

# NUMBER LINE, OFFLINE ACTIVITY 2

## Lesson Plan: Number Line, Number of Steps, Activity 2

### OVERVIEW OF THE ACTIVITY

Students are introduced to the idea of Number Line through the action of stepping forward and backward along a line drawn on the floor.

### DESCRIPTION OF THE ACTIVITY

This activity is the second in a series of games based on the idea of stepping along a line drawn on the floor. In this game students explore the Treasure Hunt game in a more advanced manner: students are given a sequence of commands at one time which they must remember and execute, in an attempt to drive their need to develop a language for recording the commands. Students eventually anchor their understanding of the number line in their kinaesthetic knowledge of linear movement, both forwards and backwards.

### PRINCIPAL LEARNING GOAL(S)

- Create a need for a formal language used to describe movements along the number line;
- Reinforce students' ability to count fleeting events;
- Reinforce the meaning of “backward” and “forward” relative to linear movement;
- Reinforce students' attention to and accuracy of execution of a given set of commands;
- Anchor the abstract notion of a number line in the kinaesthetic knowledge of linear movement.

### PREREQUISITE KNOWLEDGE AND SKILLS

This activity assumes that students have already:

- practiced counting physical objects in a set;
- began to associate a count with a corresponding number of steps along a line.

### RESOURCES FOR THE LESSON

- long line (about 10 child sized steps) drawn on the floor with 10 marks at equal intervals (floor tiles help with equal intervals, chalk is useful for marking the line).  
It is traditional that number lines have numbers increasing in value as one moves from left to right so that when students start they should be standing either at the left edge of the line, from the perspective of their classmates, or at a position determined by counting from that left edge;
- examples of instruction;
- cards of the same look, one of which is marked as “Treasure” on the hidden (bottom) side (10 sheets of paper, gently taped to the floor).

### POTENTIAL DIFFICULTIES

May flow from:

- one of the students selected to step having difficulty counting steps as he/she moves, but the rest of the students counting aloud should aid in overcoming this difficulty,

particularly if the teacher instructs the class to count slowly, before the student takes each step;

- students having a limited attention span, and hence forgetting the instruction before completing their movement, which could be helped if the teacher initially gives very simple one or two step instructions to get the student involved in the activity, and only then slowly increases the complexity of the instructions;
- students having difficulty remembering the set of commands issued by the teacher orally.

### MAIN ACTIVITY ~ 20 MINUTES

The teacher prepares for this lesson by drawing a line on the floor with 10 marks at equal intervals. The distance between two adjacent marks should be equal to the length of the step of a child. The teacher then distributes 10 cards, one at each mark. One of the cards is marked as a "treasure" on the hidden (bottom) side. At the beginning of the lesson the teacher explains that there is a treasure hidden under one of these ten cards and that like the last time they played the game she will give instructions as to how to walk to reach the treasure, but that this time she will give all of the instructions at once. Thus, the students need to listen carefully, remember all of the instructions and then follow the instructions in the order that they were given.

This activity is carried out in a number of steps that are listed below:

- It is important to understand that it is okay if initially the students experience some difficulty with this new version of the game. The goal is to make students feel that they need an additional tool that they can use to support their memory - a system of recording a sequence of commands. Thus, this time, the teacher explains to the students that she will issue all of the commands at one time and the students must remember the commands and execute them by themselves. This forces the students to: 1) develop their capacity to remember a sequence of numbers; 2) see the need and usefulness for, and then to actually develop a language/notation for recording the sequence of steps to be taken.
- As before, select two students and ask them to stand on each side of the left end of the line, facing along the line. Tell the students that you will give all of the commands at once and that they must remember them and then execute them on their own. See Appendix 1 for examples of instructions. The teacher should issue the commands orally from memory, without reading any paper. If you really need to, place the paper in a drawer so that students cannot see it. After a short time, change the pair of students.
- Vary the starting points, intersperse commands to go forward and backward, and change the number of commands in a sequence, varying between two, three and even four commands in a sequence. Tell the students that they may not start moving until you have finished giving them the whole sequence.

### ACTIVITIES IN OTHER SUBJECTS

When teaching other subjects the teacher can engage students in activities that will help with this activity:

- in a language class the students can discuss the meaning of the word "treasure".



## TEACHER ACTIONS 15 MINUTES

Upon completion of the activity it is important to discuss with the students the concepts involved in the activity so as to consolidate the knowledge acquired and help make connections to prior knowledge. Discuss with students the following questions:

- 1) Ask students if they found it more difficult to play the game this time when you were giving them the entire sequence of instructions all at once, before they were allowed to move.

### Elements to Pay Attention To

Anticipate that some students will deny having any problems, but others are likely to say that it was more difficult. Point 2) below is designed to get students involved in thinking about how they can make the task of remembering a sequence of instructions easier, probably by using symbols to record the instructions.

- 2) Ask students, whether they found it more difficult or not, to try and think of ways of making this new more complicated task easier for everyone (other than the teacher going back to issuing instructions one at a time).

### Elements to Pay Attention To

Hopefully some students will suggest that instructions can be written down so that instead of remembering them, one can read each instruction in turn and execute it before reading the next one. Since the students have previously done the addition and subtraction activities which involve equations, such as  $2+4=6$  and  $5-3=2$ , the hope is that some students will suggest that writing equations will be a way of helping to carry out more complex number line instructions.

## APPENDIX 1: EXAMPLES OF INSTRUCTION

### Examples of sets of commands:

Suggestions: At first you may wish to simplify for the students by starting them both at the same position and giving them both the same set of instructions, delivered orally.

As you progress with a pair of students you can increase the length of the set of instructions given to them.

**The sets of instructions below are just a sample to illustrate such variation. When you face the class and hold fingers in the air, please use your left hand to indicate a number of steps going forwards and your right hand to indicate going backwards.**

**Set 1:** Have both students start at the **same** point and give them the **same** instructions.

- 1) Put the treasure at the 2<sup>nd</sup> point.
- 2) Position both students at the 3<sup>rd</sup> point.
- 3) Say "Please take 3 steps backward and then 2 steps forward".

**Set 2:** Have both students start at the **same** point and give them the **same** instructions.

- 1) Put the treasure at the 4<sup>th</sup> point.
- 2) Position both students at the 5<sup>th</sup> point.
- 3) Say "Please take 3 steps forward and then 4 steps backward".



**Set 3:** Have both students start at the **same** point and give them the **same** instructions.

- 1) Put the treasure at the 5<sup>th</sup> point.
- 2) Position both students at the left of the line (0th point).
- 3) Say "Please take 4 steps forward, then 2 steps backward and then 3 steps forward".

**Set 4:** Have both students start at the **same** point and give them the **same** instructions.

- 1) Put the treasure at the 4<sup>th</sup> point.
- 2) Position both students at the 3<sup>rd</sup> point.
- 3) Say "Please take 4 steps forward, then 3 steps backward and then 1 step forward".

**Set 5:** Have both students start at the **same** point and give them the **same** instructions.

- 1) Put the treasure at the 7<sup>th</sup> point.
- 2) Position both students at the 8<sup>th</sup> point.
- 3) Say "Please take 5 steps backward, then 3 steps forward, then 1 step backward, and then 2 steps forward".

**Note that this last set will probably push many students to or beyond their capacity to remember. That is the intention. It will help students to see the need to record such sequences of commands. In discussion afterwards it will be useful to see the variety of ideas that students can come up with for recording these sequences.**

## APPENDIX 2: TREASURE CARDS

### "Treasure" and "Not Treasure" Images

For each game you will need 10 cards, one for each of the number line positions: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. We are suggesting two possibilities.

The first suggestion is to use a pair of oversized emoticons, happy face to represent "Treasure" and sad face to represent "Not Treasure". The next two pages contain four images per page, each of which can be cut out and should fit on a 3.5" x 5" card. If you print the first page four times, and the second page once, you will have enough images for two number lines.

Alternatively, you can just print the second page, cut out one "happy face", paste it on one card, and not paste anything on the remaining cards used, thus representing "Not Treasure" with a blank card.

The second idea is to use pictures that you find on the web of pets (cats, dogs, etc.) that you think the children might like to collect and keep. The remaining pages have some samples of such pictures. In that case, put two cards at each number line position, with blank cards at the "not treasure" positions, and two cards with pictures of pets pasted on at the "treasure" position. Then the children can keep the cards and collect them as rewards for successful participation.









