



Revised 6/00

Lesson #41
Marble Masters
Grade Level: K-2

Teachers, this is a basic lesson plan that you may modify at your discretion.

Overall educational objective: Students will plan and complete the construction of a complex object from simple materials. Students will observe the differences and similarities of the structural components and identify their potential functions.

Associated Standard and CORE objective:

3020-502 Construct a complex object from simple materials.

Materials list:

6 sets of "Marble Works"
6 marbles per set
6 dominos per set

Lesson activities:

1. Divide students into six groups instructing them that they will be working in a team to build the most unusual marble tunnel they can. They must use as many parts as possible. The groups that are able to use all the pieces, with the marbles actually making contact with all the surfaces will have mastered this step. Students may figure out for themselves that the marbles can be divided up equally among them so each person has an equal opportunity to "send" marbles or this may be assigned by the teacher. When used with Kindergarten students, it may be good to have the teacher facilitate this. This step should allow the children to explore and become familiar with the materials.
2. Draw comparisons between the students' structures and structures we find in the real world, like roads, buildings, staircases, and elevators in buildings. Ask questions, such as, "Would people be able to get from one place to another very quickly if our roads were as curvy as some of your marble tunnels? Would you be able to get to different rooms in your house, or would you be able to get to different rooms in our school very quickly if stairs or halls were as crooked and made as many turns as some of your structures?"

3. Explain to the children that you would now like them to change their structures so the marbles can move as fast and as forcefully as possible. Talk about what changes need to be made to make this possible. Student may suggest removing curves, make the angles the marbles fall as steep as possible, or not using all of the pieces. Allow students to make necessary changes within their groups and again take turns sending their marbles through their new structures.
4. Pass out sets of dominos and instruct students that they are now going to check the momentum or force behind their marbles by lining up their dominos and seeing if their marbles can knock them down. Suggest that they experiment with the distance and placement of the dominos in relation to the structure and the ways they drop the marbles. Ask if dropping them quickly in turn, or very slowly one after the other might make a difference. A contest may be held to see who can knock down the most dominos, or which group can knock down dominos farthest from their structure.

Safety precautions: Normal precautions should be taken to avoid improper use of the marbles and dominos as they are small, i.e., throwing, placement in mouth or pockets, etc.

Please make your students aware that this lesson relates to the following:

Career Fields: SCIENCE, TECHNICAL

Occupations: **Architect:** Plan and design the construction for houses, apartments, office buildings, factories, and other buildings. They will also plan and design projects such as parks, airports, and highways. They prepare detailed drawings about the scale and structure of the project, the dimensions of all the parts, and the location of the plumbing and heating units.



Education: Bachelor's Degree

Mechanical Engineer: Plan and design tools, engines, machines, and other mechanical equipment. They design and develop power-producing machines such as internal combustion engines, steam and gas turbines, and jet and rocket engines. They also design and develop power-using machines such as refrigeration and air-conditioning equipment, robots, machine tools, materials handling systems, and industrial production equipment.

Education: Bachelor's Degree

Review Questions:

1. Have the students think of any structures or buildings in the real world that resemble their first structures i.e., water slides, roller coasters, etc. Compare these structures to the roads, staircases, elevators, etc. mentioned earlier and the purposes of the different types of structures.
2. Ask whether we need both kinds of structures; those for fun and those to get us from one place to another efficiently. Suggest that it is very interesting that there are wonderful structures that provide fun and ways to move around in our world efficiently.