Mfacts121

Note: This unit contains many significant **multiplication and division concepts**. You may wish to **spread these sessions across a Semester**, or **repeat some lessons** across the year. Of course, you may wish to use it as a base on which to add your own ideas, according to your student's needs.

Topic: Multiplication and Division	Level: 4

KEY CONCEPTS: (please insert your relevant curriculum outcomes here)
*Recall **multiplication facts** up to 10 x 10 and **related division facts.**
*Investigate number sequences involving **multiples of 3, 4, 6, 7, 8, and 9**.
*Develop e**fficient mental and written strategies** for multiplication and for division where there is no remainder.

Equipment/Resources: Arrays, printed games (links provided below), printed pre-assessment task sheets (link below), Mfacts121 Practise Cards printed (link below), 10 sided dice, counters, individual whiteboards and markers, growth mindset activities	**Vocabulary:** 'rows of', array, double, product, multiple, factor, divisible, strategy language- 'double, double', commutativity-turn-around facts

SESSION & LEARNING INTENTION (L.I.)	**TOOLS / WARM UP**	**WHOLE GROUP LEARNING**	**INDEPENDENT LEARNING**	**REFLECTION/ SUMMARY**	**ASSESSMENT and FEEDBACK**
Session 1 L.I: We are reflecting on **what we know about multiplication** and what we don't know **yet.**	**Whole class-** each student will be given one minute to **write down the multiples of 6** (skip count by 6s) (**or could be multiples of 7-** teacher chooses based on class needs). How far can each student get in **one minute**? Students write in their books/whiteboards. After the one minute concludes, the class calls out the list of multiples and students correct their own work. Teacher briefly draws attention to **patterns/ strategies.** Asks students to look at their own work- what was tricky for you? What strategies can help you when	**Teacher explains:** 'We will be finding out what we already know about multiplication and what we don't know **yet,** with this task. Let's do that now.'	Pre-Assessment Task & Teacher Talk & Marking Guide for Assessment Teacher explains- students are to **answer** the questions and **explain** their thinking. **Teacher to rove and question** the students on their thinking- record any observations on the student work. ***Try to question the students in order to get more information.*** Students may be reluctant to record their thinking- it's very useful to rove and get better insights.	**Teacher summarises-** 'today we were thinking about what we know about multiplication. In the next few sessions, we will be working on strategies for learning our multiplication facts (times tables)'	**Collect pre-assessment task** and **sort** into groups according to *level of understanding.* Notice trends to inform teaching practice for this unit. Teacher Talk & Marking Guide for Assessment

	counting by 6s/7s? **Then, repeat-** can students go further and improve on their **personal best**? Provide **one more minute** for students to count as far as they can by 6s. *Becoming proficient at anything takes effort and practise.* [Teacher Talk Video: 'Skip Counting and Multiples'](#)				
Session 2 L.I: We are solving **4 X _** equations and exploring our strategies.	**Whole class-** each student will be given one minute to **write down the multiples of 6** (skip count by 6s) (**or could be multiples of 7-** teacher chooses based on class needs). How far can each student get in **one minute**? Students write in their books/whiteboards. After the one minute concludes, the class calls out the list of multiples and students correct their own work. Teacher briefly draws attention to **patterns/ strategies.** Asks students to look at their own work- what was tricky for you? What strategies can help you when counting by 6s/7s? **Then, repeat-** can students go further and improve on their **personal best**? Provide **one more minute** for students to count as far as they can by 6s. *Becoming proficient at anything takes effort and*	**Write 4 x 7 on the board** and ask- 'How would *you read* this number sentence/equation?' Record variations- **'4 times 7', '4 groups of 7', '4 multiplied by 7'** Introduce the idea that X also means **'rows of'. Add '4 rows of 7' to the list.** *On individual whiteboards/in workbooks*, ask students to **draw 4 x 6** as an **array** (4 rows of 6)**.** *Teacher note-* many children will draw **6 rows of 4**. This is not the array they were asked to draw. Discuss with class. Does it matter? If you needed to set out 4 rows of 6 chairs for a concert, would it be the same if you set our 6 rows of 4 chairs instead? You will get the same answer/product, but <u>6 rows of 4 is the turn around fact for 4</u>	*Students have individual whiteboards/workbooks so everybody has the chance to participate:* Write **4 X 7 = ?** on the board. Ask students: how would *you* solve this equation? Ask all students to record their answers and workings. Writing not only the answer, but using diagrams or showing workings out, to demonstrate how they would *explain* their answer. *Teacher note: we are looking for strategies such as skip counting by 7s or 4s, repeated addition, drawing a diagram (drawing arrays or groups of), making connections (e.g.I knew 3 x 7 is 21, so I added an extra 7).* Did any student think of *doubling twice*? [View '4 x _ Strategy' Video](#), saying 'Here is another example of a good way to solve **4 X** anything'. *Teacher note: we wish to have students discussing and sharing their strategies, learning from each other and exploring efficient ideas. The aim is to move students on from skip*	What new idea did you learn today?	

	practise. Teacher Talk Video: 'Skip Counting and Multiples'	*rows of 6*. You can literally turn the array around 90°, to show the two arrays. Teacher Talk Video: 'Using Arrays & meaning of the X sign'	*counting, to more sophisticated and effective strategies.* Play '4 x _ Game' ***Extend**- play an adjusted version of the '4 x _ Game', increasing the number range, so that high attainers are to multiply 4 x 2-digit numbers (refer to instructions on game)		
Session 3 L.I: We are practising solving **4 X _** equations using efficient strategies**.**	**Count aloud** as a class, by 4s, 6s or 7s. Note patterns or strategies. Reiterate that these are the *multiples of 4/6/7.*	*Students have individual whiteboards/workbooks so everybody has the chance to participate:* Write **4 X 5 = ?** on the board. Ask students: how would *you* solve this equation? Ask all students to record their answers and workings. Writing not only the answer, but using diagrams or showing workings out, to demonstrate how they would *explain* their answer. *Teacher note: we wish to have students discussing and sharing their strategies, learning from each other and exploring efficient ideas. The aim is to move students on from skip counting, to more sophisticated and effective strategies.* View '4 x _ Strategy' Video again, if you believe this would be beneficial. *See 'Teacher Talk' for ideas and tips on teaching the Fours Facts. You will also find ideas	Begin Rotations: (complete over two sessions) 1. Students to log onto mfacts121.com and view the '4 x _ Strategy' Video. They then complete 'Online Practise' for the level they are working on. 2. Worksheet: Worksheet- doubling numbers 10-50 And /or: Worksheet- doubling numbers from 50-99 3. Students use the Mfacts121 Playing Cards: students choose the level they are working on and play card games (answers on back of each card). *Teachers: please print these **playing card sets** for your classroom, on coloured card. Photocopy back-to-back, so answers are on the back of each card. They can all be found here: Printable Resources, for example Red Apprentice Playing Cards.*	What are your strategies for doubling numbers? E.g. how would you solve double Double 12? Double 26? *Look for efficient strategies such as double the tens, then the ones, then add back together for the total.*	

		about student prerequisite skills required for learning this strategy.			
Session 4 L.I: We are practising solving **4 X _** equations using efficient strategies**.**	**Count aloud** as a class, by 4s, 6s or 7s. Note patterns or strategies. Reiterate that these are the *multiples of 4/6/7.*	Provide instructions for the rotational activities, to be completed this session.	Rotations- continued- complete the rotations from last session: 1. Students to log onto mfacts121.com and view the '4 x _ Strategy' Video. They then complete 'Online Practise' for the level they are working on. 2. Worksheet: Worksheet- doubling numbers 10-50 And /or: Worksheet- doubling numbers from 50-99 3. Students use the Mfacts121 Playing Cards: students choose the level they are working on and play card games (answers on back of each card). *Teachers: please print these **playing card sets** for your classroom, on coloured card. Photocopy back-to-back, so answers are on the back of each card. They can all be found here:* Printable Resources*, for example* Red Apprentice *Playing Cards.*	What are your strategies for doubling numbers? E.g. how would you solve double Double 12? Double 26? *Look for efficient strategies such as double the tens, then the ones, then add back together for the total.*	
Session 5 L.I: We are solving **5 X _** equations and exploring our strategies.	**Play** 'Multiples Game' (Teacher chooses which multiple they would like to focus on- perhaps 6 or 7).	Write **5 X 8= ?** on the board. Ask students: how would *you* solve this equation? Allow think time and share ideas. E.g. students may say: turn it around and make it **8 x 5** and count by 5s up to 40, or count by 8s, or 'I just know it' (ask for an explanation!) **Begin recording strategies for**	In pairs, students play '5 x _ Game' ***Extend**- play an adjusted version of the '**5 x _ Game',** increasing the number range, so that high attainers are multiplying **5 x 2-digit numbers** (refer to instructions on game). *See'Teacher Talk' for ideas and tips on teaching the Fives Facts. You will also find ideas about **student**	Growth Mindset Reflection: How have you grown your maths brain? How do you improve at your multiplication facts?	**Assessment-** Teacher logs onto mfacts121.com and clicks **'Results'** button on top of page, to view, at a glance, which level of facts each child is up

		multiplication on a class chart- **'Multiplication Facts – Our Strategy List'** ● **You can skip count** ● **2 X _ you can double it** ● **4 X _ you can double it twice** *(It's a good idea to start with the **class building up their own list**, rather than giving them the pre-determined list of strategies. The Mfacts121 Strategy List can be brought in later and linked to what students have developed themselves.* **View -** '5 x _ Strategy' Video	**prerequisite skills** required for learning this strategy.	Optional extra: Growing Your Maths Brain, reflection sheet Keep the worksheet safe and add to it later as students continue to work on the multiplication.	to. Click this Levels and Strategies Teacher Checklist to see the progression of levels.
Session 6 L.I: We are investigating **efficient strategies for the multiplication facts.**	**(Repeat Session 1 Tools/Warm Up)** **Whole class-** each student will be given one minute to **write down the multiples of 6** (skip count by 6s) (**or could be multiples of 7**- teacher chooses based on class needs). How far can each student get in **one minute**? Students write in their books/whiteboards. After the one minute concludes, the class calls out the list of multiples and students correct their own work. Teacher briefly draws attention to **patterns/ strategies.** Asks students to	Depending on the stage your class is at, either: *revise the fours facts and the fives facts*, by posing questions such as: *How would you solve:* 4 x 8 4 x 23 *(you could use 'double, double' with large numbers too)* 5 x 8 5 x 50 (*you could use 'think 10 X 50, then halve it' for example)* *Students have their workbooks/whiteboards to try these equations, to ensure maximum involvement.* **or**	In pairs, students play Play '4 x Game', '5 x _ Game' or '6 x _ Game'. *Students can self-reflect and decide which strategy/facts they believe they need to work on, choosing the appropriate game in pairs.* ***Extend**- for high attainers, play an adjusted version of the '**6 x _ Game',** increasing the number range, so that high attainers are multiplying **6 x 2-digit numbers.** *They may need pencil and paper to calculate these products and can be encouraged to use **a range of** efficient strategies, including **'distributive property- separate the question into easier parts'** such as for 6 X 23, think 6 X 20 and 6 X 3 and add.* (refer to instructions on game for	What are your favourite strategies for your multiplication facts so far? Why?	

	look at their own work- what was tricky for you? What strategies can help you when counting by 6s/7s? **Then, repeat-** can students go further and improve on their **personal best**? Provide **one more minute** for students to count as far as they can by 6s. *Becoming proficient at anything takes effort and practise.* [Teacher Talk Video: 'Skip Counting and Multiples](#)	Introduce the **6 X_ strategy,** through the video, **View '**[6 x _ Strategy' Video](#)'	'extend' version).		
Session 7 L.I: We are investigating **strategies for the multiplication facts.**	[Mfacts121 Practise Cards](#)- These cards should be photocopied *back-to-back* so that you have questions on the front and *questions with answers* on the back. Best to do it on *coloured card* and keep sets in the classroom for regular use. Students can choose whichever colour level they are working on, or wish to revise, and use that Practise Card. Students will be given **two minutes** to see how many they can answer. *They must write each question and the answer in their book.* When time is up, students	**View the** ['Turn Around Facts Strategy' Video](#) (Commutativity) Continue recording on a **class chart-** **'Multiplication Facts – Our Strategy List'** **Suggestion- this may be a good point to introduce the** [Mfacts121 Strategy List.](#) E.g. you could: display in classroom/stick in student's books/students self-reflect and tick off each strategy, once they understand it.	**Rotational Activities: (done over two sessions)** 1) [Self-Directed Tasks:](#) students log on to their [mfacts121.com](#) account and choose which colour *Self-Directed task* they will complete. They will need a desktop / laptop or tablet, their workbook and headphones (preferably) to complete these tasks. 2) **Game- '**[4 X _ Game](#)' or '[6 X _ Game](#)' from last sessions 3) Worksheet- [4 x and 6 x facts](#) ***Early finishers:** choose a **Practise Card** (from Tools/Warm Up) to keep working on.	What helps you learn your multiplication facts?	

	turn their Practise Card over and **self correct** (answers will be on the back of their card). Next, teacher picks out a multiplication question from any card, to discuss- E.g. 4 x 6 ask: *what is your strategy?* or '*How did you know the answer?*' Discuss ideas. Now repeat the Practise Card activity. <u>Provide **two minutes again.**</u> Can the students improve on their score? Aim is to continue to improve on personal best, Teacher Talk Video: 'Practise Cards'.				
Session 8 L.I: We are investigating **strategies for the multiplication facts.**	Mfacts121 Practise Cards- These cards should be photocopied *back-to-back* so that you have questions on the front and *questions with answers* on the back. Best to do it on *coloured card* and keep sets in the classroom for regular use. Students can choose whichever colour level they are working on, or wish to revise, and use that Practise Card.	Provide instructions for the rotational activities, to be completed this session.	**Rotational Activities: (done over two sessions- complete this session)** 1) Self-Directed Tasks: students log on to their mfacts121.com account and choose which colour Self-Directed task they will complete. They will need a desktop / laptop / tablet, their workbook and headphones (preferably) to complete these tasks. 2) **Game- '**4 X _ Game' or '6 X _ Game' from last sessions 3) Worksheet- 4 x and 6 x facts 4)	What helps you learn your multiplication facts?	**Assessment-** Teacher logs onto mfacts121.com and clicks **'Results'** button on top of page, to view, at a glance, which level of facts each child is up to. Click this Levels and Strategies Teacher Checklist to see the progression

	Students will be given **two minutes** to see how many they can answer. *They must write each question and the answer in their book.* When time is up, students turn their Practise Card over and **self correct** (answers will be on the back of their card). Next, teacher picks out a multiplication question from any card, to discuss- E.g. 4 x 6 ask: *what is your strategy?* or '*How did you know the answer?*' Discuss ideas. Now repeat the practise cards. <u>Provide **two minutes again.**</u> Can the students improve on their score? Aim is to continue to improve on personal best, Teacher Talk Video: 'Practise Cards'.		*Early finishers:** choose a Practise Card (from Tools/Warm Up) to keep working on.		of levels.
Session 9 L.I: We are **reflecting** on what we have learnt about multiplication.	**Whole class-** each student will be given one minute to **write down the multiples of 6** (skip count by 6s) (**or could be multiples of 7-** teacher chooses based on class needs). How far can each student get in **one minute**? Students write in their	**Teacher explains: '**we have learnt about multiplying. You are going to reflect on what you have learnt, by having another look at the **task** you did in the beginning.'	Pre-Assessment Task & Teacher Talk & Marking Guide for Assessment Students are given back their **original assessment task and now they <u>add to /change</u>** their answers based on their new learnings (using a different colour		**Correct the Post Assessment** and identify new learnings and growth for each student. Give the task back to

			pen/pencil).		students, so they can view their own growth and achievements.
books/whiteboards. After the one minute concludes, the class calls out the list of multiples and students correct their own work. Teacher briefly draws attention to **patterns/ strategies.** Asks students to look at their own work- what was tricky for you? What strategies can help you when counting by 6s/7s? **Then, repeat-** can students go further and improve on their **personal best**? Provide **one more minute** for students to count as far as they can by 6s. *Becoming proficient at anything takes effort and practise.* [Teacher Talk Video: 'Skip Counting and Multiples'](#)			**Teacher to rove and question** the students on their thinking- record any observations on the student work. *Question the students, to obtain more information.*		

- **Next, are sessions which build on the previous multiplication concepts.**
- **Division is introduced and strategies for multiplication with larger numbers are explored.**
- **You may wish to do these sessions in the second Semester.**
- **Remember to regularly revisit multiplication concepts, strategies and facts, during 'Tools time/Warm Ups' throughout the whole year, as it's such an vital part of Senior Primary Maths and requires regular attention.**

| **Session 10** L.I: We are investigating **strategies for the multiplication facts.** | **Play** ['Multiples Game'](#) (Teacher chooses which multiple they would like to focus on, perhaps 6 or 7). | View ['Making Connections Strategy' Video.](#) *See ['Teacher Talk'](#) for ideas and tips on teaching the Making Connections strategy. | **Fill in the** [Making Connections Chart](#)- individually or in pairs. | What are your favourite strategies for multiplication facts? What facts and/or strategies do you not understand YET? | **Assessment-** Teacher logs onto [mfacts121.com](#) and clicks **'Results'** button on top of page, to view, at a glance, which level of facts each child is up to. |

					Click this [Levels and Strategies Teacher Checklist](#) to see the progression of levels.
Session 11 L.I: We are using our **knowledge of multiplication to help with division**.	*Once multiplication facts are consolidated, division facts can be introduced, by relating to multiplication.* **'Fact families' .** Write a multiplication fact on the board e.g. **3 x 5 = 15** Ask students to draw the array; **3 rows of 5**. Use the array to explore these facts- *3 rows of 5 is 15 (3 x 5 = 15) *5 rows of 3 is 15 (5 x 3 = 15) (turn the array 90 degrees to illustrate this). The array also helps with **division**. Let's think about: *15 ÷ 3 = ? Encourage students to '*think multiplication' to solve division facts- i.e. think: *3 whats are 15*? Or 3 X ? = 15 3 **fives** are 15.	View the video relating division and multiplication. [Connecting Multiplication and Division](#) video.	Worksheets: [Fact Families- Connecting Multiplication and Division](#) [Fact Families- Connecting Multiplication and Division 2](#) ***Extend:** Challenge: [Fact Families- Connecting Multiplication and Division Challenge!](#)	Have you ever 'thought multiplication' to help with division?	

	Highlight or ring each row of five. 3 fives are 15 (or 3 rows of 5 is 15) ***Now turn the array 90 degrees around so it's showing 5 rows of 3.*** *15 ÷ 5 = ? Encourage students to *'think multiplication' to solve division*- i.e. think: *5 whats are 15*? Or 5 X ? = 15 5 **threes** are 15. Next, highlight or ring each row of three. 5 threes are 15 (or 5 rows of 3 is 15) **Students then write the 4 facts, in the fact family:** 3 x 5 = 15 5 x 3 = 15 15 ÷ 3 = 5 15 ÷ 5 = 3				
Session 12 L.I: We are using our **knowledge of multiplication to help with division**.	**'Fact families'** - Write a multiplication fact equation on the board e.g. **6 x 4 = 24** Students to **draw the array**, (6 rows of 4), then **write the 4 facts in the fact family** 6 x 4 = 24 4 x 6 = 24 24 ÷ 6 = 4	If you wish, review all or parts of the Connecting Multiplication and Division video.	**Students complete another** 'Making Connections' **chart** to show how knowing one multiplication fact, can help us with many more facts, including **division.** ***Early finishers/ Extend:** **Play online** division games. *Teacher to search for free online division games.*	What does 'inverse' operation mean? Find definition.	

	$24 \div 4 = 6$ Now call on **students to explain each fact, using the array as a model -** *E.g.* 6 x 4 = 24, we can see six rows of 4, equals 24 on the array 4 x 6 = 24, if we rotate the array, we can also see that 4 rows of 6, equals 24 $24 \div 6 = 4$, if we divide 24 into 6 equal groups, it's 4 in each $24 \div 4 = 6$, if we divide 24 into 4 equal groups, it's 6 in each				
Session 13 We are **multiplying with larger numbers.**	**Count aloud** as a class, by 6s or 7s. Note patterns or strategies. Reiterate that these are the *multiples of 6 or 7.*	Write the equation: **4 X 18 =** *All students to have workbooks/whiteboards to ensure engagement with this question.* Ask: how could *you* solve this? Allow time to think- ask students to show any working. *Teacher notes: you may see attempts at repeated addition, lists of counting by 4s, perhaps 'double, double'. Or the formal algorithm. Ask students who use the formal algorithm if they have another mental strategy too. We are aiming to develop number sense, as well as the formal algorithm.* Share suggestions. Focus in on anyone who uses the	*What you need:* playing cards spread around student's tables (picture cards removed). Students make their own 2 digit by 1 digit multiplication equations, by choosing 3 playing cards and making the numbers. They record their equation and solve, using any strategy they feel is efficient for them. Draw attention to any efficient mental strategies being used- such as distributive property.	What does distributive property mean to you?	

		distributive property (separating the question into parts- e.g. 4 x 10 and 4 x 8) View [Distributive Property Video](#)			
Session 14 We are **multiplying with larger numbers.**	[Mfacts121 Practise Cards](#)- These cards should be photocopied *back-to-back* so that you have questions on the front and *questions with answers* on the back. Best to do it on *coloured card* and keep sets in the classroom for regular use. Students can choose whichever colour level they are working on, or wish to revise, and use that Practise Card. Students will be given **two minutes** to see how many they can answer. *They must write each question and the answer in their book.* When time is up, students turn their Practise Card over and **self correct** (answers will be on the back of their card). Next, teacher picks out a multiplication question from any card, to discuss- E.g. 4 x 6	Teacher explains: 'We are going to learn a great strategy for larger multiplication questions.' View this demonstration video link: [Grid Method](#) Teacher demonstrates **grid method (2 x 1 digit)**. *Teacher note: this is really a version of 'distributive property- separating the question into easier parts'. Place value is important to draw attention to as well.* *If you would like to view the distributive property video again:* [Distributive Property Video](#)	**Students work on Grid Method worksheets.** [Grid Method Worksheet- 2 x 1 digit numbers](#) ***Extend:** high attainers may be challenged to use the same approach with 2 x 2 digit numbers: [Grid Method Worksheet- 2 x 2 digit](#)	What do you think of using the grid method as a mental strategy? What are the positives and negatives of it?	

	ask: *what is your strategy?* or '*How did you know the answer?*' Discuss ideas. Now repeat the practise cards. Provide **two minutes again.** Can the students improve on their score? Aim is to continue to improve on personal best, [Teacher Talk Video: 'Practise Cards'.](#)				
Session 14 and beyond- We are **multiplying and dividing with larger numbers.**	**Play** ['Multiples Game'](#) (Teacher chooses which multiple they would like to focus on, perhaps 6 or 7).	*At this point, formal written algorithms can be introduced. It is our belief that introducing them too early, stifles the development of flexible mental strategies, which are so important.* In the following sessions, model the use of the formal written algorithms for multiplication and division. Still being aware that students should be able to explain each step in the process.	*What you need:* playing cards spread around student's tables (picture cards removed). Students make their own 2 digit by 1 digit multiplication/division equations, by choosing 3 playing cards and making the numbers. They record their equation and solve (twice), using *two strategies*- one mental and also the formal written algorithm. Draw attention to any efficient mental strategies being used.	How confident do you feel with multiplication and division?	

Other Strategy Videos suggested for this level: (use across the year, in 'Tools/Warm Up time'- add to your bank of strategies, etc.)

- [Tens Facts:](#)   10 x _ = Think 'make it 10 times bigger with a zero'