Name: _____ Date: _____

Why Bridge Builders Trust Triangles

Circle group

Picture four wooden sticks joined at the corners with loose bolts. They make a rectangle. Push one corner. The frame leans over into a slanted shape called a parallelogram. The sticks are the same length, but the angles changed. Now add a fifth stick across two opposite corners. The frame becomes two triangles. It stops leaning.

A triangle cannot be squeezed out of shape. When the three sides are fixed, the angles are fixed too. The triangle holds still unless a stick bends or breaks. Engineers use this in bridges, roof supports, and tall cranes.

Many bridges use a truss. A truss is a frame made of rows of triangles. When a heavy truck drives onto the bridge, the weight does not sit on one beam. Some beams are pressed together. Others are gently stretched. The weight spreads out, so no one beam does all the work.

Triangles are not magic. A good bridge still needs strong materials and careful measuring. But look for the zigzag of metal beams on a bridge. You are looking at triangles at work.

Questions

1. What shape does the pushed rectangle become?

_____

_____

2. What does the fifth stick do?

_____

_____

3. What is a truss?

_____

_____

4. Why does a triangle keep its shape?

_____

_____

5. What happens to a truck's weight on a truss bridge?

_____

_____

6. Why does a good bridge need more than triangles?

_____

_____

Words to know

parallelogram: a four sided shape with two pairs of matching sides
angles: the spaces where two lines meet at a corner
engineers: people who design and build useful structures
truss: a bridge or roof frame made of triangles
beam: a long strong piece of wood or metal

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why Bridge Builders Trust Triangles

Triangle group

Imagine four wooden sticks joined at the corners with loose bolts to make a rectangle. Push on one corner and the whole frame leans over into a slanted shape called a parallelogram. The sticks have not changed length, but the angles between them have. Now add a fifth stick across two opposite corners. The frame splits into two triangles, and it stops leaning.

A triangle is the one shape that cannot be squeezed out of shape this way. When the three side lengths are fixed, the angles are fixed too, so the triangle holds still unless a stick bends or breaks. Engineers take advantage of this in bridges, roof supports, and tall cranes.

Many bridges use a truss, which is a frame built from rows of triangles. When a heavy truck rolls onto the bridge, the weight does not rest on one beam. Some beams are pressed together, and others are gently stretched. The load spreads out through the whole frame, so no single beam has to do all the work.

Triangles are not magic, and a good bridge still needs strong materials and careful measuring. But the next time you cross a bridge with metal beams in a zigzag pattern, look closely. You are probably looking at triangles, doing a job that rectangles cannot.

Questions

1. What shape does a pushed rectangle frame turn into?

_____

_____

2. What does the fifth stick do to the frame?

_____

_____

3. What is a truss?

_____

_____

4. Why does a triangle hold its shape?

_____

_____

5. What happens to the weight of a truck on a truss bridge?

_____

_____

6. Why does the passage say a good bridge still needs more than triangles?

_____

_____

Words to know

parallelogram: a four sided shape with two pairs of matching sides
angles: the spaces where two lines meet at a corner
engineers: people who design and build useful structures
truss: a bridge or roof frame made of triangles
beam: a long strong piece of wood or metal

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why Bridge Builders Trust Triangles

Square group

Imagine four wooden sticks fastened at their corners with loose bolts so that they form a rectangle. If you push on one corner, the entire frame leans over into a slanted shape known as a parallelogram. The sticks have not changed in length, yet the angles between them have shifted. Now fasten a fifth stick diagonally across two opposite corners. The frame divides into two triangles, and it no longer leans at all.

A triangle is the one shape that cannot be squeezed out of form in this manner. Once its three side lengths are fixed, its angles are fixed as well, so the triangle holds steady unless one of its sticks bends or snaps. Engineers take advantage of this property in bridges, roof supports, and towering cranes.

Many bridges are built on a truss, which is a framework assembled from rows of triangles. When a heavy truck rolls onto the bridge, its weight does not rest on any single beam. Some beams are pressed together while others are gently stretched, and the load is distributed throughout the whole frame, so that no one beam must carry the burden alone.

Triangles are not magical, and a sound bridge still demands strong materials and careful measuring. Even so, the next time you cross a bridge whose metal beams form a zigzag pattern, look closely. You are very likely seeing triangles performing a task that rectangles cannot.

Questions

1. What shape does a pushed rectangle frame become?

_____

_____

2. What effect does the fifth stick have on the frame?

_____

_____

3. What is a truss?

_____

_____

4. Why does a triangle hold its shape so well?

_____

_____

5. What becomes of a truck's weight on a truss bridge?

_____

_____

6. Why does the passage say a sound bridge needs more than triangles?

_____

_____

Words to know

parallelogram: a four sided shape with two pairs of matching sides
angles: the spaces where two lines meet at a corner
engineers: people who design and build useful structures
truss: a bridge or roof frame made of triangles
beam: a long strong piece of wood or metal

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: Why Bridge Builders Trust Triangles

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: Why Bridge Builders Trust Triangles

Easier · 179 words · Flesch-Kincaid grade 3.2

1. A parallelogram.
2. It makes two triangles and stops the leaning.
3. A frame made of rows of triangles.
4. When its sides are fixed, its angles are fixed too.
5. It spreads out so no one beam does all the work.
6. It also needs strong materials and careful measuring.

Triangle: Why Bridge Builders Trust Triangles

This passage · 215 words · Flesch-Kincaid grade 5.8

1. A parallelogram.
2. It splits the frame into two triangles and stops the leaning.
3. A frame built from rows of triangles.
4. When its three side lengths are fixed, its angles are fixed too.
5. It spreads through the whole frame so no one beam does all the work.
6. It also needs strong materials and careful measuring.

Square: Why Bridge Builders Trust Triangles

Harder · 235 words · Flesch-Kincaid grade 7.9

1. A parallelogram.
2. It divides the frame into two triangles and stops the leaning.
3. A framework built from rows of triangles.
4. Once its three side lengths are fixed, its angles are fixed too.
5. It is distributed through the whole frame so no one beam carries it alone.
6. It also needs strong materials and careful measuring.