Witches Transportation

There were 20 witches who needed to get to the witches' convention in California. 12 lost their brooms so they needed to broom pool. There were 8 brooms, but no more than 4 could fit on a broom and no less than 2.

Explain with pictures, words and/or numbers how you are going to get them all there.
Witches Transportation

Suggested Grade Span
Pre-K-2

Task

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Alternate Versions of Task

More Accessible Version:

There were 12 witches that needed to broom-pool to a witch convention. 4 witches could fit on a broom. How many brooms did they need to take?

Explain your answer with pictures, words and/or numbers.

More Challenging Version:

There were 20 witches who needed to get to a witches’ convention in California. 12 witches lost their brooms so they needed to broom-pool. No more than 4 could fit on a broom and no less than 2.

Explain with pictures, words and/or numbers all of the different ways the witches could get to the convention.

What This Task Accomplishes

This task provides students with the opportunity to find multiple solutions. It also allows for students to create diagrams, sentences, numbers and equations to communicate their solutions. The task also presents a context for students to work with a task that has several components, in that there are several rules to be followed.

What the Student Will Do

Some students draw one broom with several witches at a time and guess/predict as they go. Some draw all brooms then fill each broom with one witch at a time. Others may draw all
brooms, placing two witches on each and then placing the others. Still others will draw all brooms then fill each with four witches. They will then scatter the remaining witches or leave off brooms. Finally, some students will fill the brooms with four witches and erase one at a time until they get to 20.

**Time Required for Task**

60 minutes

**Interdisciplinary Links**

Halloween is undoubtedly one of the high points of the year for a first grader. We bring Halloween into all parts of the curriculum. We read books, write, sing songs, read poems and play games surrounding this holiday. Many of our math and science activities revolve around Halloween. We measure, observe and draw pumpkins. We estimate and count numbers of Halloween-related objects. Solving a Halloween problem is engaging for these kids, especially during their time of intense obsession with the holiday.

**Teaching Tips**

It would be helpful to students if the problem is read to them, and the four rules recorded so students can easily refer to them.

It may also be helpful to do the following pre-assessment activity before students begin to work the task independently:

Cut pictures of brooms and witches out of colored paper. In a whole-group lesson, ask individual students to come to the front of the class and create possible broom loads (using the rules stated in the task) until all combinations are discovered. Discuss why some loads do and do not meet the requirements.

After students have solved the task independently, have them share their solutions with each other so students can see that there is more than one solution to the problem.

**Suggested Materials**

- Manipulatives that can represent witches and brooms
- Paper
- Pencils (to write with and/or to represent brooms)
- Halloween stencils

**Possible Solutions**

Two brooms with four witches and six brooms with two witches
Four brooms with three witches and four brooms with two witches

One broom with four witches, two brooms with three witches and five brooms with two witches

More Accessible Version Solution:

\[ 12 \div 4 = 3 \text{ brooms} \]

More Challenging Version Solution:

The student must come up will all combinations shown in the original solution.

Task Specific Assessment Notes

Novice
This student was distracted by the limitation of having a certain number of witches on each broom. S/he seemed to think the broom would steer better with three witches. S/he put three on each broom until s/he ran out of witches and was confident that by showing the extra broom without witches meant s/he used eight brooms. This student counted until s/he got to 20.

Apprentice
The idea of using eight brooms was missed by this student. This student solved some of the problem by using 20 witches and putting no more than four on a broom. S/he drew three on a broom and counted the total and then drew four and eventually five. His/her idea that s/he had no room was true in that there were no more witches to ride on the brooms. S/he fully grasped that the limit was 20 witches.

Practitioner
This student was comfortable with all of the limitations and requirements of the problem. S/he was able to find a solution using a strategy of estimating as s/he went along until all the brooms were full with appropriate numbers of witches. This student was very clear when explaining his/her solution.

Expert
This student has a deep understanding of the problem and was able to find two solutions. S/he understands that four threes equals 12 and counted by twos to reach one of the solutions. S/he was able to represent one of his/her solutions with an addition equation. S/he wrote numbers next to each witch to verify his/her solution. This student's explanation involved appropriate use of mathematical terminology and notation.
Novice

The student uses a total of 20 witches. The eighth broom is empty.

"I did 8 brooms and 20 witches. I decided I just thought I'd have more control of the room with three witches on it. I counted up to six then I counted and I knew how many I needed."

We are unsure what the student means by "I counted up to six".
"I did them on five brooms. First I drew three then I drew four. (After three) I couldn't fit any more brooms. Four witches on the brooms. I have 20."
I drew a broom w/ 3 witches and then I guessed 4 + 3 on the other brooms. Then I made a broom with two and I counted in the air how many other witches counted up to twenty on the brooms.

All eight brooms are used and all 20 witches are transported.
"I started with the brooms then I did four witches on three brooms. That equals twelve. Then I decided to do the ones with two witches on the broom. That's 20."
The student keeps track of the witches by numbering them.

The student uses addition equations to verify his/her solution.

\[
2 + 2 + 3 + 2 = 10
\]

\[
2 + 2 + 3 + 2 = 10 + 10 = 20
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