

# PRE-KINDERGARTEN MATH #1

## ORIENTATION & SPATIAL SENSE

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

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This is the first 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.*

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## DIAGNOSTICS & LESSONS

### ☺ Diagnostic P1.1      Identify parts of the body

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify parts of the body  
    **"Point to your FACE."**  
    **"Point to your EARS."**  
    **"Point to your EYES."**  
    **"Point to your NOSE."**  
    And so on.
2. If the diagnostic fails, then do the Lesson & Exercise.

### Lesson & Exercise

*In this lesson one learns to identify different parts of the body to orient oneself in space. This lesson also tells the student that mathematics is based on real things.*

- (a) Introduce yourself to the student. Invite the student to play a game with you.  
    **"Hi! I'm \_\_\_\_\_. Let's play a game."**
- (b) Explain the game.  
    **"I shall point to a body part and call out its name. You do the same."**
- (c) Start the game. Point to a body part.  
    **"This is my FACE. Now, you point to your face."**
- (d) When the student identifies a body part correctly acknowledge it with an appropriate expression, such as,  
    **"Very good," "Alright," "Thank you," etc.**
- (e) If the student fails to identify the body part, gently correct the student by pointing to that body part. Then repeat the same instruction.  
    **"Now you point to your face."**
- (f) Have the student identify the following body parts.  
    **"Point to your face."**  
    **"Point to your ear."**  
    **"Point to your eye."**  
    **"Point to your nose."**  
    **"Point to your mouth."**  
    **"Point to your head."**



**"Point to your stomach."**

**"Point to your arm."**

**"Point to your hand."**

**"Point to your leg."**

**"Point to your foot."**

(g) Have the student identify additional body parts and/or items of clothing, such as,

- |            |             |            |
|------------|-------------|------------|
| (a) Chin   | (f) Cheeks  | (k) Shirt  |
| (b) Lips   | (g) Elbows  | (l) Pants  |
| (c) Teeth  | (h) Knees   | (m) Shoes  |
| (d) Tongue | (i) Fingers | (n) Socks  |
| (e) Hair   | (j) Toes    | (o) Pocket |

(h) Have the student ask you to identify body parts and items of clothing.

(i) Repeat the diagnostic test.

## ☺ Diagnostic P1.2 Identify objects in the room

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify objects in the room  
"Point to a CHAIR."  
"Point to a TABLE."  
"Point to a BOOK."  
"Point to a WALL."  
And so on.
2. If the diagnostic fails, then do the Lesson & Exercise.

### Lesson & Exercise

*In this lesson one learns to identify different things in the room to orient oneself in space. This lesson also helps one recognize that real things (chairs, tables, lamps, beads, etc.) form the basis of mathematics.*

- (a) Invite the student to play another game.

"Let's play another game. I shall point to things in this room. You do the same."

- (b) Start the game. Point to an object in the room.

"That is a CHAIR. Now you point to a chair."

- (c) When the student identifies an object correctly acknowledge it with an appropriate expression, such as,

"Very good," "Alright," "Thank you," etc.

- (d) If the student fails to identify the object, gently correct the student by pointing to that object. Then repeat the same instruction.

"Now you point to a chair."

- (e) Have the student identify objects in the room or in the house.

"Point to a CHAIR."  
"Point to a PICTURE."  
"Point to a TABLE."  
"Point to the FLOOR."  
"Point to a BOOK."  
"Point to the CEILING."



Table



Plant



Lamps



Clock



Light



Chair

**"Point to a WALL."**  
**"Point to a CLOCK."**  
**"Point to a DOOR."**  
**"Point to a LAMP."**  
**"Point to a WINDOW."**  
**"Point to a FAN."**

- (f) Have the student identify other objects in the environment, such as,
- |                |                  |            |
|----------------|------------------|------------|
| (a) Class room | (e) Eraser       | (i) Desk   |
| (b) Teacher    | (f) Doorknob     | (j) Pencil |
| (c) Blackboard | (g) Paper        | (k) Ball   |
| (d) Chalk      | (h) Light switch | (l) Toy    |

(g) Have the student ask you to identify objects in the environment.

(h) Repeat the diagnostic test.

### ☺ Diagnostic P1.3      Identify the directions FRONT and BACK

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify the directions FRONT and BACK

**"Point to something in FRONT of you."**

**"Point to something at the BACK of you."**

**"Point to something in the FRONT of \_\_\_\_\_ (a person or an object)."**

**"Point to something at the BACK of \_\_\_\_\_ (a person or an object)."**

And so on (repeat).

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

### Lesson & Exercise

*DIRECTION and DISTANCE are the two key factors, which determine a location in space. In this lesson one learns to recognize the directions FRONT and BACK with respect to oneself and other objects.*

- (a) Seat the student in a chair.

**"Let's play a game."**

- (b) Place a toy in FRONT of the student, and explain,

**"This toy is in FRONT of you. You can look at it without turning your head."**



- (c) Place a toy at the BACK of the student. Explain,

**"This toy is at the BACK of you. You must turn all the way to look at it."**

- (d) Point alternately to at least three things in front and three things at the back of the student. Make sure that you allow the student enough time to observe the directions FRONT and BACK.

**"That \_\_\_\_\_ is in FRONT of you."**

**"That \_\_\_\_\_ is at the BACK of you."**

- (e) Place a doll in another chair. The student may walk around this setup. Point alternately to at least three things in front, and three things at the back of the doll.

**"That \_\_\_\_\_ is in FRONT of the doll."**

**"That \_\_\_\_\_ is at the BACK of the doll."**

- (f) Have the student identify the directions FRONT and BACK for at least three items.

**"Point to something in FRONT of you."**

**"Point to something at the BACK of you."**

- (g) Have the student identify items in FRONT and BACK of at least three different persons or objects.

**“Point to something in the FRONT of \_\_\_\_\_ (a person or an object).”**  
**“Point to something at the BACK of \_\_\_\_\_ (a person or an object).”**

- (h) Have the student demonstrate the following.
  - (a) Place some thing in FRONT.
  - (b) Place some thing at the BACK.
  - (c) Point to the FRONT.
  - (d) Point to the BACK.
- (i) Have the student ask you to identify the directions FRONT and BACK in different ways.
- (j) Repeat the diagnostic test.

## ☺ Diagnostic P1.4      Identify the directions ABOVE and BELOW

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify the directions ABOVE and BELOW

**"Point to something ABOVE you."**

**"Point to something BELOW you."**

**"Point to something ABOVE \_\_\_\_\_ (a person or an object)."**

**"Point to something BELOW \_\_\_\_\_ (a person or an object)."**

And so on (repeat).

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

### Lesson & Exercise

*DIRECTION and DISTANCE are the two key factors, which determine a location in space. In this lesson one learns to recognize the directions ABOVE and BELOW with respect to oneself and other objects.*

- (a) Seat the student in an elevated position, such as, a high chair.

**"Let's play a game."**

- (b) Point to the ceiling.

**"That ceiling is ABOVE you. You have to look up to see it."**

- (c) Point to the floor,

**"That floor is BELOW you. You have to look down to see it."**

- (d) Point alternately to at least three things above and three things below the student. Make sure that you give enough time to the student to observe the directions ABOVE and BELOW.

**"That \_\_\_\_\_ is ABOVE you."**

**"That \_\_\_\_\_ is BELOW you."**

- (e) Place a doll in another chair. The student may walk around that setup. Point alternately to at least three things above and three things below the doll.

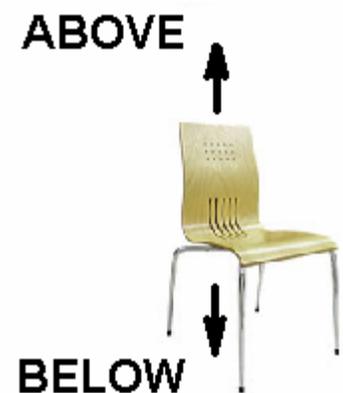
**"That \_\_\_\_\_ is ABOVE the doll."**

**"That \_\_\_\_\_ is BELOW the doll."**

- (f) Have the student identify the directions ABOVE and BELOW for at least three items.

**"Point to something ABOVE you."**

**"Point to something BELOW you."**



(g) Have the student identify items ABOVE and BELOW of at least three different persons or objects.

**"Point to something ABOVE \_\_\_\_\_ (a person or an object)."**

**"Point to something BELOW \_\_\_\_\_ (a person or an object)."**

(h) Have the student demonstrate the following.

(a) Place some thing ABOVE you.

(b) Place some thing BELOW you.

(c) Point to ABOVE.

(d) Point to BELOW.

(i) Have the student ask you to identify the directions ABOVE and BELOW in different ways.

(j) Repeat the diagnostic test.

## ☺ Diagnostic P1.5      Identify the distances NEAR and FAR

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify the distances NEAR and FAR

**"Point to something NEAR you."**

**"Point to something FAR from you."**

**"Point to something NEAR \_\_\_\_\_ (a person or an object)."**

**"Point to something FAR from \_\_\_\_\_ (a person or an object)."**

And so on (repeat).

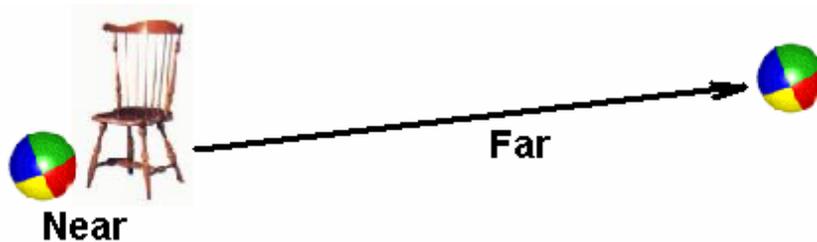
2. If the diagnostic fails, then do the Lesson & Exercise.

### Lesson & Exercise

*DIRECTION and DISTANCE are the two key factors, which determine a location in space. In this lesson one learns to recognize things that are NEAR and FAR with respect to oneself and other objects.*

- (a) Seat the student in a chair at a table.

**"Let's play a game."**



- (b) Place a toy NEAR the student. Explain,

**"This toy is NEAR you. You can touch it easily."**

- (c) Place a toy FAR from the student. Explain,

**"This toy is FAR from you. You cannot touch it easily."**

- (d) Point alternately to at least three things near and three things far from the student. Make sure that you give enough time to the student to observe the distances NEAR and FAR.

**"That \_\_\_\_\_ is NEAR you."**

**"That \_\_\_\_\_ is FAR from you."**

- (e) Place a doll on a table. The student may walk around the table. Point alternately to at least three things near and three things far from the doll.

**"That \_\_\_\_\_ is NEAR the doll."**

**"That \_\_\_\_\_ is FAR from the doll."**

- (f) Have the student identify the distances NEAR and FAR for at least three items.  
**“Point to something NEAR you.”**  
**“Point to something FAR from you.”**
- (g) Have the student identify items NEAR and FAR from at least three different persons or objects.  
**“Point to something NEAR \_\_\_\_\_ (a person or an object).”**  
**“Point to something FAR from \_\_\_\_\_ (a person or an object).”**
- (h) Have the student demonstrate the following.  
(a) Place some thing NEAR you  
(b) Place some thing FAR from you  
(c) Point to NEAR  
(d) Point to FAR
- (i) Have the student ask you to identify the distances NEAR and FAR in different ways.
- (j) Repeat the diagnostic test.

## ☺ Diagnostic P1.6      Identify the positions IN and OUT

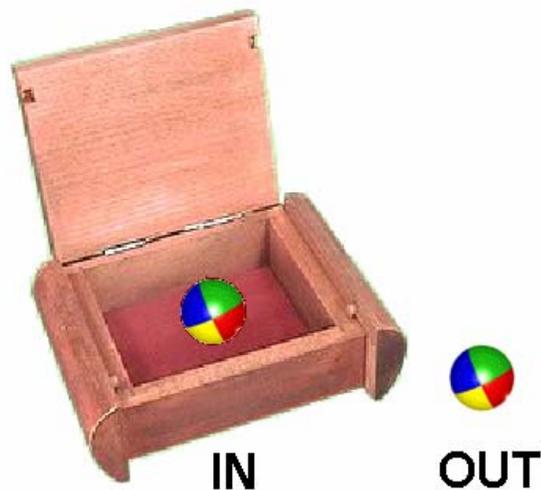
*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify the positions IN and OUT  
    **"Point to something, which is INSIDE another thing."**  
    **"Point to something, which is OUTSIDE another thing."**  
    And so on (repeat).
2. If the diagnostic fails, then do the Lesson & Exercise.

### Lesson & Exercise

*In this lesson one learns to recognize things that are IN and OUT of other things.*

- (a) Place a box in front of the student. Explain,  
    **"I am going to show the positions IN and OUT."**



- (b) Place some toys in the box,  
    **"These toys are IN the box."**
- (c) Take one toy OUT of the box.  
    **"This toy is OUT of the box."**
- (d) Point alternately to at least three things that are IN something and three things that are OUT of something.  
    **"That \_\_\_\_\_ is IN \_\_\_\_\_."**  
    **"That \_\_\_\_\_ is OUT of \_\_\_\_\_."**
- (e) Make sure that you give enough time to the student to observe the positions IN and OUT.

- (f) Have the student identify the positions IN and OUT for at least three items.  
**“Point to something positioned IN another thing.”**  
**“Point to something positioned OUT of another thing.”**
- (g) Have the student demonstrate the following.
  - (a) Place some thing IN another thing.
  - (b) Place some thing OUT of another thing.
- (h) Have the student ask you to identify the positions IN and OUT in different ways.
- (i) Repeat the diagnostic test.

## ☺ Diagnostic P1.7      Identify the positions ON and UNDER

*To pass, the student should be able to respond to the question correctly three times in a row, with confidence.*

1. Have the student identify the positions ON and UNDER  
    **"Point to something, which is ON another thing."**  
    **"Point to something, which is UNDER another thing."**  
    And so on (repeat).
2. If the diagnostic fails, then do the Lesson & Exercise.

### Lesson & Exercise

*In this lesson one learns to recognize things that are ON and UNDER other things.*

- (a) Explain to the student,  
    **"I am going to show the positions ON and UNDER."**
- (b) Place a toy on the table,  
    **"This toy is ON the table."**
- (c) Place another toy under the table.  
    **"This toy is UNDER the table."**



- (d) Point alternately to at least three things that are ON something and three things that are UNDER something.  
    **"That \_\_\_\_\_ is ON \_\_\_\_\_."**  
    **"That \_\_\_\_\_ is UNDER \_\_\_\_\_."**
- (e) Make sure that you give enough time to the student to observe the positions ON and UNDER.
- (f) Have the student identify the positions IN and OUT for at least three items.  
    **"Point to something positioned ON another thing."**  
    **"Point to something positioned UNDER another thing."**

(g) Have the student demonstrate the following.

**“Place some thing ON another thing.”**

**“Place some thing UNDER another thing.”**

(h) Have the student ask you to identify the positions ON and UNDER in different ways.

(i) Repeat the diagnostic test.

## SUMMARY

This is the first 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

<b>Direction</b>	A <b>direction</b> is the line or course along which something is directed. For example, when you look out, your sight follows a direction. The six main directions are: FRONT, BACK, ABOVE, BELOW, LEFT and RIGHT.
<b>Distance</b>	A <b>distance</b> is the separation between two locations or objects. For example, things in the same direction from you can be at different distances, such as, NEAR or FAR.
<b>Math</b>	See <b>Mathematics</b> .
<b>Mathematics</b>	The subject of <b>Mathematics</b> provides a systematic way of learning. It starts with counting, and develops into addition, multiplication and so on.
<b>Orientation</b>	<b>Orientation</b> is the process of getting adjusted to (or aligned in) space.
<b>Position</b>	A <b>position</b> tells us how something is located in relation to other things, such as, IN, OUT, ON, UNDER, MIDDLE, and NEXT TO. (Lesson 1.6)
<b>Spatial sense</b>	<b>Spatial sense</b> is the sense of directions and distances in space.