

SAMPLE PAGES





Working with Fractions

CONTENT DESCRIPTION

NA078 Count by guarters, halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line

MATHEMATICAL BACKGROUND

In this unit, students explore different ways to represent the same fraction. By shading squares they discover that one-quarter has many different representations. This is true when the square is divided into four equal parts. Common fractions and unit fractions are then compared, with students discovering that as the denominators increase the unit fraction decreases. The unit concludes with students using the area model to count fractions which introduces the concept of improper fractions. When students count parts of a whole and the fractions extend beyond one, it is natural for them to use improper fractions forms (e.g. $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{5}{4}, \frac{6}{4}$ and so on). Improper fractions are then converted to mixed numerals through the use of a number line.

LESSON OVERVIEW

- 10.1 **Reviewing Common Fractions**
- 10.2 **Comparing Common Fractions**
- 10.3 **Relating and Comparing Unit Fractions**
- 10.4 Counting with Fractions
- 10.5 Relating Improper Fractions and Mixed Numerals

LANGUAGE

Students will use and develop the following language: common fraction, unit fraction, improper fraction, mixed numeral, numerator, denominator

MATERIALS

Lesson 10.1

- GM ACE student journal, page 45
- 2 copies of Blackline Master 17 for each group of students
- Scissors for each group of students
- Blu-Tack

Lesson 10.2

- GM ACE student journal, page 46
- GM ACE mentals workbook, page 19
- 2 copies of Blackline Master 18 for each group of students
- Scissors for each group of students
- Blu-Tack

Lesson 10.3

- GM ACE student journal, page 47
- For each group of students:
 - 10 paper strips (approx. 5 cm x 30 cm)
 - 2 sheets of A3 paper
 - sticky tape

Lesson 10.4

- GM ACE student journal, page 48
- 1 copy of Blackline Master 19 for each pair of students
- · Scissors for each pair of students
- Blu-Tack

Lesson 10.5

- GM ACE student journal, page 49
- GM ACE mentals workbook, page 20

Optional Digital Resources and Program Blackline Masters

The lessons in this program are further supported by optional online resources. Go to www.origoeducation.com/go-maths-ace-support for further information about the program blackline masters and these resources.

Assessment

CONTENT INDICATORS

On completion of this unit, the students should be able to

	A identify common fractions
	B compare common fractions
NA078	C count by quarters, halves and thirds beyond one whole
	D identify improper fractions and mixed numerals on a number line
	E convert improper fractions and mixed numerals

TECHNIQUES

The following tools can be used to assess the content indicators.

1. Written Test A B D E

Allow time for the students to complete the written test for Unit 10. Consider administering the test one or two weeks after completion of the unit.

2. Student Journal Page C

Refer to GO Maths ACE student journal page 48.

3. Diagnostic Probe C E

Say: We're going to count in fourths together. I'm going to start the count and you're going to continue the count when I stop. Ensure the student is familiar with task before starting the count: *One-fourth, two-fourths, three-fourths* (stop). Encourage the student to continue the count until they reach $\frac{9}{4}$. Challenge the student to write this improper fraction then convert it to a mixed numeral (2 $\frac{1}{4}$).

GOMATIS UNIT 10 TEST Name A B Write the fraction of the shape that is shaded. Then shade the bubble below the **greater** fraction in each pair D 2. Complete the missing numbers $\frac{2}{3}$ $\frac{3}{3}$ 1 <u>4</u> 3 <u>6</u> 8 10 12 123 슼 Ε a. $\frac{l_4}{3} = \left| \frac{l}{3} \right|$ b. $\frac{8}{3} = \left| \frac{2}{3} \right|$ c. $\frac{10}{3} = 3\frac{1}{3}$ **a**. $1\frac{2}{3} = \frac{5}{3}$ **b**. $2\frac{1}{3} = \frac{7}{3}$ **c**. $2\frac{2}{3} = \frac{8}{3}$ **d.** $3\frac{2}{3} = \boxed{\frac{11}{3}}$

		Year 4	
NA078	3 10		

RECORDING

Content Strands

Record each student's achievement of the content indicators in the box(es) for this unit alongside the relevant content description(s) on a copy of the Progress Record (page xii).

Proficiency Strands

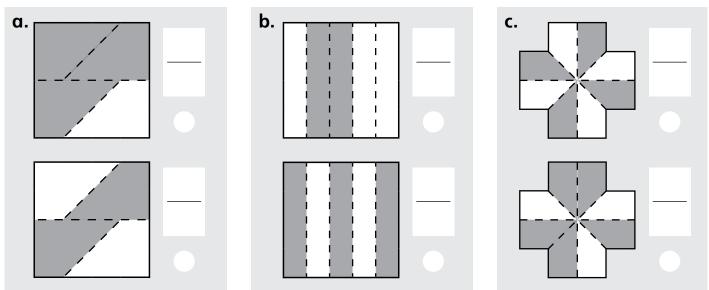
Record significant observations in the Progress Record (page xiv).

Unit 10 Written Test

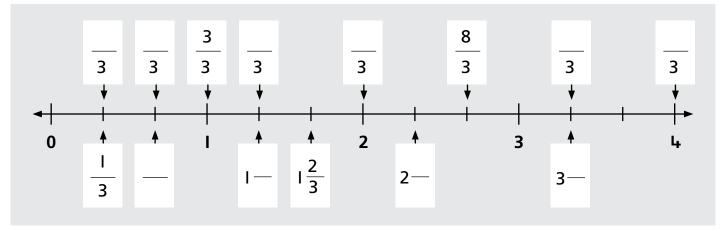
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Write the fraction of the shape that is shaded.
Then shade the bubble below the greater fraction in each pair.



2. Complete the missing numbers.



3. Use the number line above to write these improper fractions as mixed numerals.

a.
$$\frac{14}{3} =$$
 b. $\frac{8}{3} =$ c. $\frac{10}{3} =$ d. $\frac{11}{3} =$

4. Use the number line above to write these mixed numerals as improper fractions.

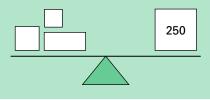
a.
$$|\frac{2}{3}| = -$$
 b. $2\frac{1}{3}| = -$ **c.** $2\frac{2}{3}| = -$ **d.** $3\frac{2}{3}| = -$

Reviewing Common Fractions

In this lesson, students work with paper squares to fold and shade equal parts of a whole to show the same fraction in different ways.

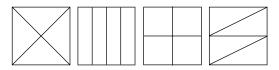
DAILY NUMBER SENSE

On the board, draw the diagram below. Ask: *What numbers could be in the boxes to balance the total of 250?* Invite individuals to write combinations on the board. Encourage them to explain how they decided which numbers to use.



ACTIVITY

- 1. Show a square cut from Blackline Master 17. Write $\frac{1}{4}$ on the board and invite one student to fold and shade the square to show one-quarter. Repeat the activity with a second and third square. Each volunteer must fold the square a different way and shade it to show one-quarter.
- 2. Distribute a copy of Blackline Master 17 to each group of students. Ask them to cut out the squares and fold them in different ways to show one-eighth. Invite two students to describe in their own words what the groups are to do and reinforce the fact that the squares must be divided into eight equal parts and they must shade one of the parts. Move from group to group and encourage them to find as many different ways to divide the square into eighths as possible. It is important to emphasise folding/dividing the squares in different ways rather than shading a different part of squares that have been folded in the same way.
- 3. Ask students who used the steps for the quarters square (shown in first example below left) as the first two steps to show eighths (as shown in the next two examples below) to attach their examples to the board. Ask: *What do you know about one-quarter and one-eighth? How can we show one-eighth if we have one-quarter?* Repeat the activity for other representations of one-quarter.



4. Have the students work independently to complete page 45 of the *GO Maths ACE* student journal.

REFLECTION

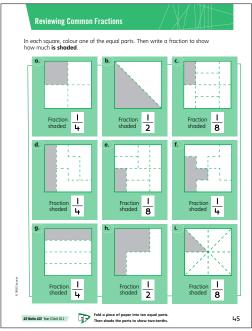
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Discuss the students' answers to page 45 of the *GO Maths ACE* student journal. Ask: *Which squares on the page have the greatest amount shaded? Which squares on the page have the least amount shaded? How do you know?* Encourage students to explain how they used either the picture or the symbol to help them decide.

MATERIALS

- GM ACE student journal, page 45
- 2 copies of Blackline Master 17 for each group of students
- Scissors for each group of students
- Blu-Tack

Student Journal



DAILY COMPUTATION PRACTICE

Write the following number sentences on the board. Have the students copy and complete them or simply write the answers.

23 + 24 =	31 + 32 =
14 + 15 =	43 + 45 =
34 + 32 =	86 - 42 =
68 – 35 =	49 – 25 =
83 - 41 =	65 – 32 =

FLUENCY

Comparing Common Fractions

In this lesson, students use a region model to begin to explore strategies for comparing fractions with the same whole.

DAILY NUMBER SENSE

Repeat the Daily Number Sense discussion from the previous lesson with **185** as the total. Have the students write numbers that are multiples of 5.

ACTIVITY

- Provide each group of students with two copies of Blackline Master 18. Ask the students to cut out the hexagons. They should then work as a group to show as many different fractions as they can by dividing and shading the hexagons into halves, thirds or sixths. Encourage them to include examples that shade all of the sixths, all of the thirds and both halves.
- 2. Have individuals take turns to attach the pictures on the board, name and write the fraction. Continue until all 11 of the possible fractions have been displayed and written.
- 3. Project or write $\frac{1}{6}$ and $\frac{5}{6}$ on the board. Ask: What can you tell about these two fractions? In the discussion, encourage the students to observe that $\frac{1}{6}$ is less than $\frac{5}{6}$. Repeat the discussion for other pairs of fractions including pairs of fractions such as $\frac{1}{3}$ and $\frac{5}{6}$. Encourage students to decide which is less or greater and explain how they decided.
- 4. Have the students work independently to complete the page 46 of the *GO Maths ACE* student journal.

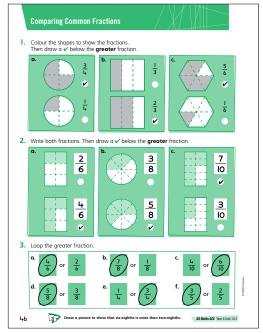
REFLECTION

Discuss the students' answers to page 46 of the *GO Maths ACE* student journal. Ask: *How can you decide which fraction is greater when you look at the pictures? How can you tell when you look at the symbols?* Reinforce the fact that the fractions must relate to wholes that are the same size. To reinforce this idea, project or draw the picture below on the board. Ask: *What fraction of each square is shaded? Which square has the greater amount shaded?*



- GM ACE student journal, page 46
- GM ACE mentals workbook, page 19
- 2 copies of Blackline Master 18 for each group of students
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- Blu-Tack

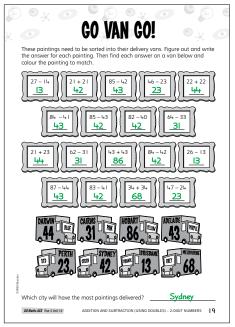
Student Journal



DAILY COMPUTATION PRACTICE

Use page 19 of the *GM ACE* mentals workbook.

Mentals Workbook



PROBLEM SOLVING

Relating and Comparing Unit Fractions

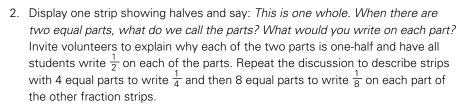
In this lesson, students use paper strips to build a fraction wall to relate families of fractions. They use the strips to compare unit fractions.

DAILY NUMBER SENSE

Repeat the Daily Number Sense discussion from 10.1 with four boxes on the left-hand side of the diagram and 325 as the total. Have the students write numbers that are multiples of 5.

ACTIVITY

1. Distribute the paper strips to each group of students. Ask them to work to as a group to fold separate strips to show halves, quarters and eighths. Introduce and explain the terms 'denominator' (the bottom number which indicates the total number of equal parts into which the one whole is split) and 'numerator' (the top number which indicates the number of parts that are to be considered).



3. Have the students tape four strips one below the other on a sheet of paper as shown below.

1							
	$\frac{1}{2}$				-	1	
-	$\frac{1}{4}$ $\frac{1}{4}$		$\frac{1}{4}$ $\frac{1}{4}$			1	
<u>1</u> 8	<u>1</u> 8	$\frac{1}{8}$	$\frac{1}{8}$	1 8	<u>1</u> 8	$\frac{1}{8}$	$\frac{1}{8}$

- 4. Provide additional paper strips and invite students to experiment folding a strip into an 'S' shape and then slowly flattening it to divide the strip into three equal parts. They should repeat this for other strips and select the most accurate three strips. Discuss the questions above to write $\frac{1}{3}$ on each part of the strip divided into three equal parts; $\frac{1}{6}$ on each part of the strip divided into 6 equal parts; and $\frac{1}{9}$ on each part of the strip divided into nine equal parts.
- 5. Have the students tape four strips one below the other on a sheet of paper as shown below.

	1				
$\frac{1}{3}$	$\frac{1}{3}$			<u>1</u> 3	
$\frac{1}{6}$ $\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	1	$\frac{1}{6}$
$\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$	$\frac{1}{9}$ $\frac{1}{9}$	<u>1</u> 9	$\frac{1}{9}$	1 9	$\frac{1}{9}$

6. Have the students work independently to complete page 47 of the GO Maths ACE student journal.

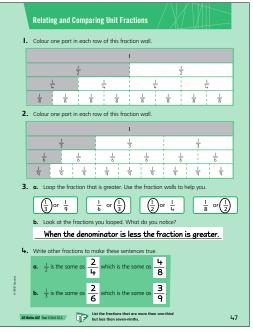
REFLECTION

Discuss the students' answers to page 47 of the GO Maths ACE student journal. Refer to Questions 1 and 2 and ask: What is the same about the fractions? (The numerator is always one.) What do you know about one of the parts when the denominators are different? Encourage students to explain that as the number of equal parts increases one of those parts must become smaller.

MATERIALS

- GM ACE student journal, page 47
- For each group of students
- 10 paper strips (approx. 5 cm x 30 cm)
- 2 sheets of A3 paper
- sticky tape

Student Journal



DAILY COMPUTATION PRACTICE

Write the following number sentences on the board. Have the students copy and complete them or simply write the answers.

25 + 26 =	36 + 37 =
17 + 15 =	46 + 47 =
38 + 39 =	36 - 18 =
56 – 27 =	75 – 37 =
93 - 46 =	53 – 26 =

Counting with Fractions

In this lesson, students use squares to count in steps of one-quarter. They write the numbers as proper and improper fractions.

DAILY NUMBER SENSE

Repeat the Daily Number Sense discussion from 10.1 with four boxes on the left-hand side of the diagram and **350** as the total. Have the students write numbers that are not multiples of 5.

ACTIVITY

- 1. Provide each pair of students with a copy of Blackline Master 19 and have them cut out the squares. Demonstrate folding the squares as shown right. Then say: *Fold each of your squares in the same way to show quarters.*
- 2. Say: We are going to show as many quarters as we can with our squares. Where should we start? Invite suggestions and encourage students to explain that they should do this in order $(\frac{1}{4}, \frac{2}{4}, \frac{3}{4} \text{ and so on})$.
- 3. Have three students shade the first three fractions and attach the squares vertically down the board. Write the fractions beside them. Ask: *What comes next?* Have the students count the quarters in order, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ and then ask the question again. Bring out the fact that shading one whole square is the same as four-quarters or $\frac{4}{4}$. Have a student shade and attach this square to the board.
- 4. Ask the students to continue the count and write the fractions $\frac{5}{4}$, $\frac{6}{4}$, $\frac{7}{4}$, $\frac{8}{4}$, $\frac{9}{4}$, and $\frac{10}{4}$ down the board for reference. Discuss how each of the fractions can be shown and how two or three squares will be needed to show these fractions. Assign a fraction to each pair to shade and attach to the board. Discuss questions such as: Which numbers are more than 1? Which numbers are less than 1? Which numbers are more than 2? How do you know?
- 5. Have the students work independently to complete page 48 of the *GO Maths ACE* student journal.

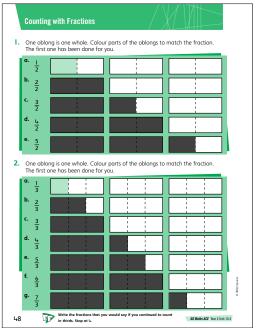
REFLECTION

Discuss the students' answers to page 48 of the *GO Maths ACE* student journal. On the board, write $\frac{11}{4}$. Ask: *Where is this fraction on the board? How do you know?* Write the mixed form $1\frac{1}{4}$ beside $\frac{5}{4}$ on the board. Repeat the discussion for other fractions to write them in mixed form where possible.

MATERIALS

- GM ACE student journal, page 48
- 1 copy of Blackline Master 19 for each pair of students
- Scissors for each pair of studnets
- Blu-Tack

Student Journal



DAILY COMPUTATION PRACTICE

Write the following number sentences on the board. Have the students copy and complete them or simply write the answers.

65 + 65 =	56 + 55 =
87 + 85 =	77 + 76 =
88 + 89 =	136 - 68 =
126 – 67 =	145 – 72 =
153 – 76 =	193 – 96 =

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Relating Improper Fractions and Mixed Numerals

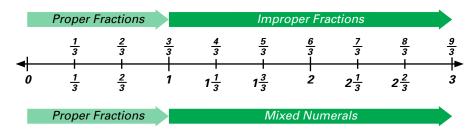
In this lesson, students explore different forms to write fractions greater than 1. They also investigate the concept of equivalence.

DAILY NUMBER SENSE

Repeat the Daily Number Sense discussion from 10.1 with four boxes on the left-hand side of the diagram and **232** as the total. Have the students write numbers that are not multiples of 5.

ACTIVITY

 Draw a number line from 0 to 3 (allow room on the right to extend it to 4) with increment marks at each third. Ask: What fractions does this number line show? If you start at zero and count in steps of one-third, what will you say? Invite volunteers to count in steps of one-third and reinforce they are making jumps of one-third as they move along the number line. Repeat the count two or three times and then write the fractions and the words **Proper Fractions** and **Improper Fractions** above the number (see below).



- Ask: What do you notice about the fractions that are equal to 1 or greater? Bring out observations such as 'The numerators are equal to or greater than the denominator.' Write the proper fractions and mixed numerals below the line, and then the words **Proper Fractions** and **Mixed Numerals** (see above).
- Extend the number line to 4. Ask volunteers to take turns to write improper fractions and the related mixed numeral and vice versa on the number line. Encourage them to explain how they worked out the related values. For example: '3 1/3 is 9/3 and one more third so the improper fraction is 10/3.'
- 4. Have the students work independently to complete page 49 of the *GO Maths ACE* student journal.

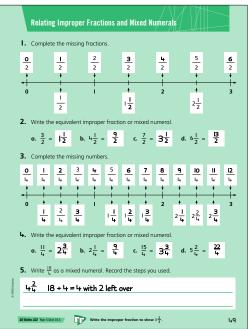
REFLECTION

Have the students describe the steps they used to work out the answers to selected examples on page 49 of the *GO Maths ACE* student journal.

MATERIALS

- GM ACE student journal, page 49
- GM ACE mentals workbook, page 20

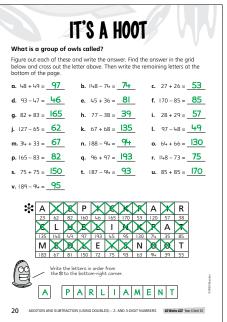
Student Journal



DAILY COMPUTATION PRACTICE

Use page 20 of the *GM ACE* mentals workbook.

Mentals Workbook



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