

Manipulatives Management

Manipulatives Management	Tips
Classroom	<ul style="list-style-type: none"> ▪ Set up and communicate the expectations for distributing, using and collecting manipulatives in the classroom. Be consistent no matter the manipulative. ▪ Schedule “play” time when introducing a new manipulative. Students need to explore the material before they can be purposeful with it. ▪ Use an advance organizer written on the board or overhead as students walk into class. List the 'Minds On' activity and the “materials for today” that are needed. ▪ Have well organized worksheets/instructions/goals for the lesson and expectations of students. ▪ Have students work in groups with manipulatives. This encourages communication and expands students thinking about how a manipulative can help them solve a problem. ▪ Train students how to work in groups with manipulatives. Use a comfortable low stress activity for the training and go slowly at first. ▪ Ensure that each group member has a role - Materials Manager; Group Leader to guide the investigation and who is the only one to ask the teacher questions; Clean-up Custodian to be in charge of making sure cleanup happens, and Recorder. Keep the groups static, but rotate the roles over a set of activities. ▪ Identify and name roles for group members using north, south, east, and west. ▪ Use the strategy “Ask three before me” – before the teacher can be approached with a question, the question must be asked of 3 other people. ▪ Model mathematical thinking using manipulatives by talking out loud as you work through a problem. ▪ Allow students to select their own manipulatives – an important step in problem solving. Putting a specific manipulatives out may limit or overly direct thinking. ▪ Avoid statements like: "Get a manipulative if you need one." The manipulative could be seen as a crutch rather than as a modeling tool or as a powerful problem-solving strategy. An alternate statement could be, “Manipulatives are available to use.” ▪ Have students individually or in pairs hold their solutions modelled with manipulatives up in the air. As the class works, from any place in the room, the teacher can see it and give feedback without calling student names. No one is embarrassed and much feedback happens in little time. ▪ Use photocopied acetate copies of appropriate manipulatives for the overhead projector, e.g., protractor and ruler. The acetate has no shadow-effect on the overhead like a clear protractor has. ▪ To make circles, use a plastic compass that has no dangerous needle-point. It is easy-to-use for students who struggle with fine motor control. ▪ ▪

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Noise	<ul style="list-style-type: none"> ▪ Use pieces of felt or placemats as work mats to lessen the noise when using “loud” manipulatives such as number cubes. Unfinished work can easily be moved or saved to be finished later. ▪ Have students roll number cubes in recycled yogurt containers. The cubes never leave the container and are read inside it. This keeps them from rolling off the desk.
Distribution and Collection	<ul style="list-style-type: none"> ▪ Use “Materials Managers” in each group to obtain manipulatives for their group and return them in the same condition. ▪ Assemble a math manipulatives trolley from a library cart loaded with group/table kits that contain frequently-used manipulatives and materials. ▪ Pre-assemble materials for specific activities into large plastic bags. Print instructions/information on coloured cardstock and worksheets on white paper. Instruct students to write only on white paper. Have groups return all other materials to the bag at the completion of the activity. ▪ Encourage teachers of the same course/grade to work as a team to assemble kits of the materials needed for an investigation. Include mass photocopied instruction/recording sheets. Create a circulation schedule for the kit. ▪ Attach magnets to the backs of appropriate manipulatives. These can be used on magnetic boards for whole class modeling or on baking sheets for small group modeling. ▪ Use music for transitions - press play when groups need to clean up and return materials. <p>Graphing Calculators</p> <ul style="list-style-type: none"> ▪ Number graphing calculators and assign each student a number for the duration of the course. Students are responsible for the safe return of their calculator. ▪ Have students hand in graphing calculators still turned on. ▪ Use caddies that store graphing calculators vertically to enable a visual check.
Storage	<ul style="list-style-type: none"> ▪ Store manipulatives in plastic bags with zippers. Students find them easy to close. ▪ Store manipulatives in student sets - each student/group gets a bag of what they will need. ▪ Store bags in easily accessible labelled bins or labelled boxes. ▪ Store pipe cleaners, number cubes, straws and toothpicks in easily accessible labelled bins or boxes. ▪ Use hard plastic 35 mm film canisters to store integer chips. They are easy to close, no chips fall out and are quick for distribution and collection. ▪ Laminate puzzle and game sheets (e.g., number tiles puzzles from TIPS) and store them in an envelope with the answer key laminated onto the envelope. ▪ Assemble student kits of manipulatives (enough of a variety of manipulatives to allow choice) and store them near or on student desks. These can include supplies (markers, stickies, etc).

Name that Manipulative

These materials are great for creating shapes and designs and students can also use them to learn about area and perimeter.

This tool helps students show understanding of the concept of ratio and proportion.

Students need time for free exploration before using these manipulatives for an activity or task.

Manipulative	Grades	Manipulative	Grades
Algebra tiles (2 colour) – class set, clear plastic organizer trays, overhead or magnetic set	7–10	Motion sensor	9–12
Base-ten materials (clear-view with interlocking pieces)	7, 8	Number cubes: 6-sided in two colours; 10-, 12-, and 30-sided	7, 8, 9
Calculators with fraction key and problem solving fraction, and compass points), translucent pieces and overhead set	7, 8	Operation cubes (cubes labelled with operation signs)	7, 8, 9
Coloured tiles and overhead set	7, 8, 9	Overhead graphing calculator with projection unit	9–12
Coloured relational rods and overhead set	7, 8, 9	Pattern blocks and overhead set	7–10
Connecting cubes (1 cm, 2 cm)	7, 8, 9	Pentominoes	7, 8
Connecting plastic shapes to build 2-D shapes and nets for 3-D solids	7, 8, 9	Plastic transparent tools	7, 8
Full circle protractors	7, 8, 9	Playing cards	7, 8, 9
Geoboards (minimum of 15 cm by 15 cm dimensions) clear 11 x 11, 5 x 5, circular, elastics	7, 8, 9	Relational geometric 3-D solids and large demonstration set	7, 8, 9
Geolegs	7, 8	Rulers, 30 cm	7–12
Graphing calculators, preferably with projection capabilities	9–12	Safety compasses	7, 8
Measuring cups	7, 8	Spinners (number, colour)	7, 8
Measuring tapes (minimum 150 cm wind-up tape in protective case calibrated in centimetres and millimetres)	7, 8, 9	Tangrams	7, 8, 9
Metre sticks (unbreakable plastic calibrated in centimetres and millimetres)	7–12	Trundle wheels	7, 8
		Two-colour counters and overhead set	7, 8

This manipulative can help students learn and practise math vocabulary.

These materials are useful for developing concepts involving fractions.

Students can use this tool to learn about probability.

Students can use this manipulative to develop and show understanding of integer operations.

This manipulative is good for exploring volume.

These manipulatives help students understand place value.

Differentiated Instruction Scenario - Leader

(Read the following to your group)

At the beginning of the unit, math assessments show that the students in Ms. Josephine's class are "all over the place" with _____. She presented her students with a variety of tasks at varying degrees of sophistication and in varied contexts. This has helped her assess their starting points. She discovered that these learners represent quite a range of readiness, from below grade/course expectations to thoroughly competent:

- Some students have difficulty with basic concepts.
- Some students can use procedures related to the concepts. They have difficulty applying their understanding of the underlying concepts in varied contexts.
- Other students do not find working on these concepts interesting or challenging.

What can Ms. Josephine do?

Brainstorm what she will need to consider when planning how to meet the needs of her students.