

PRE-KINDERGARTEN MATH #3

PATTERNS & RELATIONAL SENSE

Patterns and Relational Sense forms the foundation of the subject of ALGEBRA. It is a study of patterns underlying numbers, and quantitative relationships.

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This is the third of the three levels of the troubleshooting guide for pre-kindergarten math. See *Summary* for details on all three levels.

These lessons are designed for pre-kindergarten, but they may be applied to anybody to fill earlier blanks in understanding.

Start with the Diagnostic. If the diagnostic fails, then do the Lesson & Exercise.

Follow these guidelines.

- (a) *When helping, make sure you have the attention of the student.*
- (b) *If you lose the attention of the student, then go back to the point in the lesson where the student was attentive. Then come forward checking student's understanding.*
- (c) *Always approach any situation in an affectionate and relaxed manner.*
- (d) *Carefully listen to what the student has to say and acknowledge it appropriately.*
- (e) *Answer all questions matching the interest and understanding of the student.*
- (f) *Encourage the student, and make sure that the student can apply the materials with confidence.*

Researched and written by Vinay Agarwala

Edited by Ivan Duskocil

LESSONS

☺ Diagnostic P3.1 Identify the COLOR different from others

To pass, the student should be able to identify the bead of different color correctly, and with confidence.

1. Place several beads of the same color except for one.
"Which bead is of a different COLOR than the rest?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

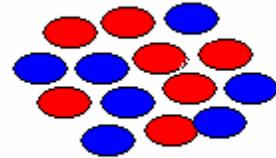
One must be able to recognize differences and similarities. In this lesson one learns to identify the COLOR that is different from the rest in a group.

- (a) Introduce beads of different colors but of the same shape and size. *NOTE: If regular beads are not readily available, you may use coins, paper cutouts, or beads made of clay.*

"These beads are of different colors."

- (b) Place two beads of the same color in front of the student.

"These two beads are of the same color."



- (c) Place two beads of different colors in front of the student.

"These two beads are of different colors."

- (d) Continue indicating different and same colors until the student can comfortably recognize them as such.

"These two beads are of different colors."

"These two beads are of the same color."

- (e) Place beads of same color in front of the student, except for one. Make sure all beads are of same shape and size.

"Find two beads of the same color."

"Find two beads of different colors."

- (f) Place beads of many different colors in a pile.

"Find two beads of the same color."

"Find two beads of different colors."

- (g) Have the student ask you to identify beads of same and different colors.

- (h) Repeat the diagnostic test.

☺ Diagnostic P3.2 Identify the SIZE different from others

To pass, the student should be able to identify the bead of different size correctly, and with confidence.

1. Place several beads of the same size except for one.
 "Which bead is of a different SIZE than the rest?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to recognize differences and similarities. In this lesson one learns to identify the SIZE that is different from the rest in a group.

- (a) Introduce beads of different sizes but of the same shape and color.

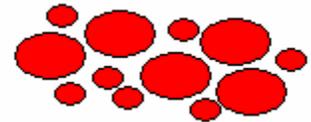
"These beads are of different sizes."

- (b) Place two beads of the same size in front of the student.

"These two beads are of the same size."

- (c) Place two beads of different sizes in front of the student.

"These two beads are of different sizes."



- (d) Continue indicating different and same sizes until the student can comfortably recognize them as such.

"These two beads are of different sizes."

"These two beads are of the same size."

- (e) Place beads of same size in front of the student, except for one. Make sure all beads are of same shape and color.

"Find two beads of the same size."

"Find two beads of different sizes."

- (f) Place beads of many different sizes in a pile.

"Find two beads of the same size."

"Find two beads of different sizes."

- (g) Have the student ask you to identify beads of same and different sizes.

- (h) Repeat the diagnostic test.

☺ Diagnostic P3.3 Identify the SHAPE different from others

To pass, the student should be able to identify the bead of different shape correctly, and with confidence.

1. Place several beads of the same shape except for one.
 "Which bead is of a different SHAPE than the rest?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to recognize differences and similarities. In this lesson one learns to identify the SHAPE that is different from the rest in a group.

- (a) Introduce beads of different shapes but of the same size and color.

"These beads are of different shapes."

- (b) Place two beads of the same shape in front of the student.

"These two beads are of the same shape."



- (c) Place two beads of different shapes in front of the student.

"These two beads are of different shapes."

- (d) Continue indicating different and same shapes until the student can comfortably recognize them as such.

"These two beads are of different shapes."

"These two beads are of the same shape."

- (e) Place beads of same shape in front of the student, except for one. Make sure all beads are of same size and color.

"Find two beads of the same shape."

"Find two beads of different shapes."

- (f) Place beads of many different shapes in a pile.

"Find two beads of the same shape."

"Find two beads of different shapes."

- (g) Have the student ask you to identify beads of same and different shapes.

- (h) Repeat the diagnostic test.

☺ Diagnostic P3.4 Sort objects by COLOR

To pass, the student should be able to sort by color with confidence.

1. Mix beads of two different colors in one pile on the table.
 "Sort these beads by COLOR."
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

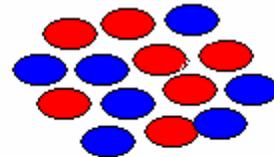
One must be able to sort. In this lesson one learns to sort beads of two different COLORS.

- (a) Mix beads of two different colors, such as, RED and BLUE, in one pile on the table.

"I am going to separate these beads by color."

- (b) Pick out a RED bead and put it in one location.

"This is a pile for RED beads."



- (c) Pick out a BLUE bead and put it in another location.

"This is a pile for BLUE beads."

- (d) Pick out subsequent beads.

"This RED bead goes to the RED pile."

"This BLUE bead goes to the BLUE pile."



- (e) Continue till the beads are sorted out neatly in two piles.

NOTE: In case of difficulty use larger and fewer objects. Modeling clay may be used to create large balls of different colors.

- (f) Mix beads of two different colors back again and have the student sort them out.

"Sort these beads by COLOR."

- (g) Mix beads of three different colors and have the student sort them out with your help.

"Sort these beads by COLOR."

- (h) Have the student ask you to sort objects by color.

- (i) Repeat the diagnostic test.

☺ Diagnostic P3.5 Sort objects by SIZE

To pass, the student should be able to sort by size with confidence.

1. Mix beads of two different sizes in one pile on the table.

"Sort these beads by SIZE."

2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

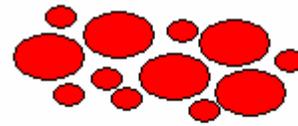
One must be able to sort. In this lesson one learns to sort beads of two different SIZES.

- (a) Mix beads of two different sizes in one pile on the table.

"I am going to separate these beads by size."

- (b) Pick out a LARGE bead and put it in one location.

"This is a pile for LARGE beads."



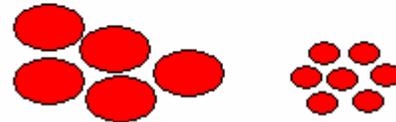
- (c) Pick out a SMALL bead and put it in another location.

"This is a pile for SMALL beads."

- (d) Pick out subsequent beads.

"This LARGE bead goes to the LARGE beads pile."

"This SMALL bead goes to the SMALL beads pile."



- (e) Continue till the beads are sorted out neatly in two piles.

NOTE: In case of difficulty use larger and fewer objects. Modeling clay may be used to create large balls of different sizes.

- (f) Mix the beads of two different sizes back again and have the student sort them out.

"Sort these beads by SIZE."

- (g) Mix the beads of three different sizes and have the student sort them out.

"Sort these beads by SIZE."

- (h) Have the student ask you to sort objects by size.

- (i) Repeat the diagnostic test.

☺ Diagnostic P3.6 Sort objects by SHAPE

To pass, the student should be able to sort by shape with confidence.

1. Mix beads of two different shapes in one pile on the table.

"Sort these beads by SHAPE."

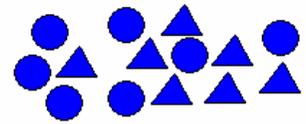
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to sort. In this lesson one learns to sort beads of two different SHAPES.

- (a) Mix beads of two different shapes, such as, CIRCULAR and TRIANGULAR, in one pile on the table.

"I am going to separate these beads by shape."

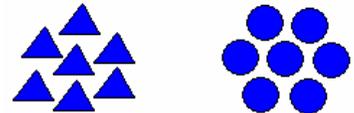


- (b) Pick out a CIRCULAR bead and put it in a separate location.

"This is a pile for CIRCULAR beads."

- (c) Pick out a TRIANGULAR bead and put it in a separate location.

"This is a pile for TRIANGULAR beads."



- (d) Pick out subsequent beads.

"This CIRCULAR bead goes to the CIRCULAR beads pile."

"This TRIANGULAR bead goes to the TRIANGULAR beads pile."

- (e) Continue till the beads are sorted out neatly in two piles.

NOTE: In case of difficulty use larger and fewer objects. Modeling clay may be used to create large objects of different shapes.

- (f) Mix beads of two different shapes back again and have the student sort them out.

"Sort these beads by SHAPE."

- (g) Mix beads of three different shapes and have the student sort them out with your help.

"Sort these beads by SHAPE."

- (h) Have the student ask you to sort objects by shape.

- (i) Repeat the diagnostic test.

☺ Diagnostic P3.7 Sort objects by KIND

To pass, the student should be able to sort by kind with confidence.

1. Mix beads of two different kinds in one pile on the table.
 "Sort these beads by KIND."
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to sort. In this lesson one learns to sort beads of two different KINDS.

- (a) Mix ERASERS of different colors, shapes and sizes with PAPERCLIPS of different colors, shapes and sizes in one pile on the table.

"I am going to separate these objects by kind."

- (b) Pick out an ERASER and put it in a separate location.

"This is a pile for ERASERS."

- (c) Pick out a PAPERCLIP and put it in a separate location.

"This is a pile for PAPERCLIPS."

- (d) Pick out the subsequent objects.

"This ERASER goes to the ERASERS pile."

"This PAPERCLIP goes to the PAPERCLIPS pile."

- (e) Continue till the objects are sorted out neatly in two piles.

NOTE: In case of difficulty use larger and fewer objects.

- (f) Mix objects of two different kinds back again and have the student sort them out.

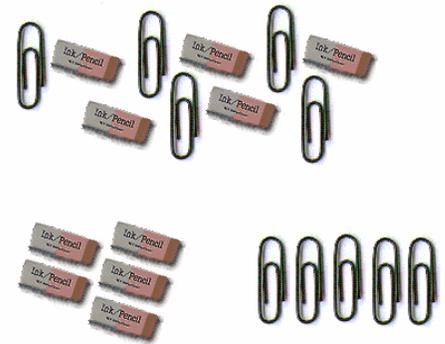
"Sort these objects by KIND."

- (g) Mix objects of three different kinds and have the student sort them out with your help..

"Sort these objects by KIND."

- (h) Have the student ask you to sort objects by kind.

- (i) Repeat the diagnostic test.



☺ Diagnostic P3.8 Identify simple PATTERNS of sound

To pass, the student should be able to recognize a simple pattern of sound with confidence.

1. Ask the student after making a sound with a simple pattern and another with no pattern:
 "Tell me which sound contained a pattern?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to identify a pattern. In this lesson one learns to identify simple patterns of sound.

- (a) Place a small drum, glass and spoon, two sticks, etc.
 "I am going to make a sound with a simple pattern."
- (b) Make a pattern on the drum with two sticks,
 **"DRUM - drum, drum - DRUM - drum, drum - DRUM - drum,
 drum - DRUM - drum, drum."**
- (c) Make the same pattern by striking the glass with two spoons.
 **"CLINK - clink, clink - CLINK - clink, clink - CLINK - clink,
 clink - CLINK - clink, clink."**
- (d) Make the same pattern by tapping.
 "TAP - tap, tap - TAP - tap, tap - TAP - tap, tap - TAP - tap, tap."
- (e) Explain,
 "When you repeat sound you get a pattern."
- (f) Demonstrate sound without any pattern.
 "When you do not have sound repeating you don't get a pattern."
- (g) Continue till the student can understand the idea of patterns with sound.
- (h) Have the student make sounds with patterns and no pattern.
 "Make sound with a simple pattern. Make sound with no pattern."
- (i) Have the student make the same sound pattern with different objects.
 "Make sound of same pattern with different objects."
- (j) Have the student ask you to make some simple patterns of sound.
- (k) Repeat the diagnostic test.



☺ Diagnostic P3.9 Identify simple PATTERNS of movement

To pass, the student should be able to recognize a simple pattern of physical movement with confidence.

1. Ask the student after making a physical movement with a simple pattern and another with no pattern:
 "Tell me which physical movement contained a pattern?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to identify a pattern. In this lesson one learns to identify simple patterns of physical movements.

- (a) Introduce this lesson to the student.

"I am going to make a pattern with physical movements."

- (b) Pick up a book and raise it up and down.

"This is a pattern with the arm."

- (c) Jog in one place.

"This is a pattern with the feet."

- (d) Do some jumping jacks,

"This is a pattern with both hands and feet."

- (e) Explain,

"When you repeat movement you get a pattern."

- (f) Demonstrate movement without any pattern.

"When you do not have movement repeating you don't get a pattern."

- (g) Continue till the student can understand the idea of patterns with movement.

- (h) Have the student make physical movements with patterns and no pattern.

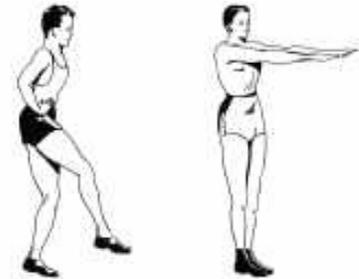
"Make movement with a simple pattern. Make movement with no pattern."

- (i) Have the student make the same movement pattern with different objects.

"Make movement of same pattern with different objects."

- (j) Have the student ask you to make some simple patterns of movement.

- (k) Repeat the diagnostic test.



Diagnostic P3.10 Identify simple PATTERNS of objects

To pass, the student should be able to recognize a simple pattern in the arrangement of objects with confidence.

1. Ask the student after arranging objects in a simple pattern and another with no pattern:
"Tell me which arrangement contained a pattern?"
2. If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

One must be able to identify a pattern. In this lesson one learns to identify simple patterns of arrangements of objects.

- (a) Introduce this lesson to the student.

"I am going to arrange some objects in a simple pattern."

- (b) Place paperclips and erasers alternately.

"Here we have paperclips and erasers arranged in a pattern."



- (c) Place spoons, knives and forks in a repeating array.

"Here we have spoons, knives and forks arranged in a pattern."

- (d) Point to some printed pattern, such as, on a wallpaper or on clothing.

"Here is a pattern in a printed design."

- (e) Explain,

"When you arrange things such that they repeat themselves you get a pattern."

- (f) Demonstrate some arrangement of things without any pattern.

"When you arrange things such that they do not repeat themselves you don't get a pattern."

- (g) Continue till the student can understand the idea of patterns with arrangement of objects.

- (h) Have the student arrange some things in a pattern or without a pattern.

"Arrange things in a simple pattern. Arrange things with no pattern."

- (i) Have the student ask you to make some simple patterns with things.

- (j) Repeat the diagnostic test.

SUMMARY

This is the third of the three levels of the Troubleshooting Guide for PRE-KINDERGARTEN MATH. This guide introduces the concept of numbers, and explores the ability to recognize differences, similarities and identities. This is the ability on which subsequent mathematical concepts are built.

The three levels of this guide are as follows:

P1. ORIENTATION & SPATIAL SENSE

Orientation and Spatial Sense forms the foundation of the subject of GEOMETRY. It introduces the elements of space and how they relate to observation.

P2. QUANTITY AND NUMBER SENSE

Quantity and Number Sense forms the foundation of the subject of ARITHMETIC. It introduces a system to represent all quantities in a simple manner.

P3. PATTERNS & RELATIONAL SENSE

Patterns and Relational Sense forms the foundation of the subject of ALGEBRA. It is a study of patterns underlying numbers, and quantitative relationships.

Though these lessons are designed for the pre-kindergarten, the diagnostic actions in this guide may be applied to students in higher grades.

GLOSSARY

Mathematics	The subject of Mathematics provides a systematic way of learning. It starts with counting, and develops into addition, multiplication and so on.
Pattern	A pattern is generated by repeatedly following some rule. For example, in counting, when you count one more to generate the next number you create the number pattern 1, 2, 3, 4, 5,
Relational sense	Relational sense is the sense of how things relate to each other because of the rules they follow in common.