



YUMI DEADLY CENTRE
School of Curriculum

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Professional Learning 5

Multiplication and Division

Booklet 5.2: Concept of Division



Queensland University of Technology



Australian Catholic University



Queensland
Government
Education Queensland

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)

DEADLY MATH TUTORS PROGRAM

Professional Learning 5: Multiplication and Division

CONCEPT OF DIVISION

TRIAL PACKAGE 2

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for

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Contributing EQ Organisations

Mount Isa EQ Regional Office	Mornington Island State School
Boulia State School	Urundangi State School
Burketown State School	Indigenous Education and
Dajarra State School	Indigenous School Support Unit
Doomadgee State School	

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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Queensland University of Technology,
Australian Catholic University &
Education Queensland

Deadly Maths Tutor Program

PROFESSIONAL LEARNING 5: MULTIPLICATION AND DIVISION

BOOKLET 5.2 CONCEPT OF DIVISION 2008

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Boulia State School	Sunset State School
Burketown State School	Urandanji State School
Dajarra State School	Indigenous Education and Training Alliance
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YuMi Deadly Centre
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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 second 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 division. 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.

INTERVIEW SCHEDULE

Materials:

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

Materials within this booklet: interview questions, interview cards, number tracks and number lines, 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.

Division Interview Questions

<p style="text-align: center;">D1</p>	<p>Show and read problem on Card 1</p> <ul style="list-style-type: none"> • Say: <i>Act out what the problem is doing with the Unifix cubes/counters.</i> • Say: <i>Draw what the problem is doing in some way. Use circles for wallabies.</i> <p>Repeat this for Card 2 and Card 3</p> <ul style="list-style-type: none"> • Say: <i>Use counters for Card 2 and number tracks/lines for Card 3.</i>
<p style="text-align: center;">D2</p>	<p>Show and read Card 1 again</p> <ul style="list-style-type: none"> • Say: <i>Read the problem in formal mathematics language</i> • If difficulty, say: <i>Can you say this problem using the words “divided” and “equals”?</i> <p>Repeat this for Cards 2 and 3.</p>
<p style="text-align: center;">D3</p>	<p>Show and read Card 1 again</p> <ul style="list-style-type: none"> • Say: <i>Write this in symbols. Can you write it two ways?</i> <p>Repeat this for Cards 2 and 3.</p>
<p style="text-align: center;">D4</p>	<p>Show and read problem on Card 4</p> <ul style="list-style-type: none"> • Say: <i>Act out what the problem is doing with the Unifix cubes/counters.</i> • Say: <i>Draw what the problem is doing in some way. Use circles for wallabies.</i> <p>Repeat this for Card 5 and Card 6</p> <ul style="list-style-type: none"> • Say: <i>Use counters for Card 5 and number tracks/lines for Card 6.</i>
<p style="text-align: center;">D5</p>	<p>Show and read Card 4 again</p> <ul style="list-style-type: none"> • Say: <i>Read the problem in formal mathematics language</i> • If difficulty, say: <i>Can you say this problem using the words “divided” and “equals”?</i> <p>Repeat this for Cards 5 and 6.</p>
<p style="text-align: center;">D6</p>	<p>Show and read Card 4 again</p> <ul style="list-style-type: none"> • Say: <i>Write this in symbols. Can you write it two ways?</i> <p>Repeat this for Cards 5 and 6.</p>
<p style="text-align: center;">D7</p>	<p>Show and read Card 7</p> <ul style="list-style-type: none"> • Say: <i>Read this number sentence in formal language</i>
<p style="text-align: center;">D8</p>	<p>Show and read Card 7 again</p> <ul style="list-style-type: none"> • Say: <i>Can you draw and act it out as a grouping problem? Can you draw and act out grouping in terms of groups, rows and jumps?</i>
<p style="text-align: center;">D9</p>	<p>Show and read Card 7 again</p> <ul style="list-style-type: none"> • Say: <i>Can you make up a grouping problem that the number sentence describes? Can you do it in terms of groups, rows and jumps?</i>
<p style="text-align: center;">D10</p>	<p>Show and read Card 7 again</p> <ul style="list-style-type: none"> • Say: <i>Can you draw and act it out as a sharing problem? Can you draw and act out sharing in terms of groups, rows and jumps?</i>
<p style="text-align: center;">D11</p>	<p>Show and read Card 7 again</p> <ul style="list-style-type: none"> • Say: <i>Can you make up a sharing problem that the number sentence describes? Can you do it in terms of groups, rows and jumps?</i>

INTERVIEW MATERIAL**CARDS**

<p style="text-align: center;">CARD 1</p> <p>Twelve wallabies were shared amongst 3 families. How many wallabies were given to each family?</p>	<p style="text-align: center;">CARD 2</p> <p>Twelve trees were planted into 3 rows. How many trees in each row?</p>
<p style="text-align: center;">CARD 3</p> <p>John cleared the 12 sticks in 3 equal jumps. How many sticks were covered in each jump?</p>	<p style="text-align: center;">CARD 4</p> <p>Twelve wallabies were put into groups of three. How many groups were there?</p>
<p style="text-align: center;">CARD 5</p> <p>Twelve trees were to be planted in rows of 3. How many rows?</p>	<p style="text-align: center;">CARD 6</p> <p>John jumped along the 12 sticks. Each jump covered 3 sticks. How many jumps?</p>
<p style="text-align: center;">CARD 7</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div data-bbox="245 1756 507 1816"> $12 \div 3 = 4$ </div> <div data-bbox="906 1688 1177 1816"> $\begin{array}{r} 4 \\ 3 \overline{) 12} \end{array}$ </div> </div>	

NUMBER TRACKS

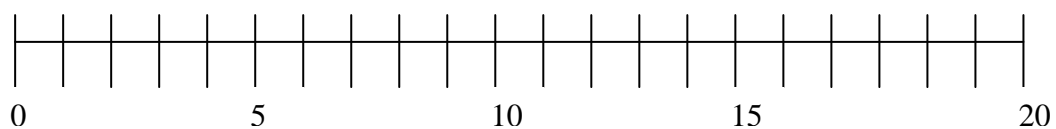
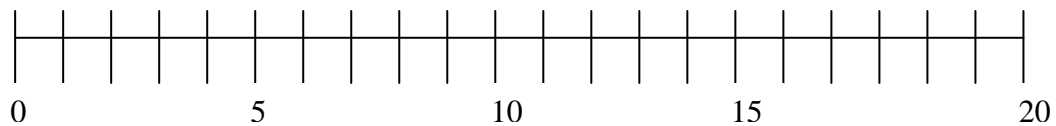
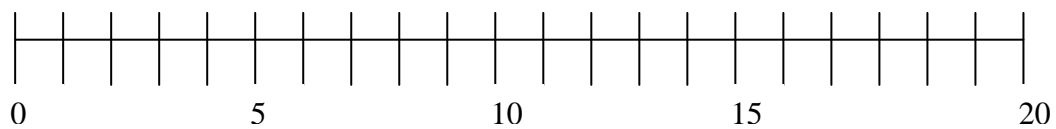
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NUMBER LINES



STUDENT RECORDING SHEET

Name: _____

School/Class: _____

Interview item	Result (✓, ✗)	Comments	Activities to be completed if incorrect
D1: sharing division problem → models/activities/drawings			DC1
D2: sharing division problem → formal division language			DC2
D3: sharing division problem → symbols			DC5
D4: grouping division problem → models/activities/drawings			DC3
D5: grouping division problem → formal division language			DC4
D6: grouping division problem → symbols			DC5
D7: symbols → formal division language			DC5
D8: symbols → grouping activities (all models)			DC4
D9: symbols → grouping problems (all models)			DC3
D9: symbols → sharing activities (all models)			DC2
D10: symbols → sharing problems (all models)			DC1

INTRODUCTION

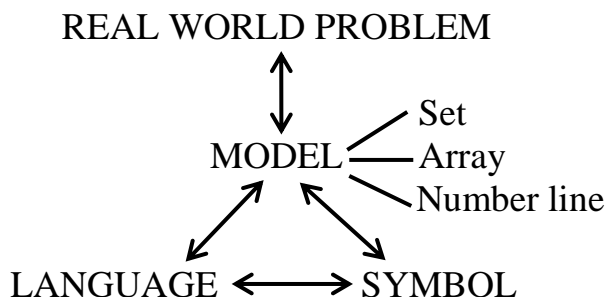
Contents

This package contains:

- five tutoring activities (DC1 to DC5) and their students materials (games and worksheets);

Pedagogy


The activities DC1 to DC5 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.

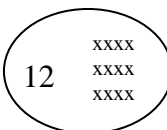



There are two methods of dividing and three models. The two approaches are:

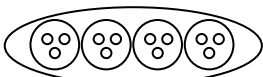
- (1) Sharing: where $12 \div 3$ means sharing into 3 groups and finding how many are in each group, and
- (2) Grouping: where $12 \div 3$ means grouping into groups of 3 and finding how many groups. The three models are set, array (rows and columns) and number lines.

This gives six ways for $12 \div 3$ as follows. To assist with the complexity of these ways, we have divided this booklet so we do sharing and grouping separately at the start.

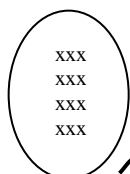
- (1) Sharing – set: $12 \div 3$ is  answer is number in each group.

- (2) Sharing – array: $12 \div 3$ is  answer is number in each row.

- (3) Sharing – number line: $12 \div 3$ is  answer is number of steps in each hop.

- (4) Grouping – set: $12 \div 3$ is  answer is number of groups.

(5) Grouping – array: $12 \div 3$ is



answer is number of rows.

(6) Grouping – number line: $12 \div 3$ is



answer is number of hops where each hop is three steps.

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 groups 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

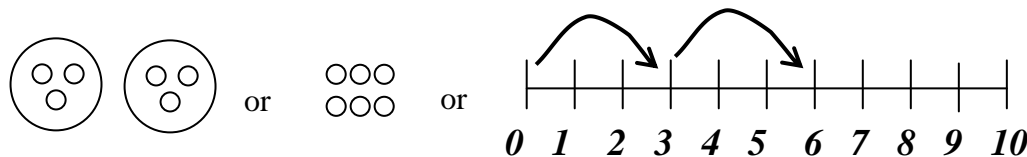
- differentiate between the operations (e.g. what is the difference between multiplication and addition); and
- relate the different ways of thinking about each operation (e.g. connecting different models, connecting drawings to actions to words and so on).

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; for example:

(1) $2 + 3$ is 2 things joined to 3 things and is



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



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

ACTIVITIES

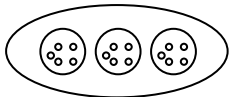
ACTIVITY DC1

[Sharing division problems \leftrightarrow sharing models]

Materials: Unifix, pen, paper, paper plates, objects (pens, shells etc. – better if natural and local), dot paper, number tracks, materials attached (worksheets, games)

Directions:

Set model sharing

1. Tell a sharing division set story, acting it out as you go. *I have fifteen objects and I share them amongst 3 groups (plates). How many (objects) do I have in each group?* Ask them to follow you with their counters/plates. *How many objects did I start with?* [15] State: *Show me these with your unifix/counters.* Ask: *How many groups do I share amongst?* [3] State: *Show me these 3 groups with your plates.* State: *Share out your counters as I share out my objects.* Ask: *How many counters/objects do you now have on each plate?* [5]
2. Ask students to draw the problem with circles to show the numbers. If needed, ask: *What did we do with the counters and plates? How can we draw this activity? What happens to the counters? How can we show this on the drawing? How many groups? How many in each group?* 
3. Repeat 1 & 2 with a new sharing division set story. *I have fifteen objects and 5 plates. How many objects on each plate?*

Array model sharing

4. Tell sharing division array story, for example: *There are 12 objects, put into 3 rows. How many objects in each row?* Act this story out with counters. Ask: *How many counters?* [12] *What do you do with them?* [make 3 rows] *How many in each row?* [4]
5. Ask the students to draw the problem with circles to show the rows or to circle the rows on dot paper. If needed, ask: *What did we do with the counters?* [put in 3 rows] *How can we draw this activity?* [draw 3 rows of circles] *How many in each row?* [4]
6. Repeat 4 & 5 with a new sharing division array story: *15 trees were placed in 3 rows, how many trees in each row?*

Number line model sharing

7. Make up a large number track with numbers 0 to 20 on A4 paper. Lay the numbers out on the floor so children can walk beside them counting as they go. Tell a sharing division number line story: *On a large number track I jumped to 8 in 2 jumps, how many spaces in each jump?* Act it out on the large number track. Ask: *How far did I jump in total?* [8] *How many jumps did I make?* [2] *How many spaces in each jump?* [4]

8. Ask the students to draw the problem on a small drawn number track or number line. If needed, ask: *What did I do on the number track?* [made 2 jumps to 8] *How can I show the 2 jumps?* [by arrows] *How many spaces for each arrow?* [4]
9. Repeat 7 & 8 with a new sharing division number line story: *I jumped to 15 using 5 jumps, how many spaces in each jump?*
10. Complete Worksheet 1.1. Discuss what makes all the examples sharing. Highlight that division is breaking a number into equal groups and that, in sharing, you are given the number of groups and have to find the number in each group.

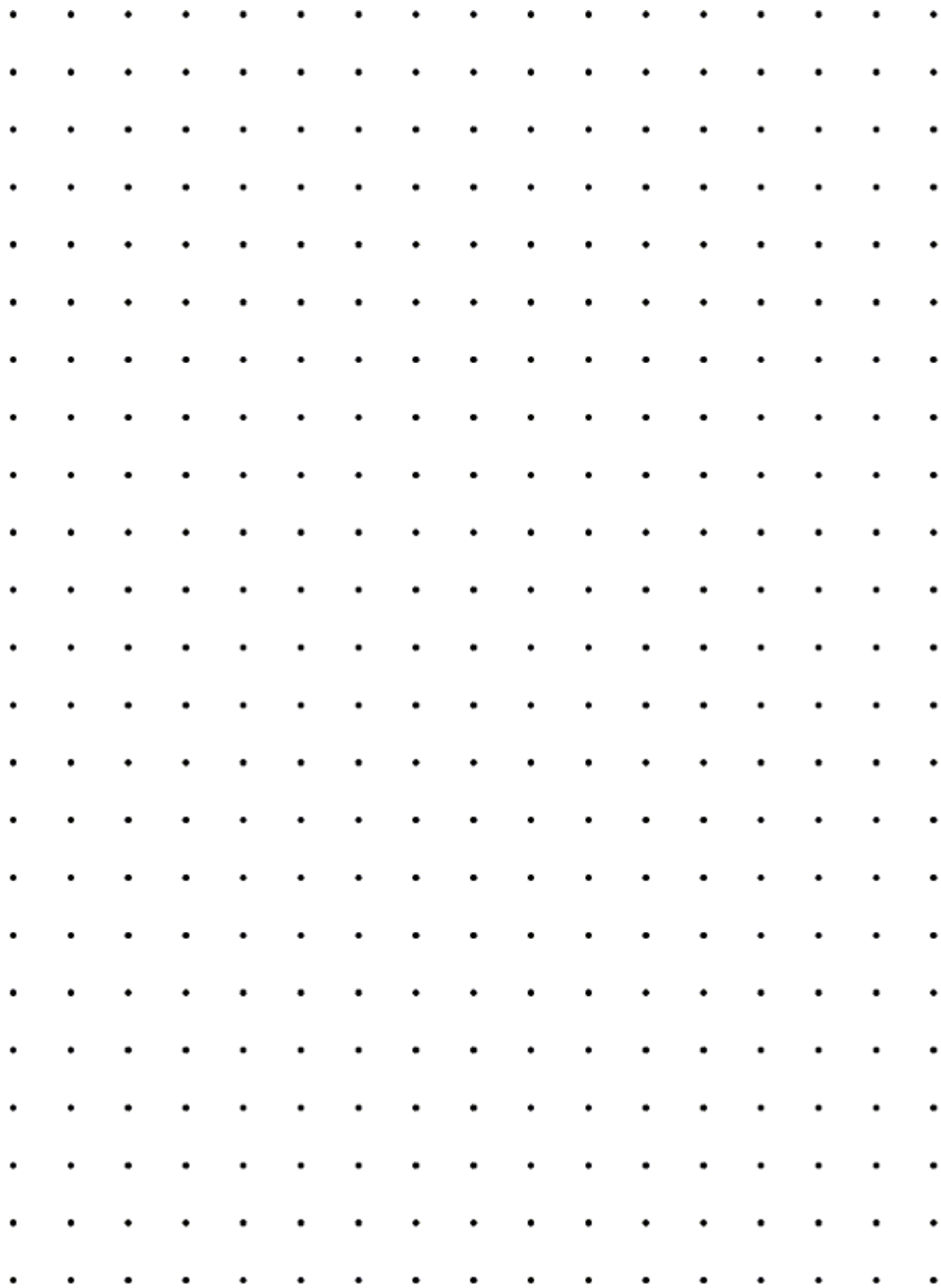
Reversing (models to problem)

11. Show the students the first three drawing on Worksheet 1.2. State: *These three drawings show groups, rows and jumps, the big circle or the end of jumps gives the total number, the number of groups, the number of rows and the number of jumps is the number sharing.* Ask the students: to act out each drawing with counters/number tracks. If difficulties, ask: *How many in total? How many groups/rows/jumps to share amongst? How many in each group/row/jump?* Then state: *Make up sharing problems that reflect the drawings!*
12. Complete Worksheet 1.2.

Practice

13. Play the games: “Sharing division Tic-Tac-Toe” and “Sharing division Racetrack”.

DC1 – Dot Paper



DC1 – Number Tracks

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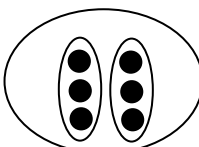
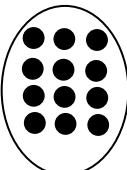
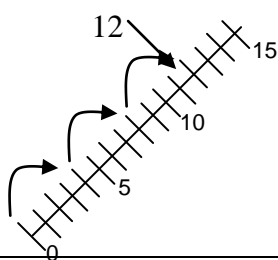
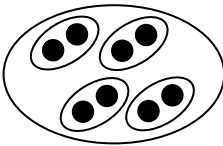

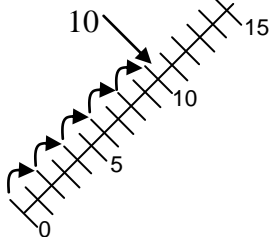
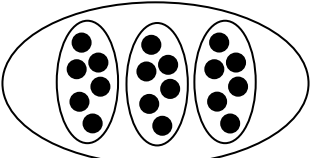
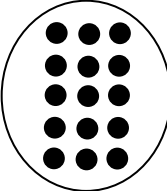
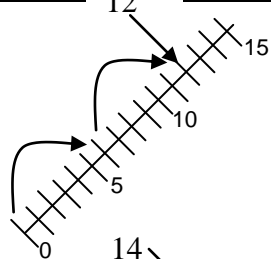
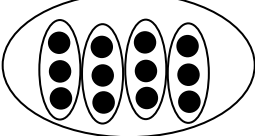
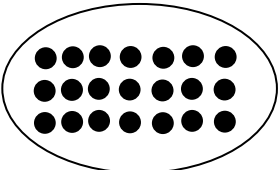
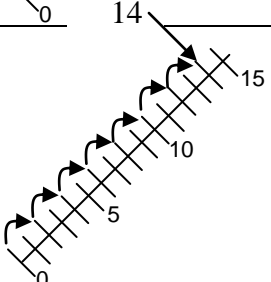
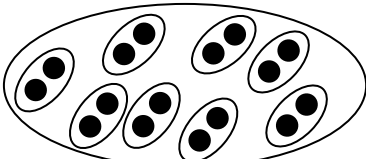
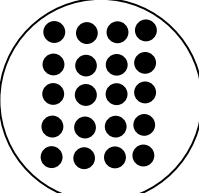
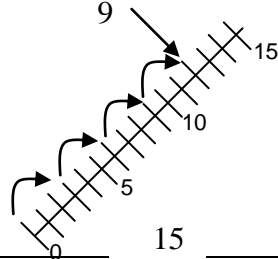
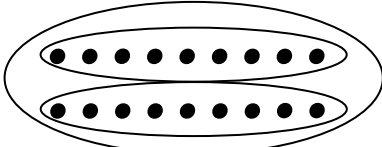
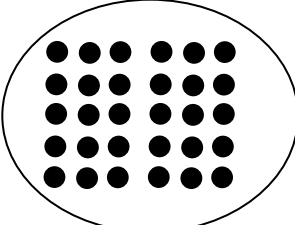
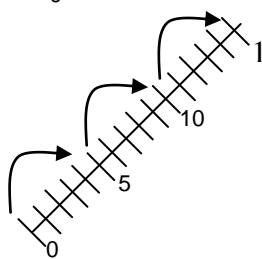
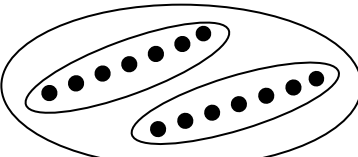
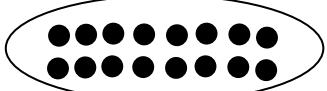
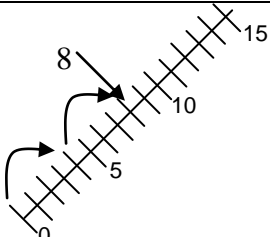
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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DC1 – Worksheet 1.1

1. I have 6 counters. I share them into 2 groups. How many counters in each group?	2. I have 15 counters. I share them into 5 rows. How many in each row?	3. I jumped 8 spaces in two jumps. How many spaces in each jump?
4. I have 12 lollies. I share them amongst 2 cousins. How many lollies does each cousin get?	5. I have 9 chairs. I put them into 3 rows. How many chairs in each row?	6. I cut the 14m post into two equal lengths. How long was each length?
7. There were 16 cockatiels sitting equally in 4 trees. How many in each tree?	8. 16 children were put into 2 rows. How many children in each row?	9. The 20m fence was painted in 4 equal sections. How long was each section?
10. I found 14 grubs equally in 2 trees. How many in each tree?	11. There were 12 bilbies standing in 4 rows. How many bilbies in each row?	12. John jumped over 21 pavers in 7 jumps. How many pavers in each jump?
13. I shared 15 eggs into 5 nests. How many in each nest?	14. There were 20 cockatiels sitting in 5 rows. How many in each row?	15. 16m was cut into 4 equal lengths. How many metres in each length?
16. There were 12 bilbies. I shared them amongst 4 burrows. How many per burrow?	17. 21 fish were laid out in 3 rows. How many fish in each row?	18. The 15km relay was run by 3 runners. How many km did each runner run?

DC1 – Worksheet 1.2

1. 	2. 	3. 
4. 	5. 	6. 
7. 	8. 	9. 
10. 	11. 	12. 
13. 	14. 	15. 
16. 	17. 	18. 
19. 	20. 	21. 

DC1 – Game: Sharing division Tic-Tac-Toe**Materials:** Deck of cards with

$4 \div 2$

$6 \div 3$

$4 \div 4$

$10 \div 10$

$14 \div 14$

$8 \div 4$

$10 \div 5$	$12 \div 6$	$6 \div 2$	$9 \div 3$	$12 \div 4$	$15 \div 5$	$18 \div 6$	$8 \div 2$	$12 \div 3$	$16 \div 4$
$10 \div 2$	$15 \div 3$	$20 \div 4$	$12 \div 2$	$15 \div 3$	$14 \div 2$	$9 \div 1$	$8 \div 1$	$16 \div 2$	$21 \div 3$

Number of players: 2

$18 \div 2$

Directions:

- 1) Shuffle the cards and players in turn choose a card.
- 2) Players use sharing counters into groups and rows and sharing spaces amongst jumps on number tracks to work out the answer to the division operation on their card.
- 3) Players put unifix cube of their colour on board to cover the answer to the division operation. If number already covered by opponent, then player places unifix over top of opponent's.
- 4) Winner is first with 3 in a row (across, down, or diagonal).

8	3	7
5	2	6
1	4	9

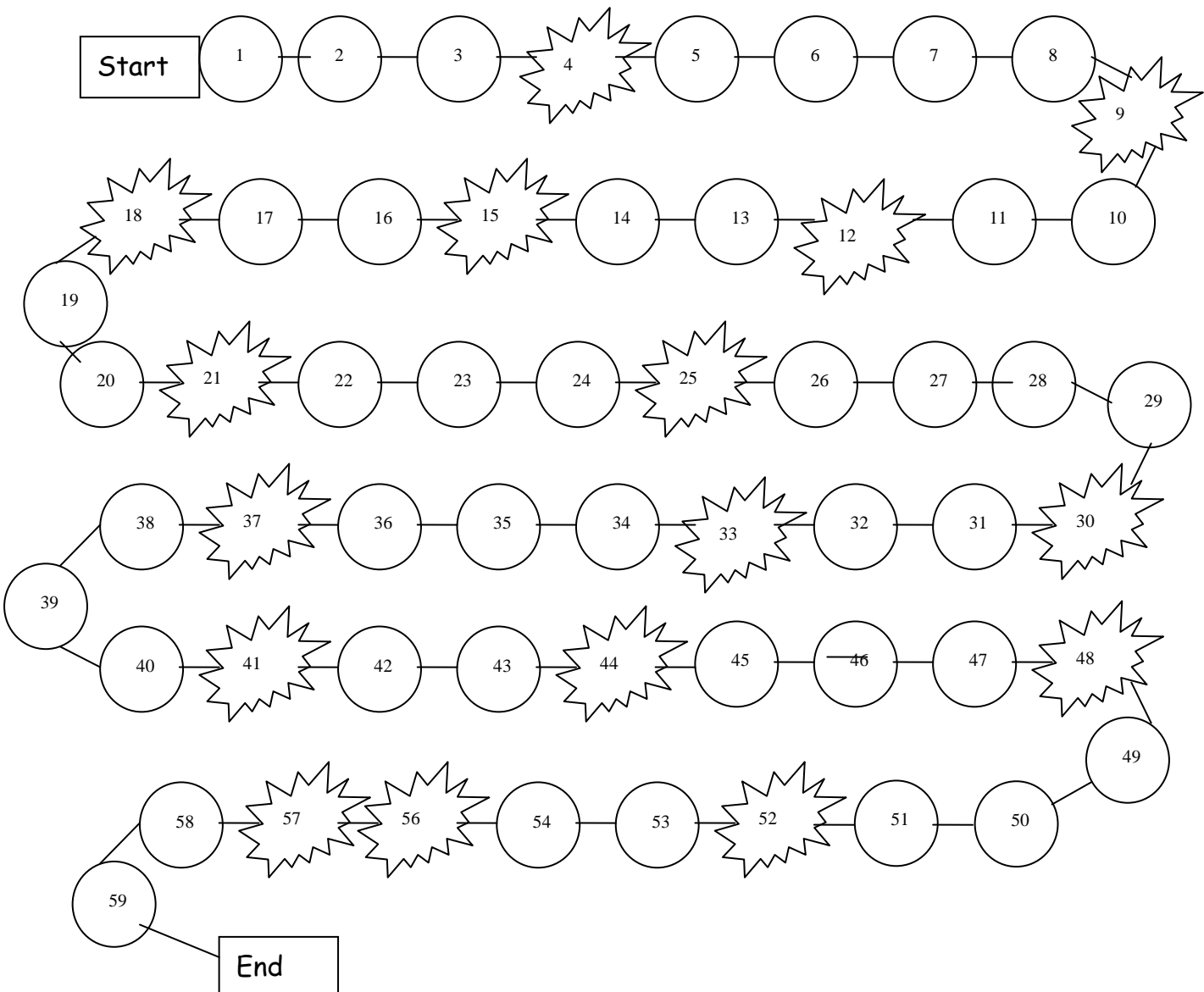
DC1 Game: Sharing division Race Track

Materials: Enlarged division Racetrack Gameboard, deck of cards with: $12 \div 6$, $18 \div 9$, $8 \div 4$, $9 \div 3$, $12 \div 4$, $21 \div 7$, $16 \div 4$, $20 \div 5$, $12 \div 3$, $15 \div 3$, $20 \div 4$, $30 \div 6$, $18 \div 3$, $24 \div 4$, $30 \div 5$, $14 \div 2$, $21 \div 3$, $28 \div 4$, $16 \div 2$, $24 \div 3$, $40 \div 5$, $18 \div 2$, $27 \div 3$, $36 \div 4$, $20 \div 2$, $30 \div 3$, $40 \div 4$, $22 \div 2$, $33 \div 3$, $24 \div 4$, $24 \div 2$, $48 \div 4$, $36 \div 3$, $15 \div 15$, $8 \div 8$, $11 \div 11$, different coloured counters for each player and dot paper.

Number of players: 2 – 4

Directions:

- 1) Players in turn select a card (cards are first shuffled) and calculate the answer to the division by sharing using counters/number tracks.
- 2) Players move their counters forward. At the star they move forward 3 spaces (landing on a second star doesn't count).
- 3) The winner is the first to the end.



DC1 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 DC2

[Sharing division problems \leftrightarrow Division language]

Materials: Counters/unifix, pen, paper, objects (pens, shells, etc.), plates, number tracks, material attached (worksheets, number cards, multiplication bingo board and cards, multiplication mix and match cards)

Directions:

Introducing formal maths language

1. Tell a set sharing story, acting it out with imaginary people as you go: *Jack had 15 lollies. He shared them among 5 friends. How many lollies did each friend have?* Recap how to act this out with counters and to draw it with circles or other shapes. Ask as they do this: *How many lollies did Jack have?* [15] *How many friends were there?* [5] *How many lollies did each friend get?* [3]. Then move on to: *What was the number of lollies?* [15] *What was the number of friends?* [5] *How many to each friend?* [3]
2. Ask students to state the story in formal mathematics language. If difficulty, ask: *How many lollies did Jack have?* [fifteen] *How many friends?* [five] *What do we call sharing?* [divide] *How many did each friend get?* [three] *What do we call getting an answer?* [equals] Say this: *fifteen divided by five equals three.* Repeat this relating it to sharing: *fifteen shared amongst five equals three; fifteen divided by five equals three.* Get students to point at the counters as they say the language.
3. Repeat 1 & 2 for an array sharing story: *There were 18 children. They lined up in 3 rows. How many children in each row?* [18 divided by 3 equals 6] Then repeat for a number line sharing story: *Jack ran twenty four blocks. He did it in 4 tries. How many blocks did he run each time?* [24 divided by 4 equals 6] Discuss the problems, act them out and draw them before generating the formal mathematics language.
4. Complete as many examples as needed using worksheet 2.1.

Reversing (formal maths language to problem)

5. Say: *Twelve divide three is four.* Ask students to act this out and draw drawings for it using the three models (set, array and number line). Make up a story for each of the models.
6. Complete as many examples as needed using worksheet 2.2.

Practice

7. Play the attached games. “Sharing division Snap”, “Sharing division Rummy”, “Sharing division Concentration”, “Sharing division Cover the Board”, “Sharing division Mix and Match”, and “Sharing division Bingo”.

DC2 – Worksheet 2.1

For each of the following problems:

- (a) act it out with materials and draw a diagram; and
- (b) write it in formal maths language.

1. 20 eggs were eaten by 4 goannas. How many eggs did each goanna eat?	2. I have 15 counters. I shared them into 5 rows. How many in each row?	3. I jumped 18 spaces in 6 jumps. How many spaces per jump?
4. There were 3 hens that laid 18 eggs. How many eggs did each hen lay?	5. There were 20 bilbies in 4 rows. How many bilbies per row?	6. Jack ran 5 times. Overall, he ran 20 blocks. How many blocks in each run?
7. Rob caught 15 fish in total. He shared them amongst 3 families. How many to each family?	8. There were 20 cockatiels sitting in 5 rows. How many in each row?	9. The relay race was 12km. There were 3 runners. How far did each runner have to run?
10. I had 12 counters. I shared them into 4 groups. How many counters in each group?	11. The 12 fish were laid out in 3 rows. How many in each row?	12. The 24m of hose was cut into 8 equal pieces. How long was each piece?
13. I shared 21 lollies among 3 of my friends. How many lollies did each friend get?	14. The 21 students lined up in 3 rows. How many students per row?	15. The 21m of wood was cut into three pieces. How long was each piece?

DC2 – Worksheet 2.2

For each of the following:

- (a) act it out as sharing for all three models – set, array and number line;
- (b) draw it as groups of objects, as arrays and on a number line; and
- (c) construct a real world sharing problem for all 3 models (set, array, number line).

1. eight divided by four	2. fifteen divided by three
3. fourteen divided by seven	4. fifteen divided by five
5. sixteen divided by four	6. fourteen divided by two
7. eighteen divided by six	8. eighteen divided by three

DC2 – Games

Division Snap

Materials: Division cards (print 4 pages in 4 different colours)

Number of players: 2

Directions:

- 1) Cut all pages into 12 cards and mix into one deck
- 2) Shuffle the operation 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) The player with the most points wins.

Division Rummy

Materials: Division cards (print 4 pages in 4 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 (2, 3, and 4 cards of same operation).
- 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.
- 4) The winner is the first player to put out all their cards as sets. Note: Can introduce other rummy rules.

Division Concentration

Materials: Division cards (printed in 4 different colours)

Number of players: 2 – 4

Directions:

- 1) Cut all pages into 12 cards
- 2) Shuffle the cards and place face down on the table in a 6 x 8 array.
- 3) Players in turn pick up 2 cards. If the same operation, keep the cards, if different return to their place and wait for next turn.
- 4) Winner is player with most sets of 2 cards when all cards gone.

DC2 – Games continued

Division Cover the Board

Materials: 1 base board (Language), 3 sets of 12 picture cards (print 3 pages in 3 different colours)

Number of players: 2 – 3

Directions:

- 1) Use the language page as a base board and cut other pages into 12 cards each. Don't mix up the cards (keep decks separate).
- 2) 3 players each get a set of 12 cards of one type 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.

Division 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 operation.

Division Bingo

Materials: 6 division bingo base boards (print boards in different colours), set of 12 division bingo flash cards (print in white), unifix or counters

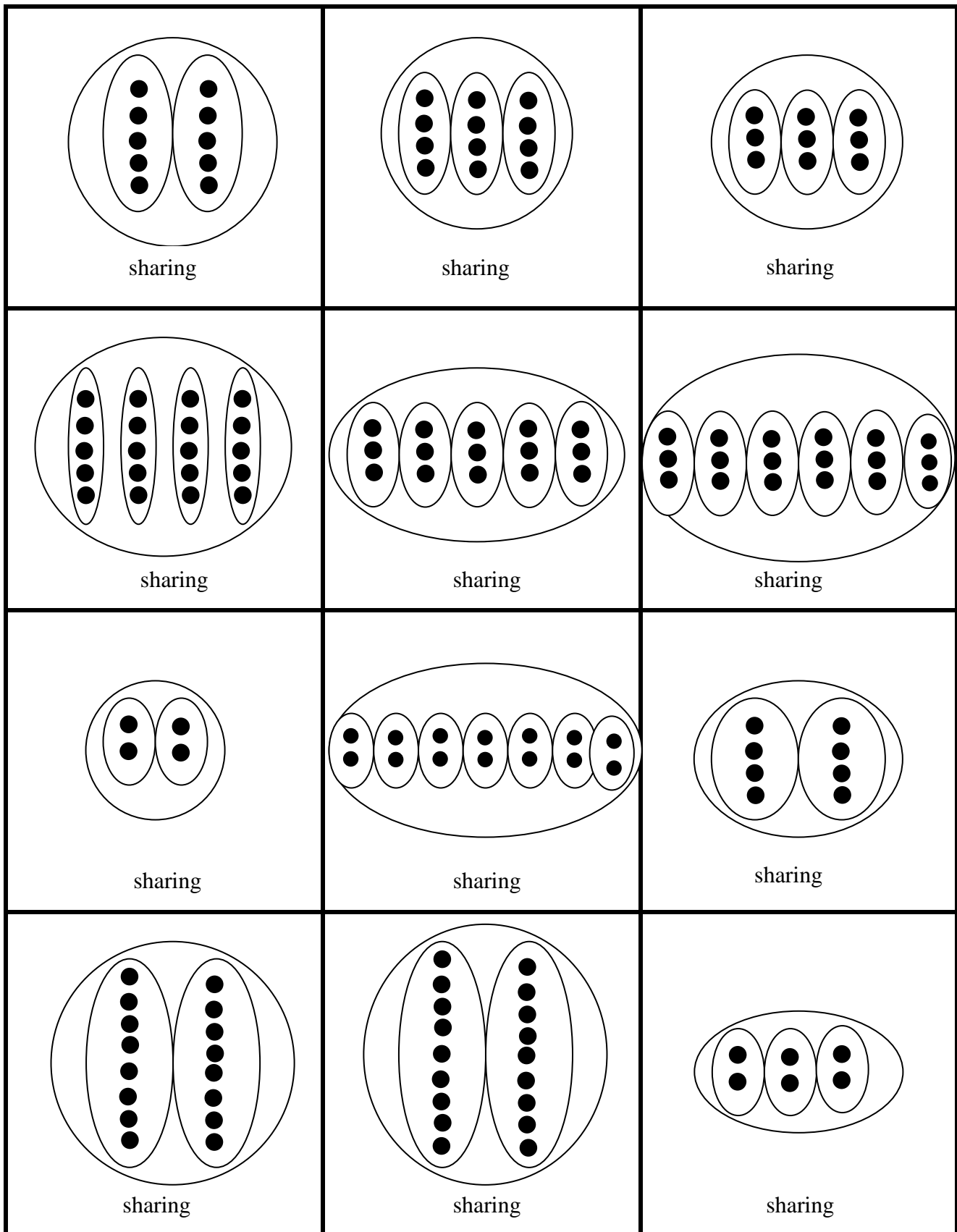
Number of players: 2 – 6

Directions:

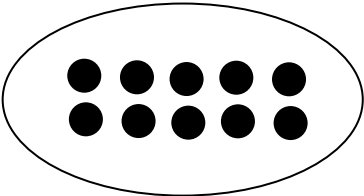
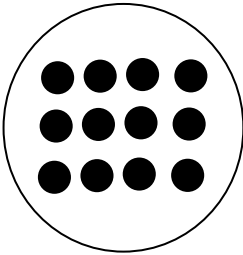
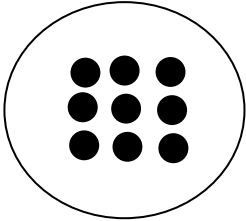
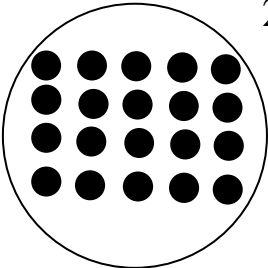
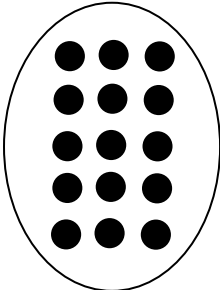
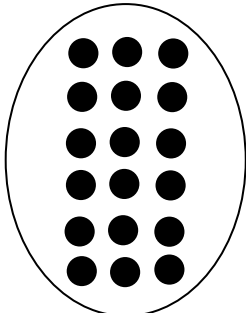
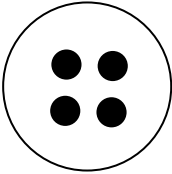
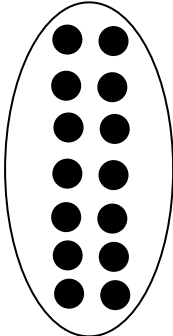
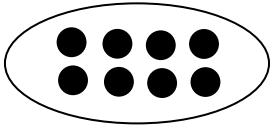
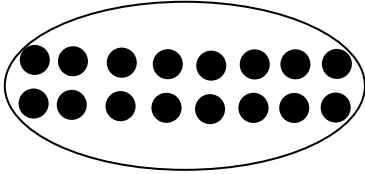
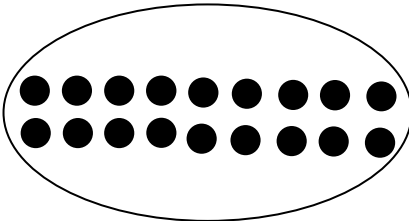
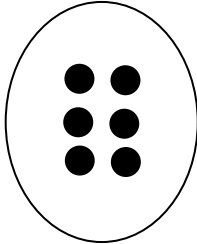
- 1) Cut out flash cards and shuffle.
- 2) Displayer shows cards one at a time.
- 3) Players cover with unifix any picture on their board which is the same operation as the flash card.
- 4) Winner is the first player with 3 pictures in a row (vertically, horizontally or diagonally).

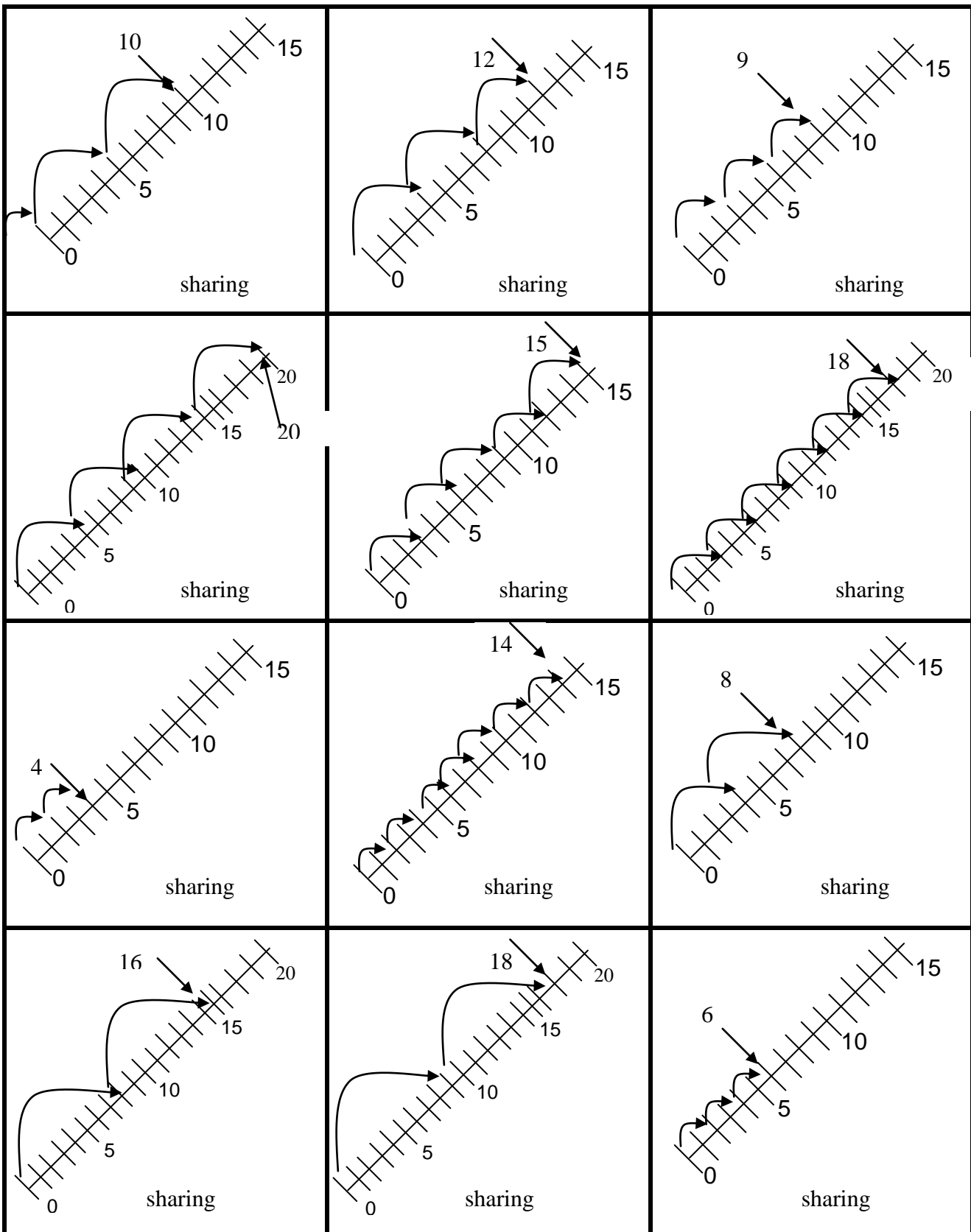
DC2 – Sharing division cards/Cover the Board baseboard (language)

ten divided by two	twelve divided by three	nine divided by three
twenty divided by four	fifteen divided by five	eighteen divided by six
four divided by two	fourteen divided by seven	eight divided by two
sixteen divided by two	eighteen divided by two	six divided by three

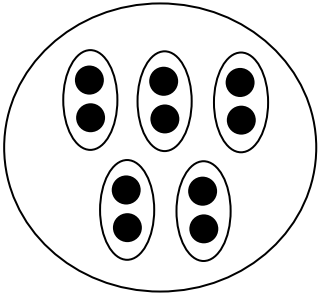
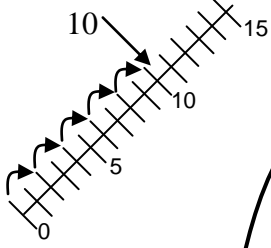
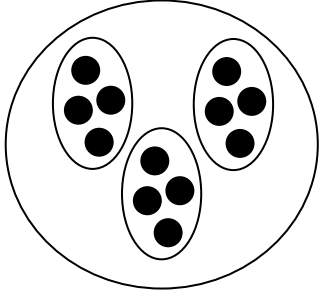
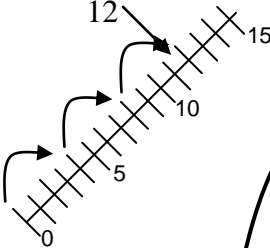
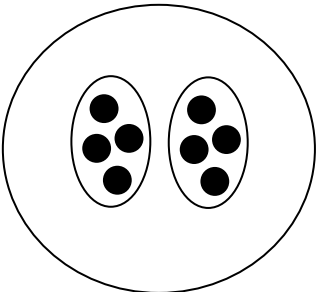
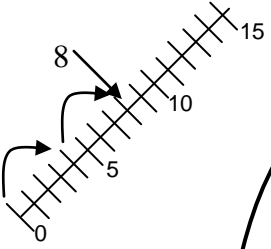
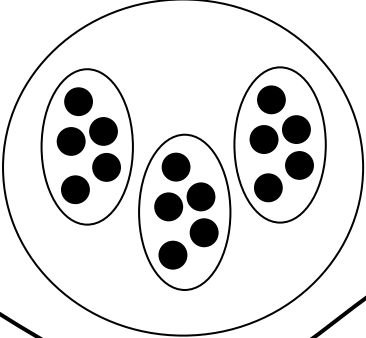
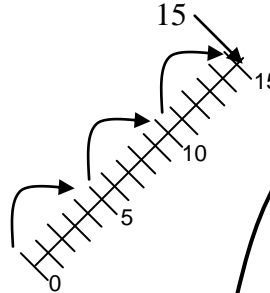
DC2 – Sharing division cards (set)

DC2 – Sharing division cards (array)

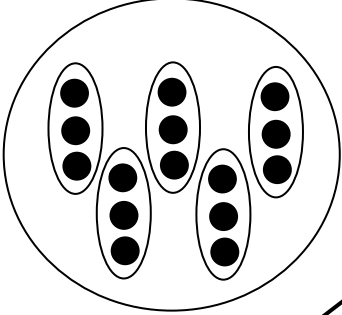
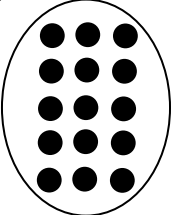
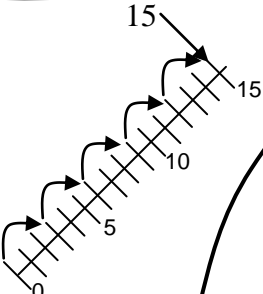
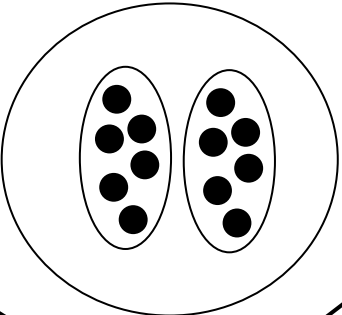
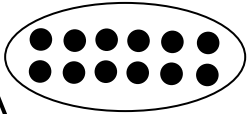
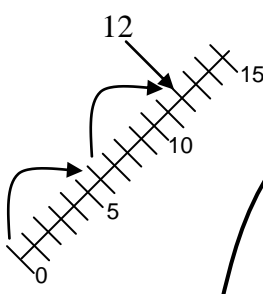
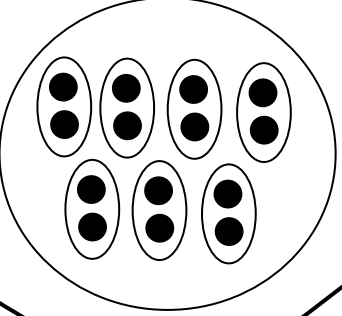
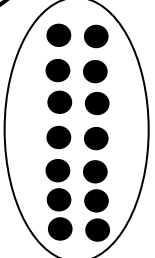
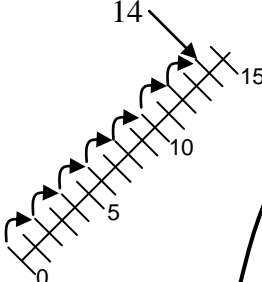
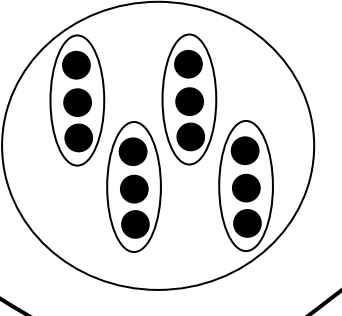
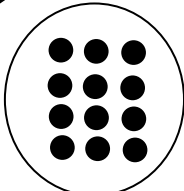
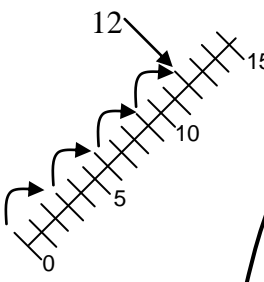
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<p>20</p>  <p>sharing</p>	<p>15</p>  <p>sharing</p>	<p>18</p>  <p>sharing</p>
<p>4</p>  <p>sharing</p>	<p>14</p>  <p>sharing</p>	<p>8</p>  <p>sharing</p>
<p>16</p>  <p>sharing</p>	<p>18</p>  <p>sharing</p>	<p>6</p>  <p>sharing</p>

DC2 – Sharing division cards (number line)

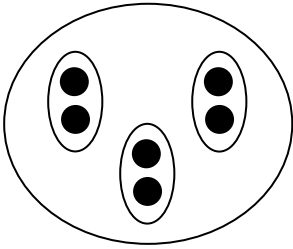
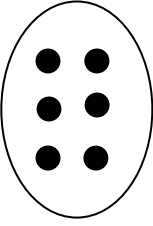
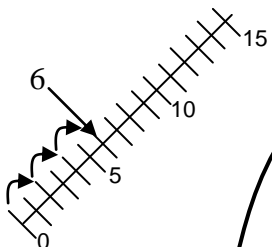
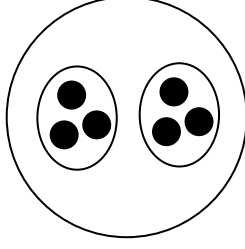
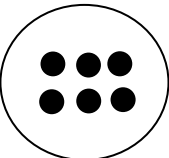
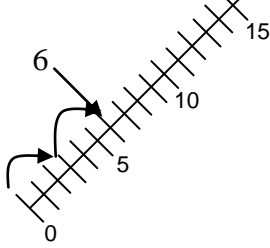
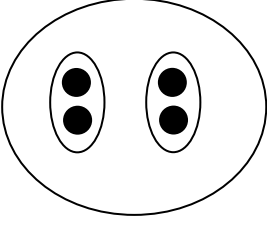
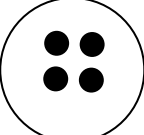
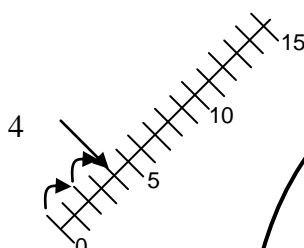
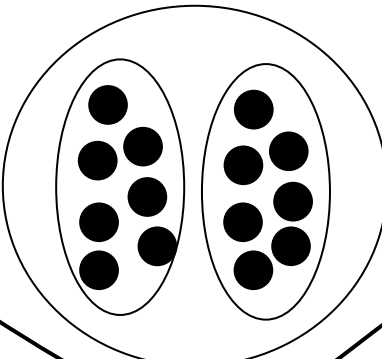
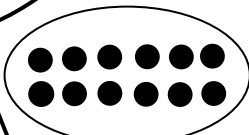
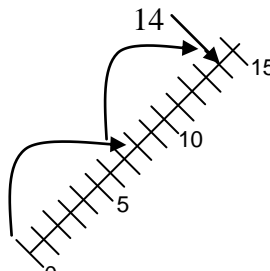
DC2 – Sharing division Mix and Match cards

 <p>ten shared amongst five</p>  <p>ten divided by five</p>	 <p>twelve shared amongst three</p>  <p>twelve divided by three</p>
 <p>eight shared amongst two</p>  <p>eight divided by two</p>	 <p>fifteen shared amongst three</p>  <p>fifteen divided by three</p>

DC2 – Sharing division Mix and Match cards (cont'd)

 <p>fifteen shared amongst five</p>   <p>fifteen divided by five</p>	 <p>twelve shared amongst two</p>   <p>twelve divided by two</p>
 <p>fourteen shared amongst seven</p>   <p>fourteen divided by seven</p>	 <p>twelve shared amongst four</p>   <p>twelve divided by four</p>

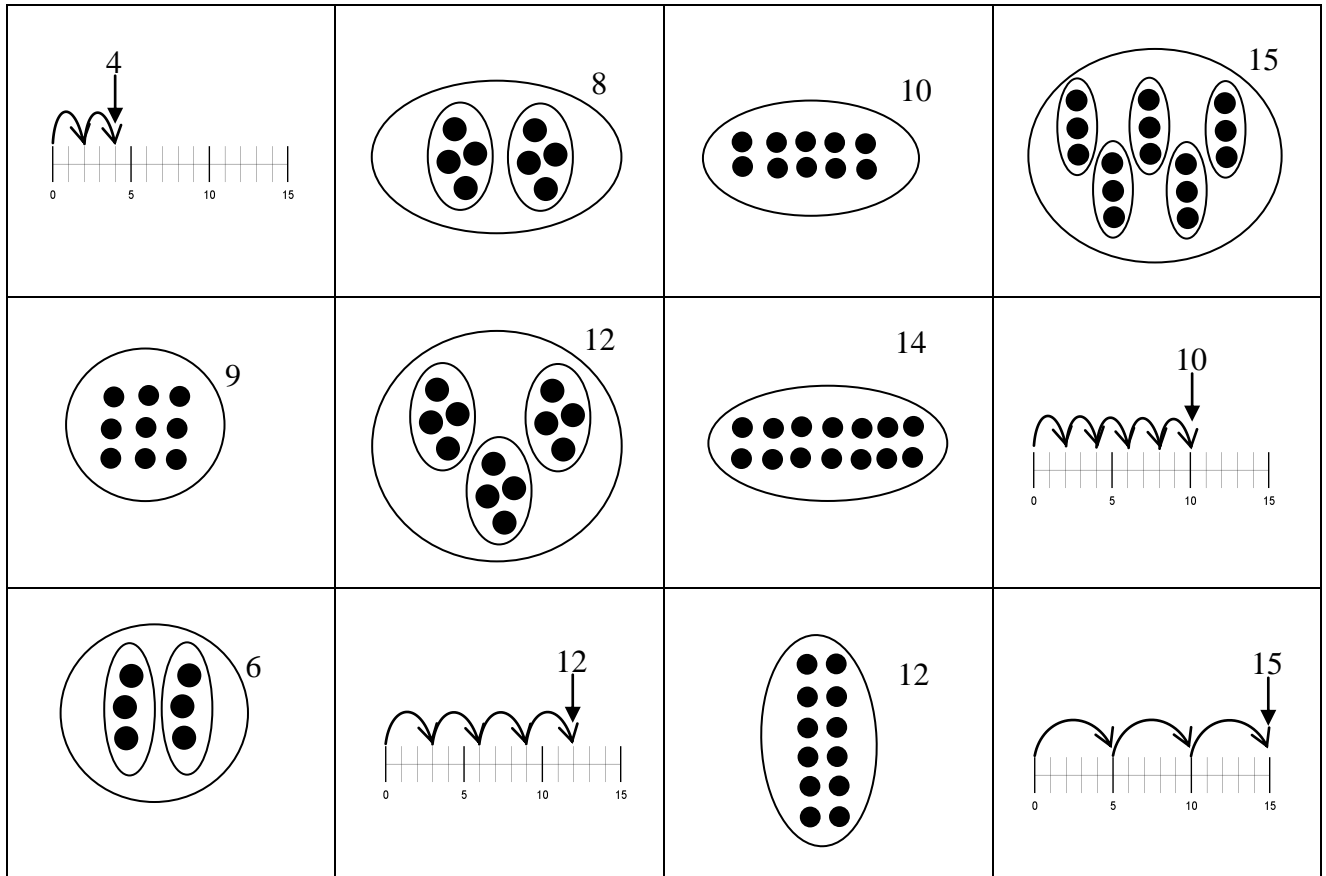
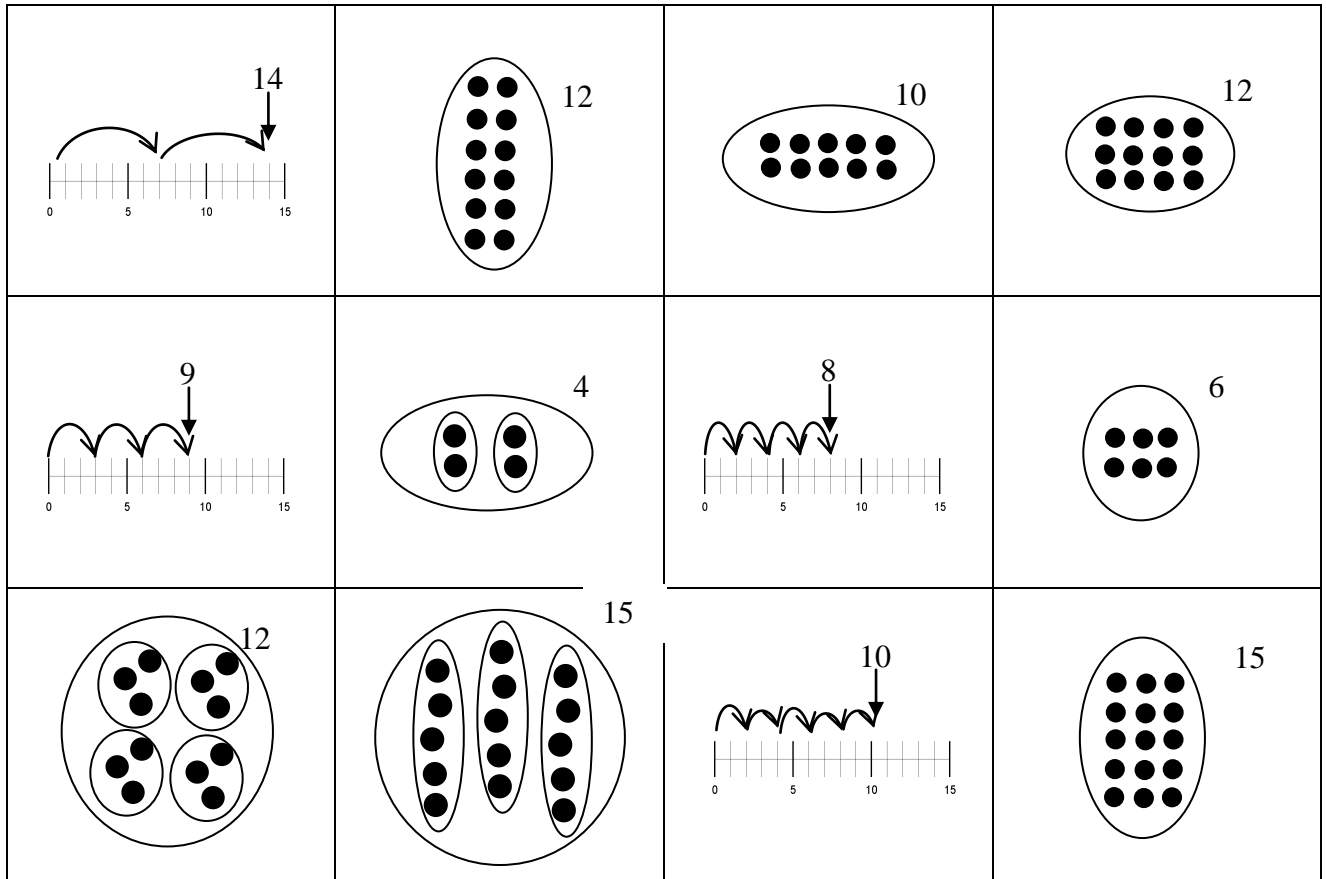
DC2 – Sharing division Mix and Match cards (cont'd)

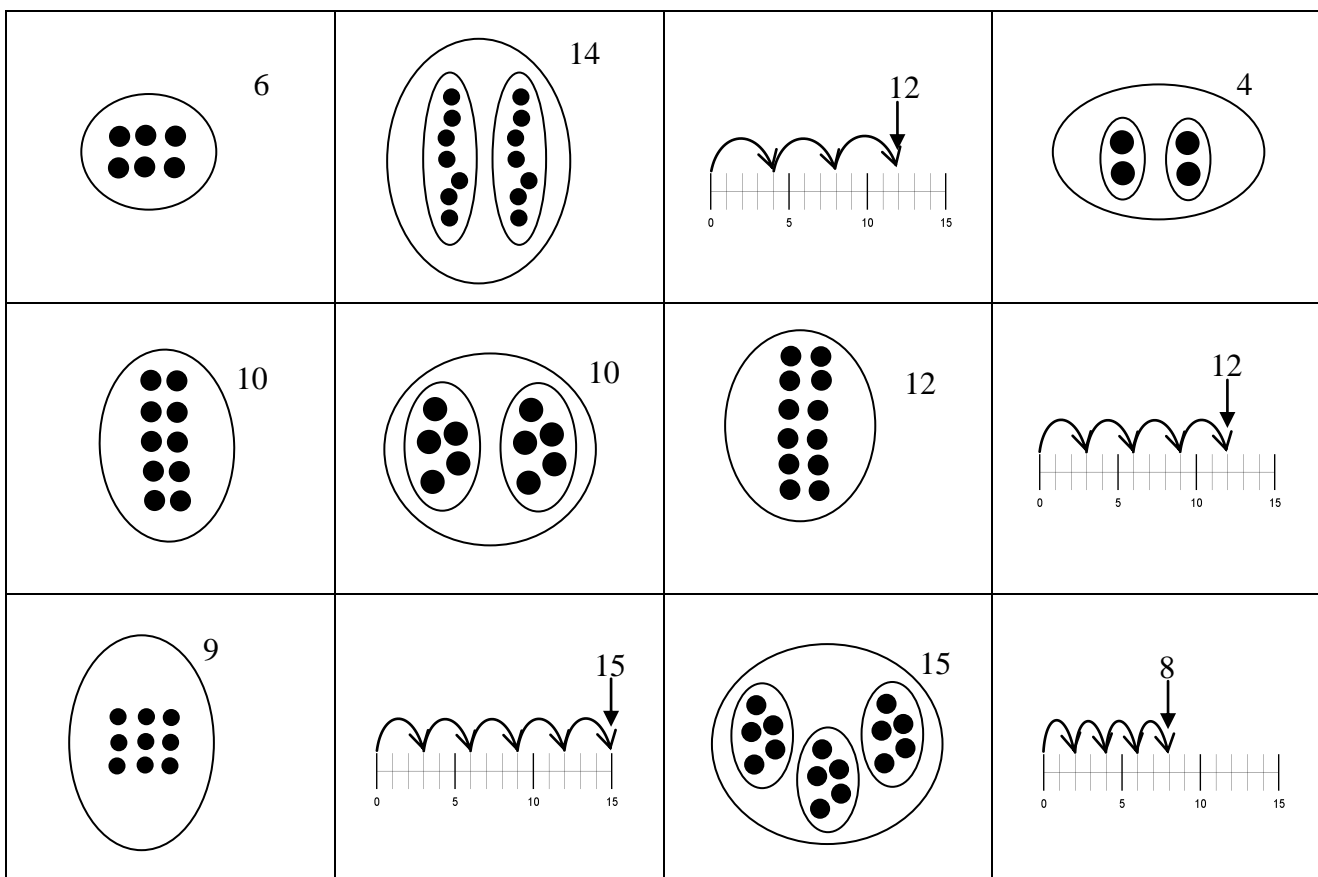
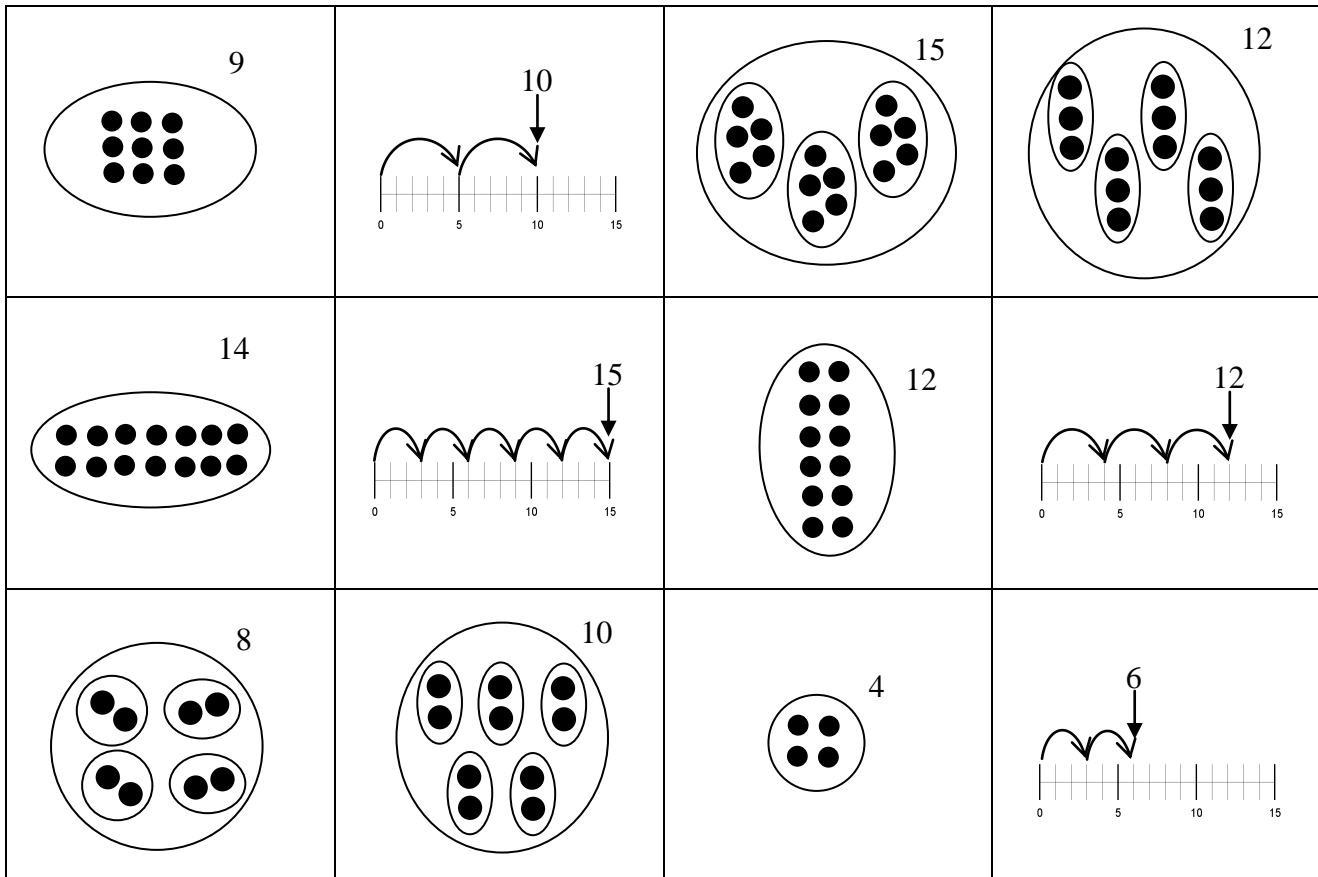
 <p>six shared amongst three</p>   <p>six divided by three</p>	 <p>six shared amongst two</p>   <p>six divided by two</p>
 <p>four shared amongst two</p>   <p>four divided by two</p>	 <p>fourteen shared amongst two</p>   <p>fourteen divided by two</p>

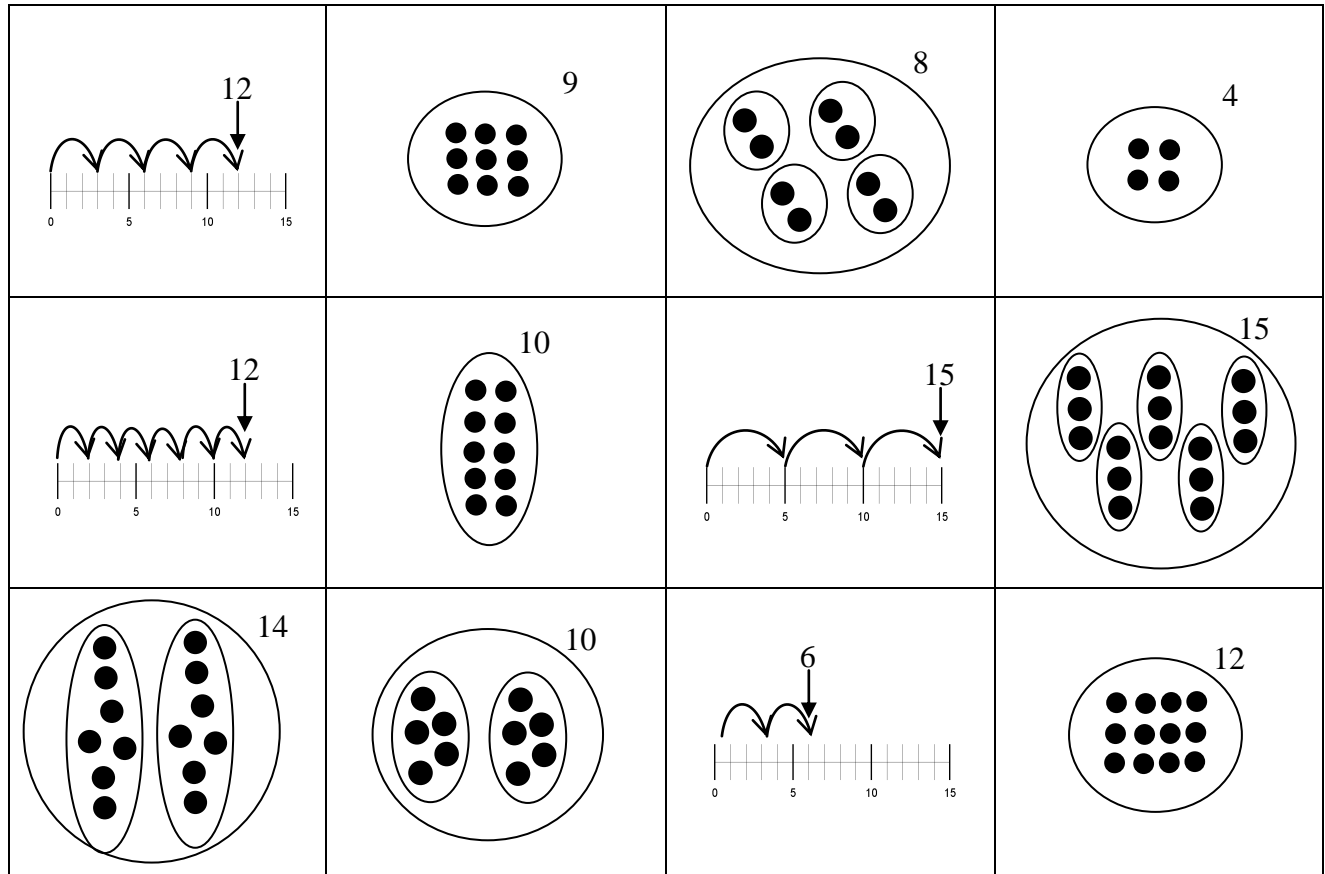
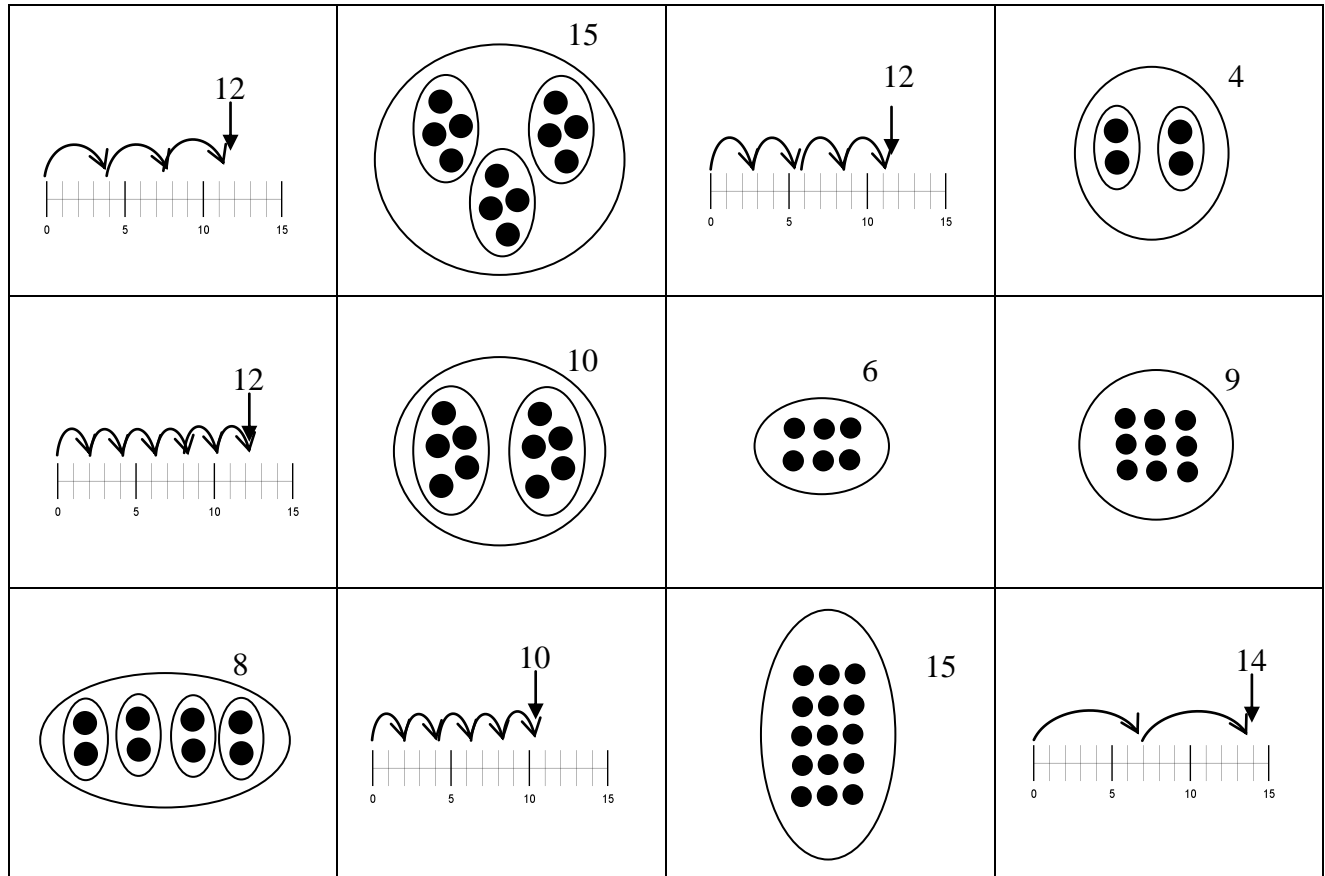
DC2 – Sharing division Bingo flash cards

ten divided by two	twelve divided by four	six divided by two
eight divided by four	fifteen divided by five	ten divided by five
twelve divided by three	four divided by two	fourteen divided by two
fifteen divided by three	nine divided by three	twelve divided by six

DC2 – Sharing division Bingo Boards



DC2 – Sharing division Bingo Boards (continued)

DC2 – Sharing division Bingo Boards (continued)

DC2 – 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?

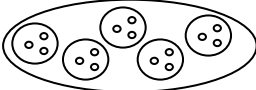
ACTIVITY DC3

[Grouping division problems \leftrightarrow grouping models]

Materials: Unifix, pen, paper, paper plates, objects (pens, shells etc. – better if natural and local), dot paper and number tracks (see DC1), materials attached (worksheets, game)

Directions:

Set model grouping

1. Tell a grouping division set story, acting it out as you go. *I have 15 objects and I put them into groups of 3 (on these plates). How many groups (plates) do I make?* Ask them to follow you with their counters/plates. *How many objects did I start with?* [15] State: *Show me these with your unifix/counters.* Ask: *What size groups do I make?* [3] State: *Put groups of 3 on plates.* State: *Put out your groups of 3 with your counters as I put out my groups of 3.* Ask: *How many groups of 3 do I make?* [5]
2. Ask students to draw the problem with circles to show the numbers. If needed, ask: *What did we do with the counters and plates? How can we draw this activity? What happens to the counters? How can we show this on the drawing? How many in each group? How many groups?* 
3. Repeat 1 & 2 with a new grouping division set story. *I have 14 objects and I put 2 on each plate. How many plates do I need?*

Array model grouping

4. Tell grouping division array story, for example: *There are 12 objects, put into rows of 3. How many rows?* Act this story out with counters. Ask: *How many counters?* [12] *What do you do with them?* [make rows of 3] *How many rows?* [4]
5. Ask the students to draw the problem with circles to show the rows or to circle the rows on dot paper. If needed, ask: *What did we do with the counters?* [put in rows of 3] *How can we draw this?* [draw rows of 3 circles] *How many rows?* [4]
6. Repeat 4 & 5 with a new grouping division array story: *15 trees were placed in rows of 3, how many rows?*

Number line model grouping

7. Make up a large number track made of numbers 0 to 20 on A4 paper. Lay the numbers out on the floor so children can walk beside them counting as they go. Tell a grouping division number line story: *On a large number track I jumped to 8 in jumps of 2, how many jumps?* Act it out on the track. Ask: *How far did I jump in total?* [8] *What size jumps did I make?* [2] *How many jumps?* [4]
8. Ask the students to draw the problem on a small drawn number track or number line. If needed, ask: *What did I do on the number track?* [made jumps of 2 to 8] *How can I show the jumps of 2?* [by arrows] *How many arrows?* [4]

9. Repeat 7 & 8 with a new grouping division number line story: *I jumped to 15 using jumps of 5 spaces, how many jumps?*
10. Complete Worksheet 3.1. Discuss what makes all the examples grouping. Highlight that division is breaking a number into equal groups and that, in grouping, you are given the number in each group and have to find the number of groups.

Reversing (models to problem)

11. Show the students the first three drawing on Worksheet 3.2. State: *These three drawings show groups, rows and jumps, the big circle or the end of jumps gives the total number, the number in each group, row or jump is the number in each group.* Ask the students: to act out each drawing with counters/number tracks. If difficulties, ask: *How many in total? How many in each group/row/jump? How many groups/rows/jumps?* Then state: *Make up a grouping problem that reflects the drawings!*
12. Complete Worksheet 3.2.

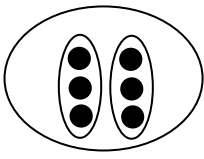
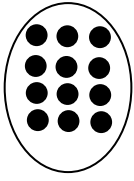
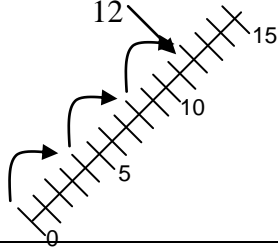
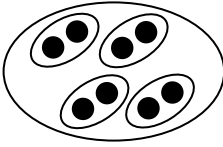

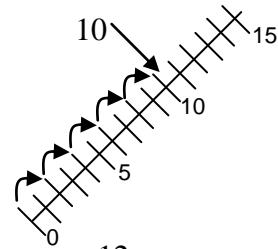
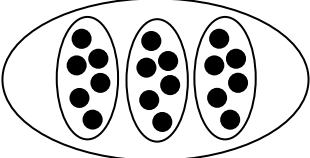
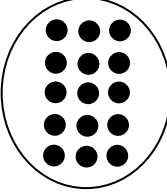
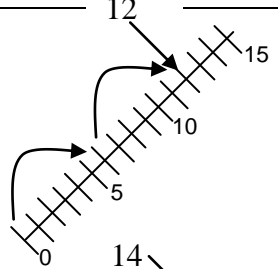
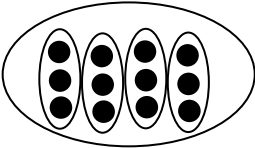
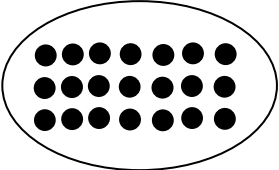
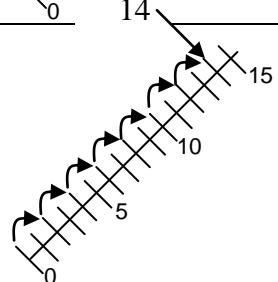
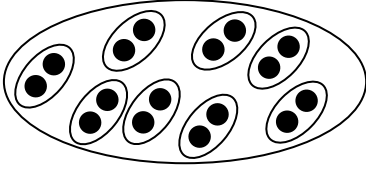
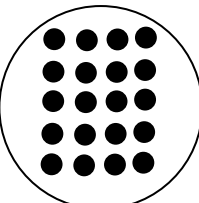
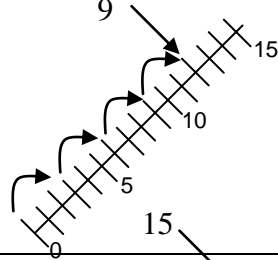
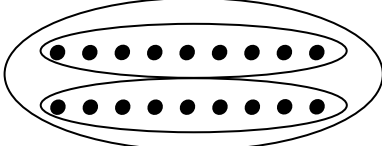
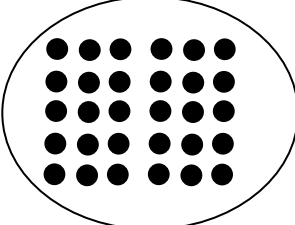
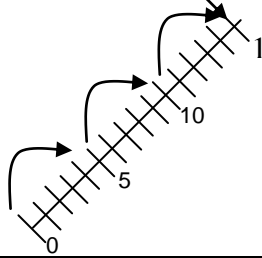
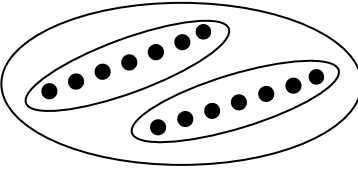
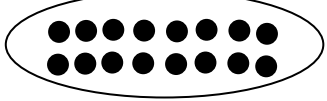
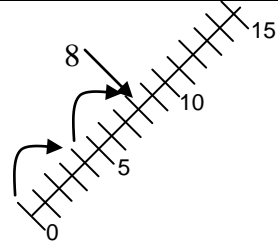
Practice

13. Play the games: “Grouping division Line Up” and “Grouping division Racetrack”.

DC3 – Worksheet 3.1

1. I have 6 counters. I share them into groups of 2. How many groups?	2. I have 15 counters. I put them into rows of 5. How many rows?	3. I jumped 8 spaces in jumps of 2. How many jumps?
4. I have 12 lollies. I give each cousin 2 lollies. How many cousins?	5. I have 9 chairs. I put them into rows of 3. How many rows?	6. I cut the 14m post into 2m lengths. How many lengths?
7. There were 16 cockatiels sitting in trees with 4 in each tree. How many trees?	8. 16 children were put into rows of 2. How many rows?	9. The 20m fence was painted in sections each 4m long. How many sections?
10. I found 14 grubs, 2 in each tree. How many trees?	11. There were 12 bilbies standing in rows of 4. How many rows?	12. John jumped over 21 pavers, 7 pavers at a time. How many jumps?
13. I shared 15 eggs putting 5 into each nest. How many nests?	14. There were 20 cockatiels sitting in rows of 5. How many rows?	15. 16m was cut into 4m lengths. How many lengths?
16. There were 12 bilbies. I put 4 in each burrow. How many burrows?	17. 21 fish were laid out in rows of 3. How many rows?	18. Each runner in the 15km relay ran 3kms. How many runners were there?

DC3 – Worksheet 3.2

1. 	2. 	3. 
4. 	5. 	6. 
7. 	8. 	9. 
10. 	11. 	12. 
13. 	14. 	15. 
16. 	17. 	18. 
19. 	20. 	21. 

DC3 Game: Grouping division Line Up

Materials: dot paper, unifix cubes (one colour for each player), deck of cards with: $12 \div 6$, $18 \div 9$, $8 \div 4$, $9 \div 3$, $12 \div 4$, $21 \div 7$, $16 \div 4$, $20 \div 5$, $12 \div 3$, $15 \div 3$, $20 \div 4$, $30 \div 6$, $18 \div 3$, $24 \div 4$, $30 \div 5$, $14 \div 2$, $21 \div 3$, $28 \div 4$, $16 \div 2$, $24 \div 3$, $40 \div 5$, $18 \div 2$, $27 \div 3$, $36 \div 4$, $20 \div 2$, $30 \div 3$, $40 \div 4$, $22 \div 2$, $33 \div 3$, $24 \div 4$, $24 \div 2$, $48 \div 4$, $36 \div 3$, $15 \div 15$, $8 \div 8$, $11 \div 11$.

Number of players: 2 – 4

Directions:

- 1) Shuffle cards. Players in turn choose a card.
- 2) Players use counters/dot paper/number tracks to make up groups/rows/jumps and calculate the answer.
- 3) Players put unifix cube of their colour on board to cover answer to the division operation. If number already covered by opponent, then player places unifix over top of opponent's.
- 4) Winner is first with 3 in a row (across, down, or diagonal).

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

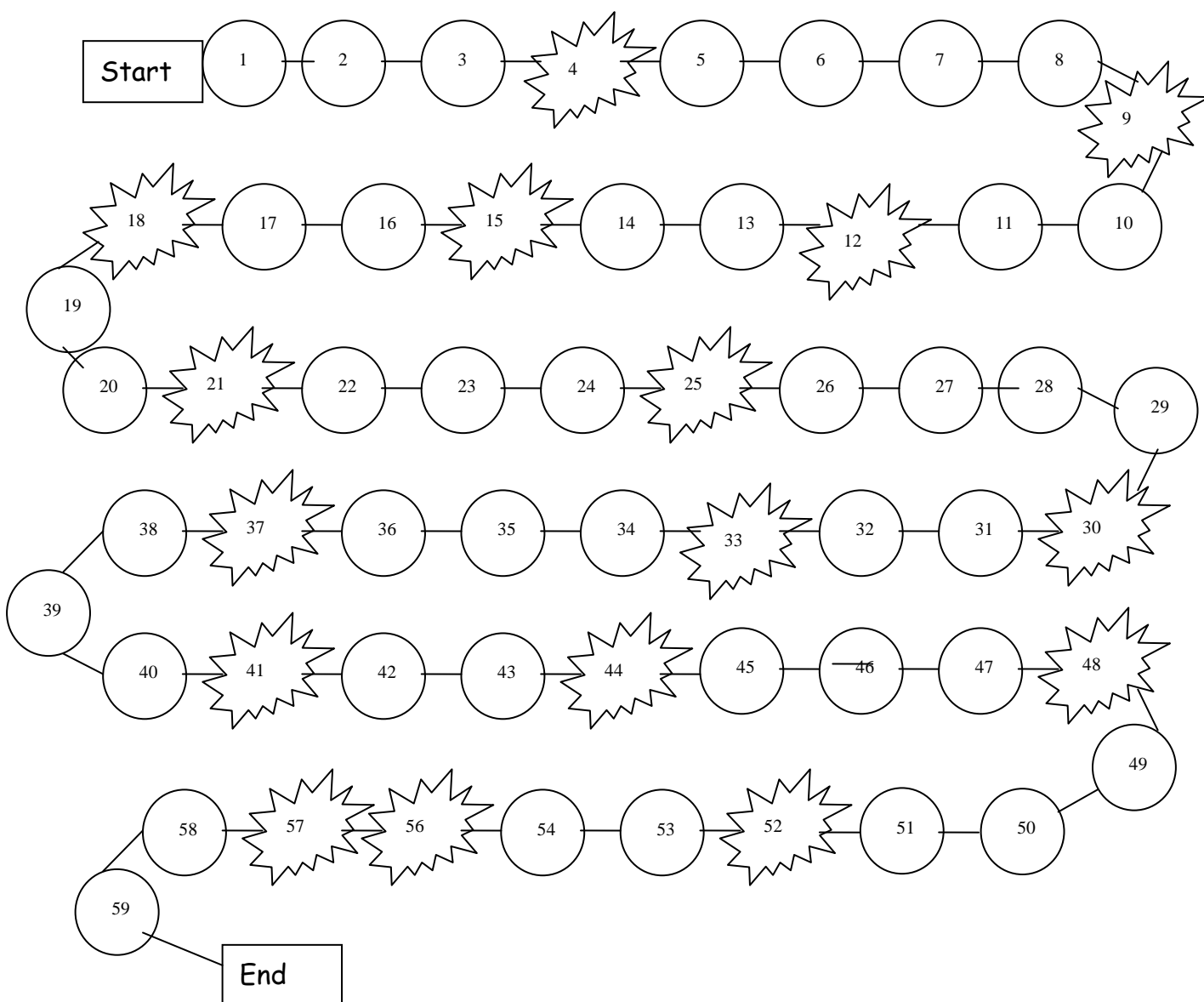
DC3 Game: Grouping division Race Track

Materials: Enlarged division Racetrack Gameboard, deck of cards with: $12 \div 6$, $18 \div 9$, $8 \div 4$, $9 \div 3$, $12 \div 4$, $21 \div 7$, $16 \div 4$, $20 \div 5$, $12 \div 3$, $15 \div 3$, $20 \div 4$, $30 \div 6$, $18 \div 3$, $24 \div 4$, $30 \div 5$, $14 \div 2$, $21 \div 3$, $28 \div 4$, $16 \div 2$, $24 \div 3$, $40 \div 5$, $18 \div 2$, $27 \div 3$, $36 \div 4$, $20 \div 2$, $30 \div 3$, $40 \div 4$, $22 \div 2$, $33 \div 3$, $24 \div 4$, $24 \div 2$, $48 \div 4$, $36 \div 3$, $15 \div 15$, $8 \div 8$, $11 \div 11$, different coloured counters for each player, ordinary counters, dot paper, number tracks.

Number of players: 2 – 4

Directions:

- 1) Players in turn select a card (cards are first shuffled) and calculate the answer to the division by grouping using counters/dot paper/number tracks.
- 2) Players move their counters forward. At the star they move forward 3 spaces (landing on a second star doesn't count).
- 3) The winner is the first to the end.



DC3 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 DC4

[Grouping division problems \leftrightarrow Division language]

Materials: Counters/unifix, pen, paper, objects (pens, shells, etc.), plates, number tracks, material attached (worksheets, number cards, multiplication bingo board and cards, multiplication mix and match cards)

Directions:

Introducing formal maths language

1. Tell a set grouping story, acting it out with imaginary people as you go: *Jack had 15 lollies. He put them into bags of 5. How many bags?* Recap how to act this out with counters and to draw it with circles or other shapes. Ask as they do this: *How many lollies did Jack have?* [15] *How many in each bag?* [5] *How many bags?* [3]. Then move on to: *What was the number **of** lollies?* [15] *What was the number **in** each bag?* [5] *How many bags?* [3]
2. Ask students to state the story in formal mathematics language. If difficulty, ask: *How many lollies did Jack have?* [fifteen] *How many in each bag?* [five] *What do we call grouping like this?* [divide] *How many bags?* [three] *What do we call getting an answer?* [equals] Say this: *fifteen divided by five equals three.* Repeat this relating it to sharing: *fifteen put in groups of five equals three; fifteen divided by five equals three.* Get students to point at the counters as they say the language.
3. Repeat 1 & 2 for an array grouping story: *There were 18 children. They lined up in rows of 3. How many rows?* [18 divided by 3 equals 6] Then repeat for a number line grouping story: *Jack ran twenty-four blocks. In each section he ran 4 blocks. How many sections?* [24 divided by 4 equals 6] Discuss the problems, act them out and draw them before generating the formal mathematics language.
4. Complete as many examples as needed using worksheet 4.1.

Reversing (formal maths language to problem)

5. Say: *Twelve divide three is four.* Ask students to act this out and draw drawings for it using the three models (set, array and number line). Make up a story for each of the models.
6. Complete as many examples as needed using worksheet 4.2.

Practice

7. Play the attached games: “Grouping division Snap”, “Grouping division Rummy”, “Grouping division Concentration”, “Grouping division Cover the Board”, “Grouping division Mix and Match”, and “Grouping division Bingo”.

Note: The rules for these games can be found in DC2.

DC4 – Worksheet 4.1

For each of the following problems:

- (a) act it out with materials and draw a diagram; and
- (b) write it in formal maths language.

1. Each goanna ate 4 of the 20 eggs. How many goannas?	2. I have 15 counters. I put them out in rows of 5. How many rows?	3. I jumped 18 spaces in jumps of 6 spaces. How many jumps?
4. The 18 eggs were 3 to a nest. How many nests?	5. There were 20 bilbies in rows of 4. How many rows?	6. Jack ran 5 blocks each day. Overall, he ran 20 blocks. How many days?
7. Rob caught 15 fish in total. He wrapped them in packs of 3. How many packs?	8. There were 20 cockatiels sitting in groups of 5. How many groups?	9. The relay race was 12km. Each runner ran 3km. How many runners?
10. I had 12 counters which I put in groups of 4. How many groups?	11. The 12 fish were laid out 3 to a row. How many rows?	12. The 24m of hose was cut into 8m pieces. How many pieces?
13. I had 21 lollies. I gave a bag of 3 to each friend. How many friends?	14. The 21 students lined up in rows of 3. How many rows?	15. The 21m of wood was cut into 3m pieces. How many pieces?

DC4 – Worksheet 4.2

For each of the following:

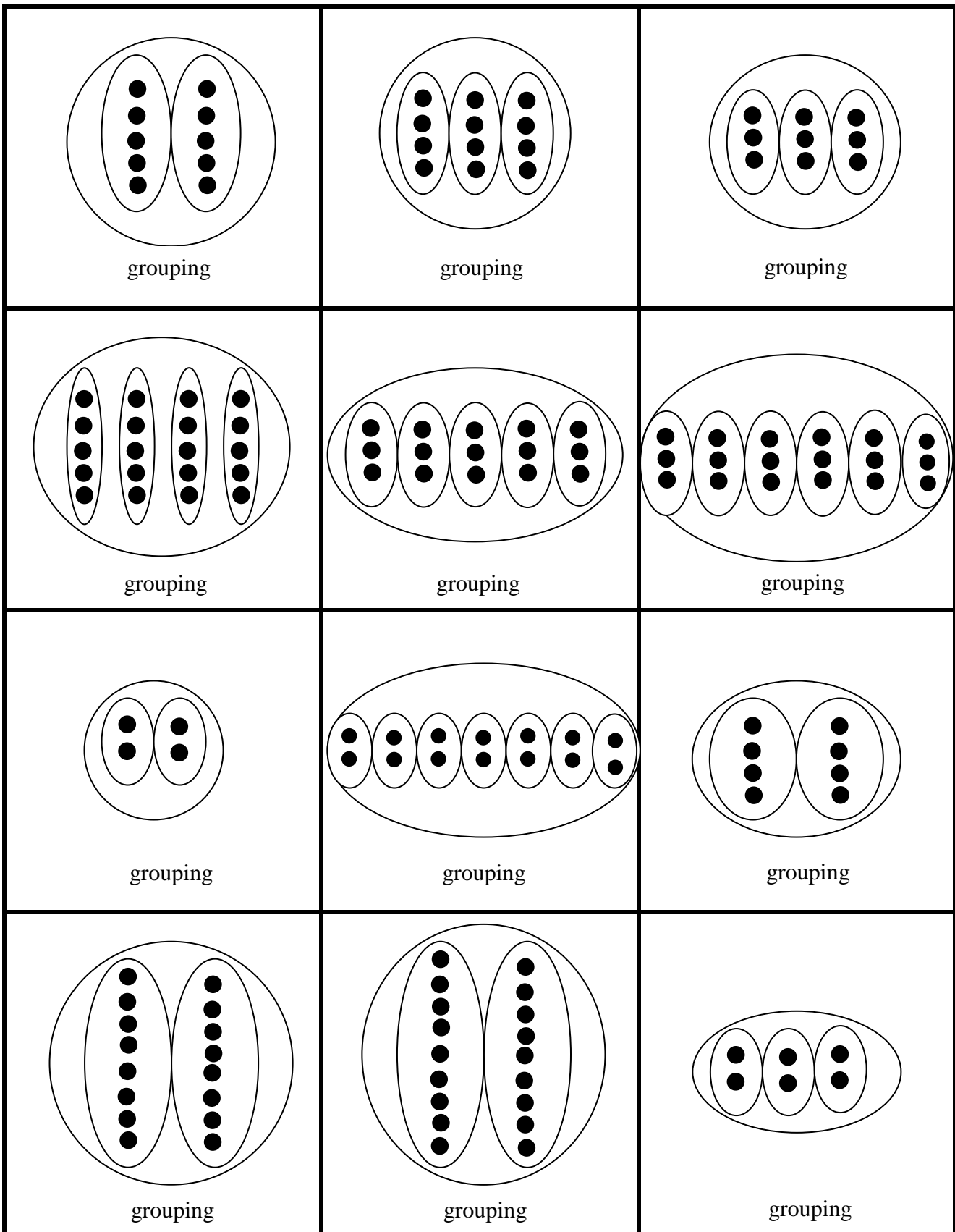
- (a) act it out as grouping for all three models – set, array and number line;
- (b) draw it as groups of objects, as arrays and on a number line; and
- (c) construct a real world grouping problem for all 3 models (set, array, no. line).

1. eight divided by four	2. fifteen divided by three
3. fourteen divided by seven	4. fifteen divided by five
5. sixteen divided by four	6. fourteen divided by two
7. eighteen divided by six	8. eighteen divided by three

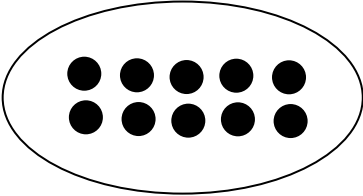
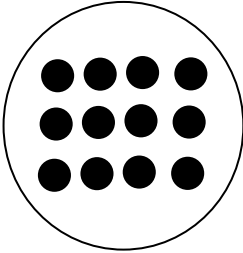
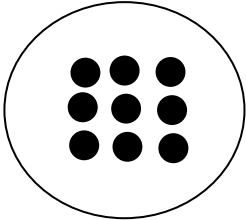
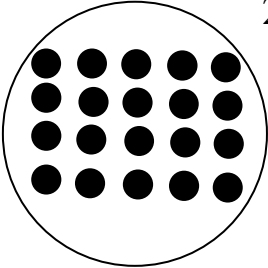
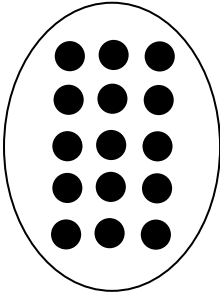
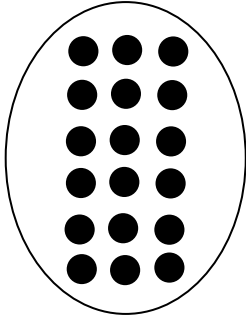
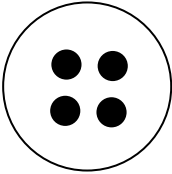
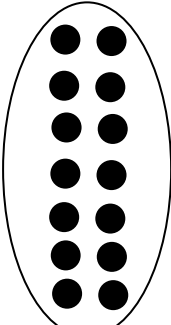
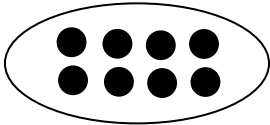
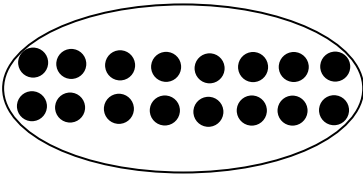
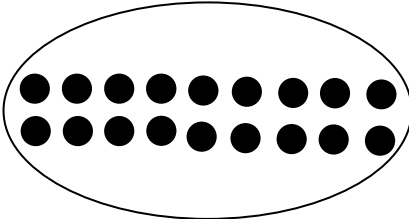
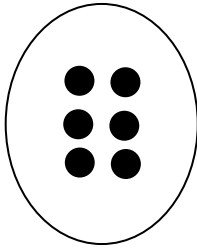
DC4 – Grouping division cards/Cover the Board baseboard
(language)

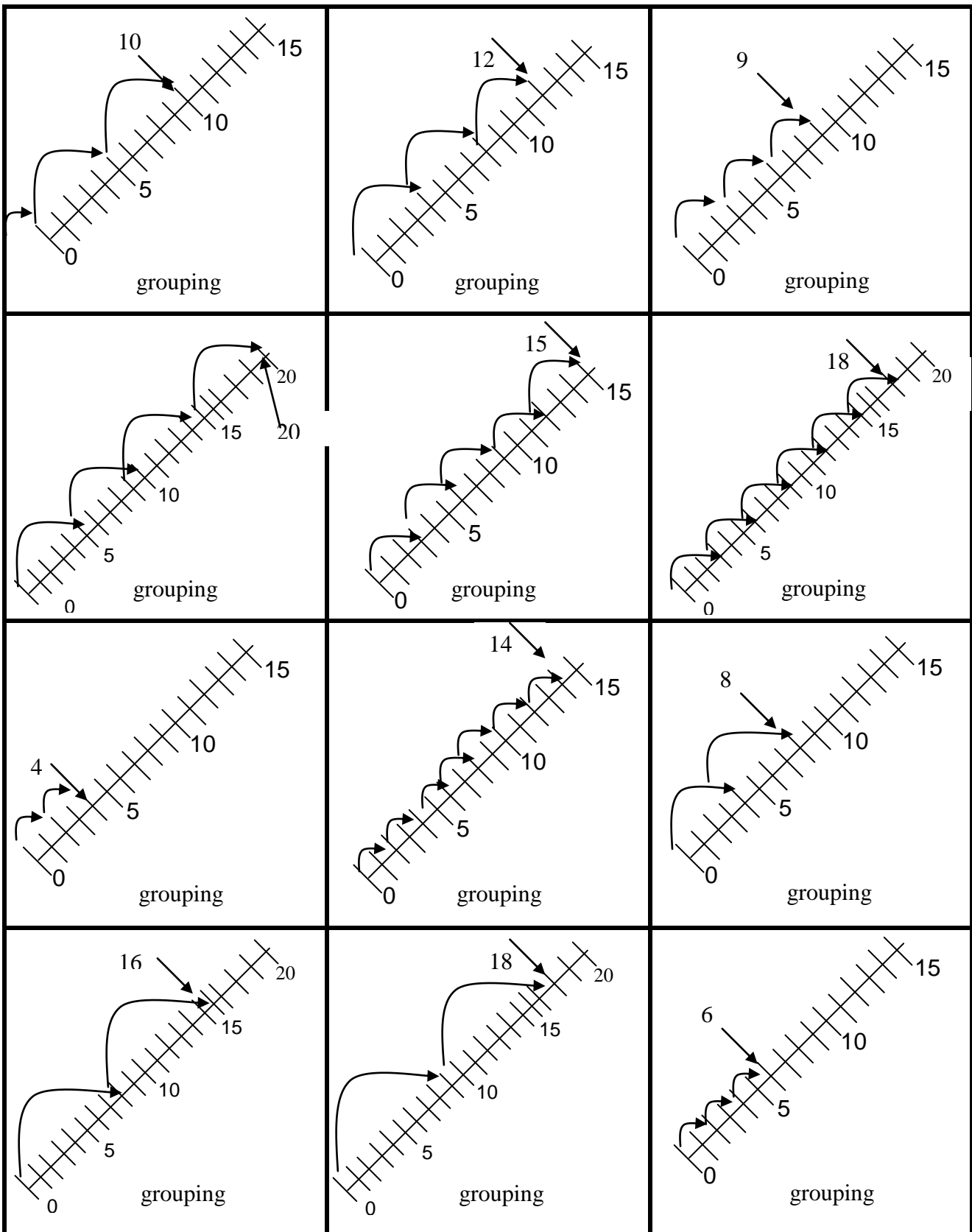
ten divided by five	twelve divided by four	nine divided by three
twenty divided by five	fifteen divided by three	eighteen divided by three
four divided by two	fourteen divided by two	eight divided by four
sixteen divided by eight	eighteen divided by nine	six divided by two

DC4 – Grouping division cards (set)

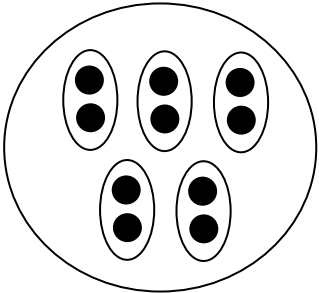
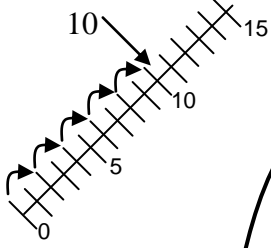
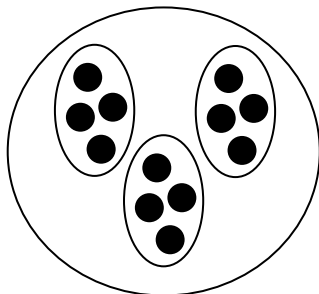
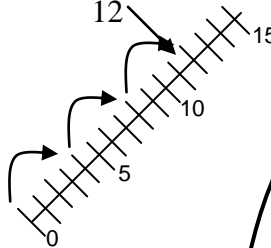
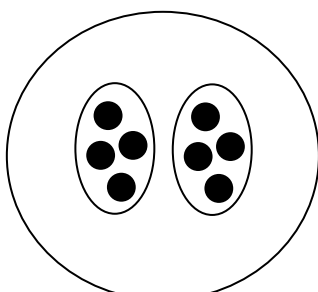
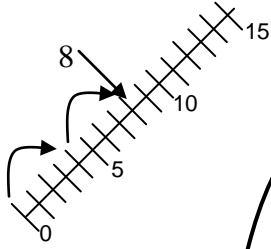
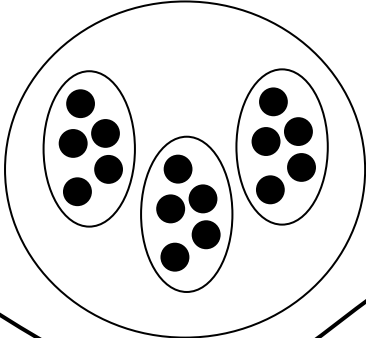
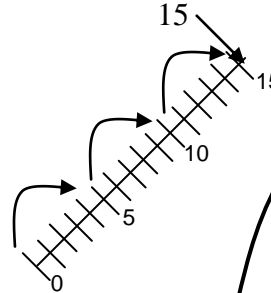


DC4 – Grouping division cards (array)

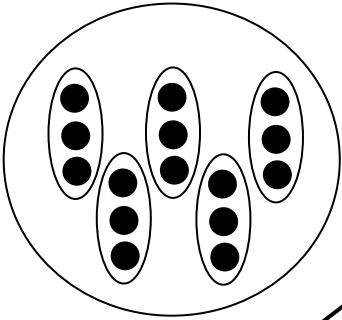
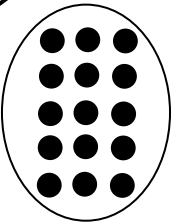
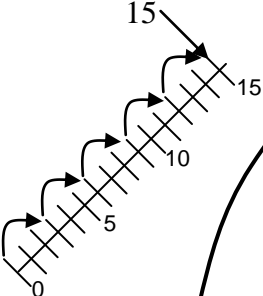
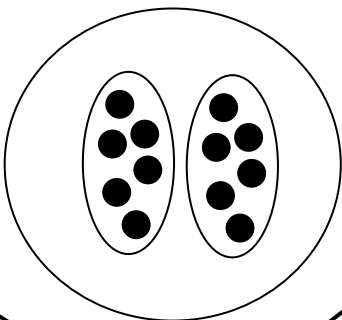
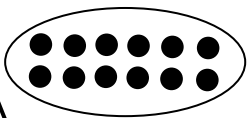
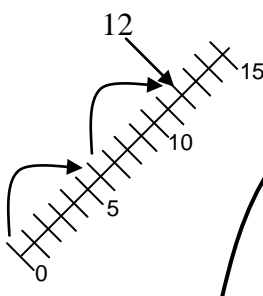
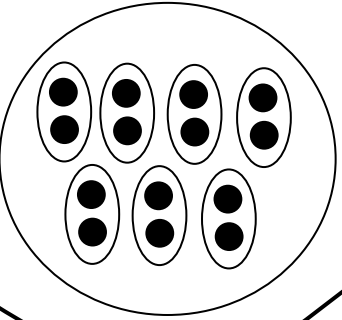
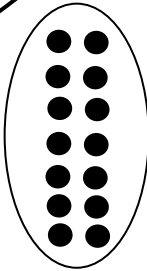
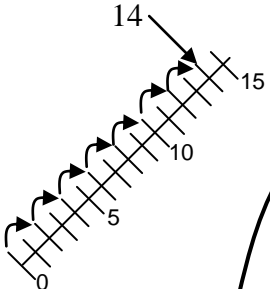
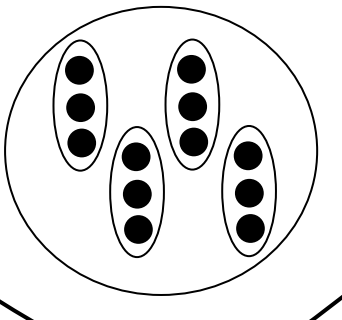
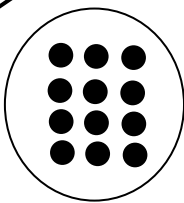
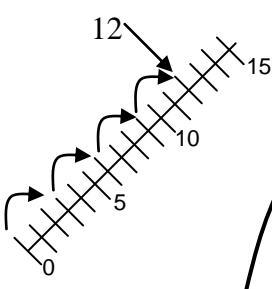
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<p>20</p>  <p>grouping</p>	<p>15</p>  <p>grouping</p>	<p>18</p>  <p>grouping</p>
<p>4</p>  <p>grouping</p>	<p>14</p>  <p>grouping</p>	<p>8</p>  <p>grouping</p>
<p>16</p>  <p>grouping</p>	<p>18</p>  <p>grouping</p>	<p>6</p>  <p>grouping</p>

DC4 – Grouping division cards (number line)

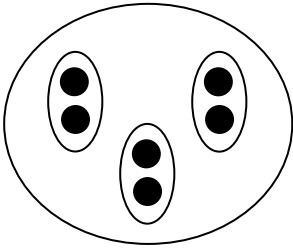
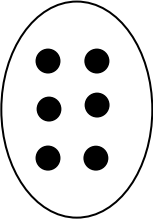
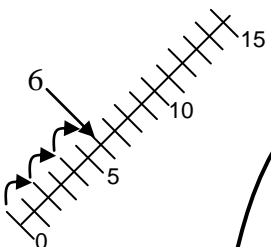
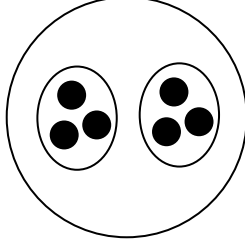
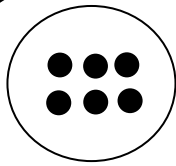
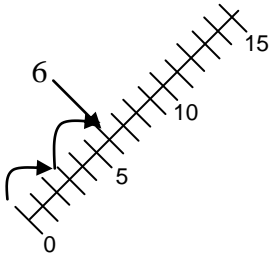
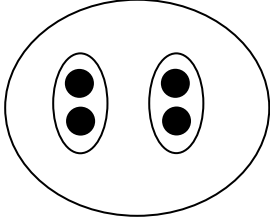
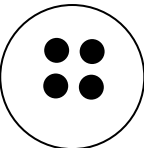
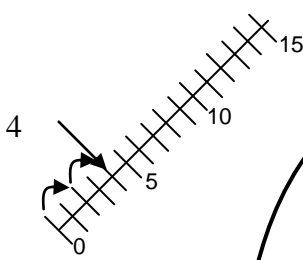
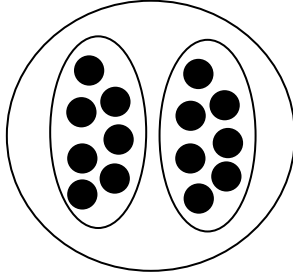
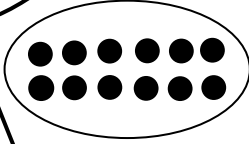
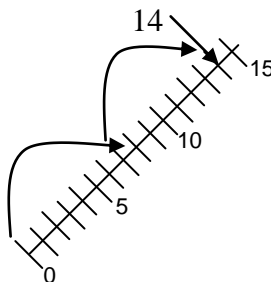
DC4 – Grouping division Mix and Match cards

 <p>ten in groups- rows-jumps of two</p>  <p>ten divided by two</p>	 <p>twelve in groups- rows-jumps of four</p>  <p>twelve divided by four</p>
 <p>eight in groups- rows-jumps of four</p>  <p>eight divided by four</p>	 <p>fifteen in groups- rows-jumps of five</p>  <p>fifteen divided by five</p>

DC4 – Grouping division Mix and Match cards (cont'd)

 <p>fifteen in groups- rows-jumps of three</p>   <p>fifteen divided by three</p>	 <p>twelve in groups- rows-jumps of six</p>   <p>twelve divided by six</p>
 <p>fourteen in groups- rows-jumps of two</p>   <p>fourteen divided by two</p>	 <p>twelve in groups- rows-jumps of three</p>   <p>twelve divided by three</p>

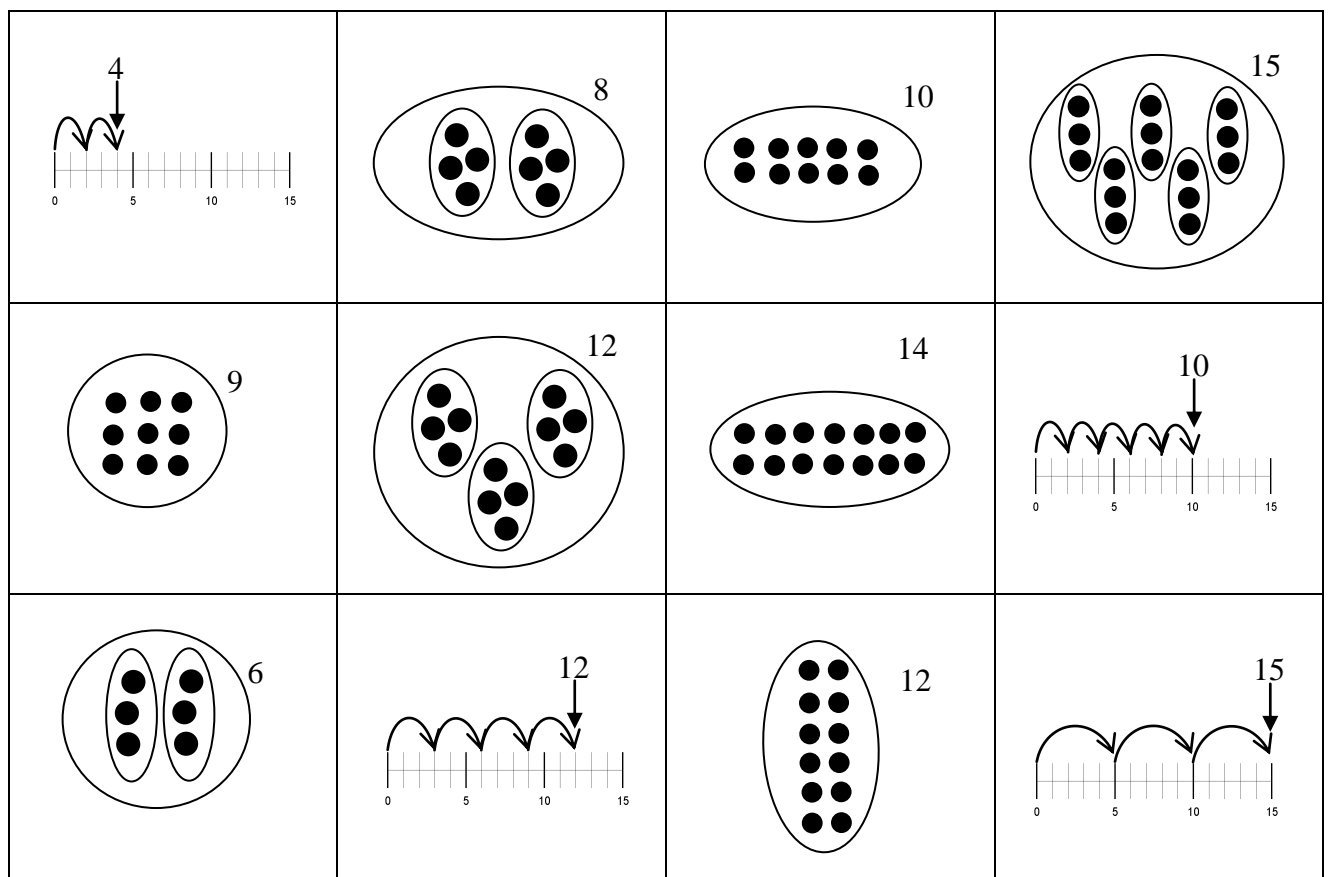
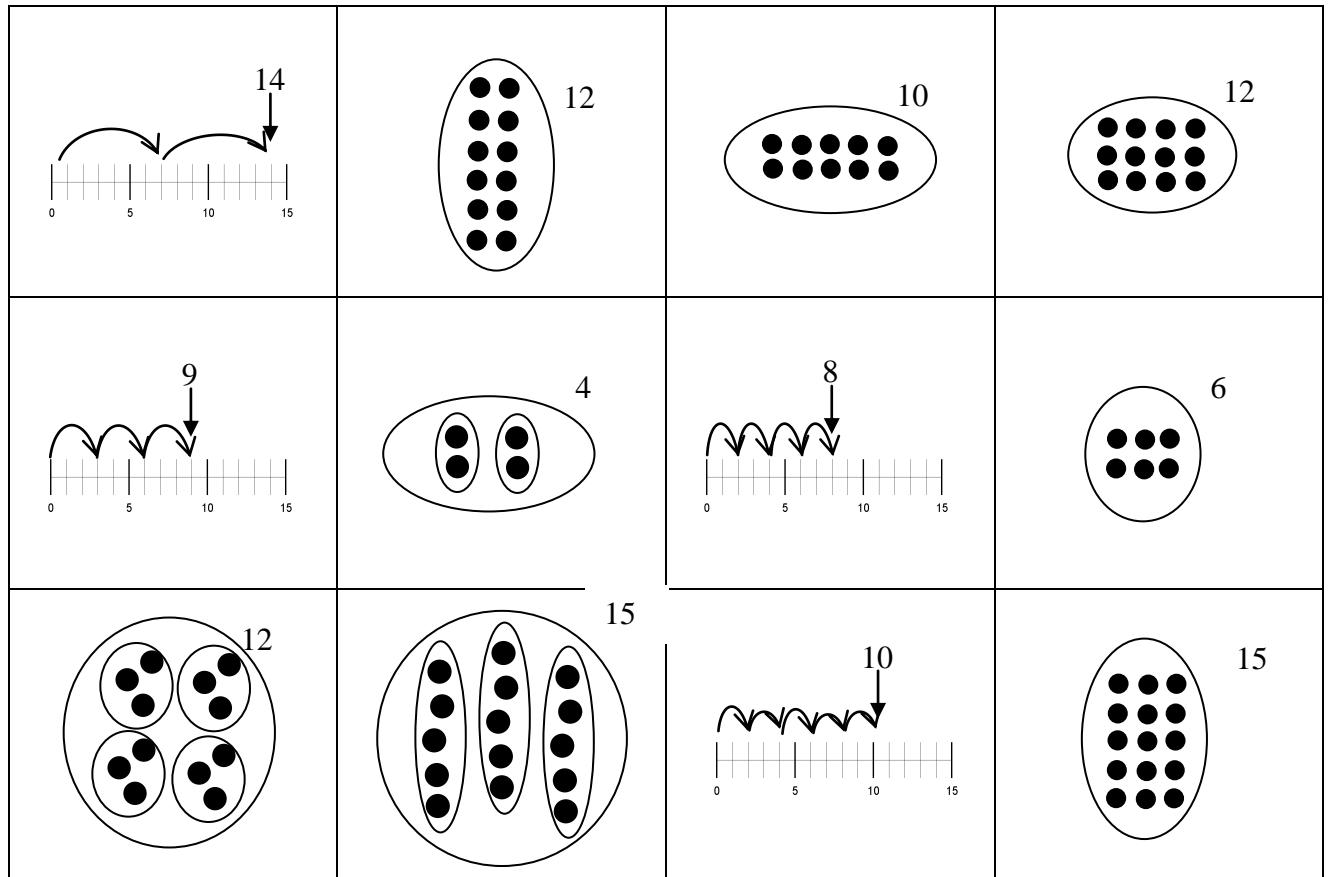
DC4 – Grouping division Mix and Match cards (cont'd)

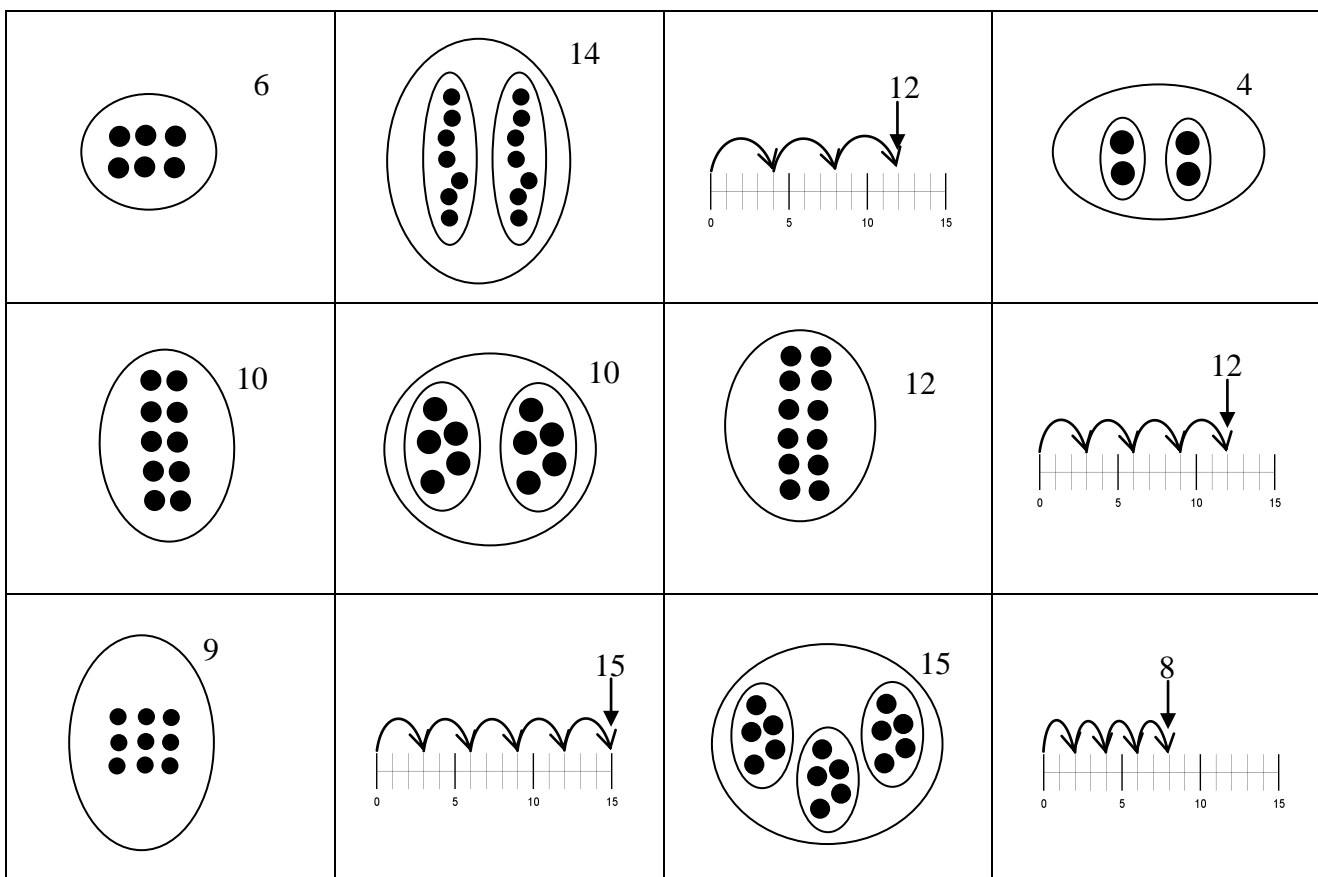
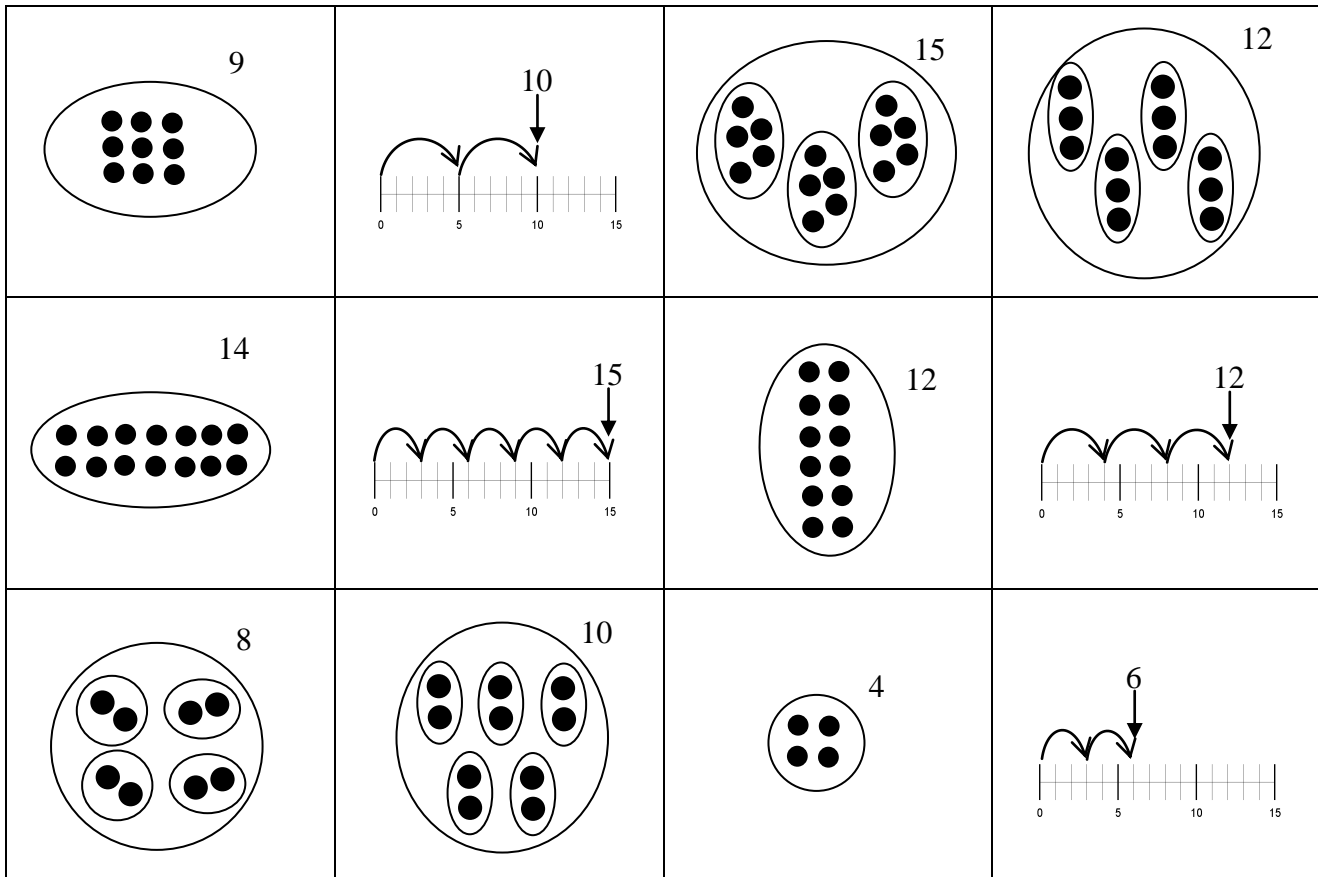
 <p>six in groups- rows-jumps of two</p>   <p>six divided by two</p>	 <p>six in groups- rows-jumps of three</p>   <p>six divided by three</p>
 <p>four in groups- rows-jumps of two</p>   <p>four divided by two</p>	 <p>fourteen in groups- rows-jumps of seven</p>   <p>fourteen divided by seven</p>

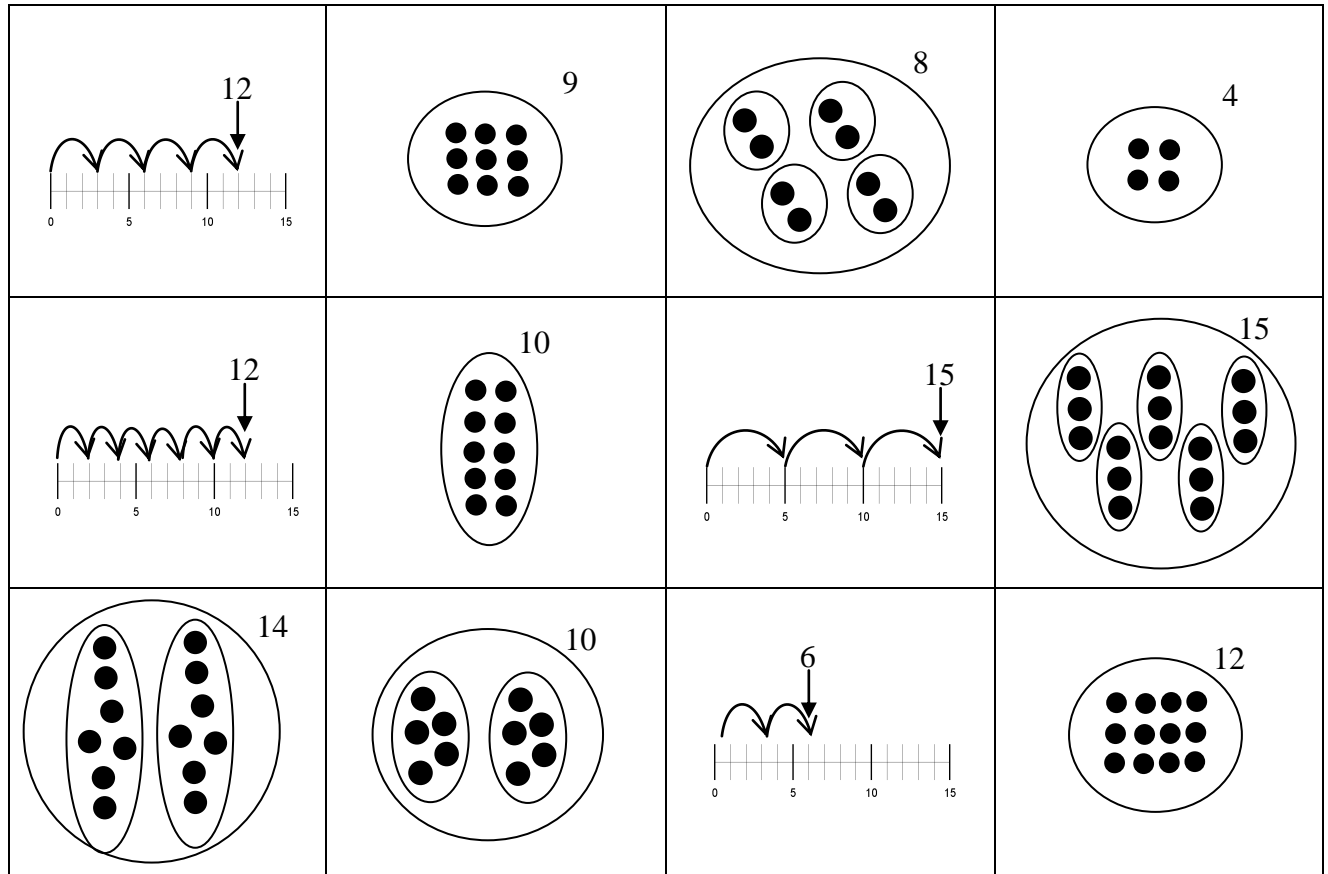
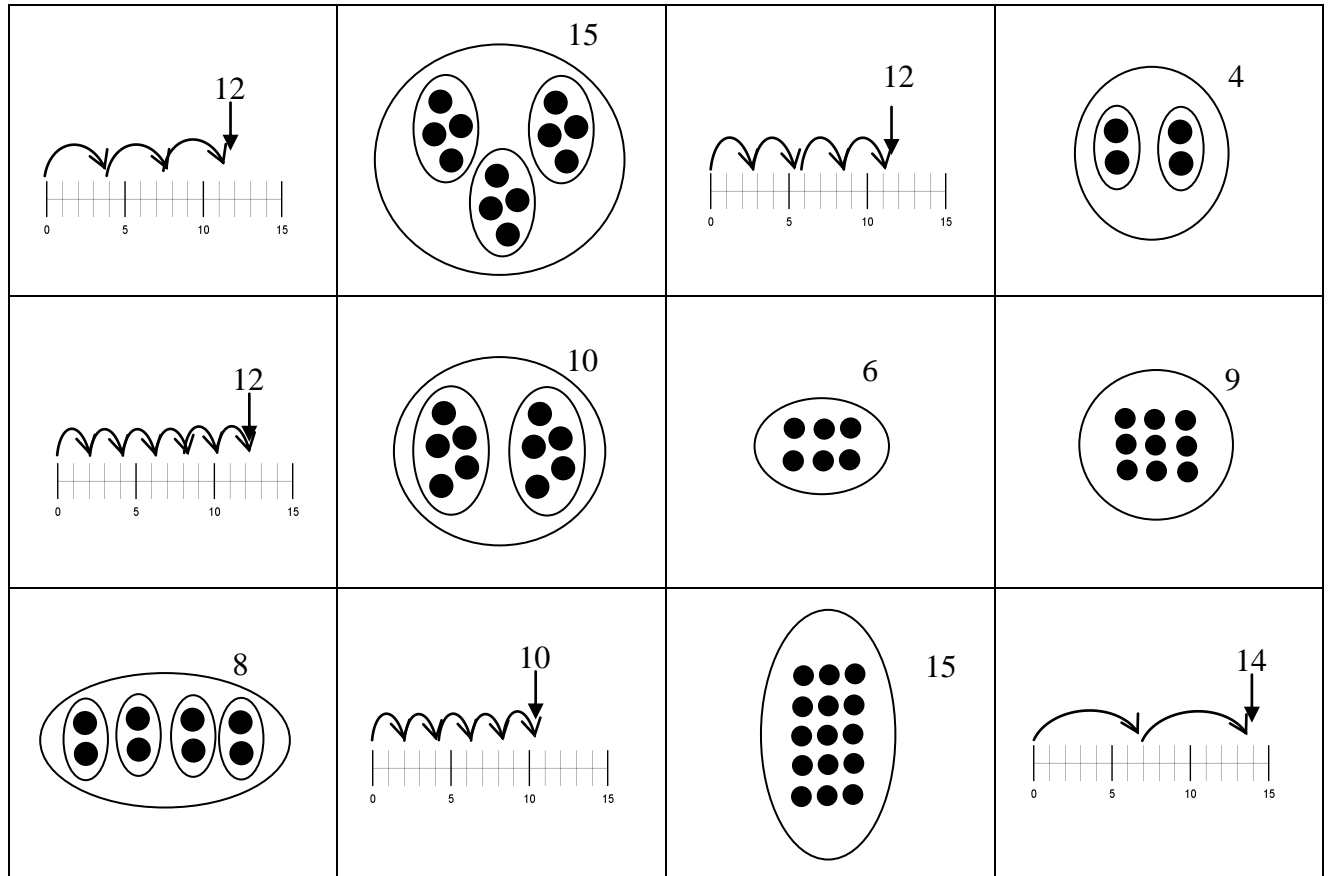
DC4 – Grouping division Bingo flash cards

ten divided by five	twelve divided by three	six divided by three
eight divided by two	fifteen divided by three	ten divided by two
twelve divided by four	four divided by two	fourteen divided by seven
fifteen divided by five	nine divided by three	twelve divided by two

DC4 – Grouping division Bingo Boards



DC4 – Grouping division Bingo Boards (continued)

DC4 – Grouping division Bingo Boards (continued)

DC4 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 DC5

[Division problems \leftrightarrow division symbols]

Materials: Counters/unifix or objects (pens, shells), dot paper, number tracks, pen, paper, material attached (worksheets and games)

Directions:

Symbols for sharing stories

1. Begin with three sharing stories:

- Set – *15 lollies shared amongst 5 people. How many lollies to each person?*
- Array – *12 children were in 3 rows. How many children in each row?*
- Number line – *8m in 2 leaps. How many m per leap?*

Ensure students know how to act these out with materials, to draw them, and to state the story in mathematics language. Focus on how sharing division is the total number and the number of groups-rows-jumps leading to knowing the number in each group-row-jump.

2. Ask students to write the story in symbols. If difficulty, ask: *How many lollies were there?* [15] *Write this number down. What happened to the lollies?* [shared] *What is the operation used?* [division] *What is the symbol?* [\div] *Write this down on the right hand side of 15.* Ask: *How many people shared?* [5]. *Write this number on the right hand side of \div .* Ask: *How many did each person get?* [3]. *Put an equal sign and 3 on the right hand side of 5* [$15 \div 5 = 3$]. Ask: *Is there another way this could be written?*
$$\begin{array}{r} 3 \\ 5 \overline{)15} \end{array}$$
 [See on right] Go through this method as well.

Symbols for grouping stories

3. Repeat 1 & 2 for three grouping stories:

- Set – *15 lollies put in packets of 5. How many packets?*
- Array – *12 children were in rows of 3. How many rows?*
- Number line – *8m board cut into 2m lengths. How many lengths?*

Discuss the differences. Ensure that students understand that, for grouping, division is the total number and the number in each group-row-jump leading to the number of groups-rows-jumps. It is opposite to sharing.

4. Complete Worksheet 5.1.

Reversing (symbols to problems)

5. Show a division problem in symbols: $12 \div 4 = 3$. Ask students to do the following:
- read the problem (state it in formal mathematics language) [12 divided by 4 equals 3]; and
 - draw it using the three models (set, array, number line) for both sharing and grouping.
6. Ask: *Make up stories that reflect the division example. Try to think of stories about groups, rows and number lines for both sharing and grouping.*

7. Complete as many examples as needed from Worksheet 5.2.

Practice

8. Play the following division symbol games: “Division symbols Snap”, “Division symbols Rummy”, “Division symbols Concentration”, “Division symbols Mix & Match”, “Division symbols Cover the Board” and “Division symbols Bingo”.

Note: The rules for each of these games can be found in DC2.

DC5 – Worksheet 5.1

For each of the following problems (one is sharing and one is grouping):

- (a) act it out with materials and draw it with a diagram; and
 (b) write it in language and symbols (both types of symbols).

<p>1. (a) I scored 20 points. Each try is equal to 4 points. How many tries did I make altogether? (grouping)</p> <p>(b) I ran 20m in 4 trips. How long was each trip? (sharing)</p>	<p>2. (a) Altogether, the 4 kangaroos made 24 hops to the shade. How many hops did each kangaroo make? (sharing)</p> <p>(b) 24 hops were made, each kangaroo made 4 hops. How many kangaroos? (grouping)</p>
<p>3. (a) I used 12 eggs to bake cakes. There were 3 eggs in each cake. How many cakes? (grouping)</p> <p>(b) There were 3 chickens that laid 12 eggs. How many eggs each? (sharing)</p>	<p>4. (a) I shared 18 lollies between 3 of our friends. How many lollies did each friend get? (sharing)</p> <p>(b) I had 18 lollies. I ate 3 a day. How many days? (grouping)</p>
<p>5. (a) Rob caught 21 fish in total. He gave 3 to each of his friends. How many friends did he have? (grouping)</p> <p>(b) I had a 21m tape. I cut it into 3 equal pieces. How long was each piece? (sharing)</p>	<p>6. (a) I walked past 10 houses. There were 2 houses on each block. How many blocks did I walk? (grouping)</p> <p>(b) I had 10 horses. I put them into 2 pens. How many per pen? (sharing)</p>
<p>7. (a) The 20 children formed rows of 5. How many rows? (grouping)</p> <p>(b) The 20 children formed 5 rows. How many children in each row? (sharing)</p>	<p>8. (a) The relay was 28km long. Each runner ran 4km. How many runners? (grouping)</p> <p>(b) The relay was 28km long. There were 4 runners. How far did each run? (sharing)</p>
<p>9. (a) I had 8 counters. I put them into 4 rows. How many counters in each row? (sharing)</p> <p>(b) I had 8 counters. I put them into rows of 4. How many rows? (grouping)</p>	<p>10.(a) There were 15 eggs laid between 5 goannas. How many eggs did each goanna lay? (sharing)</p> <p>(b) I had 15 eggs. 5 were put into each basket. How many baskets? (grouping)</p>

DC5 – Worksheet 5.2

For each of the following, read the operation, act it out with materials and draw drawings. Do this for the three models (set, array and number line) and the two approaches (sharing and grouping).

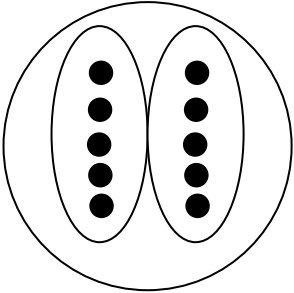
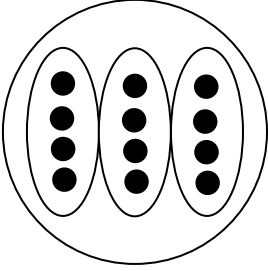
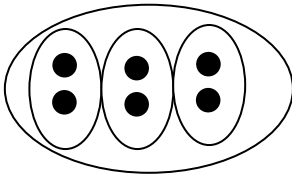
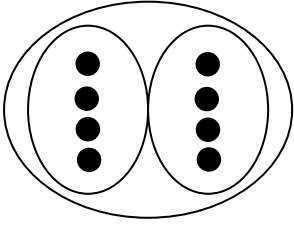
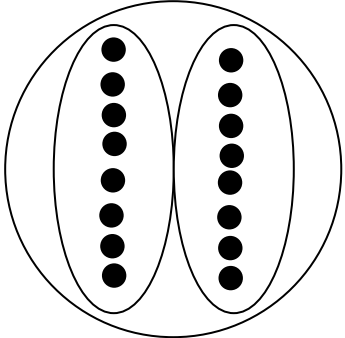
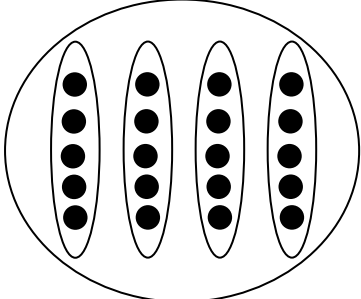
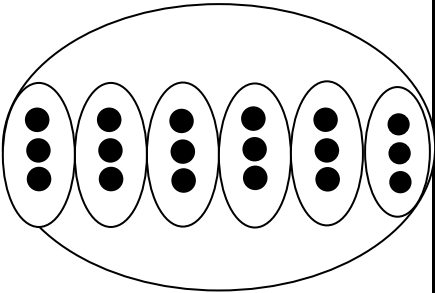
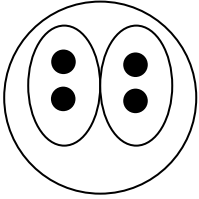
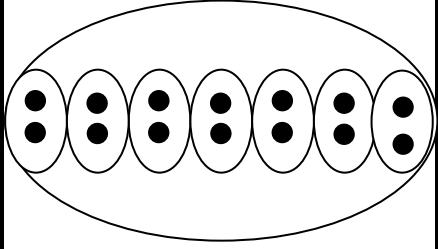
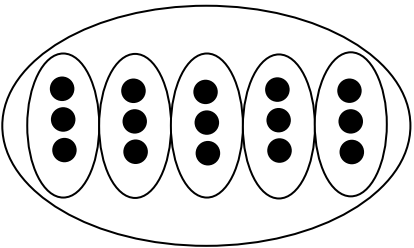
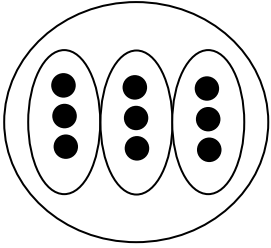
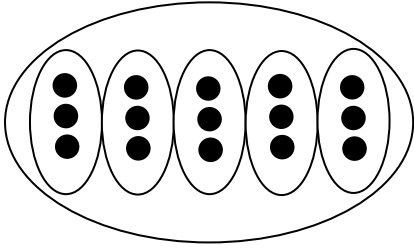
1. $9 \div 3 = 3$	2. $\begin{array}{r} 4 \\ 2 \overline{) 8} \end{array}$
3. $\begin{array}{r} 2 \\ 7 \overline{) 14} \end{array}$	4. $24 \div 4 = 6$
5. $24 \div 8 = 3$	6. $\begin{array}{r} 5 \\ 7 \overline{) 35} \end{array}$
7. $\begin{array}{r} 6 \\ 7 \overline{) 42} \end{array}$	8. $72 \div 9 = 8$
9. $\begin{array}{r} 4 \\ 8 \overline{) 32} \end{array}$	10. $32 \div 8 = 4$

DC5 – Division symbols game cards (Snap, Rummy & Concentration)/Cover the Board baseboard

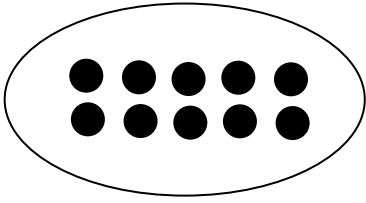
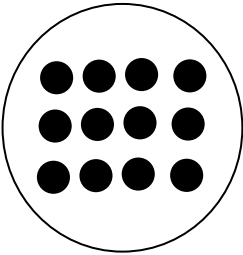
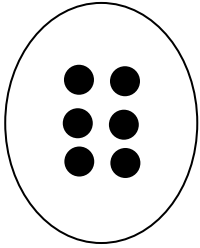
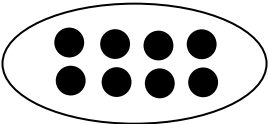
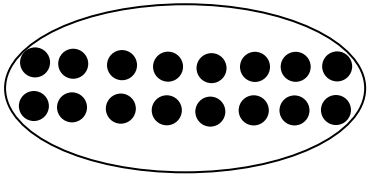
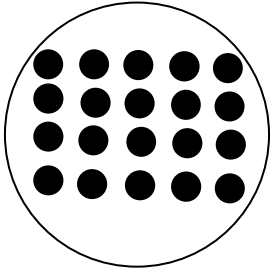
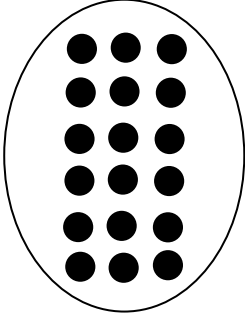
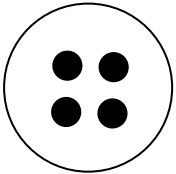
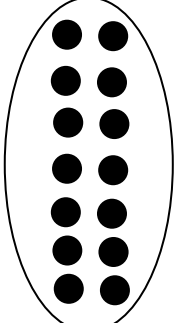
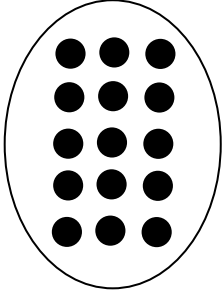
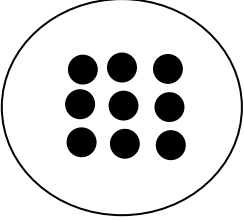
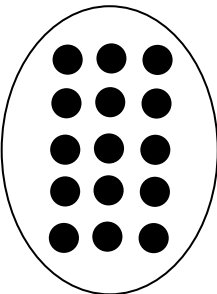
Note: The rules for these games are in DC2.

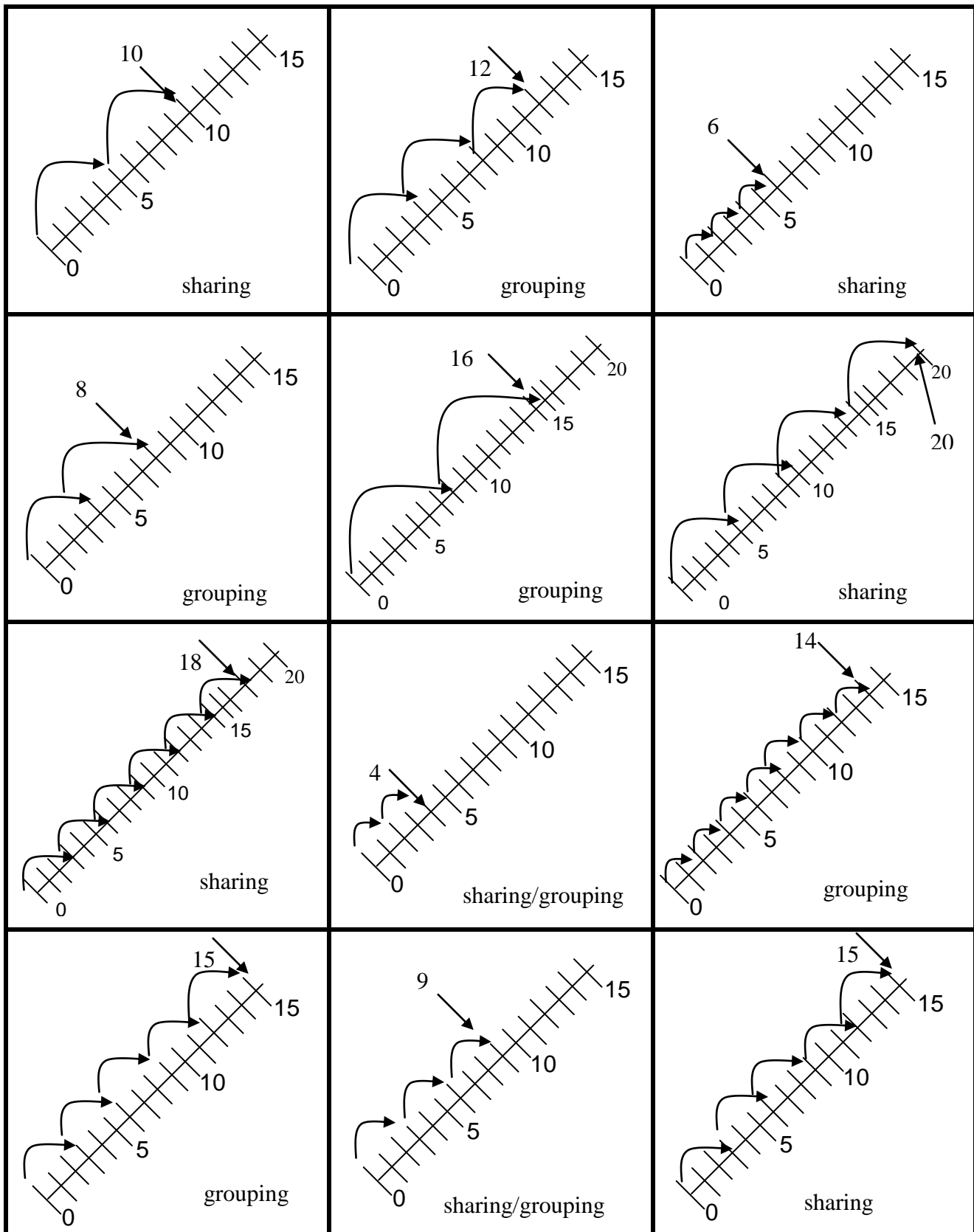
$10 \div 2$ <p>sharing</p>	$4 \overline{) 12}$ <p>grouping</p>	$6 \div 3$ <p>sharing</p>
$4 \overline{) 8}$ <p>grouping</p>	$16 \div 8$ <p>grouping</p>	$4 \overline{) 20}$ <p>grouping</p>
$18 \div 6$ <p>sharing</p>	$2 \overline{) 4}$ <p>sharing/grouping</p>	$14 \div 2$ <p>grouping</p>
$15 \div 3$ <p>grouping</p>	$3 \overline{) 9}$ <p>sharing/grouping</p>	$5 \overline{) 15}$ <p>sharing</p>

DC5 – Division symbol cards (set)

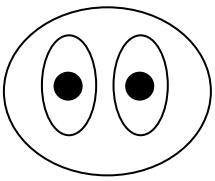
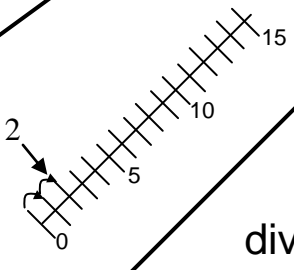

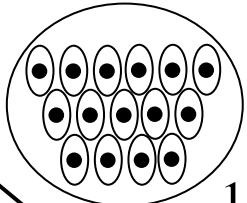
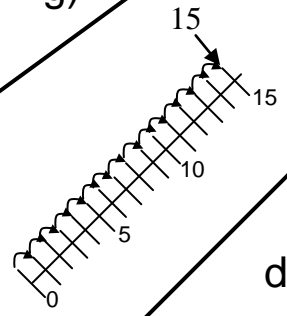
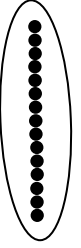
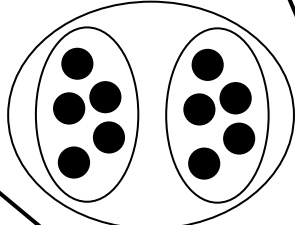
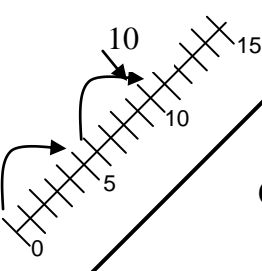
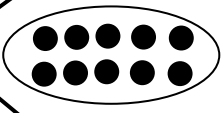
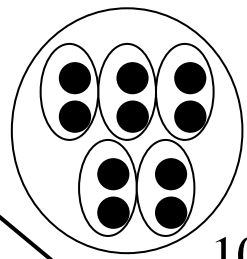
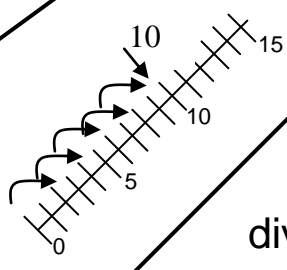
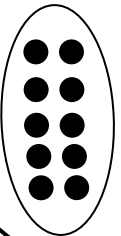
 <p>sharing</p>	 <p>grouping</p>	 <p>sharing</p>
 <p>grouping</p>	 <p>grouping</p>	 <p>sharing</p>
 <p>sharing</p>	 <p>sharing/grouping</p>	 <p>grouping</p>
 <p>grouping</p>	 <p>sharing/grouping</p>	 <p>sharing</p>

DC5 – Division symbol cards (array)

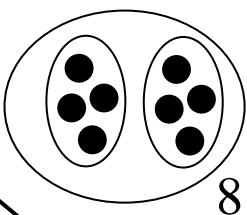
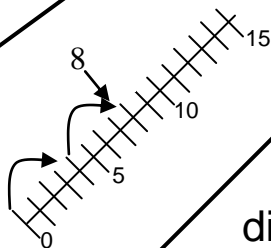
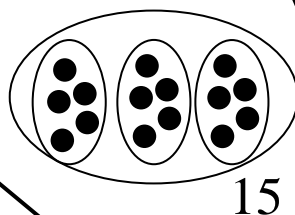
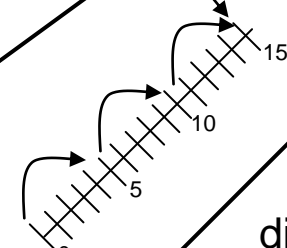
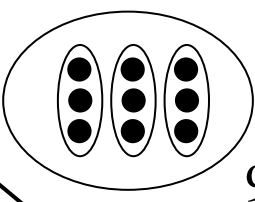
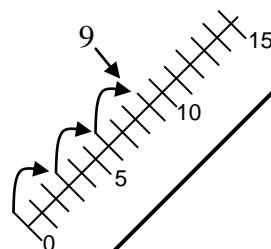
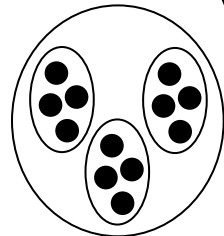
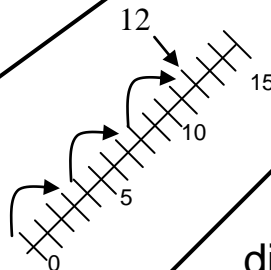
 <p>sharing</p>	 <p>grouping</p>	 <p>sharing</p>
 <p>grouping</p>	 <p>grouping</p>	 <p>sharing</p>
 <p>sharing</p>	 <p>sharing/grouping</p>	 <p>grouping</p>
 <p>grouping</p>	 <p>sharing/grouping</p>	 <p>sharing</p>

DC5 – Division symbol cards (number line)

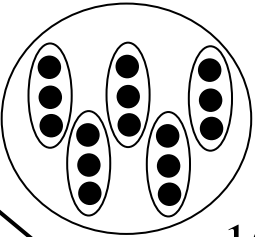
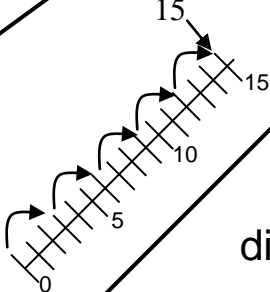
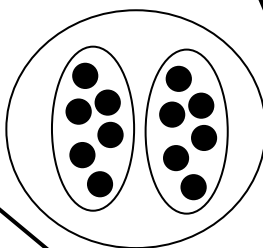
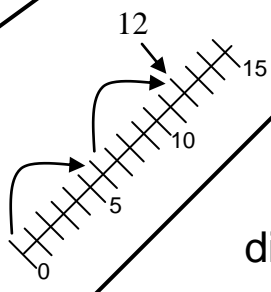
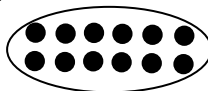
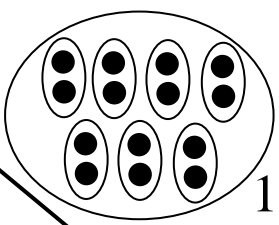
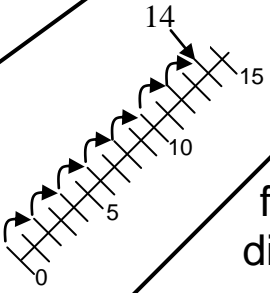
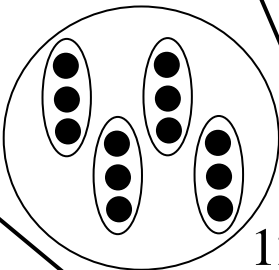
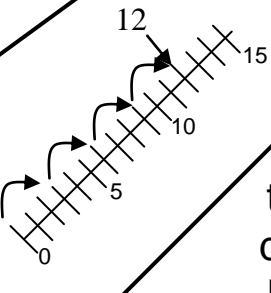
DC5 – Division symbols Mix and Match Cards

 <p>2</p> <p>two divided by one (grouping)</p> <p>$1 \overline{) 2}$ (grouping)</p> 	<p>$2 \div 2$ (sharing)</p> <p>2</p>  <p>two divided by two (sharing)</p> <p>$2 \overline{) 2}$ (grouping)</p>	 <p>15</p> <p>fifteen divided by one (grouping)</p> <p>$1 \overline{) 15}$ (grouping)</p> 	<p>$15 \div 15$ (sharing)</p> <p>15</p>  <p>fifteen divided by fifteen (sharing)</p> <p>$15 \overline{) 15}$ (grouping)</p>
 <p>10</p> <p>ten divided by five (grouping)</p> <p>$5 \overline{) 10}$ (grouping)</p> 	<p>$10 \div 2$ (sharing)</p> <p>10</p>  <p>ten divided by two (sharing)</p> <p>$2 \overline{) 10}$ (grouping)</p>	 <p>10</p> <p>ten divided by two (grouping)</p> <p>$2 \overline{) 10}$ (grouping)</p> 	<p>$10 \div 5$ (sharing)</p> <p>10</p>  <p>ten divided by five (sharing)</p> <p>$5 \overline{) 10}$ (grouping)</p>

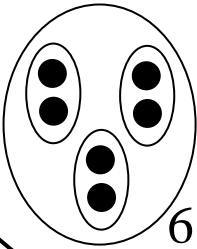
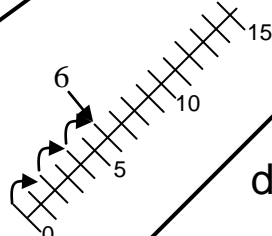
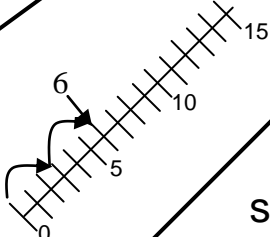
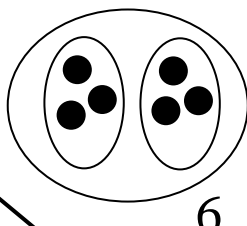
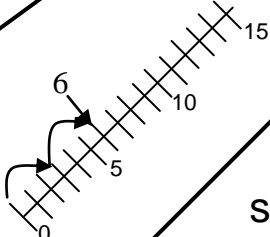

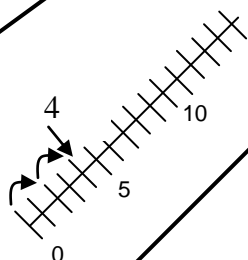
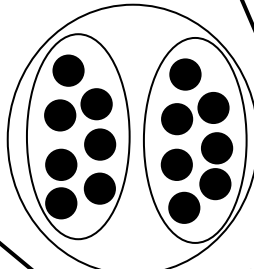
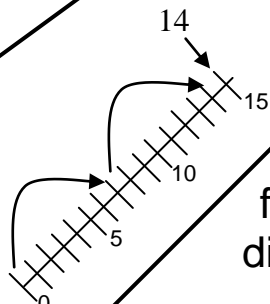
DC5 – Division symbols Mix and Match cards (cont.)

 <p>8</p> <p>eight divided by four (grouping)</p> <p>$4 \overline{) 8}$ (grouping)</p>  <p>8</p> <p>eight divided by two (sharing)</p>	 <p>15</p> <p>fifteen divided by five (grouping)</p> <p>$5 \overline{) 15}$ (grouping)</p>  <p>15</p> <p>fifteen divided by three (sharing)</p>
 <p>9</p> <p>nine divided by three (grouping)</p> <p>$3 \overline{) 9}$ (grouping)</p>  <p>9</p> <p>nine divided by three (sharing)</p>	 <p>12</p> <p>twelve divided by four (grouping)</p> <p>$4 \overline{) 12}$ (grouping)</p>  <p>12</p> <p>twelve divided by three (sharing)</p>

DC5 – Division symbols Mix and Match cards (cont.)

 <p>15</p> <p>fifteen divided by three (grouping)</p> <p>$3 \overline{)15}$ (grouping)</p>  <p>15</p> <p>fifteen divided by five (sharing)</p>	<p>$15 \div 5$ (sharing)</p>  <p>12</p> <p>twelve divided by six (grouping)</p> <p>$6 \overline{)12}$ (grouping)</p>  <p>12</p> <p>twelve divided by two (sharing)</p>
<p>$12 \div 2$ (sharing)</p>  <p>12</p> <p>twelve divided by six (grouping)</p> <p>$14 \div 7$ (sharing)</p>  <p>14</p> <p>fourteen divided by two (grouping)</p> <p>$2 \overline{)14}$ (grouping)</p>  <p>14</p> <p>fourteen divided by seven (sharing)</p>	<p>$12 \div 4$ (sharing)</p>  <p>12</p> <p>twelve divided by three (grouping)</p> <p>$3 \overline{)12}$ (grouping)</p>  <p>12</p> <p>twelve divided by four (sharing)</p>

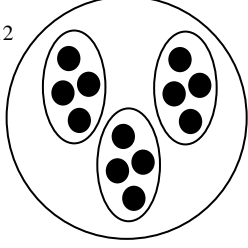
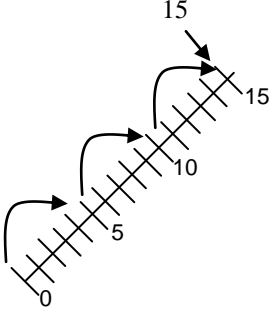
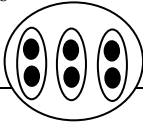
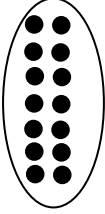
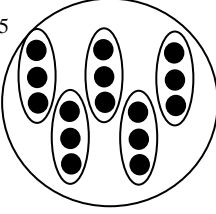
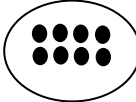
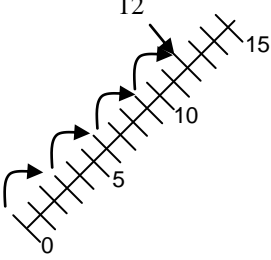
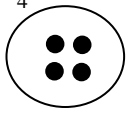
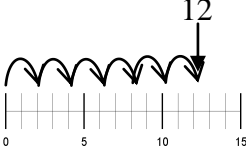

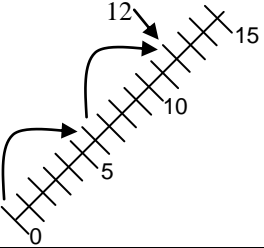
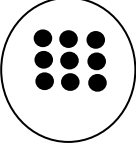
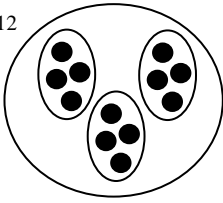
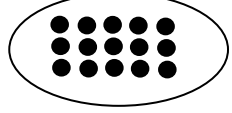
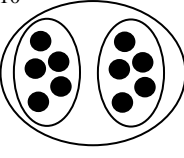

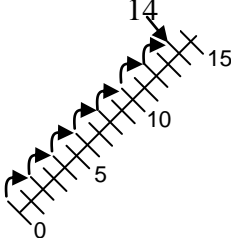
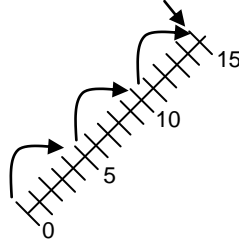
DC5 – Division Symbols Mix and Match cards (cont.)

 <p>6</p> <p>six divided by two (grouping)</p> <p>$2 \overline{) 6}$ (grouping)</p>  <p>6</p> <p>six divided by three (sharing)</p> <p>$3 \overline{) 6}$ (grouping)</p>  <p>6</p> <p>six divided by two (sharing)</p>	 <p>6</p> <p>six divided by three (grouping)</p> <p>$3 \overline{) 6}$ (grouping)</p>  <p>6</p> <p>six divided by two (sharing)</p>
 <p>4</p> <p>four divided by two (grouping)</p> <p>$2 \overline{) 4}$ (grouping)</p>  <p>4</p> <p>four divided by two (sharing)</p>	 <p>14</p> <p>fourteen divided by seven (grouping)</p> <p>$7 \overline{) 14}$ (grouping)</p>  <p>14</p> <p>fourteen divided by two (sharing)</p>

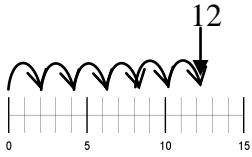
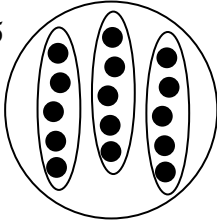
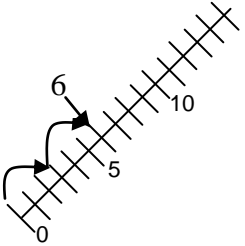
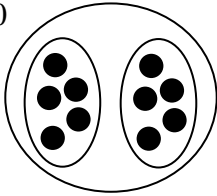


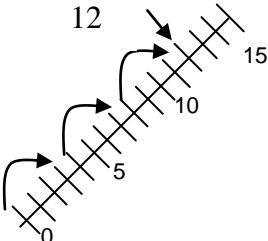
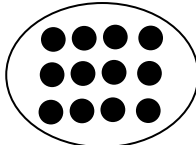
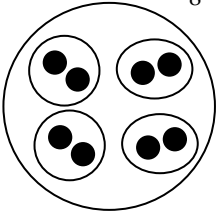
DC5 – Division symbols Bingo flashcards

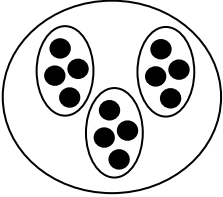


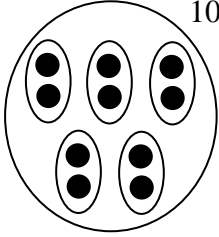
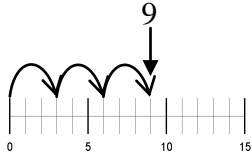
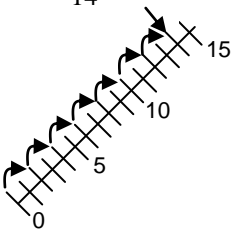
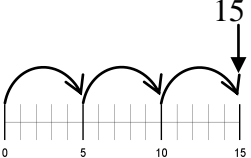
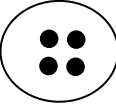
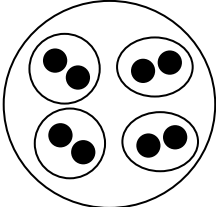
$2 \overline{)10}$	$12 \div 4$	$2 \overline{)6}$
$8 \div 4$	$4 \overline{)16}$	$10 \div 5$
$3 \overline{)12}$	$4 \div 2$	$2 \overline{)14}$
$3 \overline{)15}$	$9 \div 3$	$12 \div 6$

DC5 – Division symbols Bingo Boards

<p>six divided by two</p>	<p>12</p> 		<p>6</p> 
<p>14</p> 	<p>fifteen divided by three</p>	<p>15</p> 	<p>8</p> 
	<p>4</p> 	<p>eight divided by four</p>	
<p>4</p> 		<p>9</p> 	<p>12</p> 
<p>ten divided by two</p>	<p>15</p> 	<p>10</p> 	<p>6</p> 
	<p>twelve divided by four</p>	<p>eight divided by four</p>	

DC5 – Division symbols Bingo Boards (continued)

	four divided by two	15 	
nine divided by three	10 	14 	 10
	12 	sixteen divided by four	8 

12 	ten divided by five	6 	 12
sixteen divided by four	10 	9 	14 
	twelve divided by three	4 	8 

DC5 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?
