**Building Bridges**



Shell Creek Bridge, Big Horn County, Wyoming

Truss bridges are built using a pattern of steel beams. This pattern has great strength due to the weight distribution in the beams. This activity explores a simple pattern of steel beams in a truss bridge design. Three beams are joined together in the triangular shape shown below. The truss is made wider by adding more sections.

 One Section Two Sections Three Sections

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| There is a pattern in this truss design. The total number of beams is related to the number of truss sections. 1. Complete the table to the right to explore the pattern between the number of sections and the number of beams.
2. How many beams would be needed for 5 sections?
3. Write a recursive rule for the number of beams needed.
4. Let *s* represent the number of sections and *b* represent the number of beams needed. Write an explicit rule for the number of beams based on the number of sections.
5. How many beams would be needed for a truss with 10 sections?
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|  |  |
| --- | --- |
| **Sections** | **Beams** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

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One truss alone cannot make a one-lane bridge. At least two trusses must be joined together with additional beams positioned in the perpendicular direction. One-lane truss bridges are shown in the images below.



 One Section Two Sections Three Sections

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| There is a pattern in one-lane truss bridges. The total number of beams is related to the number of sections. 1. Complete the table to the right to explore the pattern between the number of sections and the number of beams.
2. How many beams would be needed for a bridge with 5 sections?
3. Write a recursive rule for the number of beams needed.
4. Let *s* represent the number of sections and *b* represent the number of beams needed. Write an explicit rule for the number of beams based on the number of sections.
5. How many beams would be needed for a truss bridge with 10 sections?
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|  |  |
| --- | --- |
| **Sections** | **Beams** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
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**Extension:** What if we wanted to build a bridge with two lanes?

  

 One Section Two Sections

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| There is a pattern in this bridge design. The total number of beams is related to the number of truss sections. 1. Complete the table to the right to explore the pattern between the number of sections and the number of beams.
2. How many beams would be needed for a bridge with 5 sections?
3. Write a recursive rule for the number of beams needed.
4. Let *s* represent the number of sections and *b* represent the number of beams needed. Write an explicit rule for the number of beams based on the number of sections.
5. How many beams would be needed for a truss bridge with 10 sections?
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|  |  |
| --- | --- |
| **Sections** | **Beams** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

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