River touches.
6. The Mississippi River works as a ____ highway.
7. The Mississippi ____ runs through Saint Paul.
8. The third state the Mississippi River touches.

Down

4. The Mississippi River is the ___ largest river in the United States.





Let's Discuss

1. What is a highway?
2. How can a river be a highway?

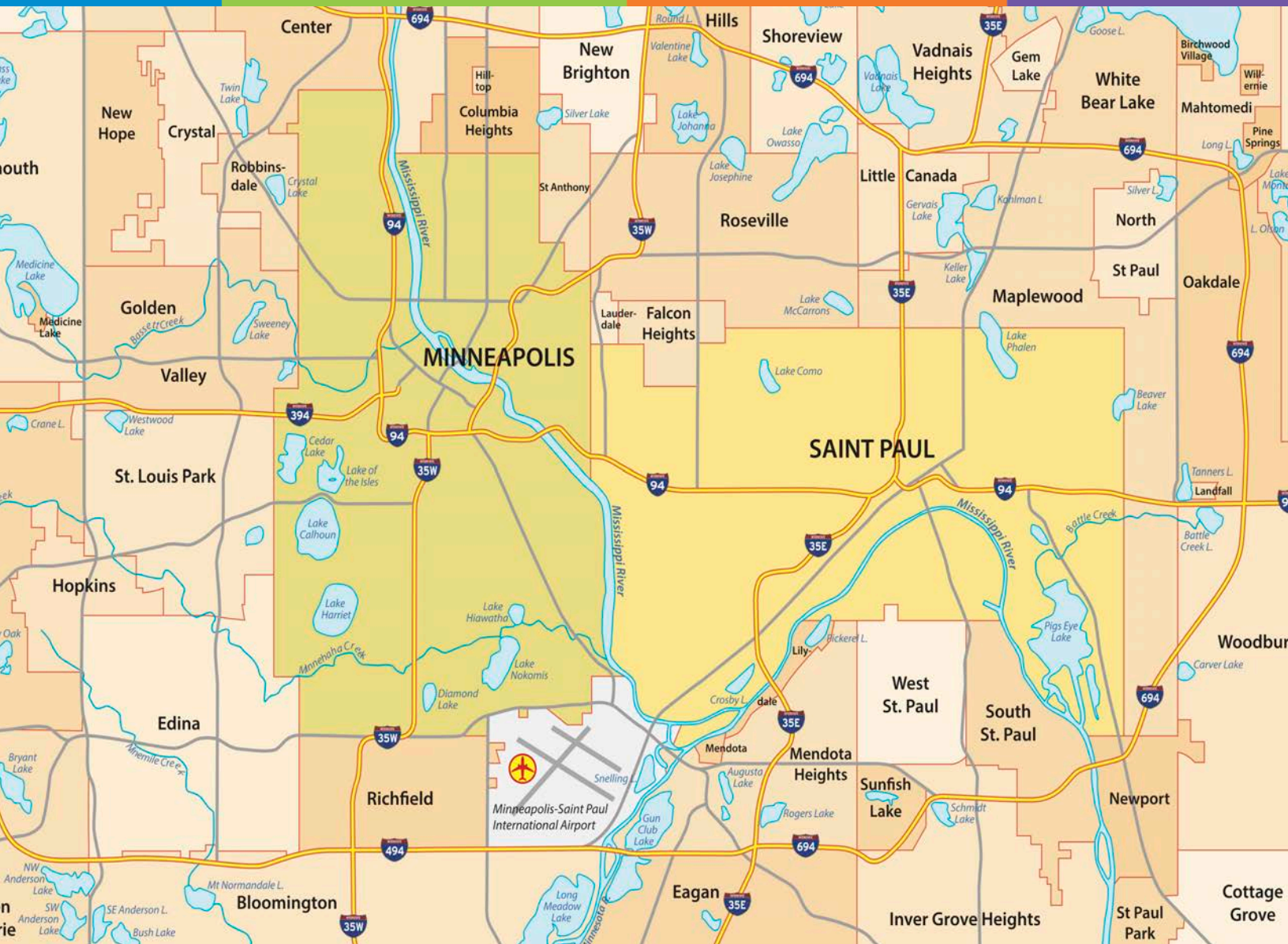


Which 10 States Touch the Mississippi River?



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____





LEGEND

Create a legend with symbols for your school and where you live. Next, draw these same symbols on the map above, showing where you live and where you go to school.

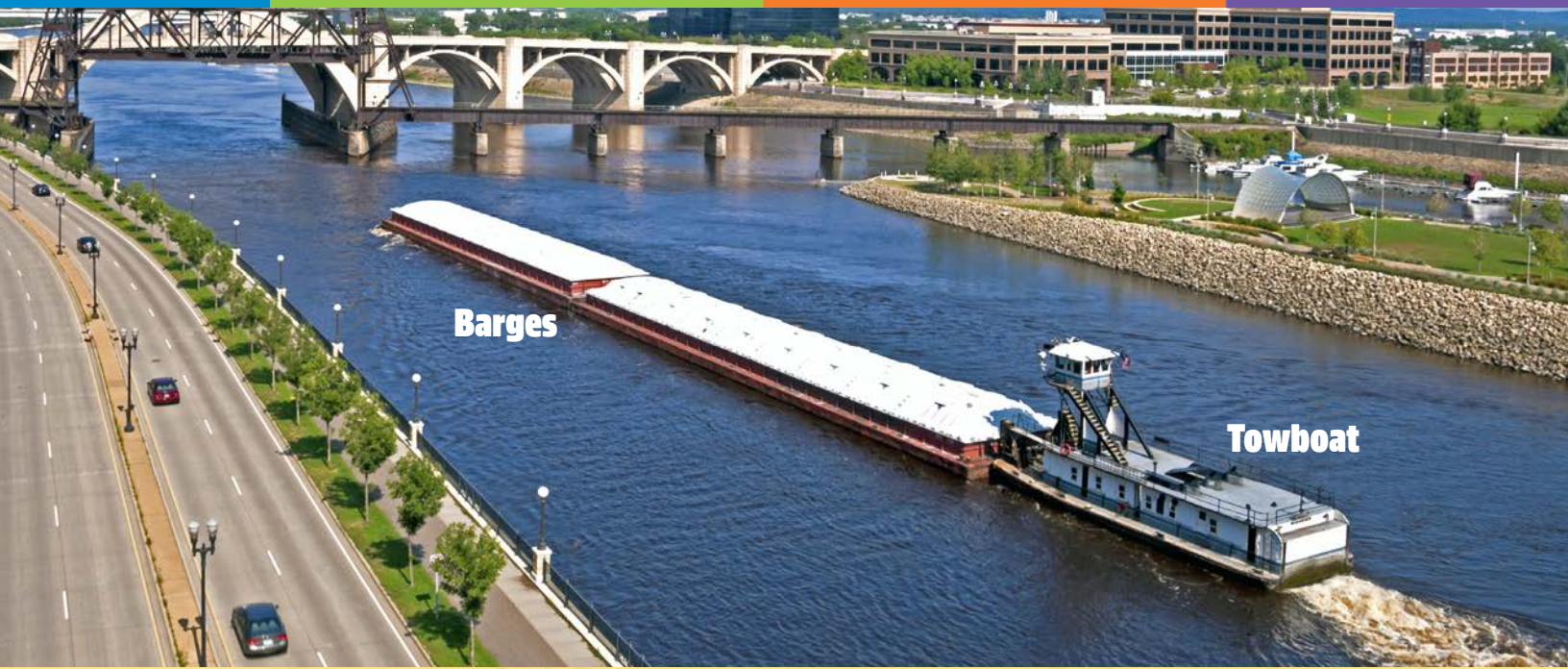


The Ports on The Mississippi River

When you drive on the highway, do you see stops along the way? Of course. It's the same on the Mississippi River. There are stops all along the river, from Minnesota to Louisiana. These stops are called **ports**. Each push pin on the map below represents a port. While you can only see 7 ports, there are a total of 40 on the Mississippi River.

At each port, **cargo** is either delivered as an **import** or shipped out as an **export**. In Saint Paul, we import many items, including: cement; chemicals that keep our water clean; and fertilizers used by nearby farmers. Our exports include **agricultural** products, including corn and wheat.





Barges

Towboat

Name a Port

city in each of these states:

Minnesota _____

Wisconsin _____

Iowa _____

Missouri _____

Tennessee _____

Mississippi _____

Louisiana _____



Look at the photo above.

You will see a towboat pushing two barges.

Inside the barges, under their lids, are the materials being shipped on the river.



Around the World

Outside of the city, farmers grow **crops**. These crops include corn, wheat, and soybeans. Once the crops are **harvested**, many farmers sell them to buyers in other countries. These countries include Canada, Mexico, Japan, and South Korea.

Here's how it works:

1. Farmers grow their crops in fields.
2. Farmers harvest their crops.
3. The crops are loaded onto a truck.
4. The crops are then transferred from the truck to a train.
5. The crops are transferred again from the train to a barge.
6. The crops arrive at their final destination.

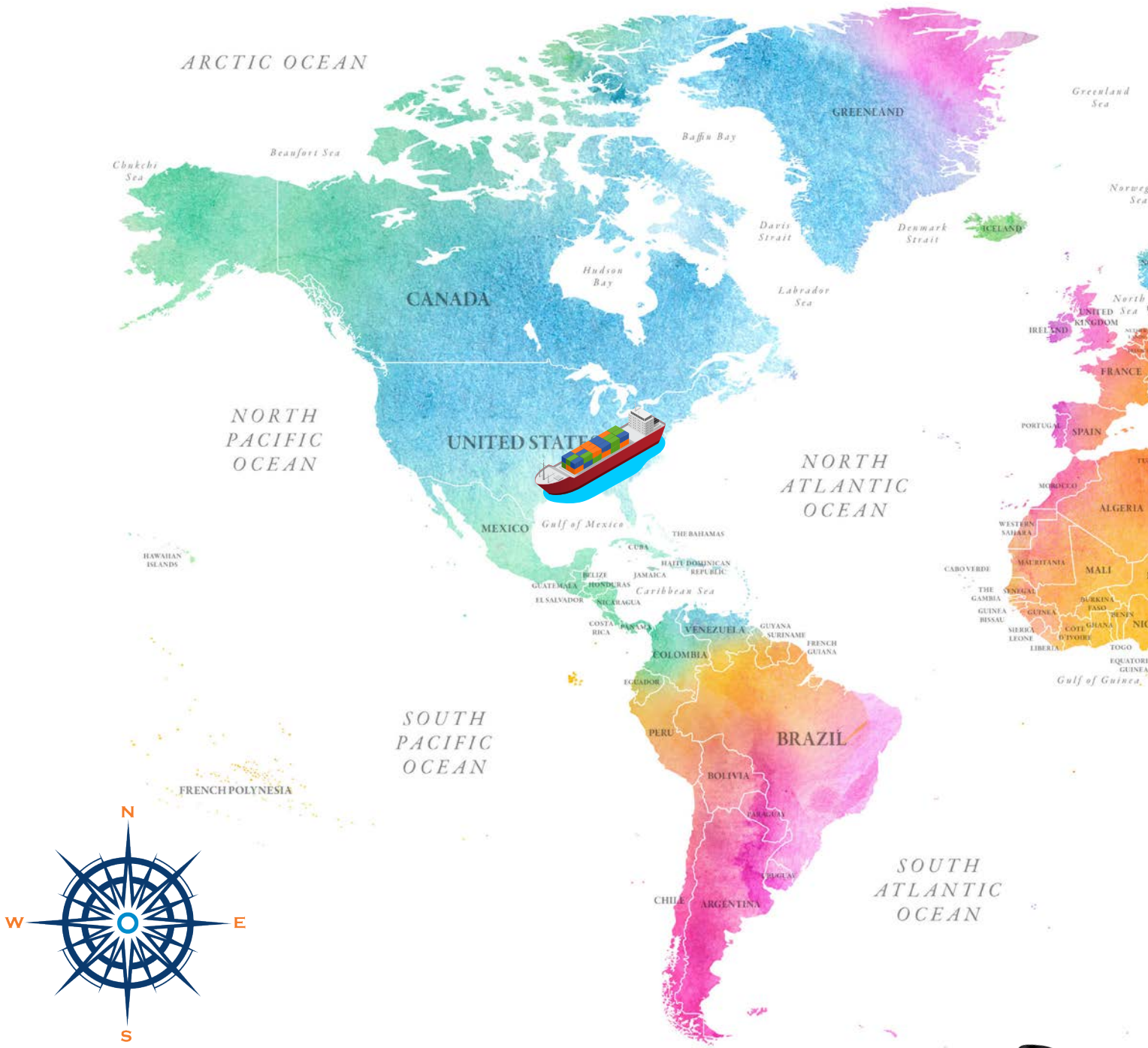
This is called **multimodal transportation** because products are transported by multiple **modes** of transportation. Trucks, trains, and barges work together to get crops from Minnesota farmers to buyers around the world.



Putting Things in Order

Help! The photos below are not in order. Using the numbers 1-6, show the sequence of events that need to happen to get Minnesota crops to countries like Canada, Mexico, Japan, and South Korea.

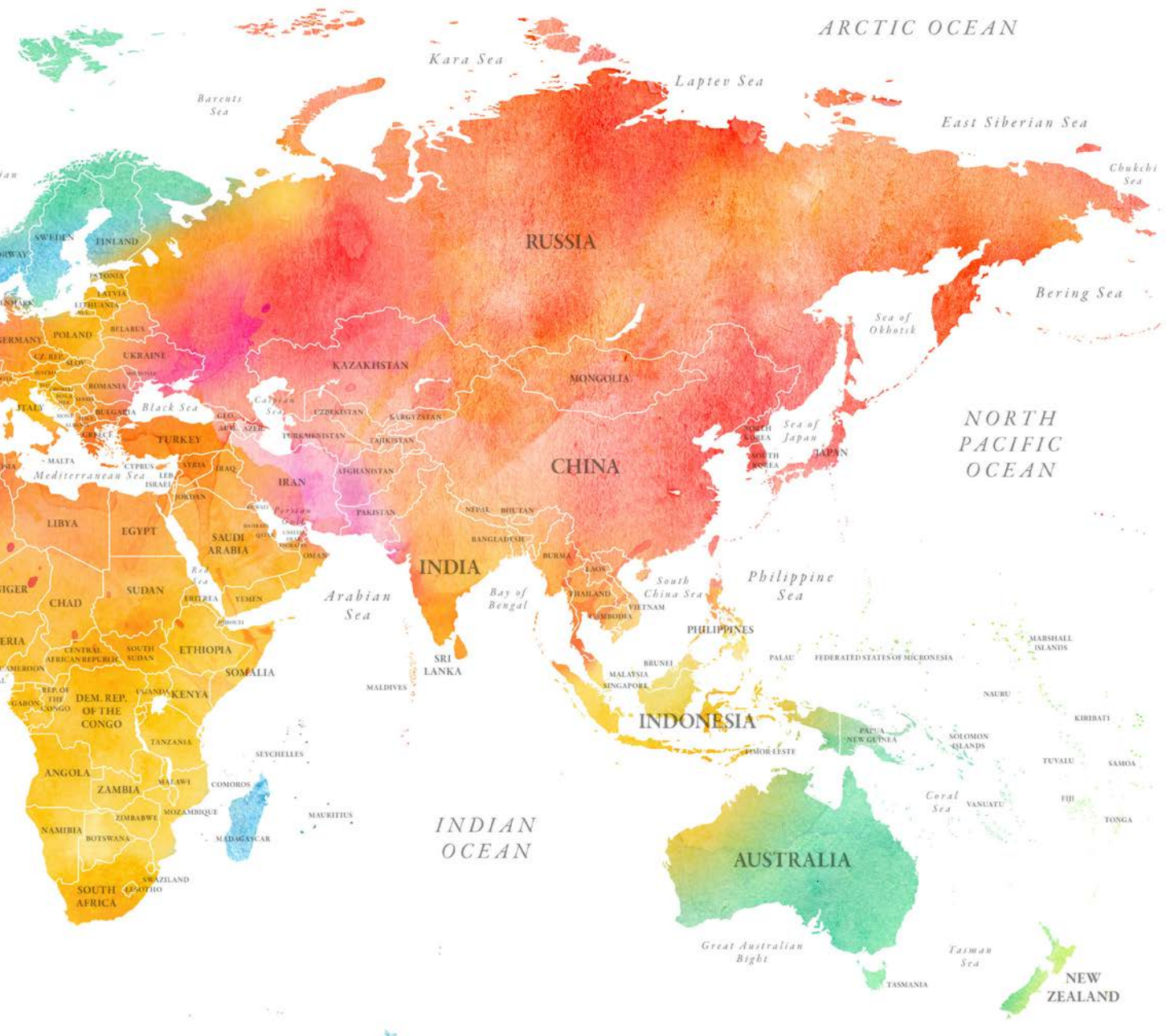




Half of all agricultural products leaving Minnesota are shipped on barges. Barge shipping works well for moving products as long as those products don't spoil quickly. Why? Because barge shipping is slower than other transportation options. The good news is that they use less energy, making them better for the environment.



TO DO: Starting with the barge, draw several paths that could be taken to transport cargo from the Gulf of Mexico to China, South Korea, Japan, and Canada.



Let's Discuss

Have you ever tried to pick up a heavy item while in a swimming pool, lake, or river?
Because of the water, did you use more or less energy?



Upstream or Downstream?

Cargo leaving Minnesota travels **downstream** to the south. As you know, many of these barges contain agricultural products.

But what about the barges coming upstream, heading north to Saint Paul? Some of the most common products arriving in Saint Paul include cement, road salt, fertilizer, and materials that keep our drinking water clean and safe to drink.

TO DO: Draw a line in one color to show the path a barge would take traveling south (downstream). Draw a second line, in another color, to show the path a barge would take traveling north (upstream).



Which Direction?

Listed below are several products that ship on the Mississippi River. Which ones should be coming upstream? And which should be going downstream? Circle the right answer for each one.



Road Salt is similar to the salt we put on our food, but in a larger rock form. Snow plows cover the streets and highways with road salt to lower the freezing point of snow. Without road salt, snow and water freeze at 32 degrees.

Does Road Salt travel
UPSTREAM or **DOWNSTREAM**?



Soybeans are small round seeds that are grown in Minnesota. They are used to make soy oil or soy meal. Soy oil is used for cooking, and making inks or paints. Soy meal is ground up soy that is fed to farm animals as a source of protein.

Do Soybeans travel
UPSTREAM or **DOWNSTREAM**?



Cement is a “binder” that sets, hardens, and fuses other materials together.

Does Cement travel
UPSTREAM or **DOWNSTREAM**?

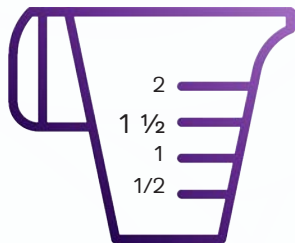
More About Cement

Cement is a perfect example of a product that travels upstream, to Minnesota, on the Mississippi River. This cement comes from Iowa and Missouri. It is mixed with water and sand or other **aggregates** (crushed or broken stone) to make **concrete**. Concrete is used for almost all building projects including houses, schools, roads, driveways and sidewalks. In fact, the only **substance** used more than cement is water.

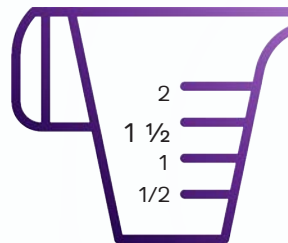
The Recipe

Making concrete is a lot like baking cookies. You need to combine the right amount of each ingredient to get the results you want.

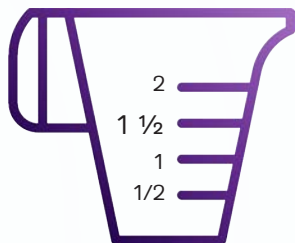
TO DO: Using the recipe below, shade the amount needed for each ingredient.



CEMENT



WATER



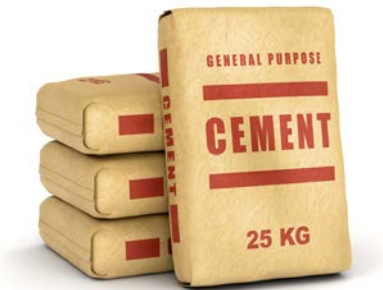
**SAND OR
AGGREGATE**



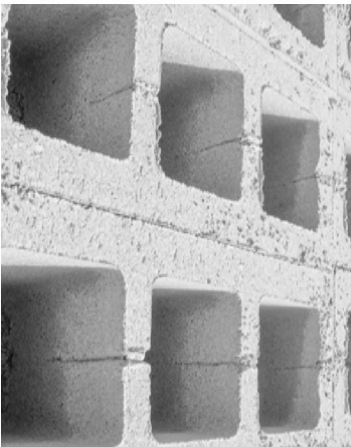
Let's Do the Math!



1. A bricklayer can make 20 concrete bricks by mixing 1 bag of cement with sand, aggregate, and water. How many bricks of concrete can the bricklayer make with 20 bags of cement?



2. Let's say the state of Minnesota buys 430 tons of cement each week. It comes on a barge from Davenport, Iowa. If there are five weeks in August, how many tons of cement will be delivered upstream?



Did you know that one ton is the same as 2,000 pounds? It's about the same weight as a small car.

Story Time

Write a short story about concrete.

Include each of these words and use the tool below to structure your story.

1. Barge
2. Cargo
3. Boats
4. Port
5. Cement
6. Concrete



The Setting

Where:

When:

Characters

Major:

Minor:

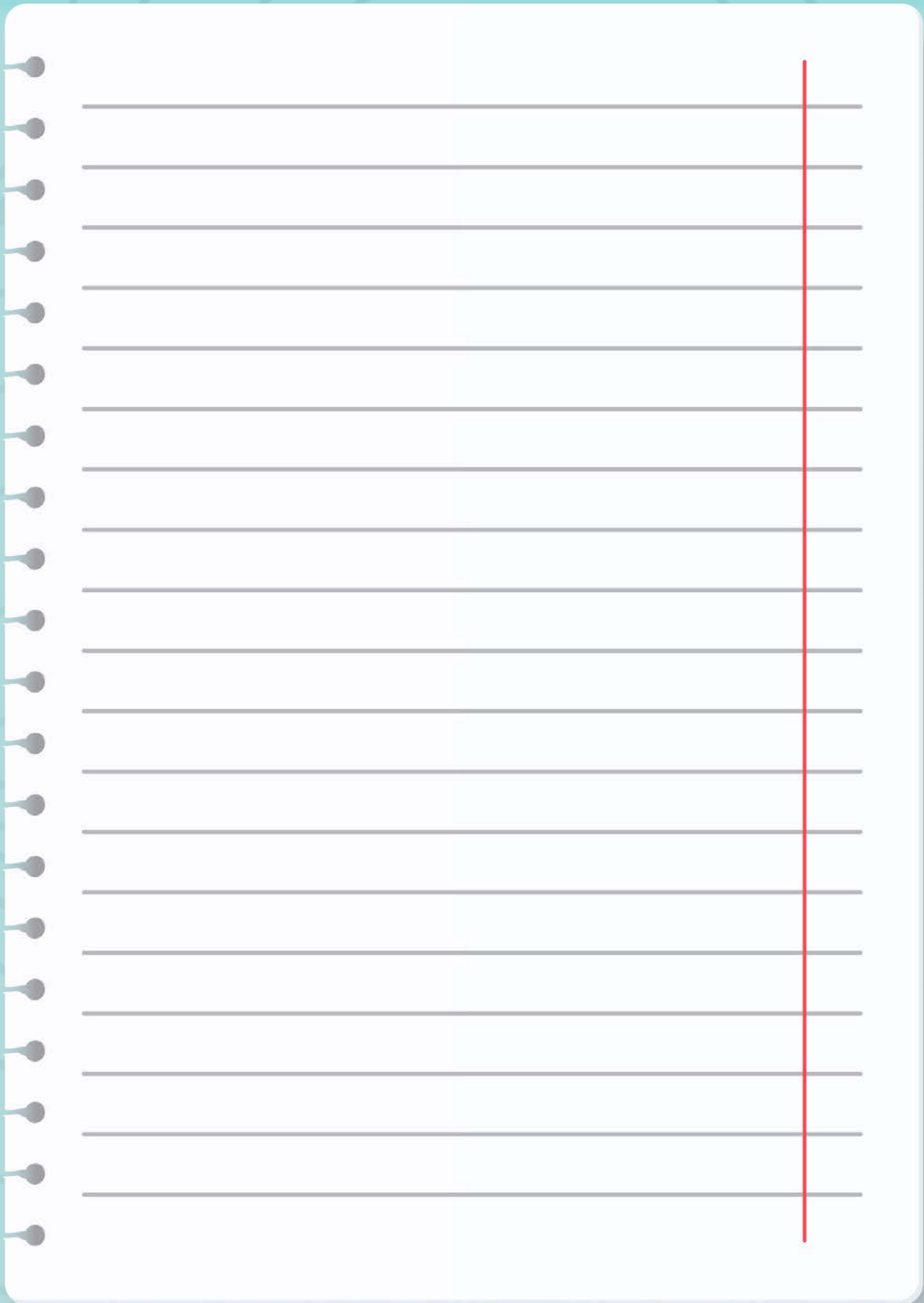
Plot/Problem

Event 1

Event 2

Event 3

Conclusion/Outcome/Solution



Writing

Draw a picture of the place(s), people, and things in your story.

A large, blank white rectangular area for drawing, framed by a spiral binding on the left side. The area is intended for the student to draw a picture related to their story.

Concrete Search-a-Word



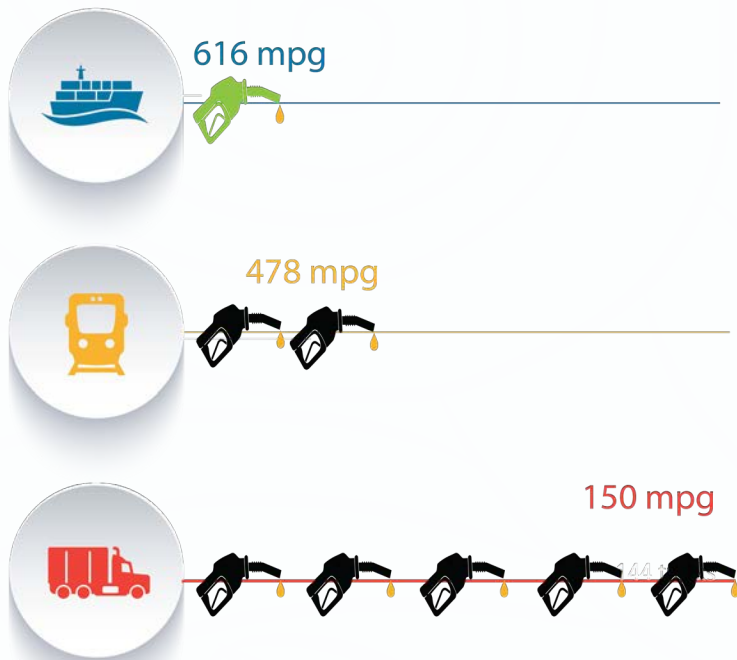
S
C I S
T O D H V
C E N E I V P
I U W C W P R Y K
N P G S R A R X O R K
R V P L H E L E E C G J V
I O W A F D T K L E T M A A Q
B P E S M A K
A X V E V E W
R K N T D R T
G M Y T M V W I L T S
E R G A R U X M Z S D
S E S Y J J P B
D V Y S H C U D
Z I M U N R N G
D R E K G A U B
U C B K S W N K

Words to Find

BARGE
CEMENT
CONCRETE
IOWA
RIVER
SAND
SHIP
SIDEWALK
UPSTREAM
WATER



Environmental Impact



This graph shows how much gas is needed to move one ton of cargo by barge, train, and semi-truck.

Source: National Waterways Foundation

Let's Discuss

What do you think?

I notice _____

I observe _____

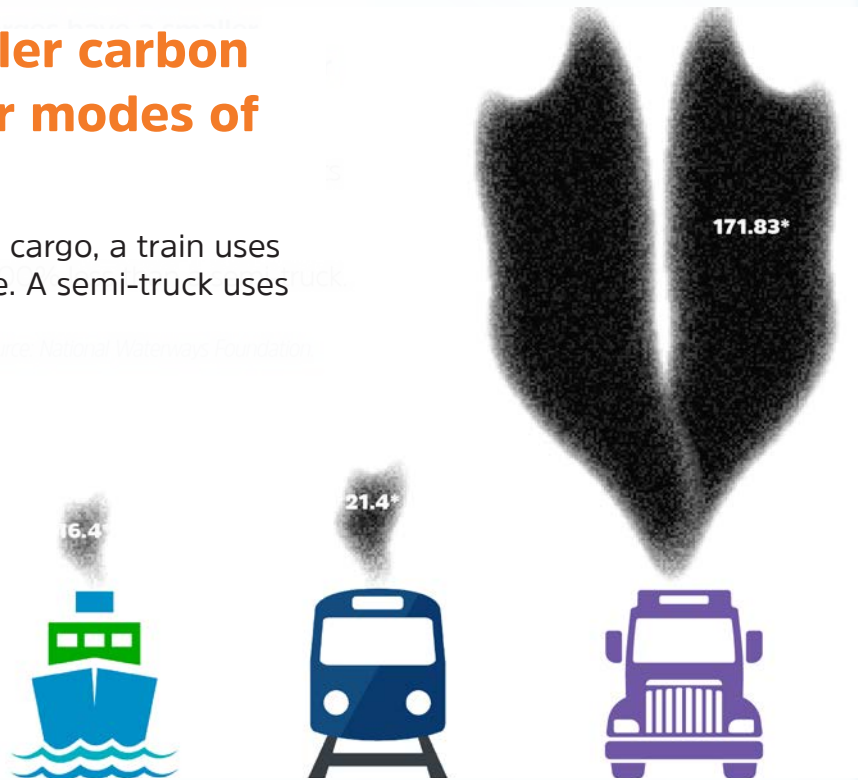
I wonder _____



Barges have a smaller carbon footprint than other modes of transportation.

When moving equal amounts of cargo, a train uses 30 times more CO₂ than a barge. A semi-truck uses 1,000 times more than a barge.

Source: National Waterways Association



Source: National Waterways Association

*Tons of CO₂ per Million Ton-Miles

Let's Discuss

What do you think?

I notice _____

I observe _____

I wonder _____



Transportation Data

One barge can transport 58,333 **bushels** of wheat. That's enough to make almost 2.5 million loaves of bread! It would take 16 rails cars **or** 70 semi-trucks to move the same amount of wheat.

1



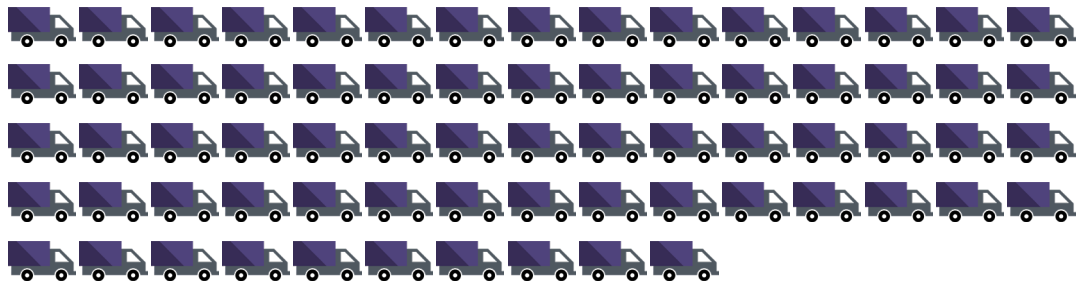
This amount of wheat will fit in one barge. The tow boat can transport 15 barges at a time.

16



Shipping the same amount of wheat by rail would require 16 rail cars. One locomotive could move all 16 rail cars.

70







To move the wheat by semi-truck would require 70 different trucks, each with its own driver.

TO DO: Create an input/output chart to show the connection between barges and trains.

CHALLENGE: How about doing another input/output chart to show the connection between barges and semi-trucks?



 Barges	 Rail Cars
1	
2	
3	

 Barges	 Semi-Trucks
1	
2	
3	



Aggregate: Pieces of broken or crushed stone or gravel used to make concrete.

Agriculture: The science or practice of farming, which includes growing crops and raising animals to sell for food, wool, and other products.

Bushel: a measurement for dry goods equal to 64 pints. *64 pints is equal to 8 gallons of milk.*

Cargo: Goods carried on a ship, aircraft, train, or semi-truck.

Crops: Plants grown for food, such as grains, fruits, and vegetables.

Cement: A powdery substance that is mixed with sand, aggregates, and water to make concrete.

Concrete: a heavy, rough building material that can be spread or poured into molds and resembles stone once hardened.

Downstream: The direction of water flowing in a river or stream.

Export: Sending goods or services to another country.

Harvest: The gathering of crops.

Import: Receiving goods or services from another country.

Mode: A particular type or form of something.

Multi-modal: Having more than one mode.

Port: A town or city with a harbor where ships and barges load or unload.

Road Salt: Road salt is a natural substance. It is the same substance used for table salt. The difference is that impurities are removed from table salt, making it white. Impurities in rock salt give it a brownish gray color.

Soybeans: A crop which is similar to a pea that produces edible seeds.

Substance: Any material that possesses physical properties.

Upstream: Moving against the current of water flowing in a river or stream.





Saint Paul Port Authority

380 Saint Peter Street | Suite 850
Saint Paul, Minnesota 55102

sppa.com

