Multiplicative Reasoning
in
Intermediate Phase (M–RIP)

Teacher Resource Pack

Grade 7

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wits maths connect
supporting primary maths

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Overview of problems in the lessons

Problem 1	Problem 2	Problem 3
Lesson 1: Rate: Equal groups of objects		
Product unknown **A x B = [ ]** Lawan is baking chocolate cupcakes. He puts **8** cupcakes in each bag. How many cupcakes will he need to fill **6** bags? 8 x 6 = [ ]	**Product unknown** **A x B = [ ]** Lawan is baking vanilla cupcakes. He puts **8** cupcakes in each bag. How many cupcakes will he need to fill **11** bags? 8 x 11 = [ ]	**Product unknown** **A x B = [ ]** At sportsday children are playing in teams of **8.** How many children are **15** teams? 6 x 15 = [ ]
Lesson 2: Rate: Equal groups of objects		
Product unknown **A x B = [ ]** Hamsa is putting out chairs. She puts **7** chairs around each table. How many chairs will she need for **8** tables? 7 x 8 = [ ]	**Number of groups unknown** **A x [ ] = C and C ÷ A = [ ]** Hamsa is putting plates on tables. She puts **7** plates on each table. She has **56** plates. How many tables can Hamsa put plates on? 7 x [ ] = 56 56 ÷ 7 = [ ]	**Number of groups unknown** **A x [ ] = C and C ÷ A = [ ]** Sameera puts stickers in a book. She puts **5** stickers onto each page. She has **120** stickers. How many pages can Sameera fill? 5 x [ ] = 120 120 ÷ 5 = [ ]
Lesson 3: Rate: Equal Measures		
Product unknown **A x B = [ ]** One mango costs R **8**. Mike buys **8** mangoes. How much does Mike spend? 9 x 8 = [ ]	**Number of units unknown** **A x [ ] = C and C ÷ A = [ ]** One cool drink costs R **9**. Constance spends R **72** buying cool drinks. How many drinks did Constance buy? 9 x [ ] = 72 72 ÷ 9 = [ ]	**Unit size unknown** **[ ] x B = C and C ÷ B = [ ]** Corin spends R **96** on bananas. He buys **8** bananas. How many Rand does one banana cost? [ ] x 8 = 96 96 ÷ 8 = [ ]
Lesson 4: Arrays of objects		
Product unknown **A x B = [ ]** Sam is planting rows of cabbages. She plants **9** cabbages in each row. Sam plants **12** rows of cabbages. How many cabbages does Sam plant? 9 x 12 = [ ]	**Factor unknown** **A x [ ] = C and C ÷ A = [ ]** Viren is putting out rows of chairs in the hall. He puts **13** chairs in each row. He puts out **156** chairs altogether. How many rows of chairs did Viren put out? 13 x [ ] = 156 156 ÷ 13 = [ ]	**Factor unknown** **[ ] x B = C and C ÷ B = [ ]** Patrick is putting out tiles in rows. He puts out **8** equal rows of tiles on the floor. He puts out **96** tiles altogether. How many tiles does he put in each row? [ ] x 8 = 96 96 ÷ 8 = [ ]

Multiplicative Reasoning in Intermediate Phase (M–RIP)

Introduction

This booklet arises out of a part of the Wits-Maths Connect (WMC) Project.

It contains everything you need to help you:

- Diagnose your learners understanding of multiplication and division and the relationship between these
- Pupil materials and lesson plans for four lessons to help improve your learners understanding.

The materials have been researched and developed and have been shown to help improve and develop intermediate phase learners' skills in and understandings of multiplication and division.

You are free to copy the tests and worksheets for use with your learners.

You are also free to share the materials here with other teachers, as long as you acknowledge where they came from.

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Diagnostic assessment

On pages 7- 13 there is a ***diagnostic test*** for you to copy and use with your learners.

The test has been organized around key types of multiplication and division problems: problems that are typical of the ones that CAPS includes in its examples and problems that research shows are the sorts of problems that learners need to be able to solve if they have a good understanding of multiplication and division.

Use the test to diagnose your learners' understanding in the following ways:

- Copy the test and get your learners to write it before you start teaching the lessons
- Use the ***test observation proforma*** (page 14) to note down how your learners work on solving the problems while they are writing the test. As you watch them, ask yourself:
    - Have they interpreted the problem correctly?
    - What methods are they using?
    - Are their methods efficient?
    - Do they seem to know their times tables?
    - Can they arrive at the correct answer?
- The ***test observation proforma*** is designed to provide you with a 'snapshot' of how your **class** is performing –it is not necessary (and probably not possible) to tally what every learning is doing on every question. Just capture a sense of what you think most learners are doing.
- Mark the test. Instead of just marking whether or not your learners get each question right or not, we suggest scoring as:
    0 – Question not attempted
    1- Question attempted but the wrong operations was used (for example adding the two numbers in the question, rather than multiplying them)
    2- Correct operation was used, but the answer was incorrect (for example multiplying 7 x 8 but getting 48 as the answer)
    3- Correct operations and correct answer
- Looking at the numbers of 1's, 2's and 3's scored will give you a sense of the strengths and weaknesses of your learners. It will also help you plan what to focus on in the lessons.
- There are four lessons, and we suggest teaching one each week across four weeks.
- A few days after you have taught the lessons, get your learners to write the test again.

We hope that you will see an improvement in their understanding!

Lesson Principles

Three principles underpin the design of each lesson.

1. ***Learners need to be fluent in rapid recall of multiplication and division facts.***

   Activities to build such fluency include working with multiplication 'triple': work with, say, 6 x 4 = 24 and encourage learners to connect multiplication and division facts:

   Twenty-four is six times four
   Four times six is twenty-four
   Twenty-four divided by six is four
   Twenty-four divided by four is six
   Six times what is twenty-four?
   Four times what is twenty-four?

2. ***Learners need to be able to identify different problem types and have the language to describe these***.

   Seeing problems as examples of particular types means not treating each one from scratch.
   This helps learners to see multiplication and division problems as linked
   Three types of problems are worked on in the lessons:
   Equal groups of objects
   Equal size measures
   Array problems.

3. ***Learners need to work with key representations to help them be more efficient.***

   Working with a small number of key representations helps learners use what they know more effectively.
   Two types of representations are worked on in the lessons:
   T-tables
   Arrays

Lesson Structure

Each lesson is built around three parts.

1. ***Practicing rapid recall of multiplication and division facts.***
   Working with 'triples' so that learners commit key number bonds to memory.

2. ***Solving a linked set of three problems.***
   Finding the solutions to problems that have been carefully designed helps learners learn to use the key representations and to work efficiently.

3. ***Identifying the links between the problems.***
   After the three problems have been solved, learners discuss what is the same and what is different about the problems and develop the vocabulary to describe and identify different problem types.

Lesson Resources

Each lesson plan provides the following resources:

1. ***Pupil sheet of the three problems.***
   A worksheet for you to copy for the learners to show their working on as you work through the three problems.

2. ***Detailed lesson plan.***
   Guidance on how to teach the lesson: what to look out for in the learners' solutions to the problems, how to help them work more efficiently, what to draw their attention to.

3. ***Practice problems.***
   A photocopiable sheet of 5 more problems for learners to consolidate what they have done in the lesson, either to work on in the lesson or to give as homework.

4. ***Rapid recall practice.***
   A photocopiable sheet of 'bald' calculations so that learners can practice becoming fluent in their times tables. One way to use this worksheet is to give it out to learner and give them a limited amount of time in which to complete it, say 5 minutes. Tell them they will be doing it again in a week's time: can they beat their score from the first time?

MR Assessment Grade 7

First name: _____
Surname: _____
Boy or girl: _____
Your date of birth: _____
Day/month/year

Instructions

1. **Show all your working in this booklet.**

2. **Do not rub anything out.**
   If you make a mistake, put a line through it.

3. **No calculators allowed**

1. Learners sell bags of mangoes during market day.
They put 6 mangoes in each bag.
How many mangoes will they need to fill 9 bags?

They need _____ mangoes.

2. A class of 56 children go out to play games.
They get into teams of 8.
How many teams do they make?

They make _____ teams.

3. The total weight of 7 same-sized bags of potatoes is 63 kg.
What is the weight of one bag of potatoes?

The weight of one bag is _____ kg.

4. Corin puts out 81 pies on one tray and 19 pies on another tray.
How many pies does Corin put out all together?

Corin puts out _____ pies.

5. Hamsa is counting how many tiles cover the bathroom floor.
She counts 12 rows of tiles.
There are 11 tiles in each row.
How many tiles cover the floor?

There are _____ tiles.

6. Zwi collected 8 bottles for recycling.
Her friend collected 6 times as many bottles as Zwi.
How many bottles did the friend collect?

Her friend collected _____ bottles.

7. 105 people are going on a car trip.
Each car can carry 7 people.
How many cars will the people need?

They need _____ cars.

8. One bar of chocolate costs R12.
How much will 19 bars of this chocolate cost?

The cost is R_____ .

9. A baker puts pies in rows on a tray.
He puts the same number of pies in each of 8 rows.
The baker has 128 pies altogether.
How many pies must he put in each row?

There are _____ pies in each row.

10. Joey bought 108 metres of wire to put up a fence.
This is 6 times more wire than Peter bought.
How much wire did Peter buy?

Peter bought _____ metres of wire.

11. Sam cycles 112 km.
Sameera cycles 99 km.
How much further does Sam cycle than Sameera?

Sam cycles _____ km further.

12. A company packs pencils into boxes.
Each box contains 15 pencils.
How many boxes are needed to pack 195 pencils?

_____ boxes are needed.

13. Viren has some pencils.
His friend gave him 12 pencils.
Now Viren has 144 pencils.
How many pencils did Viren start with?

Viren started with _____ pencils.

14. Denozo cycles at 14 km per hour.
How many hours will it take for Denozo to travel 84 km?

It takes _____ hours.

15. A farmer is planting rows of apple trees.
He has 144 apple trees.
He plants 12 trees in each row.
How many rows will there be?

There are _____ rows of apple trees.

16.

81 + 19 =

17.

112 – 99 =

18.

12 x 11 =

19.

195 ÷ 15 =

Test observation proforma

Tally approximate numbers of learners in each column

	Incorrect		Correct			
	Wrong operation	**Correct operation/ Wrong answer**	**Unit counting**	**Skip counting**	**Symbols**	**No visible working**
1. Bags of mangoes						
2. Teams						
3. Bags of potatoes						
4, Pies on a tray (+)						
5. Floor tiles						
6. Bottles recycling						
7. Car trip						
8. Bars of chocolate						
9. Pies on a tray						
10. Wire fence						
11. Cycling difference						
12. Pencils in boxes						
13. Viren's pencils						
14. Cycling hours						
15. Apple trees						
16. Add						
17. Subtract						
18. Multiply						
19. Divide						

The Lessons

MRIP Grade 7 Lesson 1

Name: _____

1. Lawan is baking chocolate cupcakes.
He puts 8 cupcakes into each bag.
How many cupcakes will Lawan use to fill 6 bags?

He needs _____ cupcakes.

2. Lawan is baking vanilla cupcakes.
He puts 8 cupcakes into each bag.
How many cupcakes will Lawan use to fill 11 bags?

He will use _____ cupcakes.

3. At sports day children are playing in teams of 8.
How many children are in 15 teams?

There are _____ children.

LESSON 1 **Aims:** Identifying equal groups problems
Working t-tables

Rapid recall	**Approx. 5 mins.**

1. Multiplication triples.
Begin with working with multiplication 'triples': write, say, 6 x 4 = 24 on the board and encourage learners to connect multiplication and division facts:

Twenty-four is six times four
Four times six is twenty-four
Twenty-four divided by six is four
Twenty-four divided by four is six
Six times what is twenty-four?
Four times what is twenty-four?

Repeat for a different triple.

Problem solving	**Approx. 40 mins.**

Learners will work on three problems.
After each problem the solution and how it was found is discussed before going on to the next problem.
Read each problem out and check that learners understand what the problem is about but without giving away what mathematics to do.

Problem 1:

Lawan is baking chocolate cupcakes.
He puts 8 cupcakes into each bag.
How many cupcakes will Lawan use to fill 6 bags?

Make it clear that the same number of cupcakes is always put into each bag.
While the learners are working on the problem, walk around the class and select 2 learners who will share their solution method with the class. Tell these learners that you will be asking them to come to the board to share their thinking.
Look out in particular for any learner's working looking like a **t-table line**:

Bags	Cupcakes
1	8
2	16
3	24
4	32
5	40
6	48

Step 1: Agree on the correct answer
When most learners have solved the problem, ask them to **turn-and-talk**; to turn to the person next to them and try to decide which answer is the correct one.
After a short time, invite learners to explain what they think the correct answer is.
Agree on the correct answer.
Step 2: Share solution methods
Invite the learners, one at a time, to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.

Work on setting up the t-table.

Bags	Cupcakes
1	8
2	16
3	24
4	32
5	40
6	48

Step 3: Refine solution methods

Once the t-table is on the board, ask learners how they can use it to answer questions like:

How many cupcakes in 4 bags?
How many bags are needed for 24 cupcakes?
Suppose the line went up to 10 bags, how many cupcakes would that be?
Can we use the information on the line to work out how many cupcakes in 12 bags?

As you set up Problem 2, ask learners to try and use a t-table to solve it.
Leave the t-table on the board for learners to refer to.

Problem 2:

Lawan is baking vanilla cupcakes.
He puts 8 cupcakes into each bag.
How many cupcakes will Lawan use to fill 11 bags?

As before, walk around and select the 2 learners who will share their solution methods with the class. Look for good use of the double number line.
Look for anyone working out that 10 bags hold 60 cupcakes and so 11 bags hold 66**.**

Step 1: Agree on the correct answer

As before, ask learners to **turn-and-talk** and try to decide which is the correct answer before reaching agreement on the correct answer.

Step 2: Share solution methods

Invite the learners you selected to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.
Work on setting up the t-table.

Bags	Cupcakes
1	8
2	16
3	24
4	32
5	40
6	48
7	56
8	64
9	72
10	80
11	88

Step 3: Refine solution methods

Discuss if there is a way to set up the table without writing out all the rows.

Establish that finding the number of cupcakes in 10 bags is easy, so a shorter table can be drawn.

Bags	Cupcakes
1	8
10	80
11	88

As you set up Problem 3, ask learners to try and use a t-table to solve it

Problem 3:

At sports day children are playing in teams of 8.
How many children are in 15 teams?

As before, walk around and select the 2 or 3 learners who will share their solution methods with the class.

Follow Steps 1, 2 and 3 to end up with this t-table:

Teams	Children
1	8
10	80
5	40
15	120

Linking the problems **Approx. 10 mins.**

Ask learners to turn-and-talk about:

What is the same about the three problems?
How are the problems different?
Can they make up a problem that is like these three problems?

Talk about how all three problems are examples of

Equal groups of objects problems.

Practice/Homework

For practice if there is time, or homework, there are more **equal groups of objects** problems for learners to work through.

One of the six problems is NOT an equal groups problem. After working through all six problems, learners should try and identify this problem and say why it is different.

They should also practice their multiplication bonds.

MRIP Grade 7 Problem practice 1

1. Lawan is baking chocolate cupcakes.
He puts 9 cupcakes into each bag.
How many cupcakes will Lawan use to fill 15 bags?

He needs _____ cupcakes.

2. Lawan is baking vanilla cupcakes.
He puts 7 cupcakes into each bag.
How many cupcakes will Lawan use to fill 12 bags?

He will use _____ cupcakes.

3. At sports day children are playing in teams of 7.
How many children are in 15 teams?

There are _____ children.

4. Lawan is baking chocolate cupcakes.
He puts 8 cupcakes into a bag.
He put another 15 cupcakes into the same bag.
How many cupcakes are in the bag?

There are _____ cupcakes.

5. Nomonde is putting out chairs around tables.
She puts 9 chairs at each table.
There are 12 tables.
How many chairs will Nomonde use?

She will use _____ chairs.

6. One of the problems above is NOT an equal groups problem.
Which problem is not an equall groups problem? Explain how you know.

Question _____ is not an equal groups problem.

I know this because

MRIP Grade 7 Rapid practice 1

8 x 5 =	80 ÷ 8 =
8 x 10 =	80 ÷ 10 =
8 x 11 =	40 ÷ 8 =
8 x 9 =	40 ÷ 5 =
9 x 8 =	48 ÷ 8 =
10 x 8 =	48 ÷ 6 =
5 x 8 =	40 ÷ 2 =
2 x 8 =	16 ÷ 8 =
4 x 8 =	32 ÷ 8 =
8 x 8 =	64 ÷ 8 =
12 x 8 =	40 ÷ 8 =
8 x 12 =	80 ÷ 8 =
8 x 3 =	120 ÷ 8 =
7 x 8 =	32 ÷ 8 =
8 x 10 =	32 ÷ 4 =

MRIP Grade 7 Lesson 2
Name: _____

1. Hamsa is putting out chairs.
She puts 7 chairs around each table.
How many chairs will she need for 8 tables?

She needs _____ chairs.

2. Hamsa is putting plates on tables.
She puts 7 plates on each table.
She has 56 plates.
How many tables can Hamsa put plates on?

She can put plates on _____ tables.

3. Sameera is putting stickers onto pages in a book.
She puts 5 stickers onto each page.
She has 120 stickers.
How many pages can Sameera fill with stickers?

She can fill _____ pages.

LESSON 2 **Aims:** Identifying equal groups problems
Working with the t-table

Rapid recall **Approx. 5 mins.**

1. Multiplication triples.

Remind the learners about **triples and the relationship between the numbers**.
Write up 6, 7, 42 and cover up the product (42). Ask learners to say the **TWO** number sentence linking the two numbers that they can see, and the answer ('six times seven is 24' and 'seven times six is 24')
Cover up one of the factors (6, say). Ask learners to say **TWO** number sentences linking the two numbers they can see, and the answer ('Forty-two divided by seven is six' and 'seven times what is 42? Six' Repeat for the other factor and different triples.

Problem solving **Approx. 40 mins.**

Learners work on three problems. After each problem the solution and how it was found is discussed before going on to the next problem.
Read each problem out and check that learners understand what the problem is about.

Problem 1:

Hamsa is putting out chairs.
She puts 7 chairs around each table.
How many chairs will she need for 8 tables?

Make it clear that the same number of chairs is always put around each table.
Remind the learners of the t-table and set this blank one up on the board:

Tables	Chairs

Ask 'Where do we put the 7 from the problem? Under "Tables" or under "Chairs"?'
Answer: 'Under chairs.'
Ask 'Why do we put 7 under "Chairs"? Ans: 'Because there are 7 chairs at each table.'
Write the 7 under "Chairs".
Ask 'What do we put under "Tables"?' Answer: 'One.'
Ask 'Why do we put 1 under "Tables"?' Answer: 'Because one table has 7 chairs.'
Complete the first row of the t-table:

Tables	Chairs
1	7

Ask 'Where do we put the 8 from the problem? Under "Tables" or under "Chairs"?'
Answer: 'Under tables.'
Ask 'Why do we put 8 under "Tables"?' Ans: 'Because there are eight tables.'
Write the 8 under "Tables", leaving space between it and the first row.
Ask 'So what do we need to find out?' Ans: 'How many chairs are needed for 8 tables.'
Write a question mark alongside the 8 and under "Chairs".

Tables	Chairs
1	7
8	?

Set the learners off to find the answer. While the learners are working on the problem, walk around the class and select 2 learners to share their solution method with the

class. Tell these learners that they will come to the board to share their thinking.
Look out in particular for any learner using doubling to find the answer:

Tables	Chairs
1	7
2	14
4	28
8	56

Step 1: Agree on the correct answer
When most learners have solved the problem, ask learners to **turn-and-talk**; to turn to the person next to them and try to decide on the correct answer. As a class agree on the correct answer.
Step 2: Share solution methods
Invite the learners, one at a time, to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.
Work on setting up the t-table using doubles as shown above.
Step 3: Refine solution methods
Once the t-table is on the board, ask how they can use it to answer questions like:

Suppose the line went up to 10 tables, how many chairs would that be?
Can we use the t-table to work out how many chairs for 16 tables?

As you set up Problem 2, leave the t-table on the board for learners to refer to.
Problem 2:

Hamsa is putting plates on tables.
She puts 7 plates on each table.
She has 48 plates.
How many tables can Hamsa put plates on?

NOTE: Although this is very similar to Problem 1, it is a division problem so learners may get confused in setting up the t-table.
Ask the learners to draw the t-table and set this blank one up on the board:

Tables	Plates

Ask 'Where do we put the 7 from the problem? Under "Tables" or under "Plates"?'
Answer: 'Under Plates.'
Ask 'Why do we put 7 under "Plates"? Ans: 'Because there are 7 plates on each table.'
Write the 7 under "Plates".
Ask 'What do we put under "Tables"?' Answer: 'One.'
Ask 'Why do we put 1 under "Tables"?' Answer: 'Because one table has 7 Plates.'
Complete the first row of the t-table:
Ask 'Where do we put the 56 from the problem? Under "Tables" or under "Plates"?'
Answer: 'Under "Plates".'
Ask 'Why do we put 56 under "Plates"?' Ans: 'Because there are 56 plates altogether.'
Write the 56 under "Plates", leaving space between it and the first row.
Ask 'So what do we need to find out?' Ans: 'How many tables are needed for 56 plates.'
Write a question mark alongside the 56 and under "Tables".

Tables	Plates
1	4
?	56

Set the learners off to find the answer.

As before, walk around and select the 2 learners who will share their solution methods with the class. Look out for any learner using, as before, doubling to find the answer and also for any learners who use the answer to the first problem**.**

Step 1: Agree on the correct answer

As before, ask learners to **turn-and-talk** and try to decide on the correct answer.

Step 2: Share solution methods

Invite the learners you selected to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.
Work on setting up the t-table.

Tables	Plates
1	7
2	14
4	28
8	56

Step 3: Refine solution methods

Discuss what is similar to question 1 and what is different.
As you set up Problem 3, ask learners to try and use a t-table to solve it

Problem 3:

Sameera is putting stickers onto pages in a book.
She puts 5 stickers onto each page.
She has 70 stickers.
How many pages can Sameera fill with stickers?

As before, set up the initial t-table:
Walk around and select the 2 learners to share their solutions with the class.
Follow Steps 1, 2 and 3 to end up with this t-table:

Pages	Sticker
1	5
10	50
20	100
4	20
24	120

Linking the problems **Approx. 10 mins.**

Ask learners to turn-and-talk about:

What is the same about the three problems?
How are the problems different?
Can they make up a problem that is like these three problems?

Talk about how all three problems are examples of

Equal groups problems

Talk about how 1 was a multiplication problem, and 2 and 3 division problems.

Practice/Homework

For practice or homework, there are more **equal groups** problems to work through. One of the five problems is NOT an **equal groups** problem. After working through all five problems, learners should try and identify this problem and say why it is different. They should also practice their multiplication bonds.

MRIP Grade 7 Problem practice 2

1. Hamsa is putting out cups on tables.
She puts 8 cups on each table.
How many cups will she need for 9 tables?

She needs _____ cups.

2. Corin is putting biscuits on plates.
He puts 8 biscuits on each plate.
He has 88 biscuits.
How many plates can Corin put biscuits on?

He can put biscuits on _____ plates.

3. Val is packing pencils into a box.
She puts 8 pencils into one box.
She puts another 80 pencils into the box.
How many pencils are in the box?

There are _____ pencils in the box.

4. Viren is packing books into boxes.
He puts 10 books onto each box.
He has 120 books.
How many boxes can Viren fill with books?

He can fill _____ boxes.

5. Herman is putting out rows of chairs.
He puts 8 chairs in each row.
There are 12 rows.
How many chairs will Herman use?

He will use _____ chairs.

6. One of the problems above is NOT an equal groups problem.
Which problem is not an equal groups problem? Explain how you know.

Question _____ is not an equal groups problem.
I know this because

MRIP Grade 7 Rapid practice 2

9 x 10 =	90 ÷ 9 =
9 x 5 =	90 ÷ 10 =
9 x 11 =	45 ÷ 9 =
8 x 9 =	45 ÷ 5 =
9 x 8 =	54 ÷ 9 =
10 x 9 =	54 ÷ 6 =
5 x 9 =	50 ÷ 2 =
2 x 9 =	18 ÷ 9 =
4 x 9 =	36 ÷ 9 =
8 x 9 =	72 ÷ 9 =
12 x 9 =	45 ÷ 9 =
9 x 12 =	90 ÷ 9 =
9 x 3 =	135 ÷ 9 =
9 x 6 =	81 ÷ 9 =
9 x 7 =	36 ÷ 9 =

MRIP Grade 7 Lesson 3

Name: _____

1. One mango costs R 9.
Mike buys 8 mangoes.
How much does Mike spend?

He spends R _____ .

2. One cool drink costs R 9.
Constance spends R 72 buying cool drinks.
How many cool drinks did Constance buy?

She bought _____ cool drinks.

3. Emmanuel spends R 96 buying bananas.
He buys 8 bananas.
How many Rand does one banana cost?

One banana costs R _____.

LESSON 3 **Aims:** Identifying equal size measures problems

Working with the t-table

Rapid recall **Approx. 5 mins.**

Multiplication and division triples.

Work on learners rapidly recalling the three numbers in various triples.

Problem solving **Approx. 40 mins.**

Learners work on three problems. After each problem the solution and how it was found is discussed before going on to the next problem.

Read each problem out and check that learners understand what the problem is about.

Problem 1:

One mango costs R 9.
Mike buys 8 mangoes.
How much does Mike spend?

Make it clear that each mango costs the same.

Remind the learners of the t-table and set this blank one up on the board:

Mangoes	Cost (Rand)

Ask 'Where do we put the 9 from the problem? Under "Mangoes" or under "Cost"?'
Answer: 'Under "Cost".'
Ask 'Why do we put 9 under "Cost"? Ans: 'Because each mango costs R 9.'
Write the 9 under "Cost".
Ask 'What do we put under "Mangoes"?' Answer: 'One.'
Ask 'Why do we put 1 under "Mangoes"?' Answer: 'Because one mango costs 9 Rand.'
Complete the first row of the t-table:

Mangoes	Cost (Rand)
1	9

Ask 'Where do we put the 8 from the problem? Under "Mangoes" or under "Cost"?'
Answer: 'Under "Mangoes".'
Ask 'Why do we put 8 under "Mangoes"?' Ans: 'Because Mike buys eight mangoes.'
Write the 8 under "Tables", leaving space between it and the first row.
Ask 'So what do we need to find out?' Ans: 'How many Rand Mike paid for 8 mangoes.'
Write a question mark alongside the 8 and under "Cost".

Mangoes	Cost (Rand)
1	9
8	?

Set the learners off to find the answer. Walk around and select 2 learners to share their solutions with the class. Alert them that they will to come to the board.
Look out in particular for any learner using doubling to find the answer:

Mangoes	Cost (Rand)
1	9
2	18
4	36
8	72

Step 1: Agree on the correct answer
Ask learners to **turn-and-talk**; to turn to their neighbor agree on an answer.
After a short time, invite learners to explain what they think the correct answer is.
Step 2: Share solution methods
Invite the learners, one at a time, to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.
Work on setting up the t-table using doubles as shown above.
Step 3: Refine solution methods
Once the t-table is on the board, ask how they can use it to answer questions like:
How many mangoes can Mike buy with 36 Rand?
Suppose the line went up to 12 mangoes, how much would that cost?
Can we use the t-table to work out how much 16 mangoes would cost?
As you set up Problem 2, leave the t-table on the board for learners to refer to.
Problem 2:
One cool drink costs R97.
Constance spends R 72 buying cool drinks.
How many cool drinks did Constance buy?
Ask the learners to draw the t-table and set this blank one up on the board:

Drinks	Cost (Rand)

Ask 'Where do we put the 9 from the problem? Under "Drinks" or under "Cost"?'
Answer: 'Under "Cost".'
Ask 'Why do we put 9 under "Cost"? Ans: 'Because each drink costs 9 rand.'
Write the 9 under "Cost".
Ask 'What do we put under "Drinks"?' Answer: 'One.'
Ask 'Why do we put 1 under "Drinks"?' Answer: 'Because one drink costs 9 rand.'
Complete the first row of the t-table:

Drinks	Cost (Rand)
1	9

Ask 'Where do we put the 73 from the problem? Under "Drinks" or under "Cost"?'
Answer: 'Under "Cost".'
Ask 'Why do we put 72 under "Cost"?' Ans: 'Because she spends 72 rand altogether.'
Write the 72 under "Cost", leaving space between it and the first row.
Ask 'So what do we need to find out?' Ans: 'How many drinks she bought for 72 rand.'
Write a question mark alongside the 72 and under "Drinks".

Drinks	Cost (Rand)
1	9
?	72

Set the learners off to find the answer.
As before, walk around and select the 2 learners who will share their solution methods with the class. Look out in particular for any learner using, as before, doubling to find the answer. Also look out for any learners who see that they can use the answer to the first problem**.**
Step 1: Agree on the correct answer
Ask learners to **turn-and-talk** and to decide on the correct answer.

Step 2: Share solution methods

Invite the learners you selected to come to the board and explain what they did.
Ask the class if anyone can re-explain what they have just heard.
Work on setting up the t-table.
Look out for any learners who see that they can uses the answer to the first problem

Drinks	Cost (Rand)
1	9
2	18
4	36
8	72

Step 3: Refine solution methods

Discuss what is similar to question 1 and what is different.
As you set up Problem 3, ask learners to try and use a t-table to solve it

Problem 3:

Emmanuel spends R 96 buying bananas.
He buys 8 bananas.
How many Rand does one banana cost?

NOTE: Although this is very similar to Problem 1, it is a division problem so learners may get confused in setting up the t-table.

As before, set up the initial t-table but this time the 8 does NOT go under the cost. It is the number of bananas – this is the critical point that learners may need help with.

Bananas	Cost (Rand)
1	?
8	96

Walk around and select the 2 learners who will share their solution methods with the class. Look out for any learners who use halving to find the cost of 4 bananas (28 rand), then 2 bananas (14 rand) and 1 banana (7 rand)
Follow Steps 1, 2 and 3 to end up with this t-table:

Bananas	Cost (Rand)
1	12
2	24
4	48
8	96

Linking the problems **Approx. 10 mins.**

Ask learners to turn-and-talk about:

What is the same about the three problems?
How are the problems different?
Can they make up a problem that is like these three problems?

Talk about how all three problems are examples of

Equal size measures problems

Talk about how 1 was a multiplication problem, and 2 and 3 division problems.

Practice/Homework

For practice, or homework, there are more **equal groups or equal size measures** problems. One problem is NOT an **equal groups or equal size measures** problem: learners should say why it is different.
They should also practice their multiplication bonds.

MRIP Grade 7 Problem practice 3

1. One sack of potatoes weighs 7 kg.
Tuhlella buys 12 sacks of potatoes.
How heavy are the sacks altogether?

The weight of all the sacks together is _____ kg.

2. One can of cola costs R 9.
Val spends R 108 buying cans of cola.
How many cans of cola did Val buy?

She bought _____ cans.

3. Trust cycles 112 kilometres.
He cycles for 8 hours.
How many kilometres does Trust cycle in one hour?

He cycles _____ kilometres in one hour

4. Sonny spends R 56 buying bananas.
He spends R 7 on a mango.
How much does Sonny spend altogether?

He spends R _____.

5. The total weight of 12 same-sized bags of onions is 108 kg.
What is the weight of one bag of onions?

The weight of one bag is _____ kg.

6. One of the problems above is NOT an equal groups or equal measures problem.
Which problem is not an equal groups or equal measures problem?
Explain how you know.

Question _____ is not an equal groups problem.

I know this because

MRIP Grade 7 Rapid practice 3

9 x 9 =	99 ÷ 9 =
8 x 5 =	90 ÷ 11 =
9 x 12 =	48 ÷ 8 =
8 x 11 =	48 ÷ 6 =
11 x 8 =	54 ÷ 9 =
10 x 12 =	54 ÷ 6 =
5 x 12 =	120 ÷ 2 =
2 x 12 =	24 ÷ 12 =
4 x 12 =	48 ÷ 12 =
8 x 12 =	96 ÷ 12 =
12 x 8 =	36 ÷ 6 =
9 x 12 =	72 ÷ 6 =
12 x 3 =	144 ÷ 6 =
12 x 6 =	49 ÷ 7 =
12 x 7 =	98 ÷ 7 =

MRIP Grade 7 Lesson 4

Name: _____

1. Sam is planting rows of cabbages.
She plants 9 cabbages in each row.
Sam plants 12 rows of cabbages.
How many cabbages does Sam plant?

Sam plants _____ cabbages.

2. Viren is putting out rows of chairs in the hall.
He puts 13 chairs in each row.
He puts out 156 chairs altogether.
How many rows of chairs did Viren put out?

Viren put out _____ rows of chairs.

3. Patrick is putting out tiles in rows.
He puts out 8 equal rows of tiles on the floor.
He puts out 96 tiles altogether.
How many tiles does Patrick put in each row?

There are _____ tiles in each row

LESSON 4 **Aims:** Identifying equal groups in arrays problems
Working with the t-table

Rapid recall	**Approx. 5 mins.**
Multiplication and division triples. Remind the learners about **triples and the relationship between the three numbers**. Work on learners rapidly recalling the three numbers in a triple.	
Problem solving	**Approx. 40 mins.**

Learners work on three problems.

As before, after each problem the solution and how it was found is discussed before going on to the next problem.

Problem 1:

Sam is planting rows of cabbages.
She plants 9 cabbages in each row.
Sam plants 12 rows of cabbages.
How many cabbages does Sam plant?

Make it clear that each each row has the same number of cabbages in it.

Remind the learners of the t-table and set this initial one up on the board:

Rows	Cabbages
1	9
12	[?]

Step 1: Agree on the correct answer

Step 2: Share solution methods

Step 3: Refine solution methods

As you set up Problem 2, leave the t-table on the board for learners to refer to.

Problem 2:

Viren is putting out rows of chairs in the hall.
He puts 13 chairs in each row.
He puts out 156 chairs altogether.
How many rows of chairs did Viren put out?

Make it clear that each each row has the same chairs in it.

Working with the learners set this blank t-table on the board:

Rows	Chairs
1	13
[?]	156

Step 1: Agree on the correct answer

Step 2: Share solution methods

Step 3: Refine solution methods

As you set up Problem 3, leave the t-table on the board for learners to refer to.

Problem 3:

Patrick is putting out tiles in rows.
He puts out 8 equal rows of tiles on the floor.
He puts out 96 tiles altogether.
How many tiles does Patrick put in each row?

A quick sketch of some tiles in rows may help learners understand the situation.
As before, set up the initial t-table:

Rows	Tiles
1	?
8	96

Step 1: Agree on the correct answer

Step 2: Share solution methods

Step 3: Refine solution methods

Linking the problems	**Approx. 10 mins.**
Ask learners to turn-and-talk about: What is the same about the three problems? How are the problems different? Can they make up a problem that is like these three problems? Talk about how all three problems are examples of **Equal groups in arrays problems** Talk about how Problem 1 was a multiplication problem, and 2 and 3 division problems.	
Practice/Homework	
For practice if there is time, or homework, there are more **equal groups and arrays** problems for learners to work through. One of the five problems is NOT an **equal group or arrays** problem. After working through all five problems, learners should try and identify this problem and say why it is different. They should also practice their multiplication bonds.	

MRIP Grade 7 Problem practice 4

1. One bag of apples contains 13 apples.
Mark buys 15 bags of apples.
How many apples is that altogether?

Mark buys _____ apples.

2. Karin is putting rows of pies on a tray.
Each row has 12 pies in it.
Karin puts out 25 rows of pies.
How many pies did Karin put out?

She put out _____ pies.

3. Trust drives 348 kilometres.
Sonny drives 356 kilometres.
How much further does Sonny cycle?

Sonny drives _____ kilometres more than Trust.

4. A farmer is planting rows of carrots.
He plants 15 carrots in each row.
He plants 180 carrots altogether.
How many rows of carrots does the farmer plant?

He plants _____ rows of carrots.

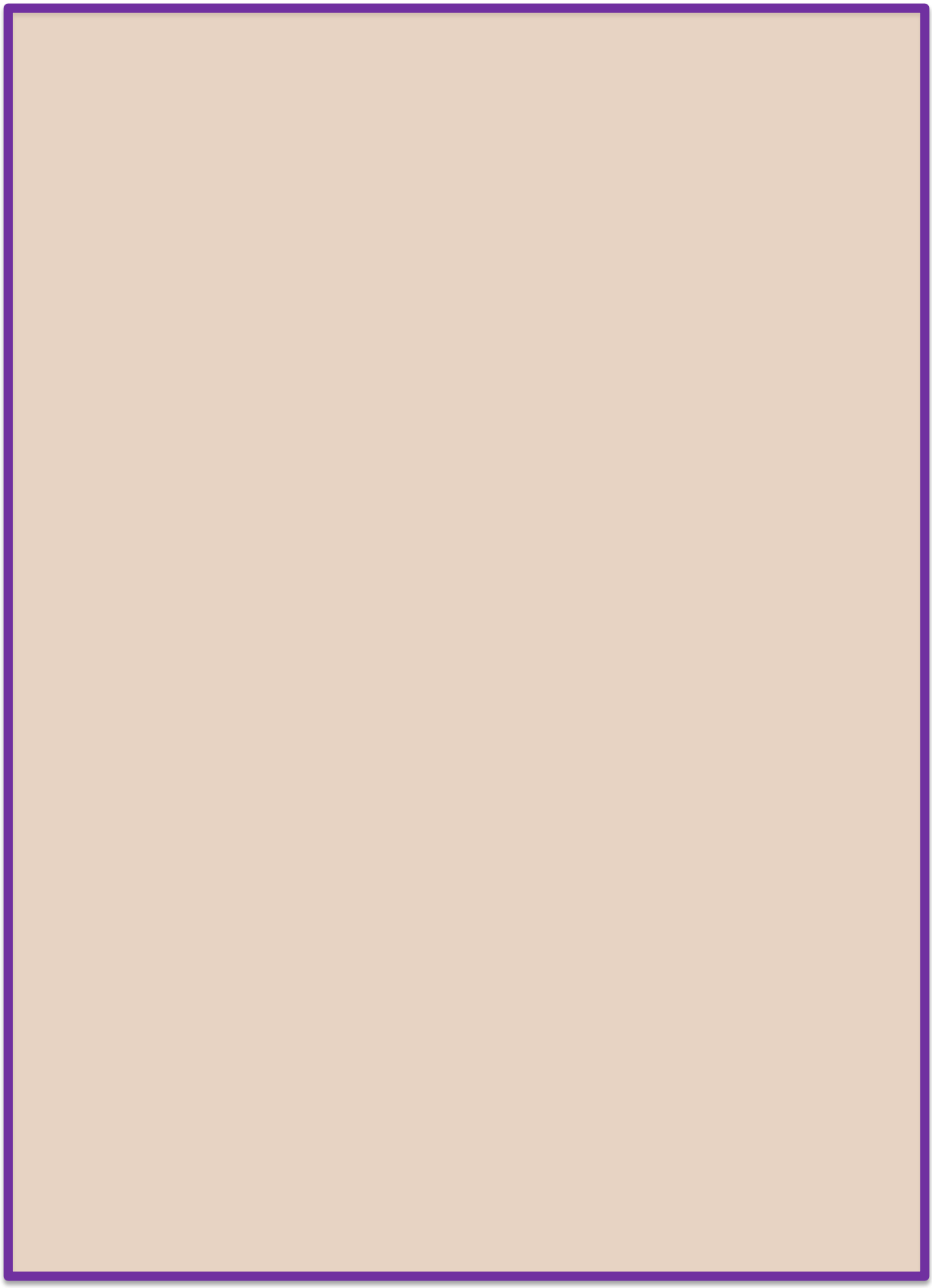
5. The total weight of 16 same-sized bags of potatoes is 192 kg.
What is the weight of one bag of potatoes?

One bag of potatoes will weigh _____ kilograms.

6. One of the problems above is NOT an equal groups problem.
Which problem is not an equal groups problem?
Explain how you know.

Question _____ is not an equal groups problem.

I know this because

MRIP Grade 7 Rapid practice 4

7 x 9 =	88 ÷ 8 =
8 x 7 =	88 ÷ 11 =
11 x 12 =	42 ÷ 6 =
9 x 11 =	42 ÷ 7 =
11 x 9 =	56 ÷ 8 =
10 x 14 =	56 ÷ 7 =
5 x 14 =	160 ÷ 2 =
2 x 16 =	36 ÷ 12 =
4 x 16 =	72 ÷ 12 =
8 x 16 =	108 ÷ 12 =
12 x 9 =	48 ÷ 6 =
9 x 12 =	96 ÷ 6 =
12 x 4 =	144 ÷ 6 =
12 x 8 =	49 ÷ 7 =
12 x 16 =	98 ÷ 7 =