

## Readiness Test: Oral format

Whole Class Oral Diagnostic Testing to determine initial Stage of Learning groups.

Time: 15-20 minutes

### **Overview:**

**Aim:** To determine whether students are ready to introduce Multiplication and Division, or whether they have misconceptions from an earlier level.

### **Main tasks:**

- Conserve six blocks when they are placed in a cup and shaken
- Show six fingers in multiple ways
- Partition eight blocks when only three are visible

### **Equipment and Preparation: You will need to undertake the following steps to prepare for this task**

- You will need **paper** and coloured **pens** for each student to draw their blocks.
- You will need a **coffee mug** (or any opaque cup), with **eight blocks** in it, sitting within reach of your chair.
- Decide whether you want to set up a video camera to record the testing for later examination or if you would like to have a second observer. Most smartphone cameras are sufficient for this and cheap mounting adaptors and tripods are available online.

*Please see flowchart overleaf for questioning structure and script.*

## Script for Readiness Test: Oral format

### Task 1:

Count six blocks into your cup in a very obvious fashion. Have a student confirm that you really do have six by looking into the cup. Say, "I really have put six blocks in here. I'm going to shake the blocks now. I'm not going to put any extra blocks into the cup and I won't let any fall out. I'm not doing anything to trick you. After I have shaken the blocks I'm going to ask you to close your eyes and put up some fingers to show how many blocks you think there are in the cup." Put your hand over the top of the cup and give it a very vigorous shake for at least five seconds. Next put your eyebrows up and ask with an upwards inflection, "How many are there now? Close your eyes, and show me with your fingers how many you think." Repeat this three times to check.

**Watch to see:** Who does not show six fingers all three times.

*Students who do not show six fingers each time are not ready for this program. See "What to Do?" below.*

### Task 2:

Say, "Close your eyes and keep them closed. Now, with your eyes closed, I want you to show me six fingers." Once they have shown six successfully in one way, ask, "Keep your eyes closed and show me six fingers a different way." If they need more prompting than this (e.g. they still keep five on one hand and one on the other, but just reverse the hands), you can say, "I know that you can make six with five and one. I want to see if you can use other numbers. How else could you do it?" You may also need to add, "No, you still have five fingers on one hand and one on the other. I want you to make six without using five and one. Use different numbers." Try to get three different combinations: five and one, three and three, as well as four and two.

**Watch to see:** Who can only make six in one way, or who resorts to counting their fingers on each hand to make six in multiple ways.

*Students who can only make six in limited ways are not ready for this program. See "What to Do?" below.*

### Task 3:

Place eight blocks on the floor. Count them obviously to show that you have eight. Next, cover the blocks with one hand and secretly pick up five with the other hand so that students do not see how many you have picked up. Say, "I started with eight blocks on the floor and then I picked some up. You can see that there are three blocks left on the floor. Please close your eyes now. Show me with your fingers how many blocks you think I picked up."

**Watch to see:** Who shows an amount other than five. Commonly: three, seven, four or eight.

*Students who did not show five are not ready for this program. See "What to Do?" below.*

## What to do?

It is not appropriate to introduce Multiplication and Division to students who are not confident with the concepts of Quantity (Task 1) and Partitioning (Tasks 2 and 3). These students need to first use the Intervention Series resource, "*Fixing Misconceptions in Addition and Subtraction*".

## Tracking sheet for Readiness Test

Record the names of students who struggled with each of the following tasks in the space provided. Each student only needs to be recorded once – after that, concentrate on checking the remaining students rather than rewriting existing names.

<p><u>Task 1:</u> Conserve six blocks when they are shaken in a cup.</p>	
<p><u>Task 2:</u> Partition six fingers in multiple ways.</p>	
<p><u>Task 3:</u> Starting with eight blocks on the floor, the teacher picks some up and leaves three. Students work out how many were removed.</p>	

Successful at all tasks:

## Whole class test two: Written format

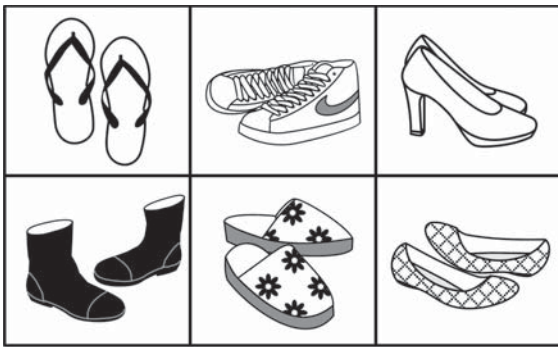
Name:

Class:

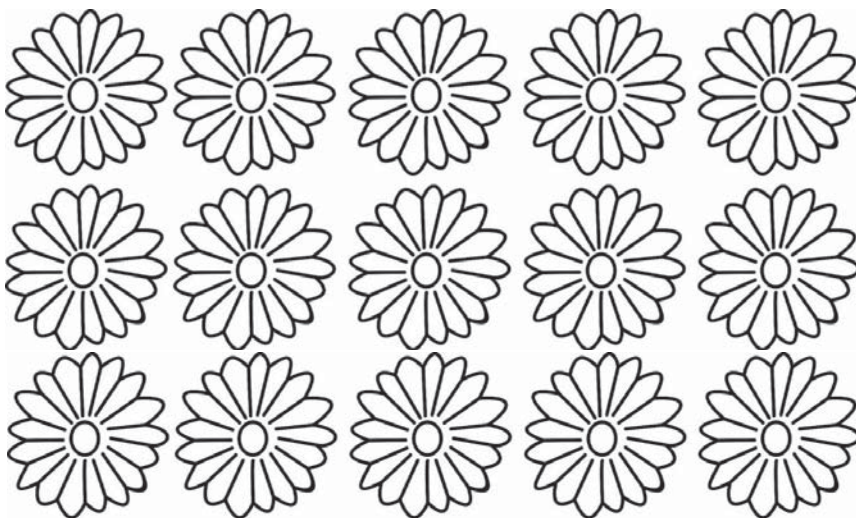
Date:

1. What does  $2 \times 3$  look like to you? This is also called "2 threes". Draw a picture to show what this looks like:

2. How many shoes are shown below? Explain how you worked it out.



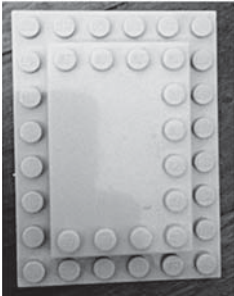
3. How many flowers are shown below? Explain how you worked it out.



4. This blanket has a pattern made of squares on it. If you unfolded the blanket, how many small squares could we see? Show how you worked it out.



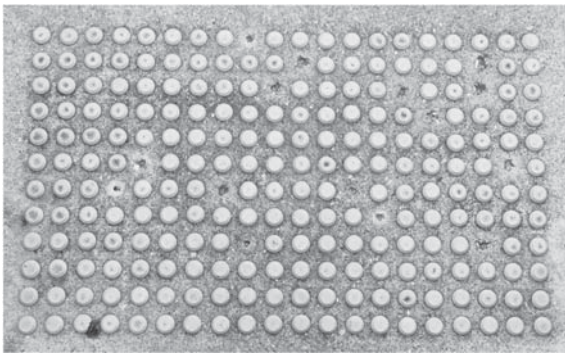
Two Lego blocks were stuck together. The block underneath is covered with dots. The block on top has some flat space.



5. The top block has a smooth section where the dots have been removed. How many dots are missing from the top block? Show how you worked it out.

6. How many dots are under the top block? Show how you worked it out

7. 28 buttons were shared fairly between 7 bags. How many were in each bag?
8. 21 buttons were shared fairly between some bags. There were 3 buttons in each bag. How many bags were needed?
9. The picture below shows some raised round dots on a footpath. These dots help someone who can't see to tell when the footpath meets a road. Some of the dots have broken off. How many dots were there before any were broken? Show how you worked it out.



10. This picture shows trays of seedling pots. How many trays would be needed for 72 seedlings? Explain how you worked it out.



11. If the pots could be broken up and rearranged into rows of 3 instead of rows of 4, how many rows would be needed for all 72 plants? Show how you worked it out.

## Whole class test two: Answers and interpretation

This test increases in complexity. Remember to stop at the point where a student begins to get the answers wrong and start the intervention program from the Lesson suggested in the answers below. Check the next few questions to make sure that the problem is genuine, but you do not have to complete the whole test once a student consistently gets answers wrong.

### What to look for in a student's answers:

#### For question 1:

Does your student draw?

- Five by adding two and three together - *Check the oral Readiness Test. Start at Lesson 1 if ready.*
- Six without showing any lots of two in it? - *Probably start at Lesson 1 to establish the concept of Arrays, but look through the rest of the test first to confirm as this could simply be a mistake. If arrays are successfully used later, ignore this initial incorrect answer.*
- Six represented using a groups model (e.g. Two circles with three in each or vice versa) - *Probably start at Lesson 1 to establish the concept of Arrays, but look through the rest of the test first to confirm.*
- Six represented as an array - **Continue on.**

#### For question 2: The answer is 12.

Does your student answer by:

- Counting each shoe in ones - *Check the readiness test. Start at Lesson 1 if ready.*
- Counting in twos - *Start at Lesson 1 to establish the concept of Arrays.*
- Writing an addition sum (2+2+2...) - *Start at Lesson 1 to establish the concept of Arrays.*
- Indicating multiplication was used. For example, "6 twos are 12" or  $6 \times 2 = 12$  - **Continue on.**

#### For question 3: The answer is 15.

Does your student answer by?

- Counting each flower in ones – *Start at Lesson 1 if ready.*
- Counting in threes or fives, or writing an addition sum - *Start at Lesson 1 to consolidate Arrays.*
- Indicating multiplication was used - **Continue on.**

#### For question 4: The answer is 30.

The student should have used multiplication to work out how many squares were on the blanket. If students did not use multiplication, or got the wrong answer start at **Lesson 3** to consolidate Commutativity. You may wish to use Lessons 1 and 2 as well.

#### For question 5: The answer is 12.

If students answered question 4 correctly, but incorrectly answered questions 5 or 6, start at **Lesson 6** to establish the link between Addition and Multiplication. You may wish to include these students from Lesson 3 to establish the Commutativity of Multiplication as well.

#### For question 6: The answer is 24.

If students answered question 4 correctly, but incorrectly answered questions 5 or 6, start at **Lesson 6** to establish the link between Addition and Multiplication. You may wish to include these students from Lesson 3 to establish the Commutativity of Multiplication as well.

#### For question 7: The answer is 4.

- If students didn't answer this correctly, start at **Lesson 8.**

#### For question 8: The answer is 7.

- If students didn't answer this correctly, start at **Lesson 9.**

**For question 9:** There are 20 dots along the top and 12 on the side.  $20 \times 12 = 240$  dots.

- If students didn't answer this correctly or answered inefficiently, *start at Lesson 12*.

**For question 10:** Each tray of pots has an array of  $6 \times 4$  (or 24). To plant 72 seedlings we would need 3 of the large pots.

- If students didn't answer this correctly or answered inefficiently, *start at Lesson 14*.

**For question 11:**  $72 \div 3 = 24$ . This question is essentially a modification of the previous question.

- If students didn't answer this correctly, or answered inefficiently, *start at Lesson 17*.