YUMI DEADLY CENTRE
School of Curriculum

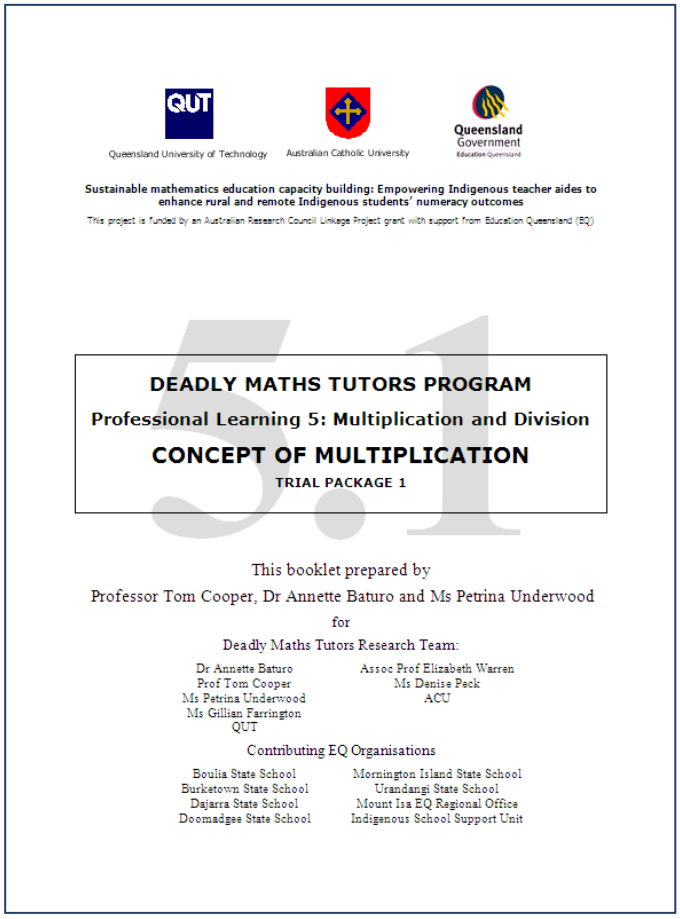
Enquiries: +61 7 3138 0035
Email: ydc@qut.edu.au

http://ydc.qut.edu.au

Professional Learning 5

Multiplication and Division

Booklet 5.1: Concept of Multiplication



Queensland University of Technology Australian Catholic University Queensland Government

Sustainable mathematics education capacity building: Empowering Indigenous teacher aides to enhance rural and remote Indigenous students' numeracy outcomes

This project is funded by an Australian Research Council Linkage Project grant with support from Education Queensland (EQ)

5.1

DEADLY MATHS TUTORS PROGRAM

Professional Learning 5: Multiplication and Division

CONCEPT OF MULTIPLICATION

TRIAL PACKAGE 1

This booklet prepared by

Professor Tom Cooper, Dr Annette Baturo and Ms Petrina Underwood

for

Deadly Maths Tutors Research Team:

Dr Annette Baturo, Prof Tom Cooper, Ms Petrina Underwood, Ms Gillian Farrington — QUT

Assoc Prof Elizabeth Warren, Ms Denise Peck — ACU

Contributing EQ Organisations

Boulia State School, Burketown State School, Dajarra State School, Doomadgee State School, Mornington Island State School, Urandangi State School, Mount Isa EQ Regional Office, Indigenous School Support Unit

YuMi Deadly Maths
Past Project Resource

Acknowledgement

We acknowledge the traditional owners and custodians of the lands in which the mathematics ideas for this resource were developed, refined and presented in professional development sessions.

YuMi Deadly Centre

The YuMi Deadly Centre is a Research Centre within the Faculty of Education at Queensland University of Technology which aims to improve the mathematics learning, employment and life chances of Aboriginal and Torres Strait Islander and low socio-economic status students at early childhood, primary and secondary levels, in vocational education and training courses, and through a focus on community within schools and neighbourhoods. It grew out of a group that, at the time of this booklet, was called "Deadly Maths".

"YuMi" is a Torres Strait Islander word meaning "you and me" but is used here with permission from the Torres Strait Island Regional Educational Council to mean working together as a community for the betterment of education for all. "Deadly" is an Aboriginal word used widely across Australia to mean smart in terms of being the best one can be in learning and life.

YuMi Deadly Centre's motif was developed by Blacklines to depict learning, empowerment, and growth within country/community. The three key elements are the individual (represented by the inner seed), the community (represented by the leaf), and the journey/pathway of learning (represented by the curved line which winds around and up through the leaf). As such, the motif illustrates the YuMi Deadly Centre's vision: *Growing community through education*.

More information about the YuMi Deadly Centre can be found at http://ydc.qut.edu.au and staff can be contacted at ydc@qut.edu.au.

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School of Curriculum
QUT Faculty of Education
S Block, Room S404, Victoria Park Road
Kelvin Grove Qld 4059
Phone: +61 7 3138 0035
Fax: + 61 7 3138 3985
Email: ydc@qut.edu.au
Website: http://ydc.qut.edu.au

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Queensland University of Technology,
Australian Catholic University &
Education Queensland

Deadly Maths Tutor Program

PROFESSIONAL LEARNING 5: MULTIPLICATION AND DIVISION

BOOKLET 5.1

CONCEPT OF MULTIPLICATION

2008

Research Team:
Prof Tom Cooper
Dr Annette Baturo
Ms Petrina Underwood
Ms Gillian Farrington
Assoc Prof Elizabeth Warren
Ms Denise Peck

Contributing EQ Organisations:

Mount Isa EQ Regional Office
Boulia State School
Burketown State School
Dajarra State School
Doomadgee State School
Mornington Island State School
Sunset State School
Urandanji State School
Indigenous Education and Training Alliance (IETA)

YuMi Deadly Centre

School of Mathematics, Science and Technology Education,
Faculty of Education, QUT

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OVERVIEW

PURPOSE

These materials were designed to be used in conjunction with a Professional Learning program for teacher aides. The objective of this Professional Learning was to empower teacher aides to enhance rural and remote Indigenous students' numeracy outcomes. This document contains the materials of the first of five different booklets on multiplication and division.

If your school would like to receive a YuMi Deadly Maths Professional Learning program please contact the YuMi Deadly Centre (YDC) on: 07 3138 0035 or ydc@qut.edu.au.

DIRECTIONS

(1) Interviewing the students:

Pick one or more students who appear to be having trouble understanding multiplication. Interview these students using the interview schedule and the materials. Mark what they do and put their results on the Student Recording Sheet.

(2) Trialling the student activities:

Use the Recording Sheet to work out the activities the students need to do and trial these activities with the students (with each student one at a time or with a group of students). Keep a record of what happens and collect the students' work.

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INTERVIEW SCHEDULE

Materials:

Unifix cubes or counters, washable felt pens, pen, pencil, paper

Materials within this booklet: interview questions, interview cards, number tracks, Student Recording Sheet

Directions:

1. Photocopy and laminate attached interview cards and number tracks pages.
2. Gather other material (unifix or counters, paper, pens, pencils).
3. Place material in front of students. Give students pen and paper to write with.
4. Tell the students you are trying to find out what they know. Say they are not expected to know it and you will teach what is not known.
5. Give the student directions slowly – read problems. Do not give hints. If student cannot do a question, pass on to the next question, repeating that it is not important if they don't know how to do the question.
6. Allow students to use material and make drawings but only after they say they do not know how to do it with symbols alone.

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INTERVIEW MATERIALS

Multiplication Interview Questions

M1	**Show and read Card 1** • Say: *Act out what the problem is doing with the unifix cubes/counters*. • Say: *Draw what the problem is doing in some way. Use circles for wallabies*.
M2	**Show and read Card 2** • Say: *What if I changed the problem to this?* • Say: *Act out what this new problem is doing with the unifix cubes/counters*. • Say: *Draw what the new problem is doing in some way. Use circles for wallabies*.
M3	**Show and read Card 3** • Say: *What if I changed the problem to this?* • Say: *Act out this new problem on the number track.* • Say: *Draw the new problem on a number line.*
M4	**Show Cards 1, 2 and 3** • Ask: *Can you say the problem using mathematics language* • If cannot say the problem formally as "four threes equals 12" or "three multiplied by four equals 12", ask can you say what the problem is using "f*our", "three", equals, "multiplied by" and "twelve".*
M5	• Say: *Write the problem in symbols.* Ask: *Can you do it two different ways?*
M6	**Show Card 4 (DO NOT READ IT)** • Say: *Read the number sentence (or sum).*
M7	• Say: *Draw what the number sentence is doing in some way using circles to show the numbers.* • Say: *Act out what the problem is doing with counters/unifix cubes*.
M8	• Say: *Draw what the number sentence is doing in some way using rows of circles.* • Say: *Act out what the number sentence is doing with counters/unifix in rows*
M9	• Say: *Draw what the number sentence is doing with a number line.* • Say: *Act out what the number sentence is doing with a number track.*
M10	• Say: *Make up a story that says what the number sentence is doing.*

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Multiplication Interview Cards

CARD 1

There were 4 mobs of wallabies, each mob had 3 wallabies. How many wallabies were there?

CARD 2

There were 4 rows of wallabies. Each row had 3 wallabies. How many wallabies were there?

CARD 3

I made 4 jumps. In each jump I leapt over 3 logs. How many logs did I leap over altogether?

CARD 4

$5 \times 2 = 10$

$$\begin{array}{r} 2 \\ \times\ 5 \\ \hline 1\ 0 \end{array}$$

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Multiplication Interview Number Tracks

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

1	2	3	4	5	6	7	8	9	10	11	12	13

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STUDENT RECORDING SHEET

Name: _____

School/Class: _____

Interview item	Result (✓, ✗)	Comments	Activities to be completed if incorrect
M1: multiplication problem → set activities/drawing			MC1
M2: multiplication problem → array activities/drawing			MC2
M3: multiplication problem → number line activities/ drawing			MC3
M4: multiplication problem → multiplication language			MC4
M5: multiplication problem → multiplication symbols			MC5
M6: multiplication symbols → multiplication problem			MC5
M7: multiplication language → multiplication problem			MC4
M8: number line activities/ drawing → multiplication problem			MC3
M9: array activities/drawing → multiplication problem			MC2
M10: set activities/drawing → multiplication problem			MC1

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INTRODUCTION

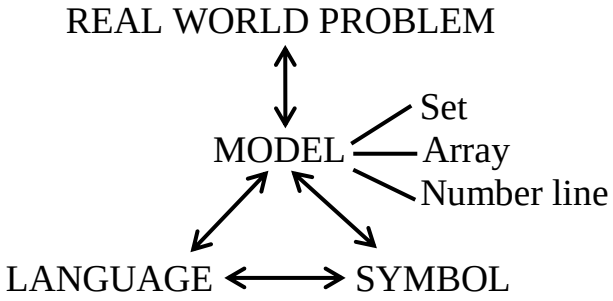
Contents

This package contains:

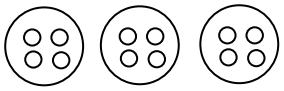
- five tutoring activities (MC1 to MC5) and their student materials (games and worksheets), as well as an activity feedback sheet for each activity;

Pedagogy

The activities MC1 to MC5 are based on the Rathmell Triangle Relationship below. The idea is to teach students to relate real world problems to set, array and number line models to language and symbol and vice versa – switching from one representation to the other – in all directions.



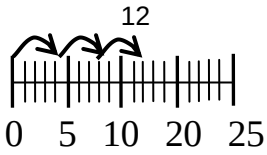
There are three models:

(1) Set – 3 × 4 is 3 groups of 4 

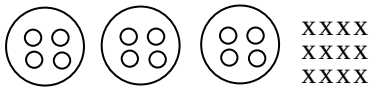
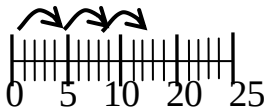
(2) Array – 3 × 4 is 3 rows of 4

xxxx
xxxx
xxxx

(3) Number line – 3 × 4 is 3 jumps of 4



These relate to language and symbols as follows:

Materials	Language	Symbols
 xxxx xxxx xxxx	"three fours"	3 × 4
 0 5 10 20 25	"Four multiplied by three"	4 × 3

Note: Some teachers also use "three times four"

Approach

The four operations of addition, subtraction, multiplication and division are important in mathematics as they reflect everyday important actions that happen in the lives of people and that cause problems that need to be solved:

- Addition: joining two (or more) different groups of things;

- Subtraction: separating (taking away) one or more smaller groups of things from a larger group;
- Multiplication: combining two or more (often more) same size groups of things; and
- Division: partitioning (breaking up) a large group of things into same size smaller groups.

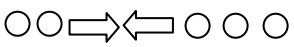
To teach the four operations means connecting the words/symbols to understanding (actions, pictures) of what the operation means.

Thus it is important to

(i) differentiate between the operations (e.g. what is the difference between multiplication and addition); and
(ii) relate the different ways of thinking about each operation (e.g. connecting different models, connecting drawings to actions to words and so on).

This is the reason that we have presented information in this way in this booklet. We are not interested in answers. What we want students to know is that:

(i) 2 + 3 is 2 things joined to 3 things and is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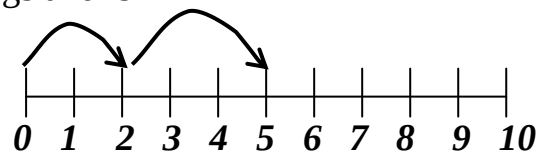
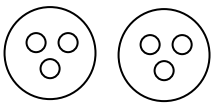


and 2 × 3 is 2 groups of 3 things and is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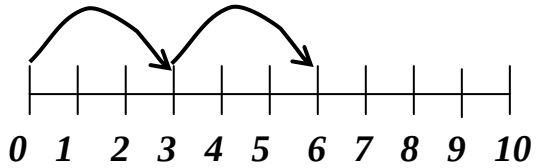

(ii) 2 + 3 is "I spent $2 on a drink and $3 on a pie" while 2 × 3 is "I bought 2 pies for $3 each".

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ACTIVITIES

ACTIVITY MC1

[Multiplication problem ←→ set activities/drawing]

Materials: Unifix, counters or objects (pens, shells etc. – better if natural and local), paper plates, pen, paper, material attached (worksheets, game)

Directions:

1. Tell a story, acting it out as you go. *I have 4 groups and I put 3 objects in each group. How many (objects) do I have if I join them all?*
2. Act out the story again for the students. Ask them to follow you with their counters/plates. Ask: *How many groups (plates) did I start with?* [4] State: *Show me these with your plates.* Ask: *How many objects did I put on each plate?* [3] State: *Show me these with your counters.* State: *Count your counters group by group as I combine the counters.* Ask: *How many counters do you now have?* [12]
3. Ask students to act out the story again with their counters. Ask: *How many groups did I start with? How many are in each group? How many in total?*
4. Ask students to draw the activity with circles to show the numbers. If needed, ask: *What did we do with the plates? What did we do with the counters? How can we draw this activity? What happens to the groups?* Discuss the drawings. Ask: *Please tell me the story pointing to your drawing as you go.*
5. Tell a new story: *I have 5 groups with 3 objects in each group. How many objects do I have?* Ask: *Act this out with your plates and counters.* Ask: *Draw the plates and counters.*
6. Repeat this as many time as needed using Worksheet 1.1.
7. Show students the first drawing on Worksheet 1.2. State: *The small circles are objects. The large circles show the groups that are all combining.* Ask: *Act this out with plates and counters.* Ask: *Make up a story that this drawing is telling.*
8. Repeat step 7 for the second drawing on Worksheet 1.2 and then as many more times as needed using Worksheet 1.2. If necessary create some other combinations.
9. Play the game "Multiplication Tic-Tac-Toe".

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MC1 – Worksheet 1.1

1. I have 3 groups. There are 3 counters in each group. How many counters?	2. I have 4 groups. There are 4 counters in each group. How many counters?
3. I have 3 bags of lollies. There are 5 lollies in each bag. How many lollies?	4. I have 5 paddocks and in each paddock I saw 5 wallabies. How many wallabies did I see?
5. There were 3 trees. In each tree lived 6 cockatiels. How many cockatiels were there?	6. There were 4 birds' nests. In each nest the birds laid 2 eggs. How many eggs altogether?
7. We visited 7 trees. We got 3 witchetty grubs from each tree. How many grubs all up?	8. I cast my net 3 times and each time I caught 7 fish. How many fish did I catch?

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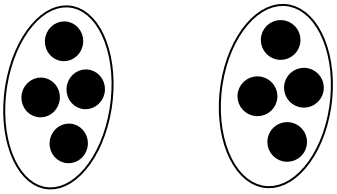
MC1 – Worksheet 1.2

1.

2.



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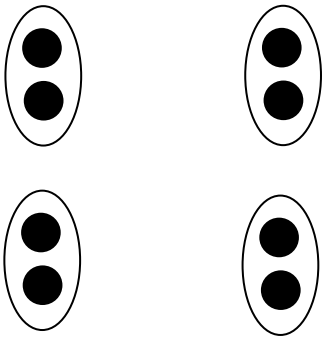

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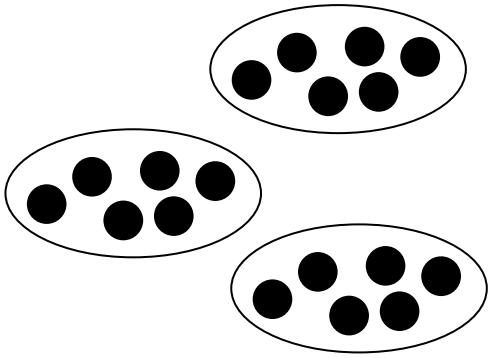

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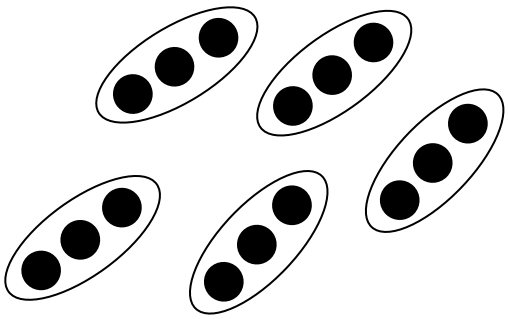

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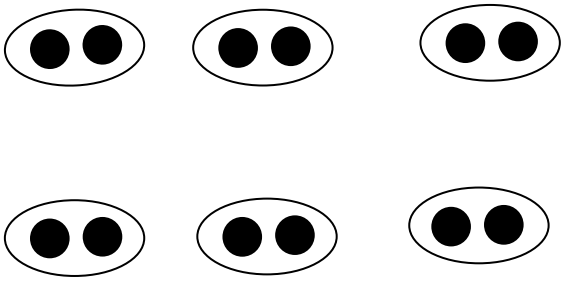

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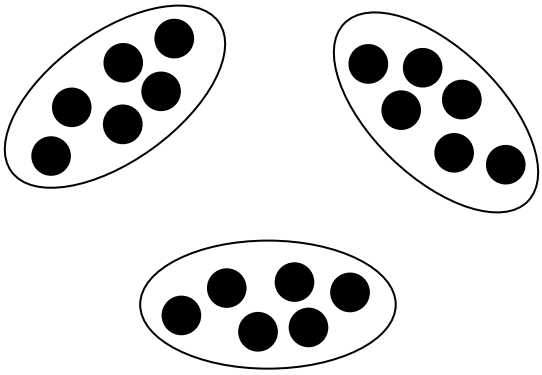

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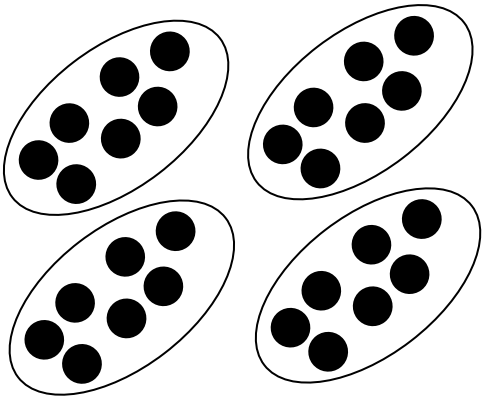

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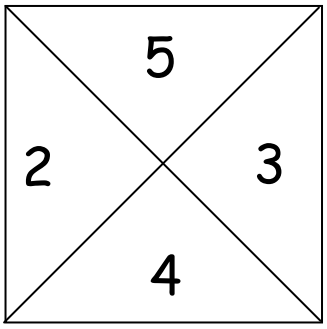
MC1 – Game: Multiplication Tic-Tac-Toe

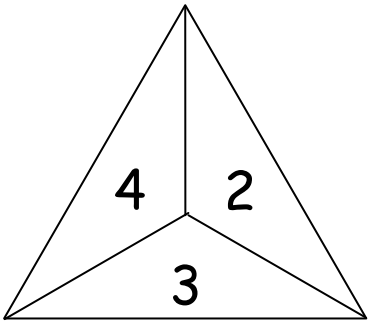


Materials: 2 spinners as on right – place a paper clip at centre held in place by a pen and flick clip.

Number of players: 2

Directions:

1) Players in turn spin both the spinners.
2) The spinner with 2, 3 & 4 gives the number of groups (plates); the spinner with 2, 3, 4 & 5 gives the number (counters) in each group. The total number of counters is then worked out.
3) Players put unifix cube of their colour on board to cover the total number that was worked out in step 2.
4) If number already covered by opponent, then player places unifix over top of opponent's.
5) Winner is first with 3 in a row (across, down, or diagonal).



6	15	4
9	12	10
20	8	16

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MC1 Activity Feedback Sheet

1. How the student found the activity (put a cross on lines)

NAME	STUDENTS' REACTIONS
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning

2. How did you feel about trialling the activity?

   Mark the line with an X: Unconfident ——— Very confident

3. Do you think the student was engaged in the activity? Explain.

   _____

4. What do you think the student learnt from the activity?

   _____

5. Do you think the student has gained an understanding of the concept being taught? Explain.

   _____

6. What do you think of the activity?

   _____

7. What are your suggestions for improving the activity?

   _____

   _____

8. What else do you suggest could be done to help students who have trouble with this activity?

   _____

   _____

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ACTIVITY MC2

[Multiplication problem ←→ array activities/drawing]

Materials: Unifix, counters or objects (pens, shells etc.), pen, paper, material attached (worksheets, games).

Directions:

1. Tell a story acting out as you go. *There were 4 rows of objects with 3 objects in each row. How many objects do I have?*
2. Act out the story again for the students. Ask them to follow you with their counters. Ask: *How many rows?* [4] *How many counters in each row* [3] State: *Show me this with your counters. Count your counters row by row and I count mine* [3, 6, 9, 12] Ask: *How many counters do I have altogether?* [12]
3. Ask students to act it out again. Ask: *How many rows? How many counters in each row? How many in total?*
4. Ask the students to draw the activity with circles to show the number. If needed, Ask: *How do we draw the rows? How do we draw the counters in the row?* Discuss the drawings. Ask: *Please tell me a story pointing to your drawing as you go.*
5. Repeat this as many times as needed using Worksheet 2.1.
6. Show students the first drawing on Worksheet 2.2. State: *The small circles are objects, the large circles around the rows means that they are being combined.* Ask: *Act the story out with counters. Make up a story that this drawing is telling.*
7. Repeat step 6 for the other drawings in Worksheet 2.2 (as many times as needed).
8. Play the game "Multiplication Line Up".

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MC2 – Worksheet 2.1

1. There were 3 rows. Each row had 5 counters. How many counters when the rows were combined?	2. There were 4 rows. Each row had 6 counters. How many counters when the rows were combined?
3. The children lined up after lunch. There were 5 rows each with 5 children. How many children when the rows were combined?	4. The children lined up with 3 rows of 8 children. How many children when the rows were combined?
5. The dancers formed 2 rows. There were 5 dancers in each row. How many dancers when the rows were combined?	6. The singers formed 4 rows, with 4 singers in each row. How many singers when the rows were combined?
7. The dancers formed 5 rows with 3 dancers in each row. How many dancers when the rows were combined?	8. The wallabies were in 6 rows. There were 6 wallabies in each row. How many wallabies when the rows were combined?

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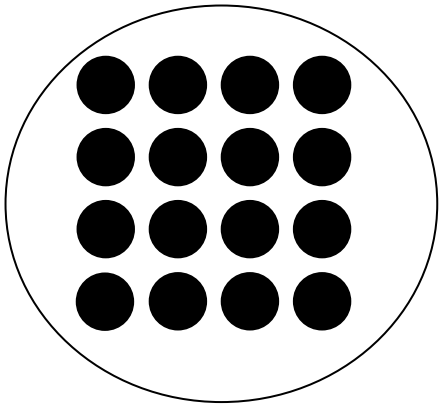
MC2 – Worksheet 2.2

1.



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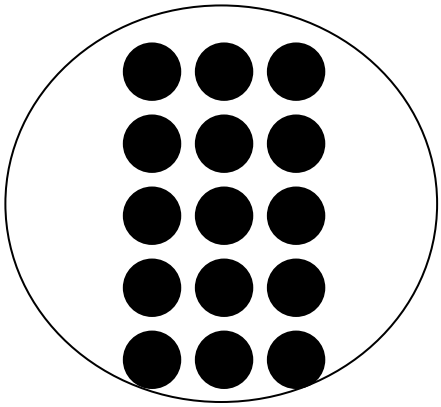

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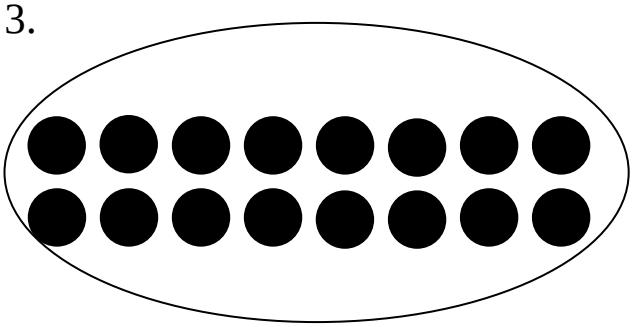

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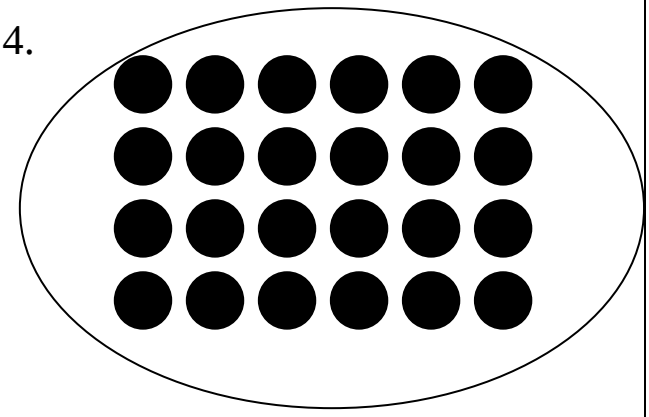

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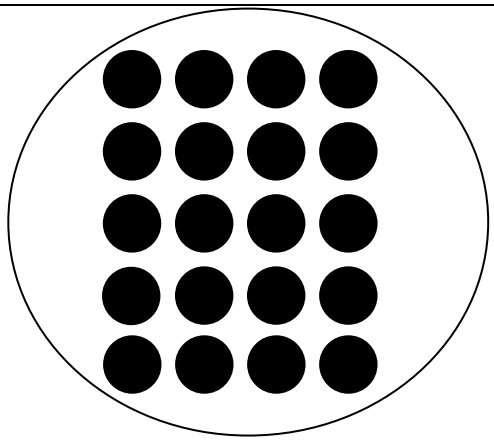

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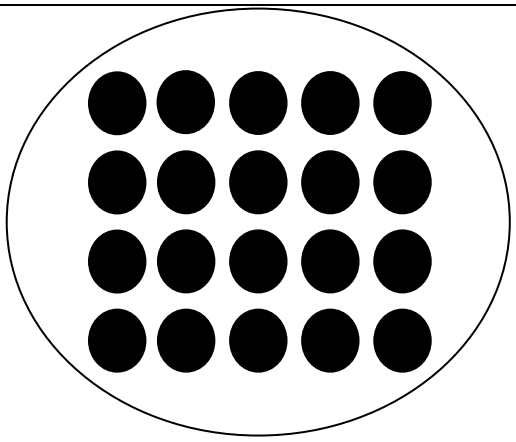

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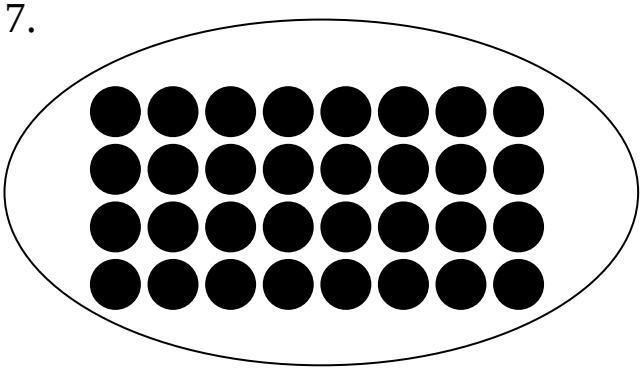

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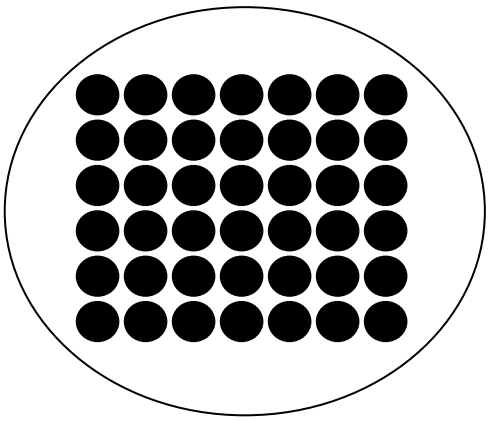

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MC2 – Game: Multiplication Line Up

Materials: 2 dice, counters or dot paper, unifix cubes (one colour for each player)

Number of players: 2-4

Directions:

1) Players in turn throw both dice.
2) First dice gives the number of rows. Second dice gives the number in each row. Players make the array with counters or draw around an array on dot paper then calculate the answer. Note: If throw two 1s or two 6s, throw again.
3) Players put unifix cube of their colour on board to cover the answer.
4) If number already covered by opponent, then player places unifix over top of opponent's.
5) Winner is first with 3 in a row (across, down, or diagonal)

4	20	9	2
16	8	12	25
24	10	15	18
3	5	30	6

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MC2 Activity Feedback Sheet

1. How the student found the activity (put a cross on lines)

NAME	STUDENTS' REACTIONS
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning

2. How did you feel about trialling the activity?

   Mark the line with an X: Unconfident ——— Very confident

3. Do you think the student was engaged in the activity? Explain.

   _____

4. What do you think the student learnt from the activity?

   _____

5. Do you think the student has gained an understanding of the concept being taught? Explain.

   _____

6. What do you think of the activity?

   _____

7. What are your suggestions for improving the activity?

   _____

   _____

8. What else do you suggest could be done to help students who have trouble with this activity?

   _____

   _____

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ACTIVITY MC3

[Multiplication problem ←→ number line activities/drawing]

Materials: Large number track on floor, pen, paper, materials attached (number tracks, worksheets, game directions, gameboard)

Directions:

1. Make up a large number track. Put numbers 0 to 20 on A4 paper. Lay the numbers out on the floor so children can walk beside them counting as they go.
2. Tell a story, acting it out as you go: O*n a large number track I made 4 jumps. Each jump was 3 spaces. I made one jump, two jumps, three jumps and four jumps. How many spaces did I jump altogether?* [12]
3. Act out the story again for the students on the large number track. Ask: *How many jumps did I make?* [4] *How many spaces each jump?* [3] State: *Jump this out: one jump (3), two jumps (6), three jumps (9), and four jumps (12). How many spaces did I jump altogether?* [12] State: *Step this out from the 3.* Ask: *How many spaces have you now jumped?* [12]
4. Ask the students to 'walk' the story with their fingers on a small number track. Ask: *How many jumps?* [4] *How many spaces to each jump?* [3] *Make the jumps, stating how many after each jump* [3, 6, 9, 12] *How many altogether?* [12]
5. Ask students to draw the activity with a number line to show the problem. If needed, ask: *What do we do first?* [the line] *What do we do second?* [the jumps]. *How can we show this on the drawing?* Discuss the drawing. Ask: *Please tell me the story pointing to your drawing as you go.*
6. Tell a new story. *I made 5 jumps. Each jump was 2 spaces.* State: *Act this out with a number track.* Ask: *Draw it on a number line.*
7. Do as many examples as needed using Worksheet 3.1.
8. Show students the first picture on Worksheet 3.2. State: *The arrows show the length of the jump. The number of arrows tells how many jumps. The last jump gives you the total.* Ask: *Act this out on a large number track. Make up a story that this drawing is telling.*
9. Repeat step 8 for as many of the other drawings as needed on Worksheet 3.2.
10. Play the game: "Multiplication Racetrack".

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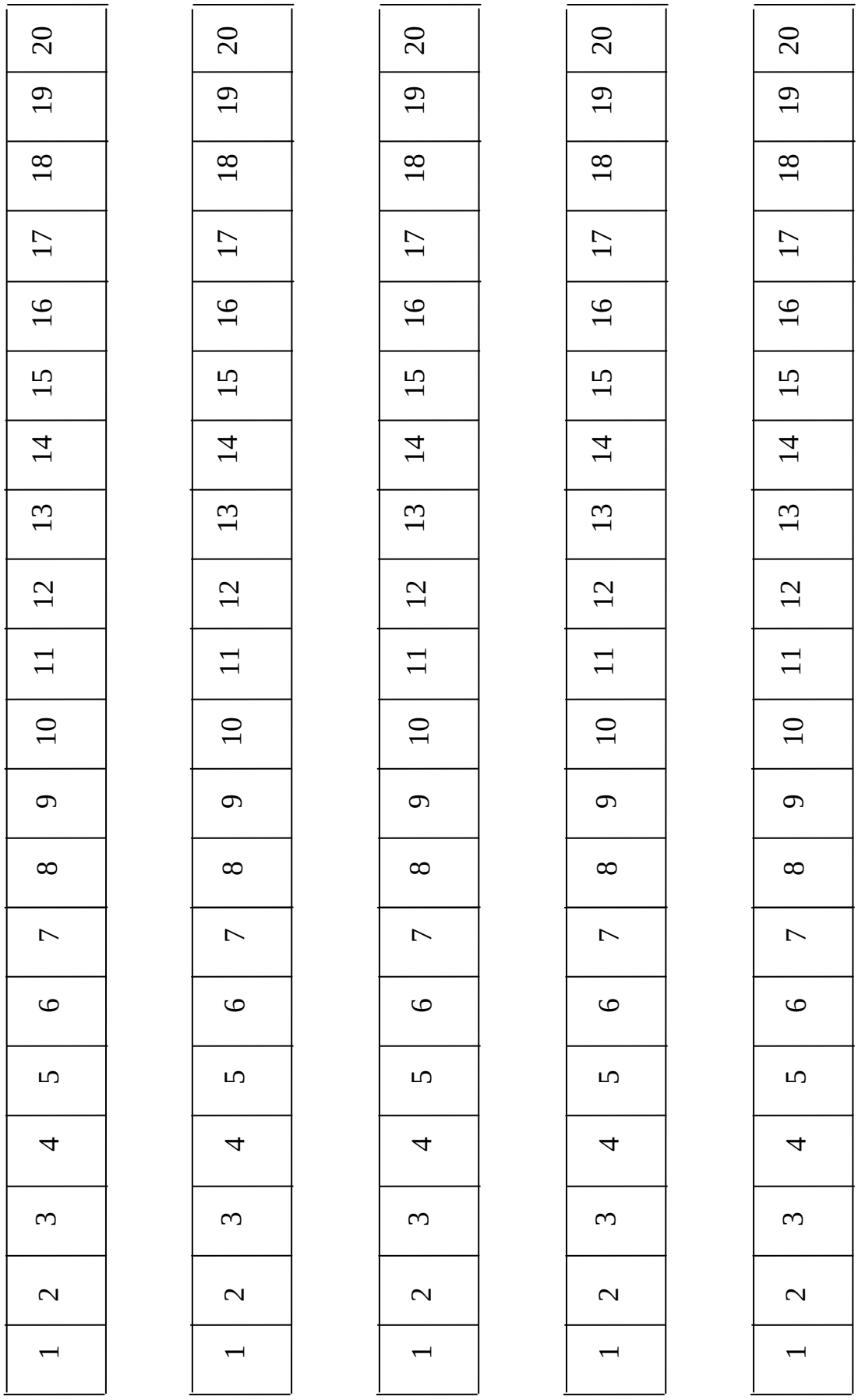
MC3 – Number Tracks



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MC3 – Worksheet 3.1

Act out the following problems on a number track and draw them on a number line.

1. I made 4 jumps. Each jump was 2 spaces. How many spaces did I jump altogether?	2. I made 5 jumps. Each jump was 3 spaces. How many spaces did I jump altogether?
3. The 3 boys each ran 4 blocks. How many blocks did they run altogether?	4. 6 girls each made 3 jumps. How many jumps did they make altogether?
5. Jill used the 3m tape 6 times to measure the wall. How long was the wall?	6. Ron found that it took him 7 lots of 5 paces to walk the paddock. How many paces did he do altogether?
7. In the relay race, the 6 contestants each ran 4km. How long was the race?	8. The 7 pythons slithered head to tail. Each python was 3m long. How long were the pythons put together?

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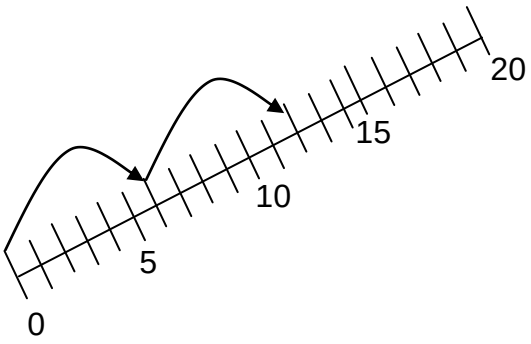
MC3 – Worksheet 3.2

Act out the following problems on a number track and create a real world problem for them.

1.



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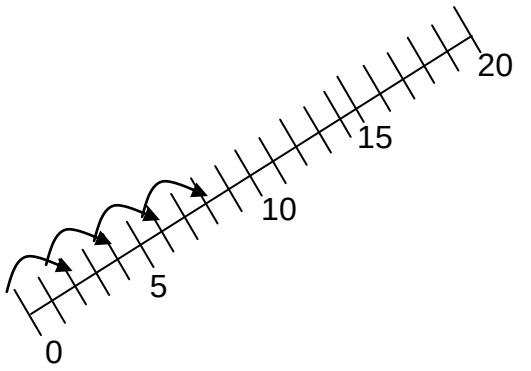

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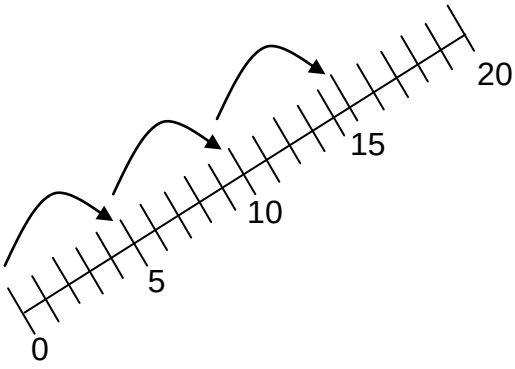

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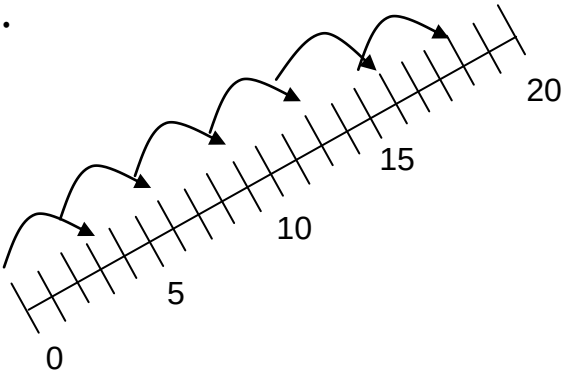

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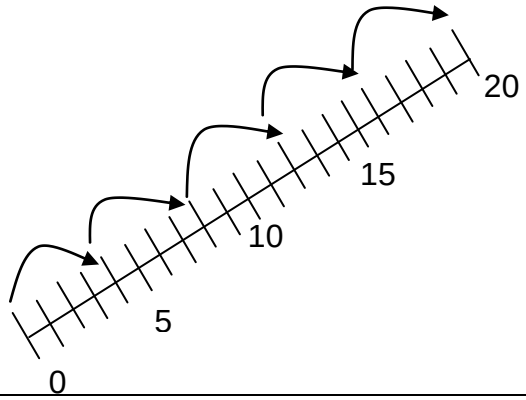

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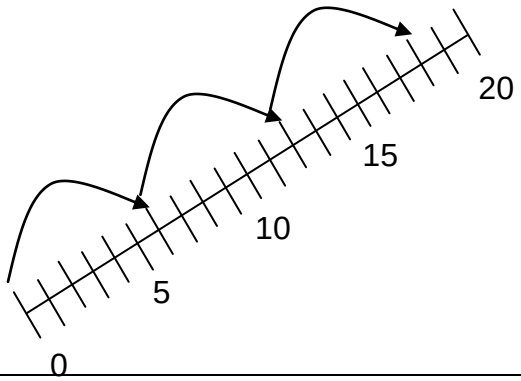

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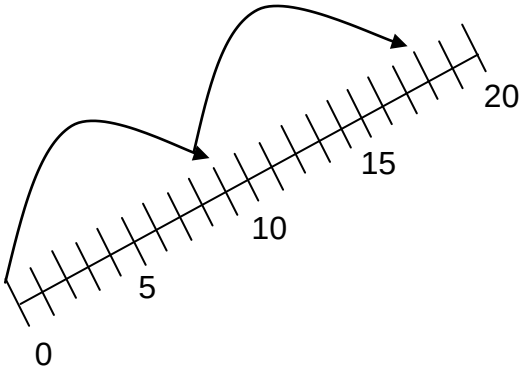

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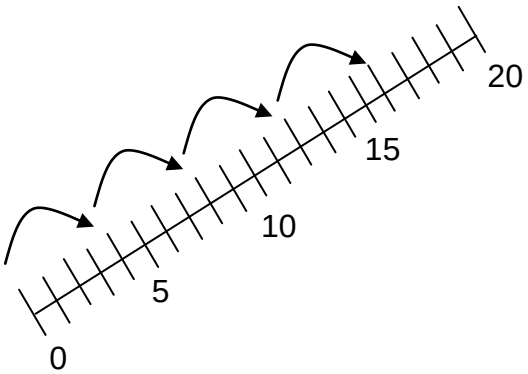

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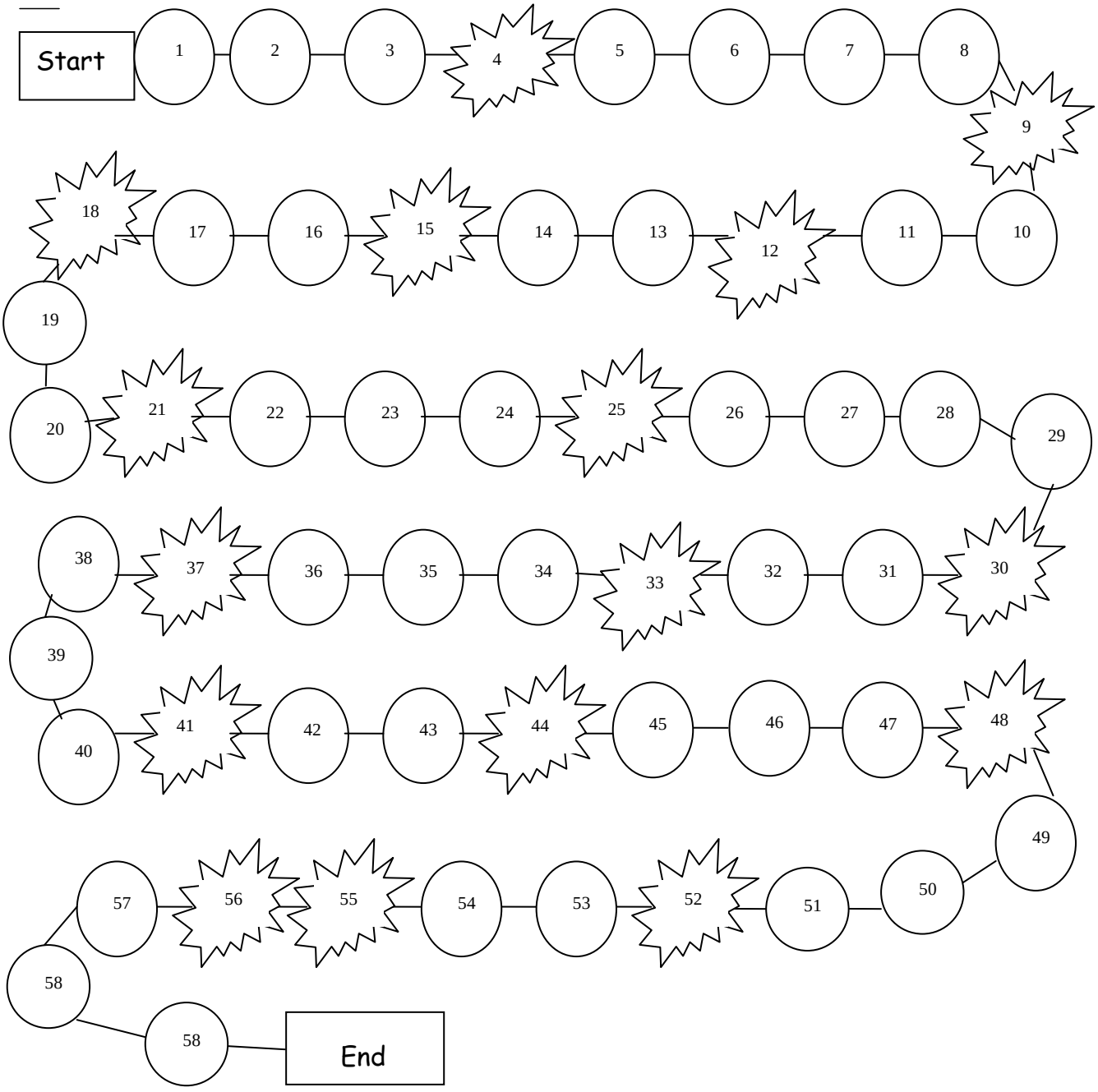
MC3 – Game: Multiplication Racetrack

Materials: Enlarged Multiplication Racetrack Gameboard, 2 dice (1, 5 & 6 replaced by 2, 3 & 4), different coloured counters for each player.

Number of players: 2-4

Directions:

1) Beginning with counters on Start, each player throws the dice (1st dice gives number of jumps, 2nd dice gives number of spaces for each jump)
2) If player lands on a star after any jump then they go forward 2 places.
3) The winner is the first to the end.



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MC3 Activity Feedback Sheet

1. How the student found the activity (put a cross on lines)

NAME	STUDENTS' REACTIONS
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning

2. How did you feel about trialling the activity?

   Mark the line with an X: Unconfident ——— Very confident

3. Do you think the student was engaged in the activity? Explain.

   _____

4. What do you think the student learnt from the activity?

   _____

5. Do you think the student has gained an understanding of the concept being taught? Explain.

   _____

6. What do you think of the activity?

   _____

7. What are your suggestions for improving the activity?

   _____

   _____

8. What else do you suggest could be done to help students who have trouble with this activity?

   _____

   _____

ACTIVITY MC4

[Multiplication problem ←→ multiplication language]

Materials: Counters/unifix or objects (pens, shells, etc.), plates, number tracks, pen, paper, attachments (worksheets, game rules, cards and boards)

Directions:

1. Tell a story, acting it out with imaginary people as you go. *Jack has 3 bags. Each bag has 5 lollies. How many lollies does Jack have?*
2. Recap how to act this out with counters and to draw it with circles or other shapes. Ask as they do this: *How many groups does Jack have?* [3] *How many lollies in each group?* [5] *How many lollies does Jack have in total?* [15] Then move on to: *What was the number **of** groups?* [3] *What was the number **in** each group?* [5] *How many in total?* [15].
3. Ask students to state the story in language. If difficulty, ask: *How many groups did Jack have?* [three] *How many counters in each group?* [five] *What do we call combining equal groups?* [multiply] *How many in total?* [fifteen] *What do we call making a total?* [equals] Say this*: Three fives equals fifteen.* Get students to point at the plates/counters as they say the language (students don't say multiply in this language).
4. Repeat step 3 but end with "five multiplied by three equals fifteen" and students point at counters then plates. Stress the backwards nature of the language.
5. Tell a new story: *The children lined up in 3 rows. There were 6 children in each row.* Ask students to act out this problem with unifix/counters. Ask students to say the problem with language in the two ways [three sixes equals eighteen, six multiplied by three equals eighteen]. Ask similar questions to steps 3 and 4.
6. Tell a new story: *Jack ran 4 times. Each time he ran 6 more blocks. How many blocks did he run altogether?* [24] Ask the students to act it out with a number track (get from MC3). Ask the students to say it with language both ways. Ask similar questions to steps 3 and 4.
7. Complete as many examples as needed using Worksheet 4.1.
8. Say: *Three fours is 12.* Act this out and draw a drawing for it using the three methods: (a) set model (unifix & plates); (b) array model (unifix in rows); (c) number line model (number line & number tracks) Ask: *Make up a story for this multiplication problem.*
9. Repeat step 8, for "five multiplied by three".
10. Repeat step 8 or 9 for as many of the multiplications in Worksheet 4.2 as is needed by the students.
11. Play the attached games: "Multiplication Snap", "Multiplication Rummy", "Multiplication Concentration", "Multiplication Cover the Board", "Multiplication Mix and Match", "Multiplication Bingo".

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MC4 – Worksheet 4.1

Act out the following problems with materials and write it in language.

1. There were 3 families. Each family had 3 members. How many people were there?	2. The children were lined up in 4 rows, each with 6 members. How many children were there?
3. The frog made 5 jumps. Each jump was 4cm. How far did the frog jump?	4. The net was cast 4 times. Each cast caught 4 fish. How many fish were there in total?
5. The cars were parked in 3 rows. Each row had 6 cars. How many cars were there?	6. In the relay race, the four runners each ran 3km. How long was the race?
7. Jenny bought 4 packets of biscuits, which had 7 biscuits in each pack. How many biscuits altogether?	8. John bought 5 pieces of wood. Each was 5m long. What was the total length of the wood that John bought?

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MC4 – Worksheet 4.2

For each of the following;

(a) Act it out with counters and plates, counters in rows, and the number track;

(b) Draw it as groups of objects, arrays, and on a number line; and

(c) Construct a real world problem (try to use all 3 models – set, array and number line)

1. three sixes	2. three multiplied by two
3. two sevens	4. three multiplied by six
5. three fives	6. seven multiplied by two
7. six eights	8. nine multiplied by four
9. five threes	10. five multiplied by three
11. four fives	12. four multiplied by five

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MC4 – Games

Multiplication Snap

Materials: Multiplication cards (print 5 pages in 5 different colours)

Number of players: 2

Directions:

1) Cut all pages into 12 cards and mix into one deck.
2) Shuffle the cards. Deal out all cards.
3) In turn play cards. First to call snap when two cards show the same operation wins a point.
4) Winner is the player with the most points when there are 12 cards left.

Multiplication Rummy

Materials: Multiplication cards (print 5 pages in 5 different colours)

Number of players: 2-4

Directions:

1) Cut all pages into 12 cards and mix into one deck.
2) Shuffle deck of cards. Deal out 7 cards to each player. Put remaining cards face-down in middle with one card face-up beside deck. Players put out any sets (triples, quadruples or quintuples).
3) Players in turn pick up a card (either the top face-up card or face-down card) and place a card face-up on the face-up pile. Sets are put out as they are formed. Players can put out singles and doubles to complete other players' sets.
4) Winner is the first player to put out all their cards as sets.

Note: Can introduce other rummy rules.

Multiplication Concentration

Materials: Multiplication cards (print 5 pages in 5 different colours)

Number of players: 2-4

Directions:

1) Cut all pages into 12 cards and mix into one deck.
2) Shuffle the cards and place face down on the table in a 6 × 10 array.
3) Players in turn pick up (or turn over) 2 cards. If the same operation, keep the cards, if different return to their place and wait for next turn.
4) Winner is the player with the most sets of 2 cards when there are 12 cards left.

MC4 – Games (continued)

Multiplication Cover the Board

Materials: 2 base boards (language 1 and 2), 3 sets of 12 picture cards (print 3 pages in different colours)

Number of players: 2-3 (2-4 if cut up one of the base boards)

Directions:

1) Use the language pages as base boards and cut other pages into 12 cards each. Don't mix up the cards (keep decks separate). The other base board can be cut into cards if wanted.
2) 3 players each get a set of 12 cards of one type and colour and shuffle their cards.
3) In turn, each player places a card correctly on base board (card and board have to have same operation) or on top of another card already placed.
4) At the end, player with most cards on top wins.

Multiplication Mix and Match

Materials: 12 sets of mix and match cards (print all cards the same colour)

Number of players: 1 (though can be a group)

Directions:

1) Cut cards along lines into pieces.
2) Mix pieces together.
3) Students put pieces back together to form cards, matching the same operations.

Multiplication Bingo

Materials: 6 bingo base boards with pictures (print 6 boards in 6 different colours), 2 sets of 12 language flash cards (print in white), unifix or counters

Number of players: 2-6

Directions:

1) Cut out language flash cards (language 1 and 2) and shuffle (can mix language or have 2 separate sets of flash cards).
2) Displayer shows cards one at a time.
3) Players cover with unifix any picture on their board which is the same operation as the flash card.
4) Winner is the first player with 3 pictures in a row (vertically, horizontally or diagonally).

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MC4 – Multiplication Cards (language 1)

five twos	three fours	three twos
two fours	three fives	four threes
two twos	seven twos	five threes
three threes	two sixes	two fives

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MC4 – Multiplication Cards (language 2)

two multiplied by five	four multiplied by three	Two multiplied by three
four multiplied by two	five multiplied by three	Three multiplied by four
two multiplied by two	two multiplied by seven	Three multiplied by five
three multiplied by three	six multiplied by two	Five multiplied by two

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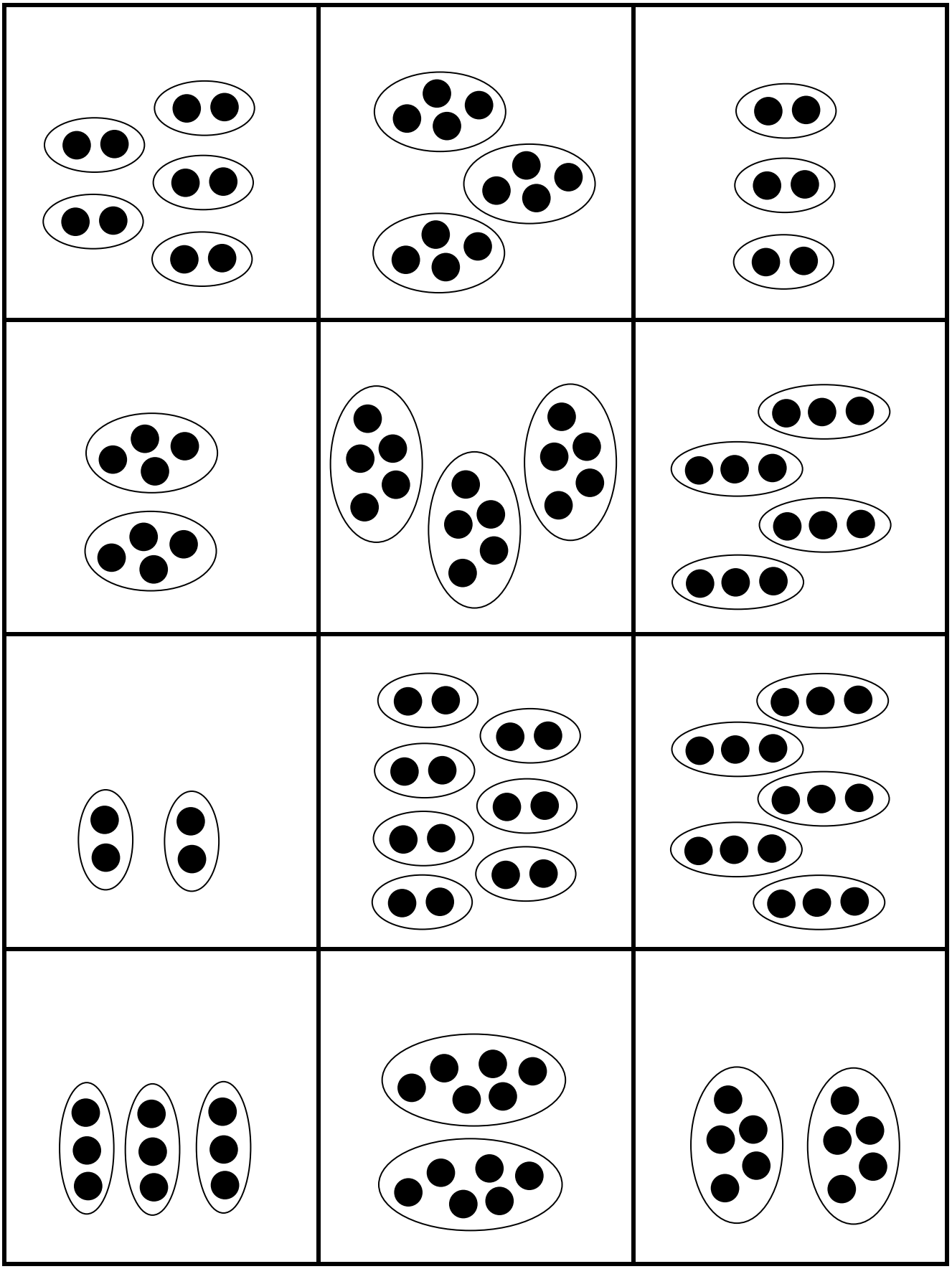
MC4 – Multiplication Cards (set model)



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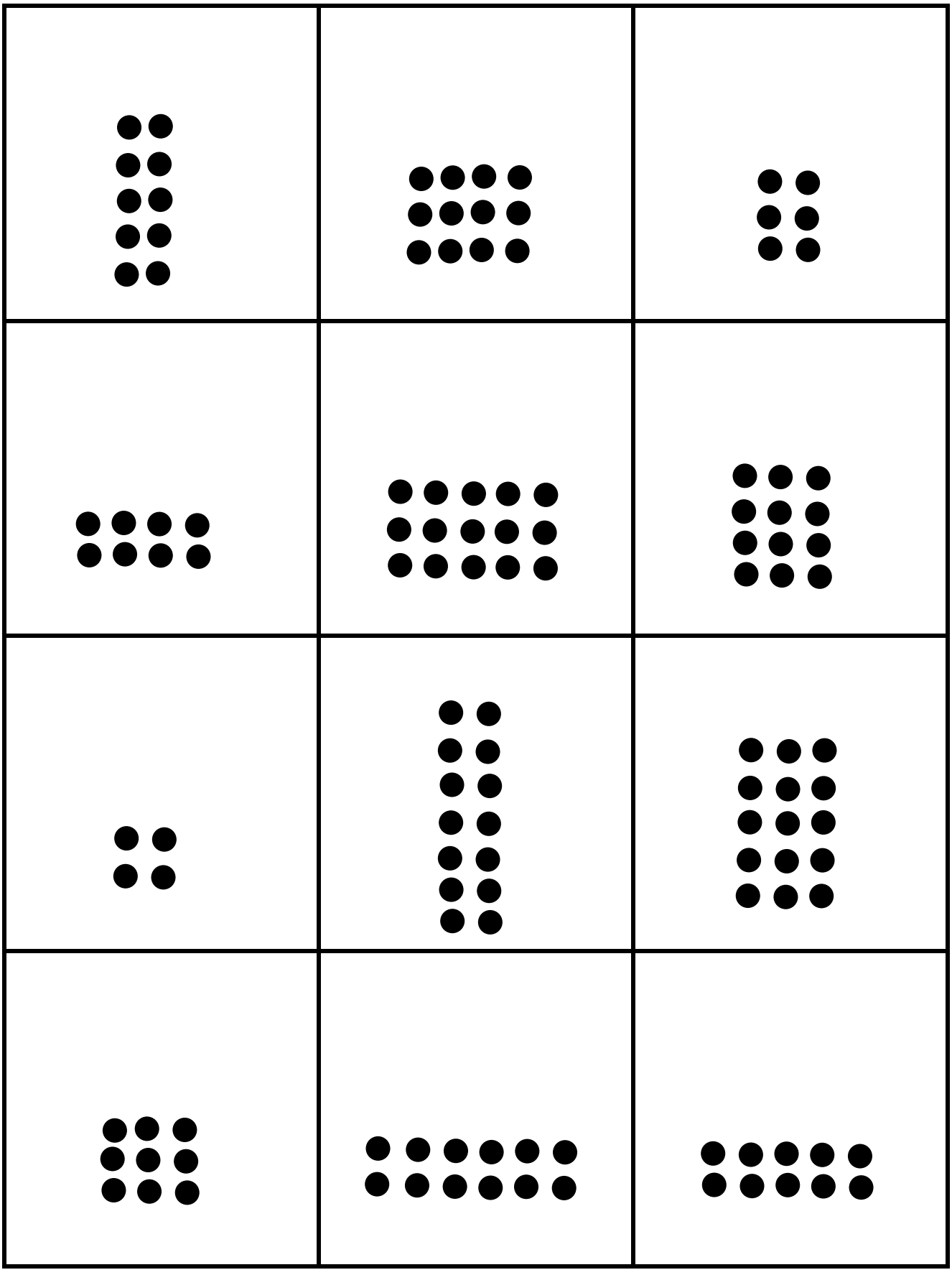
MC4 – Multiplication Cards (array model)



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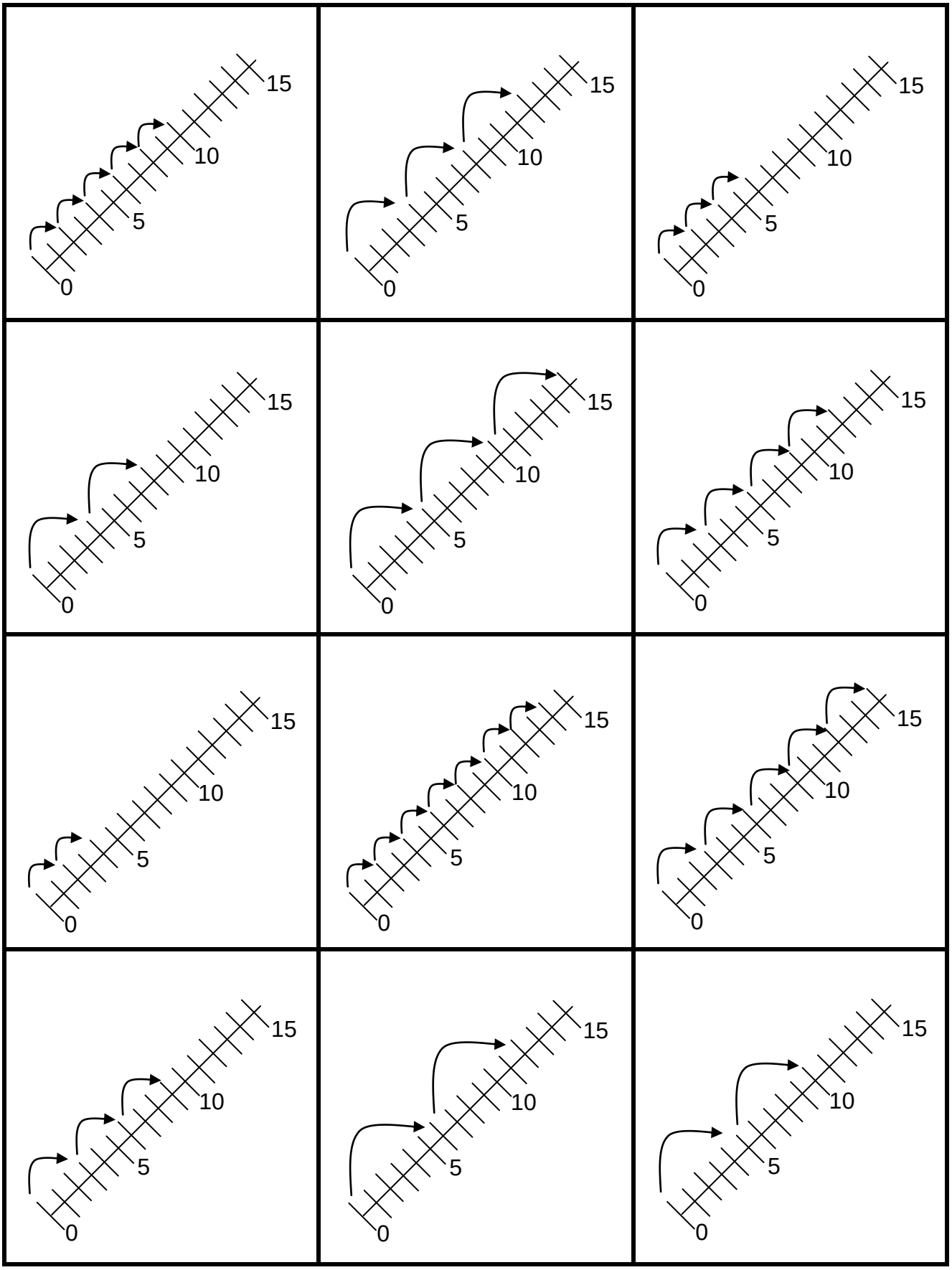
MC4 – Multiplication Cards (number line model)



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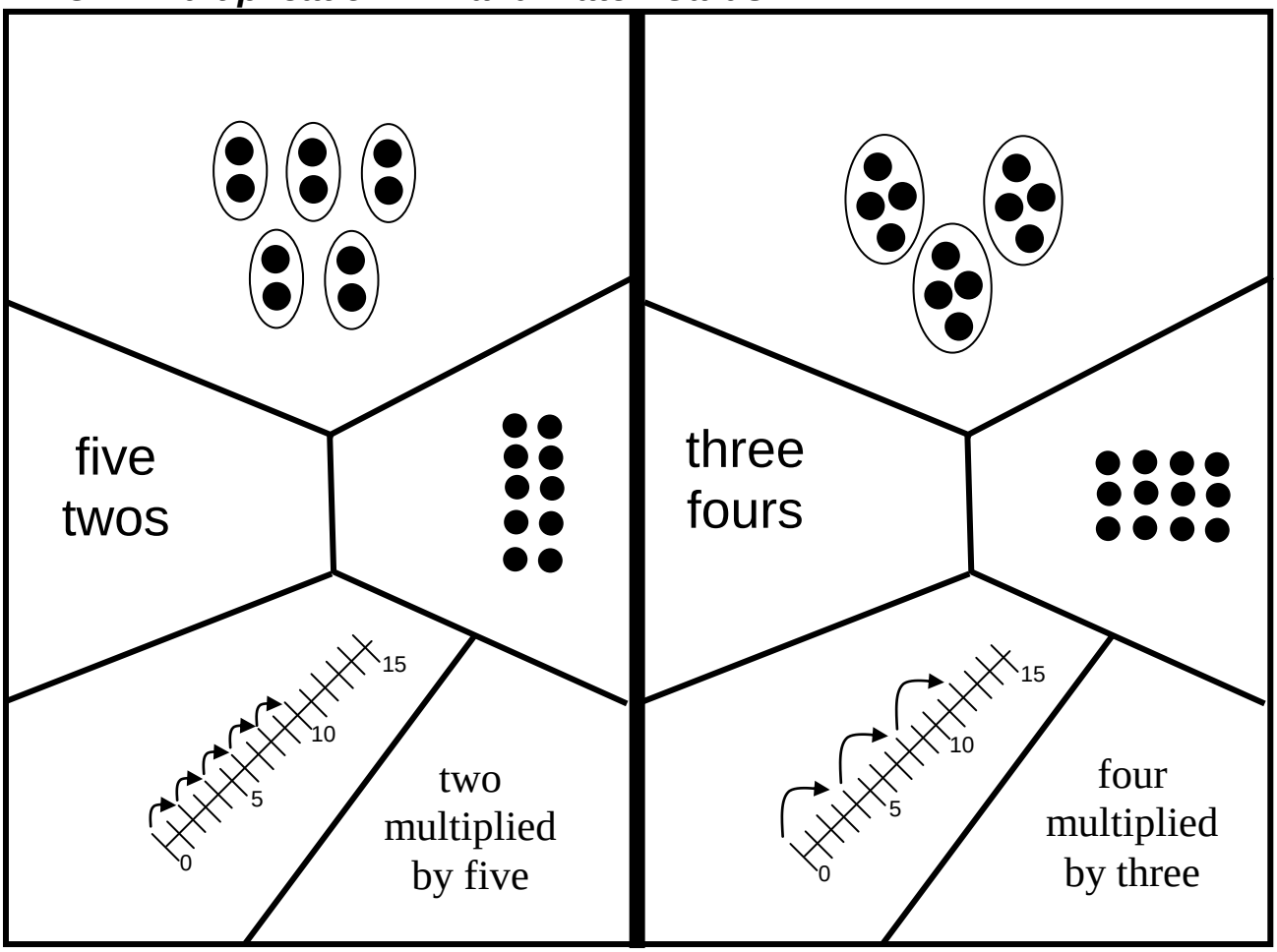
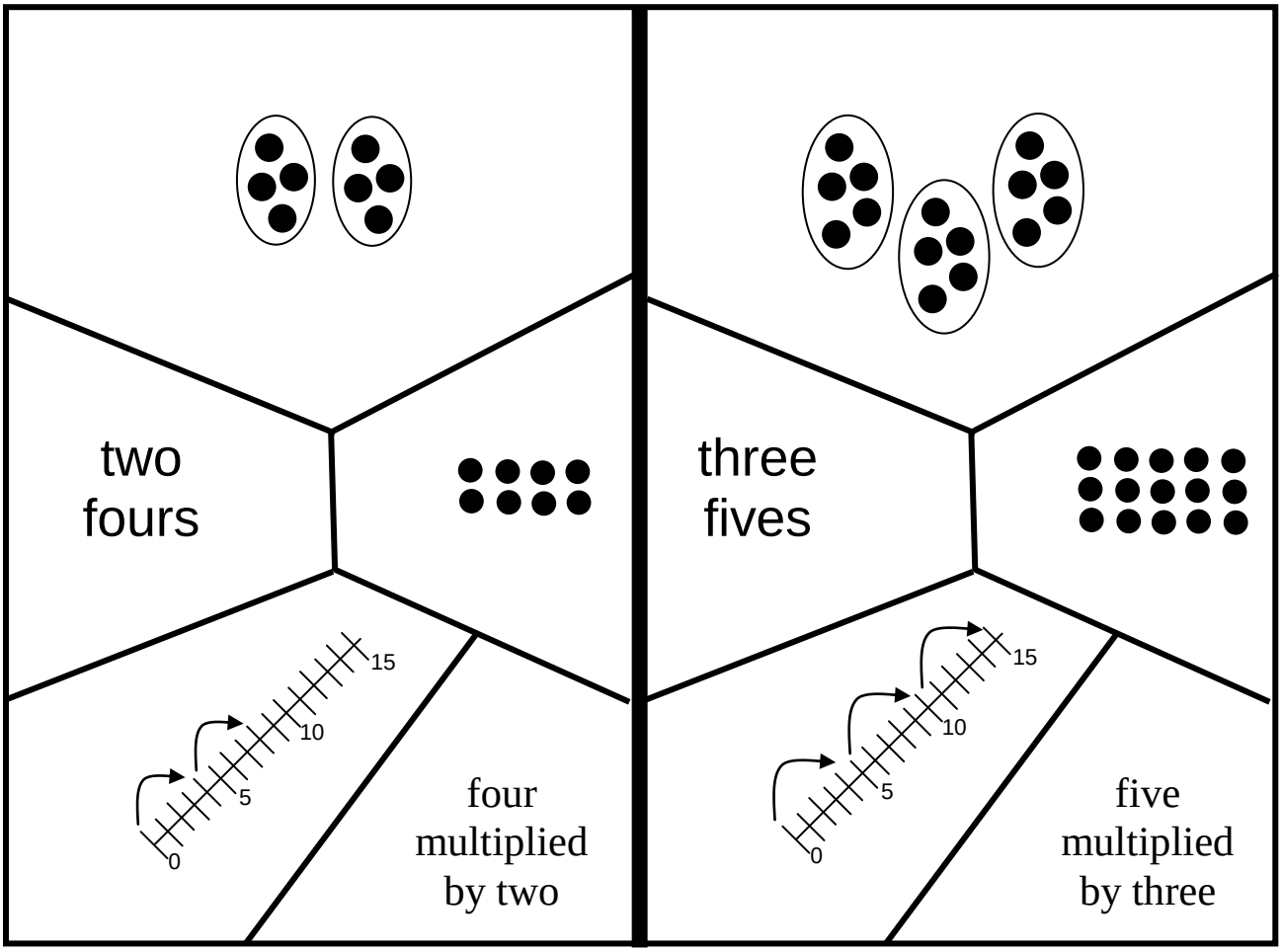
MC4 – Multiplication Mix and Match Cards





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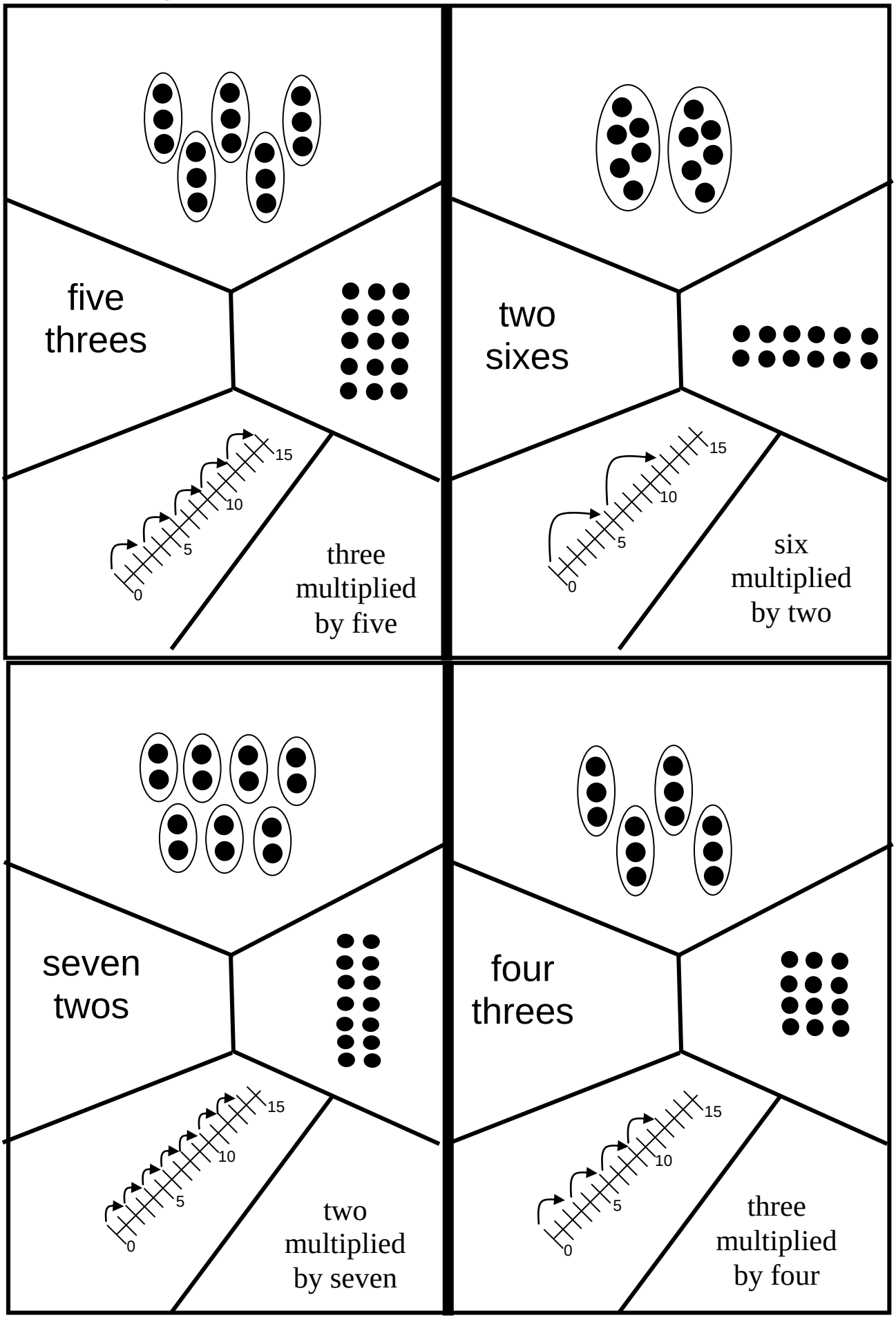
MC4 – Multiplication Mix and Match Cards (cont'd)



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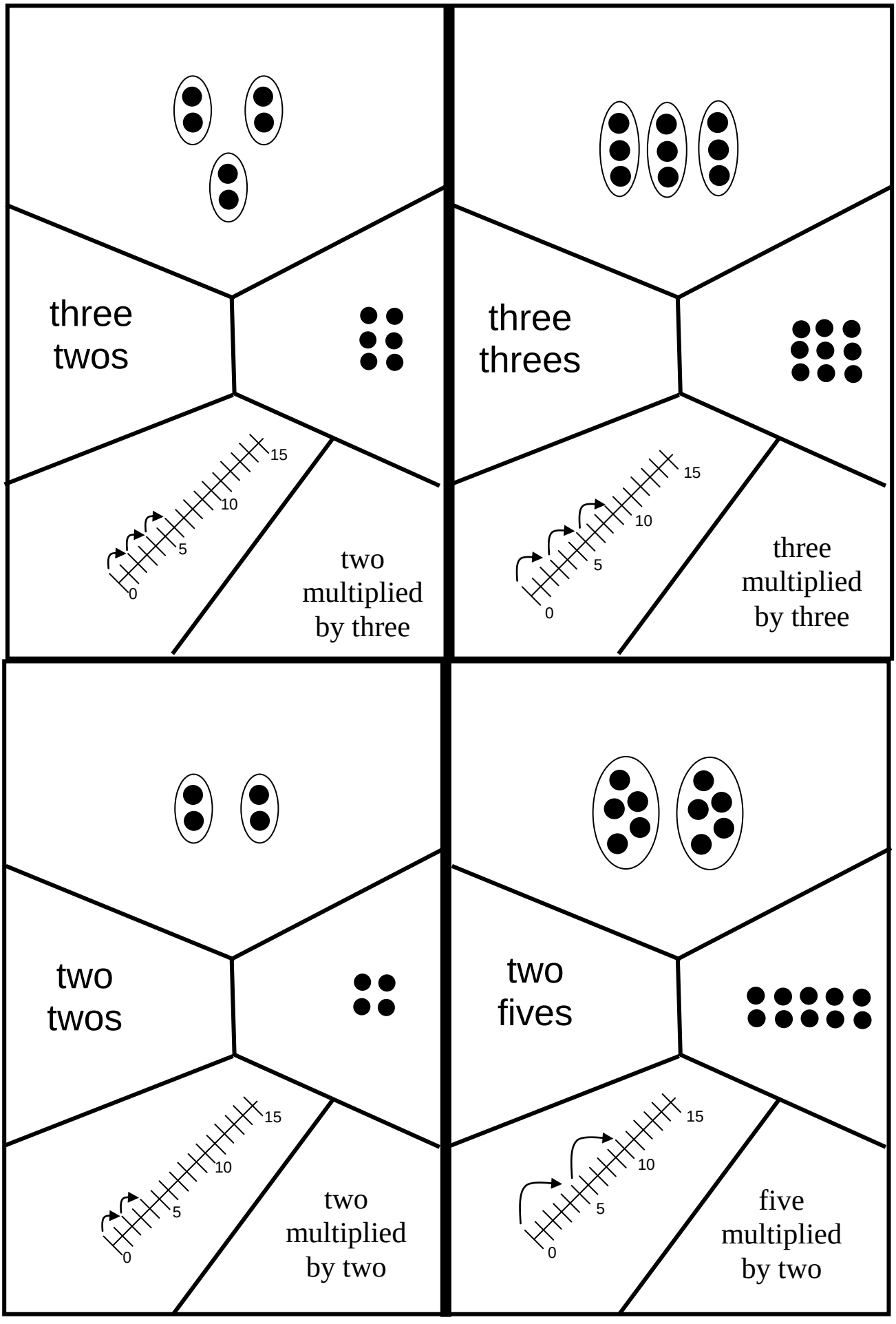
MC4 – Multiplication Mix and Match Cards (cont'd)



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MC4 – Multiplication Bingo Flash Cards (language 1)

five twos	three fours	three twos
two fours	three fives	four threes
two twos	seven twos	five threes
three threes	two sixes	two fives

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MC4 – Multiplication Bingo Flash Cards (language 2)

two multiplied by five	four multiplied by three	two multiplied by three
four multiplied by two	five multiplied by three	three multiplied by four
two multiplied by two	two multiplied by seven	three multiplied by five
three multiplied by three	six multiplied by two	five multiplied by two

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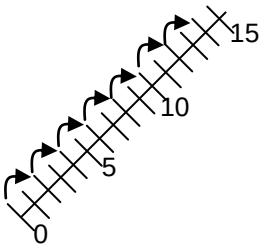
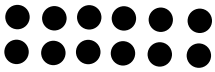
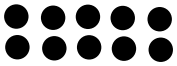
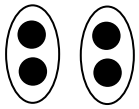
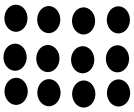
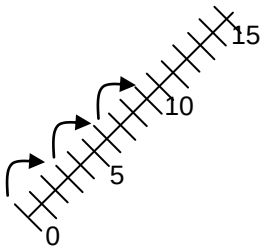
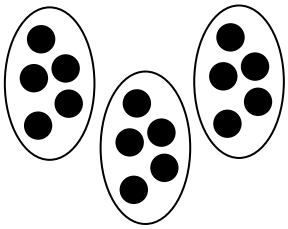
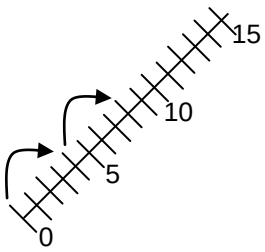
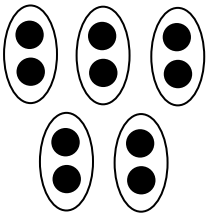
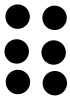
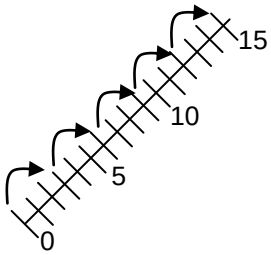
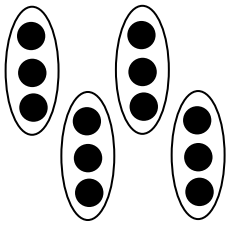
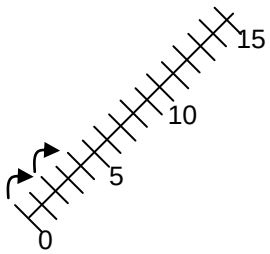
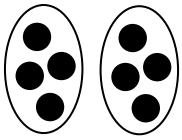
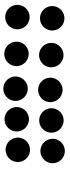
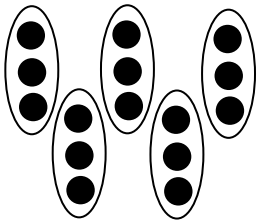
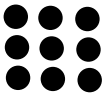
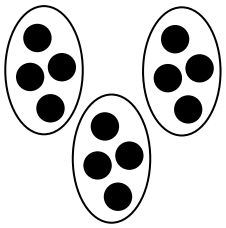
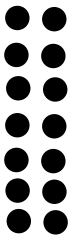
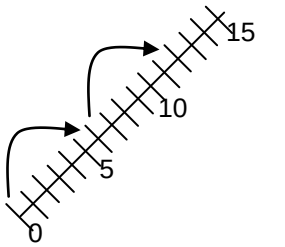
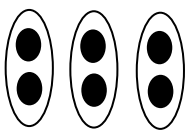
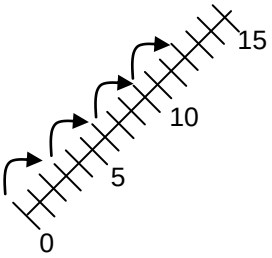
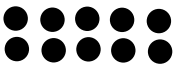
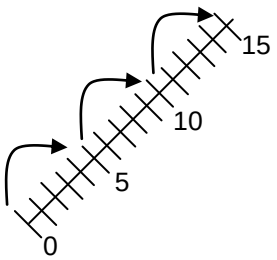
MC4 – Multiplication Bingo Boards

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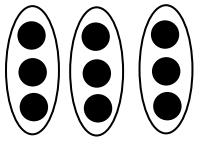
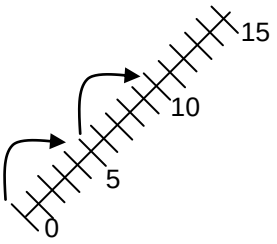
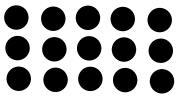
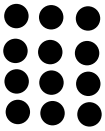
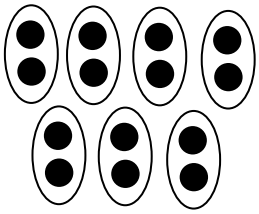
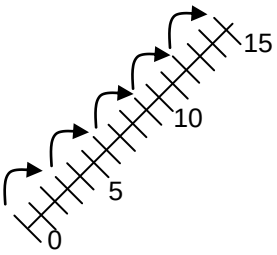
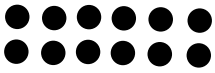
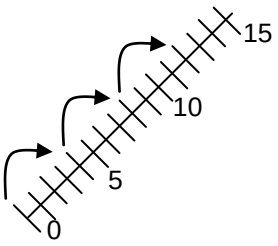
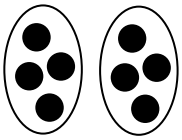
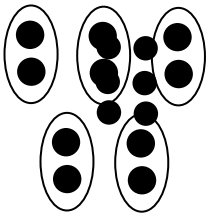
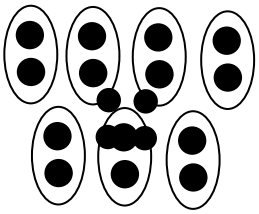
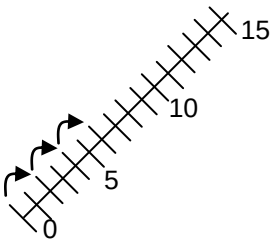
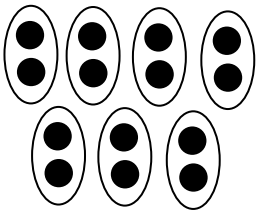
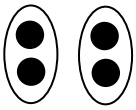
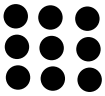
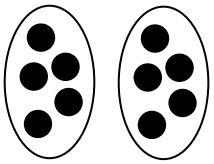
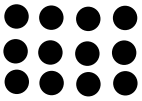
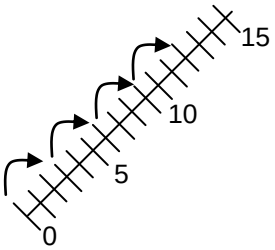
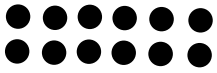
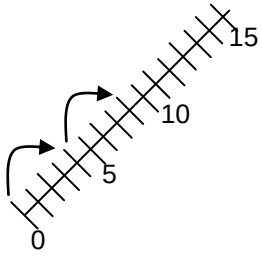
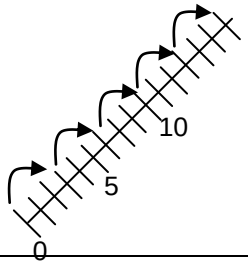
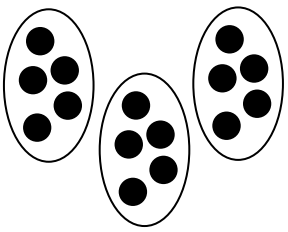
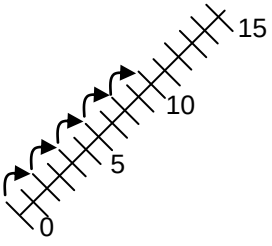
MC4 – Multiplication Bingo Boards continued

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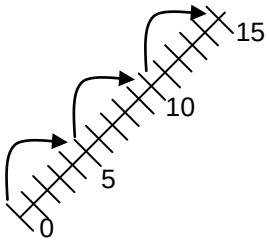
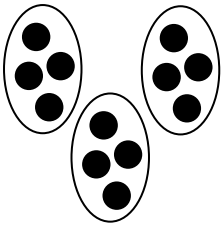
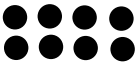
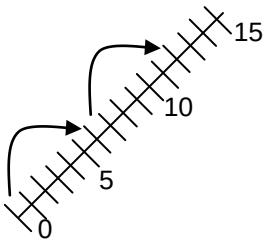
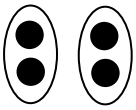
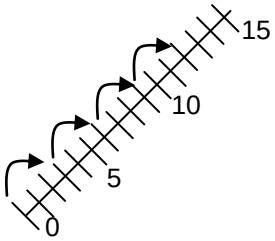
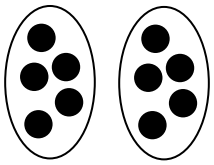
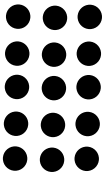
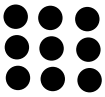
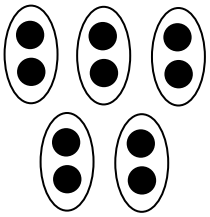
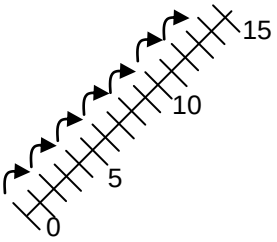
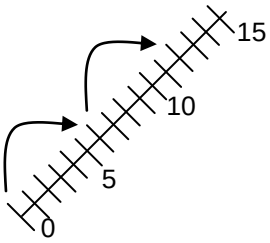
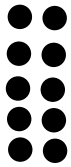
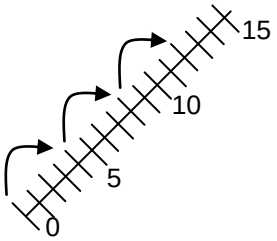
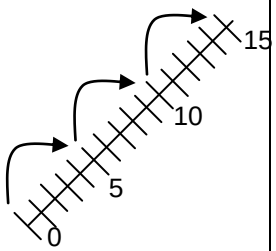
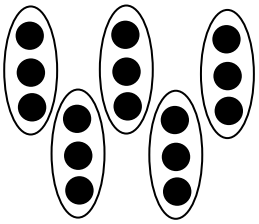
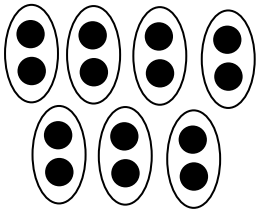
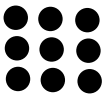
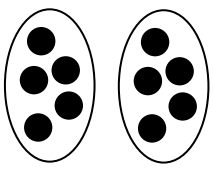
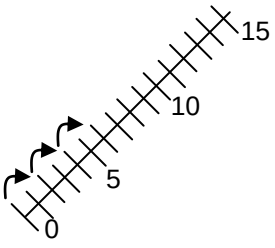
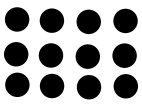
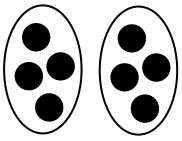
MC4 – Multiplication Bingo Boards continued

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MC4 Activity Feedback Sheet

1. How the student found the activity (put a cross on lines)

NAME	STUDENTS' REACTIONS
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning

2. How did you feel about trialling the activity?

   Mark the line with an X: Unconfident ——— Very confident

3. Do you think the student was engaged in the activity? Explain.

   _____

4. What do you think the student learnt from the activity?

   _____

5. Do you think the student has gained an understanding of the concept being taught? Explain.

   _____

6. What do you think of the activity?

   _____

7. What are your suggestions for improving the activity?

   _____

   _____

8. What else do you suggest could be done to help students who have trouble with this activity?

   _____

   _____

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ACTIVITY MC5

[Multiplication problem ←→ multiplication symbols]

Materials: Counters/unifix or objects (pens, shells, etc.), number tracks, pen, paper, attachments (worksheets, game rules, cards and boards)

Directions:

1. Tell a story, acting it out with imaginary people as you go. *There were 3 bags, each bag had 5 lollies. How many lollies were there altogether?*
2. Recap how to act this out with counters and to draw it with circles or other shapes, and say it with language (both types).
3. Ask students to write the story in symbols horizontally. If difficulty, ask: *How many groups are there?* [3] Write this number down. *How many in each group?* [5] Write this number on the right of the 3 leaving a gap. Ask: *How do we write the numbers being multiplied?* [×] Write this symbol between the 3 and the 5. How do we show what this is the same as? (=). Write = sign to right of the 5. Ask: *How many in total?* [15]. Write this number to the right of equals [3 × 5 = 15].
4. Repeat step 3 but write the symbols vertically as on right Stress that vertical is read bottom to top.

$$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$$

5. Tell a new story. *There were 4 rows of houses. 6 house were in each row. How many houses?* [24] Recap how to act it with unifix in rows, draw it and say it with language. Ask students to write the story in symbols, horizontally and vertically.
6. Tell a new story. *John did 5 jumps. Each jump covered 2 tiles. How many tiles were covered in all?* [10] Recap how to act it with unifix in rows, draw it and say it with language. Ask students to write the story in symbols, horizontally and vertically.
7. Repeat directions 3, 4, 5 and 6 for as many examples as needed from Worksheet 5.1.
8. Show a multiplication in symbols horizontally (e.g. 4 × 3 = 12). Ask: *Read this for me and draw drawings using the 3 methods: (a) set model – groups of unifix; (b) array model – rows of unifix; and (c) number line model – number tracks and number lines.*
9. Repeat step 8 as many times as needed using Worksheet 5.2 for multiplication in symbols horizontally (left column).
10. Show a multiplication in symbols vertically e.g. $\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$ Make up a story for these symbols. Ask: *Make up a story that gives a multiplication example. Try to think of stories about groups, rows and number lines.*
11. Repeat step 10 as many times as needed using Worksheet 5.2 for multiplication in symbols vertically (right column).
12. Play the following games: "Multiplication Symbols Snap", "Multiplication Symbols Rummy", "Multiplication Symbols Concentration", "Multiplication Symbols Mix & Match", "Multiplication Symbols Cover the Board" and "Multiplication Symbols Bingo". (Note: The rules for these games are in MC4, pp. 24 & 25.)

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MC5 – Worksheet 5.1

For each of the following, act it out with materials, write the operation in language and write the operation in symbols (2 ways).

1. There were 3 rows of trees, each row had 2 trees. How many trees altogether?	2. The kangaroo did 6 bounds. In each bound he jumped 3 metres. How far did the kangaroo go?
3. I had 4 envelopes of money. Each envelope had $5. How much money was there?	4. Each day I ran 5 blocks. How far did I run in 3 days?
5. The 5 boats came to shore. Each had caught 6 fish. How many fish were there?	6. Jenny lined her shells up. She had 4 rows with 7 shells in each row. How many shells?
7. Kate walked 8 blocks to and from school. How many blocks did she walk in 6 days?	8. The trees stood in 7 rows. There were 7 trees in each row. How many trees altogether?

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MC5 – Worksheet 5.2

For each of the following horizontal sums, read the operation, act it out with materials and draw drawings. Do this for the three models – set, array and number line. For each of the vertical sums, make up a story for the symbols.

1. $3 \times 3 = 9$	1. $\begin{array}{r} 4 \\ \times\ 2 \\ \hline 8 \end{array}$
2. $2 \times 7 = 14$	2. $\begin{array}{r} 4 \\ \times\ 6 \\ \hline 24 \end{array}$
3. $3 \times 8 = 24$	3. $\begin{array}{r} 7 \\ \times\ 5 \\ \hline 35 \end{array}$
4. $6 \times 7 = 42$	4. $\begin{array}{r} 9 \\ \times\ 8 \\ \hline 72 \end{array}$
5. $3 \times 5 = 15$	5. $\begin{array}{r} 3 \\ \times\ 5 \\ \hline 15 \end{array}$
6. $6 \times 3 = 18$	6. $\begin{array}{r} 6 \\ \times\ 3 \\ \hline 18 \end{array}$

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MC5 – Multiplication Symbols Cards/Baseboard (symbols 1)

5×2	3×4	3×2
2×4	3×5	4×3
2×2	7×2	5×3
3×3	2×6	2×5

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MC5 – Multiplication Symbols Cards/Baseboard (symbols 2)

2×5	4×3	2×3
4×2	5×3	3×4
2×2	2×7	3×5
3×3	6×2	5×2

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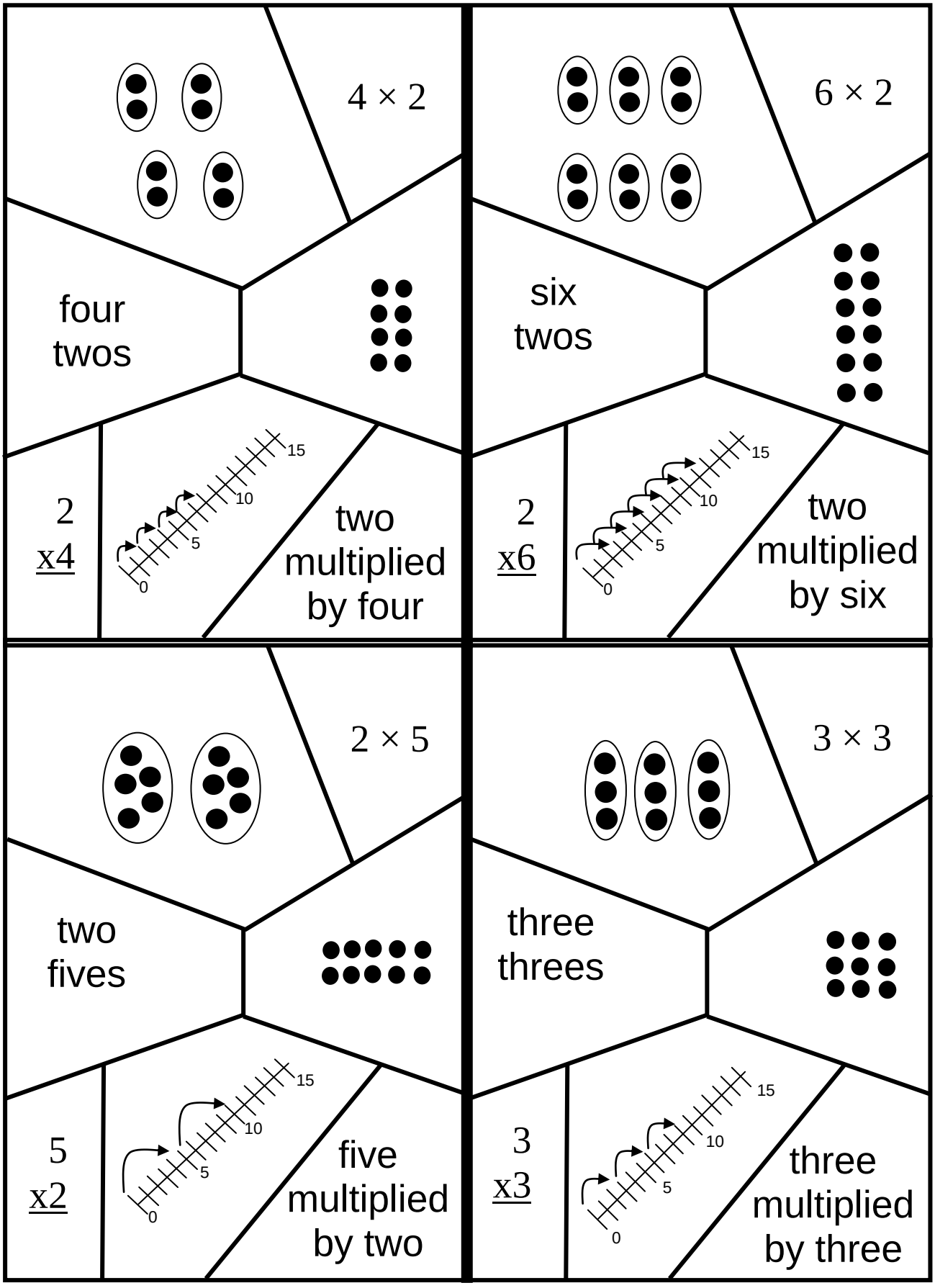
MC5 – Multiplication Symbols Mix and Match Cards



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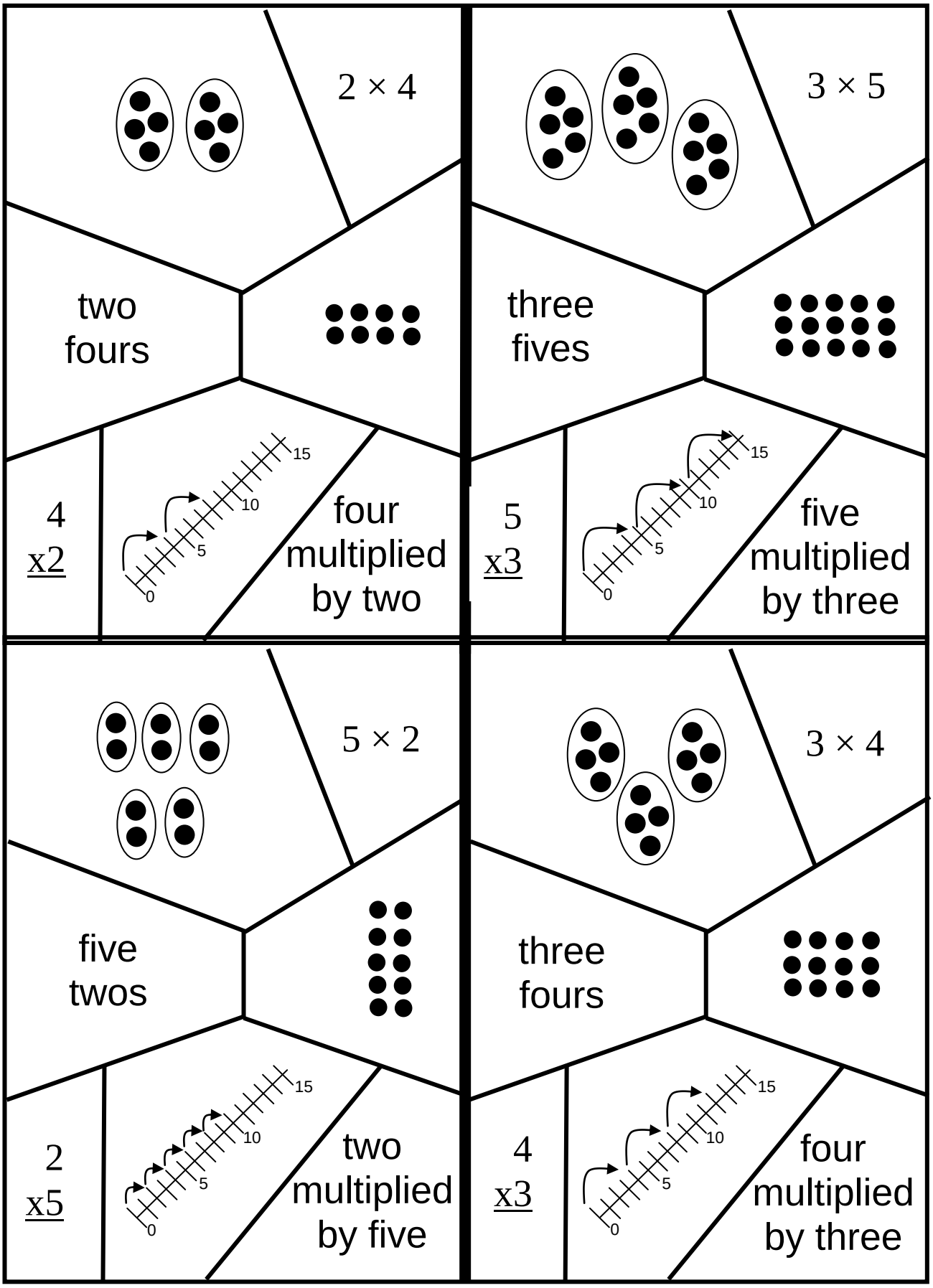
MC5 – Multiplication Symbols Mix and Match Cards



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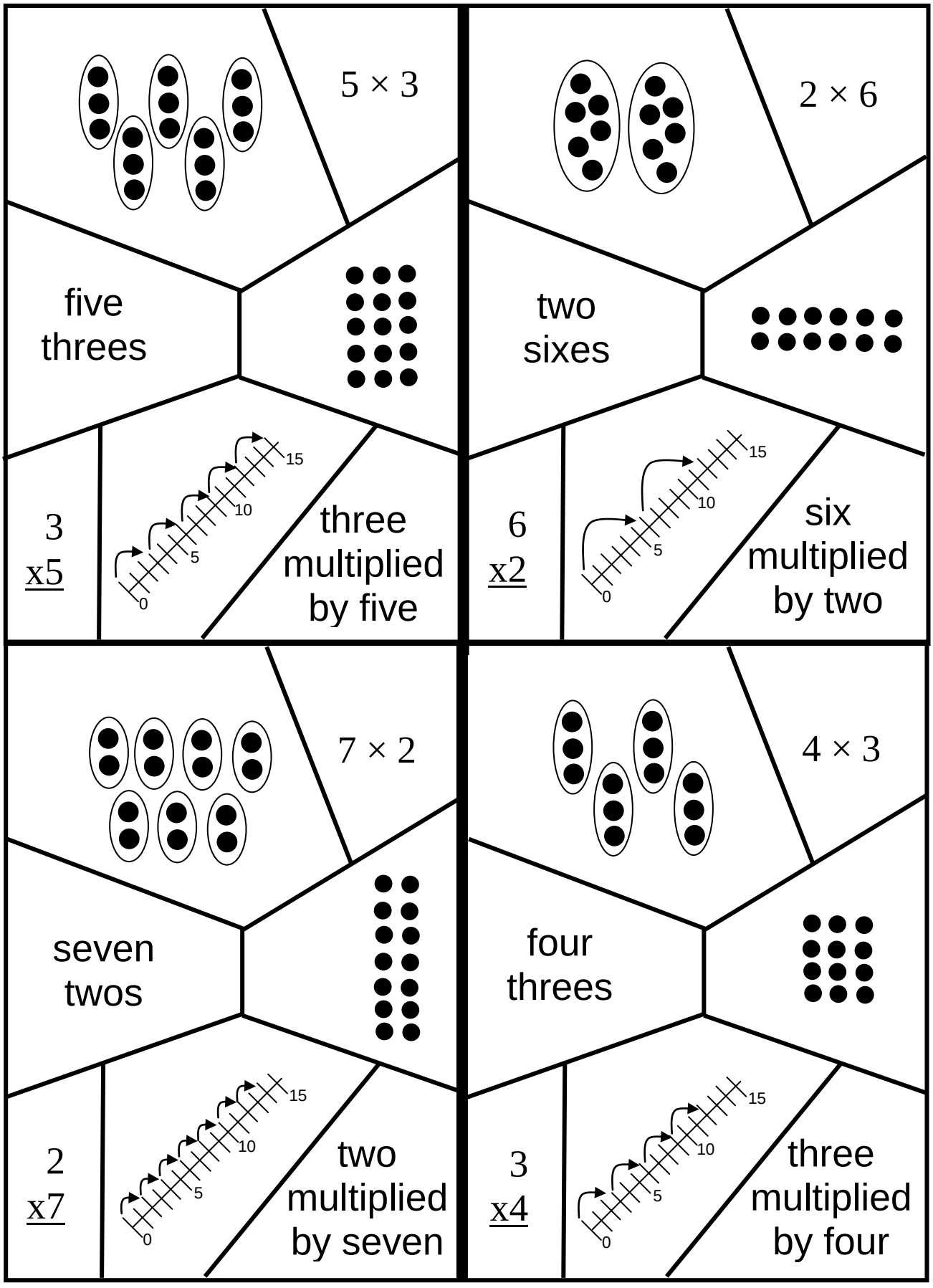
MC5 – Multiplication Symbols Mix and Match Cards



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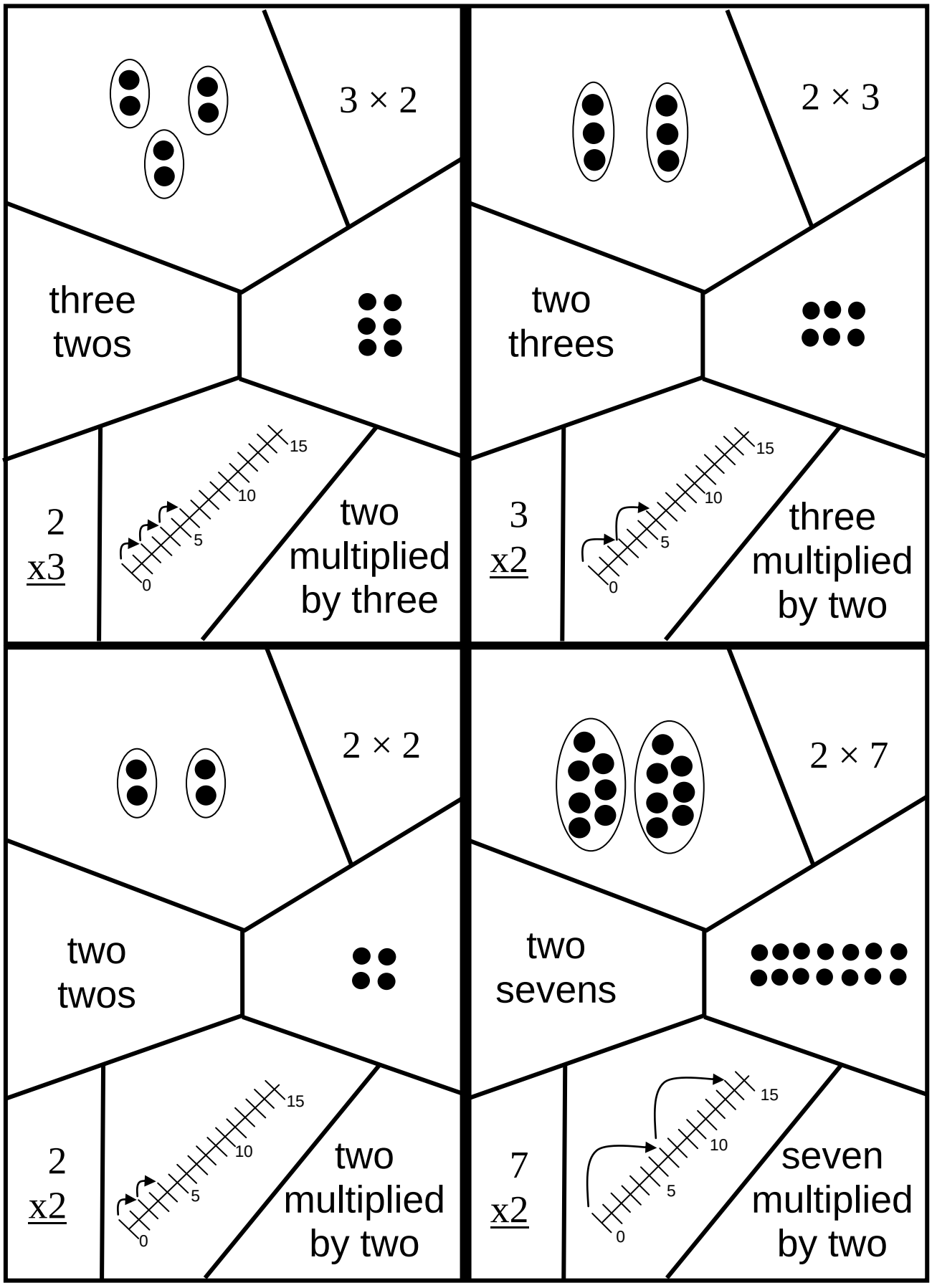
MC5 – Multiplication Symbols Mix and Match Cards



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MC5 – Multiplication Symbols Bingo Flash Cards (symbols 1)

5×2	3×4	3×2
2×4	3×5	4×3
2×2	7×2	5×3
3×3	2×6	2×5

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MC5 – Multiplication Symbols Bingo Flash Cards (symbols 2)

2×5	4×3	2×3
4×2	5×3	3×4
2×2	2×7	3×5
3×3	6×2	5×2

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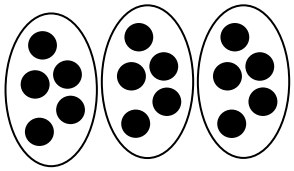
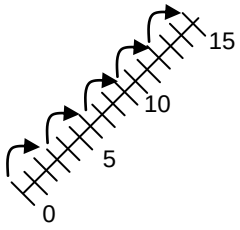
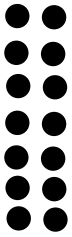
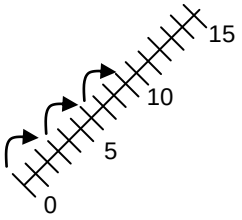
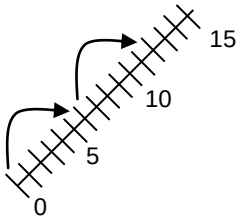
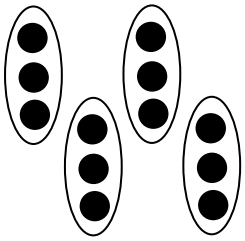
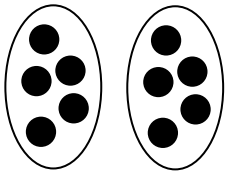
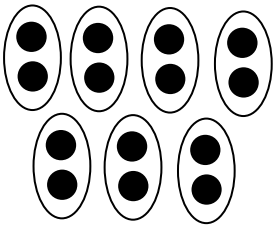
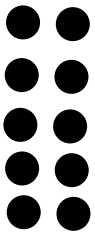
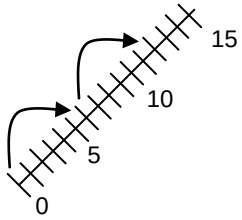
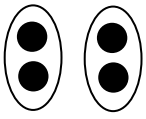
MC5 – Multiplication Symbols Bingo Boards

		two multiplied by three	
	five twos		
four multiplied by two			three fours

five multiplied by three	three twos		
	four multiplied by three		three multiplied by four
		two fours	

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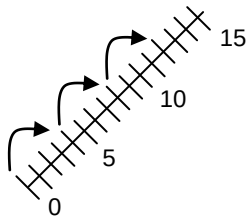
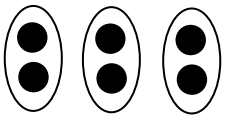
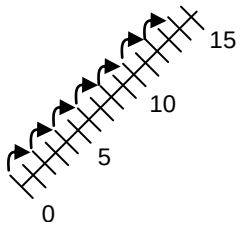
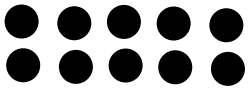
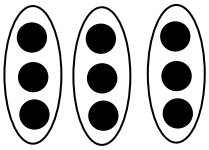
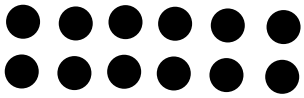
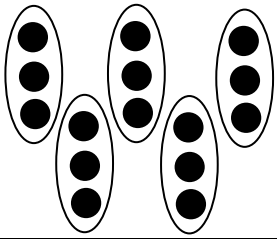
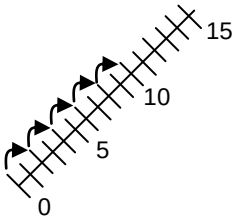
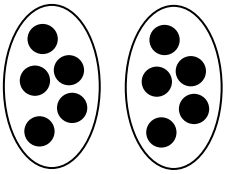
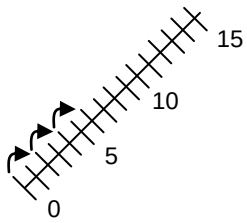
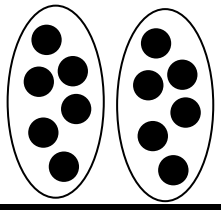
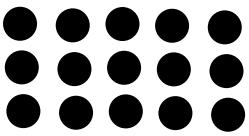
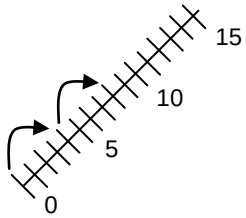
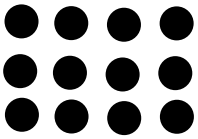
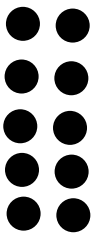
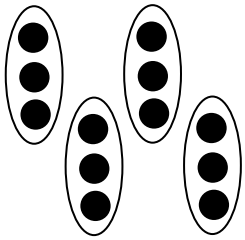
MC5 – Multiplication Symbols Bingo Boards (cont'd)

	three fives	two multiplied by two	
			
four multiplied by two			four threes

		three multiplied by five	
seven twos	three multiplied by three		
	two twos		

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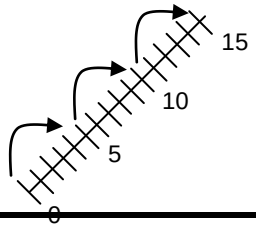
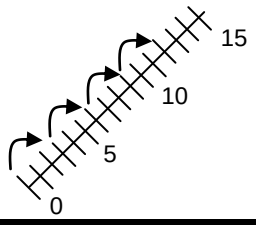
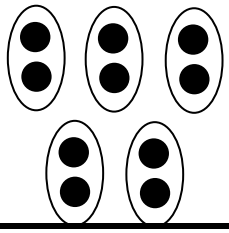
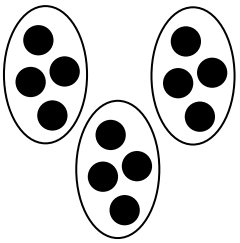
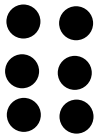
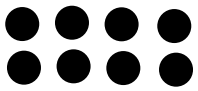
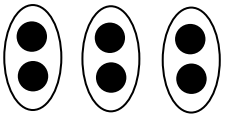
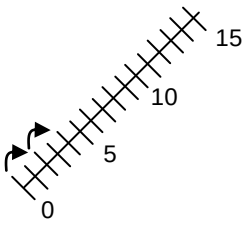
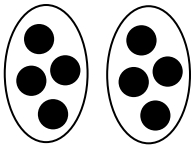
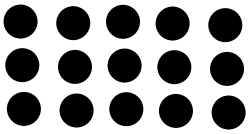
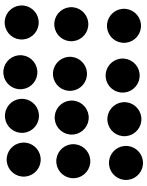
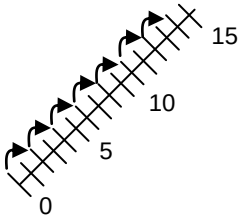
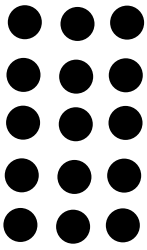
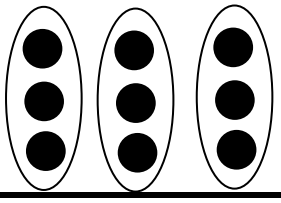
MC5 – Multiplication Symbols Bingo Boards (cont'd)

five threes			
	two multiplied by seven	six multiplied by two	
	three threes	five multiplied by two	

two sixes	two multiplied by five		
			
	two fives	four multiplied by three	

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MC5 Activity Feedback Sheet

1. How the student found the activity (put a cross on lines)

NAME	STUDENTS' REACTIONS
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning
	Boring ——— Interesting Difficult ——— Easy Not learning ——— Learning

2. How did you feel about trialling the activity?

   Mark the line with an X: Unconfident ——— Very confident

3. Do you think the student was engaged in the activity? Explain.

   _____

4. What do you think the student learnt from the activity?

   _____

5. Do you think the student has gained an understanding of the concept being taught? Explain.

   _____

6. What do you think of the activity?

   _____

7. What are your suggestions for improving the activity?

   _____

   _____

8. What else do you suggest could be done to help students who have trouble with this activity?

   _____

   _____