

enVisionMATHS Online Tutorial Guide 2

Tutorial 2.2: Differentiation

Introduction

This guide will look at the range of ways that enVisionMATHS caters for differentiation in the classroom; from additional needs to multi-age classrooms.

Differentiation

The amount of differentiation in the classroom depends on the needs of the class as identified in the planning by the teacher. enVisionMATHS is designed to allow for differentiation at all stages and provides resources that allow the planning of pathways for different ages and levels within the classroom.

(Note that pre-assessment is an important step in determining differentiation needs and is explained in the Assessment tutorial.)

Teacher Resource Booklets

Meeting Individual Needs

ESL

ESL

Considerations for ESL Students
Repeated oral-language practice with fraction names will help English learners understand fraction concepts.

- Beginning** Model equal parts for halves, thirds and so on. Ask questions such as: What is the name we give to four equal parts? **[Quarters]** What is the name we give to six equal parts? **[Sixths]**
- Intermediate** Provide students with fraction flashcards. The front of the card models part of a whole such as $\frac{1}{2}$ or $\frac{1}{3}$ and the back of the card has the numerical value of the model. Let students take turns in quizzing each other using the cards.

ESL Activity: Tile Fractions
Use with Lesson 11.2
10 minutes

Materials
plastic tiles or counters

- Have students model fractions using two colours of tiles or counters (e.g. red and blue).
- One student makes a rectangle using both colours of tiles. The second student names the fraction of the rectangle that is red tiles. The third student names the fraction that is blue tiles.
- Have students complete this chart for each model they make.

Number of Equal Parts	Name for the Equal Parts	Fraction of Red Tiles	Fraction of Blue Tiles
6	sixths	$\frac{1}{2}$	$\frac{1}{2}$

Additional Needs

Considerations for Additional Needs Students
Use of visual fractions will help additional needs students to grasp the concept of equal parts and parts of a whole.

- Begin with pieces of coloured paper. Have students fold the paper into two halves. Ask them to write 1 and 2 in the two sections of the paper. **How many equal parts?** **[2]** **What do we call the equal parts?** **[Halves]** Repeat the process for quarters, eighths, thirds, sixths and tenths. Ensure that the students use the fractions strips to compare fractions.

Additional Needs Activity: Counter Toss
Use with Lesson 11.3
15 minutes

Materials
set of double-sided counters (e.g. one side red and one side yellow)
plastic cup

- Display a set of 4 red counters and ask a student to count them. Point out that it is a set of 4 counters. Turn over 1 red counter to show the yellow side. **How many red counters now?** **[3]** **How many yellow counters?** **[1]** Is this still a set of 4 counters? **[Yes]** Assist the students to name the part of the set that is red **$\frac{3}{4}$** and the part of the set that is yellow: **$\frac{1}{4}$**
- Have pairs of students place a set of 4 counters into a cup and toss them on the table. The students write the fraction of the set for red and yellow counters.
- Allow students to repeat the activity using different numbers of counters in the cup.

Individual Needs

For each topic in each year level, the Teacher Resource Booklets provide extra activities for individual needs including ESL and additional needs students. Error intervention tips and extension ideas are also provided for each lesson.

Skills Trace

The Skills Trace at the start of each Teacher Resource Booklet gives an at-a-glance view of what lessons in the year above and below also relate to the current lesson, providing the means to plan for a multi-age and/or differentiated classroom.



Visual Learning Bridge

There is a Visual Learning Bridge (or VLB) for each lesson in each topic for Years F to 6. These Visual Learning Bridges can be found on the IWB DVD or Teacher Resource DVD and are also reproduced in the Teacher Resource Booklets at all year levels and Student Activity Books (for Years 3 to 6 only). These visually represent maths concepts in a variety of ways to suit different learners. They provide a visual reference to the important lesson concept for students, which can be revisited.

Year F to 2

Topic 10 Lesson 3 Identifying Half of a Group

The diagram shows two examples of identifying half of a group. In the first example, there are 4 fish in a group. Half of the group (2 fish) is coloured red. In the second example, there are 6 beach umbrellas in a group. Half of the group (3 umbrellas) is coloured red. Arrows indicate the flow from the full group to the half group.

Year 3 to 6

Topic 4 Lesson 1 Using Arrays to Multiply

Understand it!
When groups of rows are equal, multiply to find the total.

How can multiplication be used when equal groups are combined?
How many ducks are there in 4 rows of 3?
To find the total, multiply the number of equal groups by the number in each group. *Objects arranged in equal rows form an array.*

Another Example
How can multiplication be used when you only know the number in one group?
Rachel and Lily collect plastic frogs. Rachel collected 5 frogs. Lily collected 3 times as many frogs. How many frogs did Lily collect?

A 3 frogs B 5 frogs
C 10 frogs D 15 frogs

Lily collected 3 times as many frogs as Rachel.
Multiply by 3:
 $3 \times 5 = 15$
Lily collected 15 frogs. The correct choice is D.

One Way
There are 4 rows. Each row has 3 rubber ducks.
Repeated addition: $3 + 3 + 3 + 3 = 12$
adding 4 rows of 3
Multiplication: $4 \times 3 = 12$
factors product
The **product** is the answer to a multiplication problem. **Factors** are the numbers multiplied together to find the product.

Another Way
The same rubber ducks can be arranged in another way.
Each group has 4 rubber ducks.
Repeated addition: $4 + 4 + 4 = 12$
Multiplication: $3 \times 4 = 12$
There are 12 rubber ducks in total.

'Another example' is added to VLBs where appropriate. This presents the concept in a different example to consolidate understanding.

Student Activity Book

The Student Activity Book Lesson pages across Years 3 to 6 provide differentiation possibilities through the many different features and practice examples on each page.

Guided Practice questions – allow students to apply the concept with teacher support

11 **2**

Writing Fractions of a Whole

How can you show and name part of a whole?

Kim made a pan of fruit bars. He served part of the pan of bars to friends. What part of the whole pan was served? What part was left?

A fraction is a symbol, such as $\frac{1}{9}$ or $\frac{5}{9}$, which names equal parts of a whole.

What You Write
 Numerator → 4 = 4 equal parts served
 Denominator → 9 = 9 equal parts altogether
 Numerator → 5 = 5 equal parts left
 Denominator → 9 = 9 equal parts altogether
 The **numerator** tells how many equal parts are described. It is the number above the fraction bar.
 The **denominator** tells the total number of equal parts. It is the number below the bar.

What You Say
 Four-ninths of the pan of fruit bars was served.
 Five-ninths of the pan of fruit bars was left.

Guided Practice
 Write the orange fraction for each whole.

1

2

Draw a picture to show each fraction.

3 $\frac{3}{4}$

4 $\frac{7}{8}$

Reasoning

5 Tamara sliced a cake into 12 equal parts. She served 3 of the parts. Can we say she has served $\frac{3}{12}$ of the cake? Explain your answer.

Independent Practice
 Use the pizza chart on page 159 to answer each question.

6 Ben and his friends ordered a medium pizza. Ben ate 1 slice of the pizza. What fraction of the pizza was left?

7 Eden's family bought a large pizza. The family ate 4 slices of the pizza. What fraction of the pizza was left?

Price	\$7	\$9	\$11
Size of Pizza			
	Small	Medium	Large

8 What fraction of the whole is white? Circle the correct answer.

A $\frac{4}{8}$ B $\frac{6}{8}$ C $\frac{6}{10}$ D $\frac{2}{10}$

Problem Solving

9a Alex says that this model shows $\frac{3}{12}$. Miguel says it shows a model of $\frac{1}{4}$. Can they both be right? Use the diagram to explain.

9b How many different ways can you show $\frac{1}{4}$?

158 one hundred and fifty-eight 159 one hundred and fifty-nine

Problem-solving questions – allow all students to be challenged to varying degrees, so that they can come up with an appropriate answer

Independent Practice questions – allow confident students to progress at their own speed

8 **4**

Understanding Comparison Stories

Use cubes to write a subtraction sentence. Write how many more.

★ Peggy draws 6 frogs. Mike draws 3 frogs. How many more frogs does Peggy draw than Mike?

$6 - 3 = 3$ more frogs

★ Kelly sees 8 ducks. Nick sees 6 ducks. How many more ducks does Kelly see than Nick?

$8 - 6 = 2$ more ducks

★ Draw 3 red birds. Draw 5 blue birds. How many more blue birds than red birds did you draw?

more blue birds

★ Draw a picture to help you solve this problem. There were some mice in front of the cheese and some at the back. There were more mice in the front. How many more mice were there in the front?

54 fifty-four

The Student Activity Books for Foundation to Year 2 have a different format with fewer sections, but still include problem solving for every lesson

Activity Zone Cards

The Activity Zone cards at each year level are particularly designed to provide differentiated activities in class.

enVision Minds Cards

These are provided for years 3 to 6. The front of each card introduces a mental maths strategy. The back contains quiz questions in groups of six, with each group becoming progressively more difficult, allowing success for all levels of ability.

Note that there are no Minds Cards for Foundation to Year 2. Mental Computation activities are provided in each Teacher Resource Booklet for these year levels.

enVision Digital Cards

These cards can be used independently by students or with teacher support in group situations. Follow-up tasks are provided on each card as an extension activity.

enVision Investigations Cards

These cards provide two to four real-life investigations related to the topic. These investigations are progressively more challenging by the end of the card.

enVision Investigations **CARD A** 3
Fractions

3 Find out the number of students in your class and in the whole school. Write this as a fraction. Can it be written as a simpler equivalent fraction?

4 Conduct a survey of your class to find the number of students that barrack for each of the AFL, NRL or A-league teams. What fraction of the class barracks for each of the teams?

enVision Investigations **CARD A** 3
Fractions

1 You and a friend are having a party and have decided to pay half each for the cost of the food. Explore what items you need to buy for your party and use a supermarket catalogue to find out how much each item would cost. Then work out the best way to halve the cost.

2 Investigate what time is exactly half-way through the school day.

Note that there are 2 investigations only per card in Foundation to Year 2.

enVision Games Cards

The enVision Games cards are two-sided. The first side (*) is suitable for all students and the second side (**) is an extension.

enVision Games **CARD A** 3
Fractions

Beady to Roll

10 counters in one colour and 10 in another colour
2 dice

Take turns with another player or team. Talk about maths as you play! Roll two dice. Add the numbers. First player roll below. Follow the directions. Explain your thinking. Cover the answer with your counter. If the answer is already covered, lose your turn. Have fun!

Roll	Name the equal parts of the whole.	7	
2		8	
3		9	
4		10	
5		11	
6		12	

quarters	thirds	halves	twelfths
tenths	eighths	sixths	quarters
fifths	halves	sevenths	fifths
sixths	quarters	thirds	twelfths

You win if you get four connected rectangles on the board. See . Play again!

enVision Games **CARD A** 3
Fractions

Beady to Roll

10 counters in one colour and 10 in another colour
2 dice

Take turns with another player or team. Talk about maths as you play! Roll two dice. Add the numbers. First player roll below. Follow the directions. Explain your thinking. Cover the answer with your counter. If the answer is already covered, lose your turn. Have fun!

Roll	Say the name, what operation and parts that form the total.	7	sevenths
2	halves	8	eighths
3	thirds	9	ninths
4	quarters	10	tenths
5	fifths	11	elevenths
6	halves	12	twelfths

You win if you get four connected rectangles on the board. See . Play again!

Teacher Resource DVD

The Teacher Resource DVD is provided with the Overview and Implementation Guide for each year level. This DVD provides Differentiated Worksheets, Visual Learning Bridges, diagnostic Pre- and Post-assessments and editable teacher planning and recording documents. It provides resources for the year below and the year above as well as the current year, which allows for valuable differentiation possibilities.

Differentiated Worksheets

Three Differentiated Worksheets are provided for each lesson within each topic in each year level. These are designed for below-level (Replay), at-level (Practice) and above-level (Challenge) students, with the teacher directing students to the appropriate worksheet.

The image shows three differentiated worksheets for Year 4, each with a 'Name' field and a '4' in a circle in the top right corner.

- Replay Worksheet:**
 - Section 1: 'Using Arrays to Multiply'. Shows an array of 20 circles (4 rows of 5). Addition sentence: $5 + 5 + 5 + 5 = 20$. Multiplication sentence: $4 \times 5 = 20$.
 - Section 2: 'There are 3 boxes. There are 7 books in each box.' Shows 3 boxes with 7 books each. Addition sentence: $7 + 7 + 7 = 21$. Multiplication sentence: $3 \times 7 = 21$.
 - Section 3: 'Write an addition sentence and a multiplication sentence for each picture.'
 - 1. Array of 12 squares (3 rows of 4). Addition: $4 + 4 + 4 = 12$. Multiplication: $3 \times 4 = 12$.
 - 2. Array of 15 stars (3 rows of 5). Addition: $5 + 5 + 5 = 15$. Multiplication: $3 \times 5 = 15$.
 - Section 4: 'Write a multiplication sentence for each addition sentence.'
 - 3. $10 + 10 + 10 + 10 = 40$. Multiplication: $4 \times 10 = 40$.
 - 4. $3 + 3 + 3 + 3 + 3 = 15$. Multiplication: $5 \times 3 = 15$.
 - Section 5: 'Explain how multiplication can help you find $6 + 6 + 6$.' Answer: $3 \times 6 = 18$.
- Practice Worksheet:**
 - Section 1: 'Using Arrays to Multiply'. Shows an array of 15 circles (3 rows of 5). Addition sentence: $5 + 5 + 5 = 15$. Multiplication sentence: $3 \times 5 = 15$.
 - Section 2: 'Write a multiplication sentence for each addition sentence.'
 - 2. $4 + 4 + 4 + 4 = 16$. Multiplication: $4 \times 4 = 16$.
 - 3. $10 + 10 + 10 + 10 + 10 = 50$. Multiplication: $5 \times 10 = 50$.
 - 4. How could you use multiplication to find $7 + 7 + 7$? Answer: $3 \times 7 = 21$.
 - 5. A classroom desk has 4 legs. How many legs do 5 desks have altogether? Answer: $5 \times 4 = 20$.
 - 6. Danielle planted 3 seeds in 6 different pots. How many seeds did she plant? Answer: $6 \times 3 = 18$.
 - 7. Which is the multiplication sentence for $2 + 2 + 2 + 2$?
 - A. $4 \times 4 = 16$
 - B. $2 \times 2 = 4$
 - C. $4 \times 2 = 8$
 - D. $2 \times 4 = 8$
 - 8. Explain how you can use multiplication to find $2 + 2 + 2 + 2$. Answer: $4 \times 2 = 8$.
- Challenge Worksheet:**
 - Section 1: 'Hurray Array!'. Shows an array of 20 circles (4 rows of 5). Addition sentence: $5 + 5 + 5 + 5 = 20$. Multiplication sentence: $4 \times 5 = 20$.
 - Section 2: 'Write an addition sentence and a multiplication sentence for each picture.'
 - 1. Array of 15 circles (3 rows of 5). Addition: $5 + 5 + 5 = 15$. Multiplication: $3 \times 5 = 15$.
 - 2. Array of 12 squares (3 rows of 4). Addition: $4 + 4 + 4 = 12$. Multiplication: $3 \times 4 = 12$.
 - Section 3: 'There are at least two arrays for any product. The product 4×1 and 1×4 the product. Sometimes there are other possible arrays for a product.'
 - 3. Draw the other array for the product 25. Write the multiplication sentence. Answer: $5 \times 5 = 25$.
 - 4. Draw the other array for the product 9. Write the multiplication sentence. Answer: $3 \times 3 = 9$.
 - Section 4: 'Sometimes there are several different arrays that can be drawn for a product.'
 - 5. Draw an array for the product 28 that is not 28×1 , 1×28 , 7×4 , or 4×7 . Write the multiplication sentence for your array. Answer: $4 \times 7 = 28$.

These worksheets can be used in any number of ways: as homework, as group work, for extra practice, for extension work or revision in class.

The Multi-age Classroom

enVisionMATHS is a flexible program. The abundance of interrelated resources such as Activity Zone cards, Visual Learning Animations or Videos, Differentiated Worksheets and Tools4Maths can be selected and used with different age and ability groups as required.

Specific advice on implementing enVisionMATHS in multi-age classrooms is provided on pages 41 to 43 of each Overview and Implementation Guide.