"Pushing for Progression" in number sense and fluency
Maths Club Development Programme

Addition and Subtraction

Session Two
Teacher Handbook

Name

School

District

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The big ideas in addition and subtraction

In this series of club sessions, we focus on some of the big ideas in addition and subtraction.

1. Thinking of **part-part-whole** relationships is helpful in linking addition and subtraction. This encourages learners to understand that addition and subtraction have a reciprocal relationship.

   For example, where the whole is 6, and 4 and 2 are parts. This means that 4 and 2 together form the whole, which is 6. 6 subtract 4 leaves the 2 and 6 subtract 2 leaves the 4.

2. Understanding that addition of two or more numbers can be done in any **order** is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. This encourages a '**count on'** strategy which is discussed in more detail below.

   For example, for 3 + 8 it is easier to calculate 8 + 3.

3. When adding three or more numbers it is helpful to look for pairs or groups of numbers that are easy to add using known facts. These can be called ***friendly numbers***. A friendly number is normally 10 or a decade number.

   For example, with 5 + 8 + 2, it is easier to rearrange the numbers to add 8 + 2 first to make a 'friendly' 10 than to begin with 5 + 8.

4. Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20.
   For example, with 8 + 7, thinking of 7 as 2 + 5 and adding the 2 to 8 to make 10 and then the 5 to total 15.

5. Understanding the importance of the **equals sign** meaning 'equivalent to' (i.e. that 6 + 4 = 10, 10 = 6 + 4 and 5 + 5 = 6 + 4 are all valid uses of the equals sign) is crucial for later work in algebra.

   Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.

Progression in addition and subtraction

Count all

When presented with an addition problem such as 5 + 3, some children may count from one – "one, two, three, four, five – six, seven, eight!" This is referred to as ***Count All***.

Advanced counting-by-one strategies

With addition and subtraction problems, children generally advance from counting all to *count on strategies*. These can be seen as four counting-by-ones strategies:

1. Count up from
2. Count up to
3. Count down from
4. Count down to

Count-up-from: addition *Example: 6 plus 3* "Six, ... seven, eight, nine, ... nine!" With this scenario, the number to count on is **known** in advance.	**Count -up-to**: addition *Example: 6 plus what equals 9 or 6 + ☐ = 9* "Six, ... seven, eight, nine, ... three!" The essential feature is that the student counts on from "six". This strategy involves keeping track of counts but the student does not know in advance the number of counts.
Count -down-from: subtraction *Example: 9 take away 3* "Nine, ... eight, seven, six, ... six!" This strategy involves keeping track of backward and the student knows in advance the number of counts.	**Count-down-to**: subtraction *Example: 9 take away what equals 6 or 9 - ☐ = 6* "Nine, ... eight, seven, six, ... three!" This strategy involves keeping track of backward counts. The student knows in advance where he or she is counting to.

Constrained methods	**Less constrained**	**Semi fluent methods**	**Flexible fluency**
Inefficient (I)	*Somewhere in between (IE)*		*Efficient (E)*
Use of fingers, tally marks, circles, drawings of any kind	Breaking down into place value, using some kind of expanded notation	Another strategy such as splitting, working with a friendly number	Use of known addition and subtraction facts, appropriate use of algorithms for 2 and 3 digit problems
Look for these specific addition and subtraction strategies and encourage learners to try using more efficient ones			
Count all	Count up / down to Count up / down from		

Adding and subtracting fit together using a whole-part-part structure

Whole	
Part A	Part B

Part A + Part B = Whole

Part B + Part A = Whole

Whole – Part A = Part B

Whole – Part B = Part A

Learners should be able to write down all the equivalent number sentences for any addition or subtraction fact.

80	
70	10

If 80 – 70 = 10 then the following are also true:

70 + 10 = 80
10 + 70 = 80
80 - 70 = 10
80 – 10 = 70

80 = 70 + 10
80 = 10 + 70
10 = 80 – 70
70 = 80 – 10

There are always 8 ways to write any addition and subtraction fact. Learners can use this to be flexible about how they calculate. For example, working with 305 – 298 = □, may be easier for them than 298 + □ = 305.

Introductory story

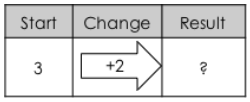
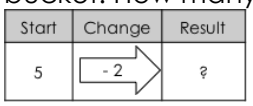
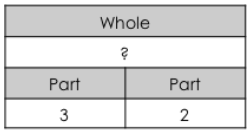
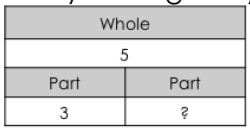
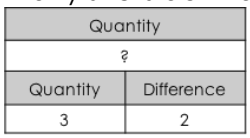
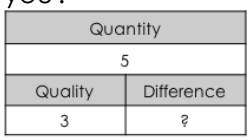
Today I want to tell you about a boy named Siya, who loves to play marbles with his friends at school.

Every day, Siya puts his 5 favourite marbles in the front pockets of his school trousers so that he remembers to take them to school.

On some days, Siya puts all his marbles in one pocket. And on other days, he puts all his marbles in the other pocket. Most of the time, he uses both pockets and puts some marbles in each one.

Let's look at the ways the Siya can tell stories about his marbles.

Types of addition and subtraction problems

<table>
<tr><th>Type of problem</th><th>Number Model</th><th>Examples and models</th><th></th></tr>
<tr><td>INCREASING
Change increase problems - problems where there is an action of joining that increases the number in a set.
  </td><td>3 + 2 = ___</td><td>Start + change = result
I have 3 shells in my bucket. I get 2 more shells. How many shells do I have now?
  </td><td rowspan="2">Like a movie (dynamic)</td></tr>
<tr><td>DECREASING
Change decrease problems - problems where there is an action of separating which decreases the number in a set.
  </td><td>5 – 2 = ____</td><td>Start – change = result
I have 5 shells. I take 2 out of the bucket. How many are left?
  </td></tr>
<tr><td colspan="3">Collections problems - problems where two parts make a whole but there is no action.</td><td rowspan="5">Snapshot in time (static)</td></tr>
<tr><td>COMBINING
  </td><td>3 + 2 = ___</td><td>Whole = part + part
I put 3 shells into a bucket. My brother puts 2 shells into the bucket. How many shells are in the bucket now?
  </td></tr>
<tr><td>SEPARATING
  </td><td>Separate
5 – 3 = ___
3 + ___ = 5</td><td>Whole = part + part
I have 5 shells in my bucket. Three are mine. The rest are Siya's. How many belong to Siya?
  </td></tr>
<tr><td colspan="3">Compare problems where the numbers of objects in two disjoined sets are compared.</td></tr>
<tr><td>COMPARING
  </td><td>Compare
3 + 2 = ____</td><td>Whole = part + part
You have 3 shells in your bucket. I have 2 more shells in my bucket. How many shells do I have in my bucket?
  </td></tr>
<tr><td>FINDING THE DIFFERENCE
  </td><td>Difference
5 – 3 = ___
3 + ___ = 5</td><td>Whole = part + part
I have 5 shells. You have 3 shells. How many more shells do I have than you?
  </td></tr>
</table>

Source: Nicky Roberts and http://insideteaching.org/quest/collections/sites/lampkin_sue/additionsubtraction.htm

Club sessions 4 to 9: mathematical focus

The overall object of learning for this series of clubs is detailed on this page. The activities detailed in this booklet help to focus on these big ideas and are intended to help you as the club leader to encourage learners to progress from counting all to more efficient strategies for addition and subtraction.

At the start of each session, check the **PURPOSE OF THE SESSION / OBJECT OF LEARNING** and **APPROACH TO RUNNING THE SESSION** boxes at the top of each planning sheet to set your focus for each session.

Club Session Planning

Club Overviews: Session 4 to 9 *Page: 8*	
Foundation Phase	**Intermediate Phase**
Session Four *Page: 9*	**Session Four** *Page: 15*
Session Five *Page: 10*	**Session Five** *Page: 16*
Session Six *Page: 11*	**Session Six** *Page: 17*
Session Seven *Page: 12*	**Session Seven** *Page: 18*
Session Eight *Page: 13*	**Session Eight** *Page: 19*
Session Nine *Page: 14*	**Session Nine** *Page: 20*

Object of learning for all these sessions:

- Emphasis on the part-part-whole relationships is inherent in all activiteis in linking addition and subtraction.
- Emphasise that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first to encourage 'counting on'.
- Emphasis that when adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given 5 + 8 + 2 it is easier to add 8 + 2 first than to begin with 5 + 8.
- All card and dice games are intended to promote learners' fluency in using number facts

Overviews

The session overviews are shown here for Grade 1 through to the IP grades. This means that if you encounter a learner who needs to be extended or remediated in your clubs, you have access to other activities that can be useful.

Foundation Phase

Grade 1

	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9
	Timings based on a 60 minute club					
Mental warmup	Fizz Pop (doubling and halving up to 10/20)	Fizz Pop (number before/after)	Fizz Pop (how many to make 10)	Patterns: what comes next?	FINDING 10 or 12	Fizz Pop (how many to make 10/20)
Time	*5 mins*	*5 mins*	*5 mins*	*10 mins*	*15 mins*	*5 mins*
Games	DOUBLES & NEAR DOUBLES	TEN!	ADD 3 CARDS (Numbers to 15)	SALUTE		PYRAMID CARD GAME (add to 10)
Time	*15 mins*	*30-40 mins*	*15 mins*			*20 mins*
Activities	ROLL & FILL Part-part-whole (with numbers up to 10/20)	NUMBER SEARCHES	BUILD A SNAKE	FACES & GRID PUZZLE	JOINING NUMBERS	PYRAMID SUMS (3 LEVELS) (with 1 digit numbers in bottom row)
Time	*30-40 mins*	*20 mins*	*30-40 mins*	*30 mins*	*30-40 mins*	*30 mins*
Pay it Forward	DOUBLES & NEAR DOUBLES	TEN! (Grocotts 9)	ADD 3 CARDS (Numbers to 15)			PYRAMID CARD GAME (add to 10)
Take home work	Homework book(s)					

Grades 2 and 3

	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9
	Timings based on a 60 minute club					
Mental warmup	Fizz Pop (doubling and halving up to 10/20)	Finding 20	Fizz Pop (how many to make 10)	Patterns: what comes next? (Grocotts 6)	Finding 24	Fizz Pop (how many to make 10/20)
Time	*5 mins*	*15 mins*	*5 mins*	*10 mins*	*20 mins*	*5 mins*
Games	DOUBLES & NEAR DOUBLES (Grocotts 10)	TEN!	ADD 5 CARDS (Numbers to 30)	SALUTE		PYRAMID CARD GAME (add to 13, 15 etc)
Time	*15 mins*	*20 mins*	*15 mins*	*20 mins*		*25 mins*
Activities	ROLL & FILL Part-part-whole (with numbers up to 30)	NUMBER SEARCHES	FIND SUBTRACTION SUMS	FACES & GRID PUZZLE	JOINING NUMBERS	PYRAMID SUMS (3 LEVELS) (with 1 and 2-digit numbers to 15 in bottom row)
Time	*30-40 mins*	*20 mins*	*30-40 mins*	*20 mins*	*30-40 mins*	*30 mins*
Pay it Forward	DOUBLES & NEAR DOUBLES	TEN!	ADD 5 CARDS (Numbers to 30)			PYRAMID CARD GAME (add to 13, 15 etc)
Take home work	Homework book(s)					

Intermediate Phase

	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9
	Timings based on a 60 minute club					
Mental warmup	Fizz Pop (doubling and halving)	Finding 50	Fizz Pop (how many to make 50)	Patterns: what comes next?	Finding 70	Fizz Pop (how many to make 100)
Time	*5 mins*	*15 mins*	*5 mins*	*10 mins*	*15 mins*	*5 mins*
Games	ADD 5 CARDS	SALUTE	FLIP OUT			
Time	*15 mins*	*15 mins*	*15 mins*			
Activities	ROLL AND FILL Part-part-whole (with numbers 50 and bigger)	CROSS OUT SINGLES	PYRAMID SUMS (3 & 4 LEVELS) (with 1 and 2-digit numbers up to 99 in the bottom row)	PATTERNS	JOINING NUMBERS	ALPHABET NUMBER WORDS
Time	*30-40 mins*	*30-40 mins*	*30-40 mins*	*30-40 mins*	*30-40 mins*	*40-50 mins*
Pay it Forward	ADD 5 CARDS		FLIP OUT			ALPHABET NUMBER WORDS
Take home work	Homework book(s)					

FP	Maths Club Whole Session Planning Sheet	Session Four
Purpose of the session / object of learning	Key focus is the relationship between addition and subtraction in the Roll & Fill game. Learners will begin to understand that the 2 operations are linked.	

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• DICE GAME: 1 dice per pair of learners • ROLL & FILL: part-whole grids in plastic sleeves, kokis, cloth	Give learners pack of cards and dice to take home. Explain that the cards and dice are for them to play games that they learn in the club with family members. Learners can play Near Doubles at home.
Organisational requirements	**Your approach to running the session**
• DICE GAME: play in pairs • ROLL & FILL: individual work	Demonstrate the Roll & Fill activity to the whole group 1st using the stories on page 6.

Mental: FIZZ POP DOUBLES AND HALVES – 5 minutes

- Start with **doubling**. Say "I will say a number and you must double it".
  - The game starts with leader saying "FIZZ", club responds with "POP"
  - Say the number and club responds. E.g. "5" and club responds with "10"
  - Keep the sequence under 20: 2, 3,4, 5, 6, 7…. up to 10 or 20.
  - If necessary, have some dice handy to show doubles and let learners count dots.
  - If you get an answer with the harder numbers, ask the learner to share their method, then ask group to try the method for the next number.
- Move onto **halving**
  - Start the sequence at 20, 18, 16, 14, 12, 10, 8, 6, 4, 2 and do not introduce odd numbers at the beginning

Game: NEAR DOUBLES – 15 minutes

The aim of this game is to practice doubling plus 1.
Learners play with a PARTNER

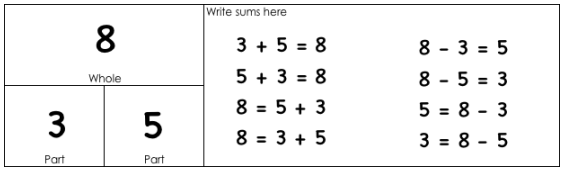
- Throw a single dice.
- Double it and add 1.
  e.g. throw a 6. Double 6 is 12 then add 1 = 13.
- The winner is the person with the highest number

Formative assessment aspects
Learners must learn to watch their partner and check that person's working out.

VARIATIONS:
- Subtract 1 from the number and then double it e.g. throw a 5. Subtract 1 is 4, double 4 is 8
- Use 3 dice or use a 12 or 2-sided dice

Activity: ROLL & FILL – 30 to 40 minutes

Object of learning: Understanding the reciprocal relationship between addition and subtraction and the role of the equal sign



- Each learner is provided with the whole-part grid (see below) and two dice
- They roll both dice
- Write the two numbers rolled in the bottom of the whole-part diagram.
- Add the two numbers together and write the total at the top of the diagram.
- They must write all the number sentences they can as demonstrated on page 7 above.

ALTERNATE WAYS TO GENERATE NUMBERS
- See options at the bottom of the learner activity sheet

FP	Maths Club Whole Session Planning Sheet	Session Five

Purpose of the session / object of learning	For FP learners, the object of learning in this session is to reinforce the facts that make 10, 20 and 30.

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• **NUMBER SENSE:** Grid of number • **TEN**: 1 pack of cards per pair • **NUMBER SEARCHES**: Koki pen, cloth and activity in plastic sleeve	Learners play TEN at home
Organisational requirements	**Your approach to running the session**
• TEN: Pair work • NUMBER SEARCHES: Individual	

Grade 1 Mental: FIZZ POP NUMBER BEFORE AND AFTER – 5 minutes

- Practice numbers that come before and after a given number. Say "I will say a number and you must say which number comes **after** it" (You may need to explain what after means)
- The game starts with leader saying "FIZZ", club responds with "POP"
- Say the number and club responds. E.g. "5" and club responds with "6"
- Work within the learners' number range capability
- **PfP** After a while you can move onto 2 numbers after e.g. "5", "7"
- Change to the number that comes **before** (learners will find this harder)
- **PfP**: After a while you can move onto 2 numbers before e.g. "7", "5"

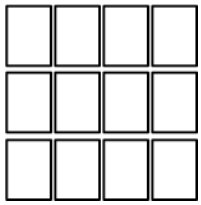
Grade 2 and 3 Number sense: COMBINATIONS THAT ADD TO 20 – 15 minutes

Put these numbers up on the board / flipchart for the learners.
They must look for combinations of numbers that make 20 using addition only
Example: 12 + 12
After 10 minutes, gather contributions from learners and write them on the board. Try not to judge if right or wrong – let the club learners take responsibility for doing that.

3	12	14	2
6	4	13	18
8	7	10	16

Game: TEN – Grade 1 30 to 40 minutes, Grades 2 & 3 20 minutes

Learners play with a partner using 1 set of playing cards. Remove Jokers and picture cards.



- Place 12 cards **FACE UP** in 3 rows of 4 as shown
- Take turns removing a pair or group of cards that add to 10.
  For example, choose a 7 and a 3; or a 3, an Ace, a 1 and a 4, or a 10.
- Each player keeps the removed cards.
- Fill in the spaces with new cards from the deck
- Play continues until no more sets of ten can be formed.
- The winner is the player who has the most cards at the end. If playing alone, see what is the highest number of cards you can get in a game.

Activity: NUMBER SEARCHES Grades 1 to 3 – 20 minutes

When learners have found all the pairs of numbers in ACTIVTIES 1, 2 & 3, see if they can find 3 or more numbers that add to 10, 20 or 30 in different shapes.
Learners can also write sums for the numbers circled using as many of the 8 ways they learned in the previous session as possible. See page 5

ACTIVITY 1: Find 2 numbers which add up to **10**. The numbers must touch each other. One has been done for you

10	0	11	7	5	9	5	5
2	3	8	3	3	1	4	6
11	7	12	8	2	5	3	7
1	0	7	11	0	5	2	8
9	10	3	10	6	3	3	6
2	13	6	3	8	4	7	9
6	7	12	10	1	2	1	8
2	4	4	11	1	9	3	7

10=10+0 etc.

ACTIVITY 2: Find 2 numbers which add up to **20**. The numbers must touch each other. One has been done for you

9	11	10	6	3	17	15	5
2	6	4	13	7	10	10	4
18	8	12	5	6	0	20	16
0	20	3	17	14	19	2	18
13	4	16	10	1	6	14	9
5	15	11	9	12	8	19	1
13	1	3	10	10	1	8	3
7	19	2	8	4	5	2	17

16=20-4; 20=16+4 etc

ACTIVITY 3: Find 2 numbers which add up to **30**. The numbers must touch each other. One has been done for you

19	11	10	6	13	17	15	15
22	6	14	23	7	20	10	24
8	18	12	4	26	0	30	6
0	30	23	7	29	19	22	8
13	14	16	10	1	16	14	9
15	15	11	19	12	8	29	21
13	11	3	10	20	25	28	13
17	19	12	26	4	5	2	17

22=30-8; 30=22+8 etc.

FP	Maths Club Whole Session Planning Sheet	Session Six
Purpose of the session / object of learning	The continued object of learning is working with the reciprocal relationships between addition and subtraction.	

What resources / manipulatives will you need?	**Home sharing/ Pay It Forward task**
• **GAME**: 1 pack of cards per pair • **BUILD A SNAKE**: Counters, bottle tops and **Build a Snake** cards • **SUBTRACTION SUMS**: Koki pen, cloth and activity in plastic sleeve	Play Add 3/5 cards
Organisational requirements	**Your approach to running the session**
• GAME: Learners work in pairs • ACTIVITY: Learners work alone	

Mental warmup: FIZZ POP HOW MANY TO MAKE 10 – 5 minutes

- Practice numbers that add to 10. Say "I will say a number and you must say how many more to make 10"
- The game starts with leader saying "FIZZ", club responds with "POP"
- Say the number and club responds. E.g. "5" and club responds with "5"
- If they struggle, remind them of the 'friends of 10'. So if you say 7, encourage them to think of the friend for 7, which is 3, so answer is 3
- **PfP** Make it harder or easier by changing the target number i.e. 10, 20, 30 etc..

Game: ADD 3 OR 5 CARDS – 15 minutes

Object of learning: 1-digit addition and addition strategies
Learners work with a partner using 1 pack of cards.

GRADE 1
Remove all the picture cards and cards from 6 up to 10. Ace = 1

- Deal out 3 cards face up as shown in the example
- Both players add up the values of the cards. For this example, the total would be 10
- Check each other's totals and discuss the strategies used to add
- Play again with 3 different cards

GRADES 2 & 3
Remove all the picture cards. Ace = 1

- Deal out 5 cards face up as shown in the example
- Both players add up the values of the cards. For this example, the total would be 16
- Check each other's totals and discuss the strategies used to add
- Play again with 5 different cards

Activity – 30 to 40 minutes

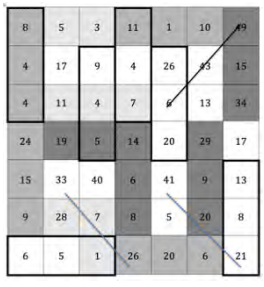
GRADE 1 BUILD A SNAKE

- Organise the learners into pairs. Provide each learners with ten bottle tops as well as an additional pile of tops, such as twenty, for each pair of learners.
- Each learner builds a snake of 5 tops to start.
- Prepare "direction cards" (see below) showing either addition or subtraction tasks, for example: + 3. Have the learners take turns to draw a card and follow the instruction by adding or subtracting the correct number of tops to their snake. The winner is the first to make a snake of twenty tops.

GRADES 2 & 3 FIND SUBTRACTION SUMS
Aim: Learners use the grid to locate subtraction sums. They can work alone or with a partner

Some sums go across, backwards, up, forwards and diagonally.
Learners must circle the ones they find and write the sum.
Answers are to the right and in the table below

8-5	11-1	49-15	8-4
11-4 (twice)	9-4	26-6	24-19
19-5	24-15	28-7	14-6
29-9	21-8	6-5	26-20
49-43	33-7	41-20	28-7



After learners have completed the activity, they practice re-writing some of the sums they've found using one of the 8 methods shown on page 5.

FP	Maths Club Whole Session Planning Sheet	Session Seven
Purpose of the session / object of learning	Encourage logical thinking with puzzles and patterns	

What resources / manipulatives will you need?	**Home sharing/ Pay It Forward task**
• GAME: 1 pack of cards for three players • ACTIVITY: Copies of the puzzles in plastic sleeves, kokis and cloth	Homework books
Organisational requirements	**Your approach to running the session**
• GAME: • ACTIVITY: Learners can work alone, but might be more productive to share ideas and work in a pair.	Use the **thinking thumb** technique for the mental session. The Puzzle Grid will take the learners long to solve than the Faces.

Mental: PATTERNS WHAT COMES NEXT? – 10 minutes

You say the sequence of numbers. Learners must say which numbers came next or before by using the thumb technique. Learners must be prepared to give the next numbers and also justify their answer.

GRADE 1
- Start with straightforward forward and backward sequences such as:
  2; 4; 6; … / 1; 3; 5; … / 6; 5; 4; … / 10; 8; 6; …
- The move onto sequences with bigger jumps such as:
  2; 6; 10; … / 5; 10; 15; … / 3; 6; 9; … / 2; 5; 8; …
  2; 4; 8; … / 4; 8; 12; …
- Try some sequences with numbers before the pattern:
  __; __; 6; 8; 10 / __; __; 5; 7; 9; / __; __; 6; 4; 2

GRADES 2 and 3
- Start with some of the simpler sequences, then try some of these
  20; 18; 16; … / 30; 25; 20; … / 6; 12; 18; …
  18; 15; 12; … / 10; 14; 18; … / 90; 80; 70; …
- Try some sequences with numbers before the pattern:
  __; __; 25; 30; 35 / __; __; 12; 16; 20
- __; __; 59; 69; 79 / __; __; 24; 32; 40
- **PfP (Extension)**
  Find the next 2 numbers in the pattern
  R25; R50; R100; … / 100c; 80c; 60c; …

Game: SALUTE – 20 minutes

- Play with a pack of cards using only the cards 2 to 10. Play with 3 players
- Dealer deals one card each, face down.
- When the dealer says "salute", each player raises the card to his or her forehead. The dealer states the total of the cards.
- Each player has to determine the value of the card being held to his or her forehead by looking at the other person's card and subtracting this amount from the total.

Activity: FACES AND PUZZLE GRID – 20 to 30 minutes

FACES

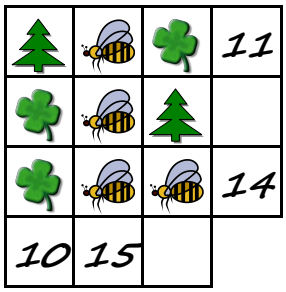
Give each face a name. These are the faces of SAM, SINO AND SIYA.

Learners use the clues to work out which name goes with each face.

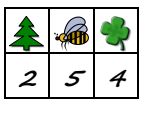
Clues
- Sino and Siya are smiling
- Siya and Sam have big noses
- Sam is sad
- Sino has hair

PUZZLE GRID

Aim: find what number each picture stands for



- In this grid, each shape stands for a number.
- The numbers shown are the totals of the line of three numbers in the row or column.
- Find the remaining totals.
- Say what number each shape stands for



FP	Maths Club Whole Session Planning Sheet	Session Eight
Purpose of the session / object of learning	This session focuses on addition. The key focus is to help learners find more efficient strategies for adding s series of numbers to encourage looking for friendly numbers etc.	

What resources / manipulatives will you need?	**Home sharing/ Pay It Forward task**
• **NUMBER SENSE**: Flipchart or blackboard to write up the grid • **JOINING NUMBERS**: Copies of the grids in plastic sleeves relevant to your grade, kokis and cleaning cloth	Homework books
Organisational requirements	**Your approach to running the session**
• JOINING NUMBERS: Pair work	As learners work on Joining Numbers activity, rotate around the pairs to push them beyond counting all to use more efficient strategies.

Grade 1 Number sense: COMBINATIONS THAT ADD TO 10 – 15 minutes

Put these numbers up on the board / flipchart for the learners
They must look for combinations of numbers that make 10 using addition
Example: 5 + 5 = 10
After 10 minutes, gather contributions from learners and write them on the board. Try not to judge if right or wrong – let the club do that.

1	6	3	5
8	7	4	2
5	2	3	9

Grade 2 and 3 Number sense: COMBINATIONS THAT ADD TO 24 – 15 minutes

Put these numbers up on the board / flipchart for the learners
They must look for combinations of numbers that make 24 using addition
Example: 12 + 12

12	5	2	6
14	12	20	7
4	15	10	18

Activity: JOINING NUMBERS – 30 to 40 minutes

Object of learning:
Learners work on their own or with a friend. If they work with a friend, take turns

GRADE 1
- Join any 3 numbers. Add them together to find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is 1 + 4 + 3 = 8

PfP (extension)
- Find the **highest** possible total with 3 numbers
- Find the **lowest** possible total with 3 numbers
- Look for numbers that add to **exactly** 10

GRADE 1

3	2	4
4	7	6
1	5	3

Encourage learners to look for pairs of numbers that can be friends i.e. numbers that may add to 10 (or a decade), doubles and so on

For Grade 1 example above:
3 + 1=4; 4 + 4=8
For Grade 2 & 3 below:
9 + 1=10; 12 + 4=16 then 16 + 10=26

GRADE 2 & 3
- Join any 4 numbers. Add them together to find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is 1 + 4 + 9 + 12 = 26

PfP (extension)
- Find the **highest** possible total with 4 numbers
- Find the **lowest** possible total with 4 numbers
- Look for numbers that add **exactly** to a decade number such as 20, 30, 40, 50 etc.
- Make up your own grids for learners or get learners to make up their own

GRADE 2 and above

9	12	4	10
4	7	6	8
1	5	3	13
20	10	11	2

FP	Maths Club Whole Session Planning Sheet	Session Nine
Purpose of the session / object of learning	Pyramid sums once again brings the focus back to the relationship between addition and subtraction.	

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• PYRAMID GAME: 1 pack of cards per pair • PYRAMID SUMS: copies of activities in plastic sleeves, kokis, cloth	Learners play PYRAMID CARD GAME at home
Organisational requirements	**Your approach to running the session**
• PYRAMID GAME: pair work • PYRAMID SUMS: individual work	Demonstrate one or two Pyramid sums on the board. Allow learners to work with Pyramid sums from bottom to top first. Then introduce how you work backwards with a number at top and how this brings in counting back and counting down to strategies.

Mental warmup: FIZZ POP HOW MANY TO MAKE 20 – 5 minutes

- Practice numbers that add to 20. Say "I will say a number and you must say how many more to make 20"
- The game starts with leader saying "FIZZ", club responds with "POP"
- Say the number and club responds. E.g. "10" and club responds with "10"
- If they struggle, remind them of the 'friends of 10'. So if you say 17, encourage them to think of the friend for 7, which is 3, so answer is 3
- **PfP:** Make it harder or easier by changing the target number i.e. 10, 20, 30 etc..

Game: PYRAMID CARD GAME – 20 minutes

The aim of the game is to remove as many cards from the pyramid as possible by looking for 2 cards that add to 10, 11, 12 or 13 depending on the grade.
Learners play on their own or take turns with a partner
You need: 1 pack of cards

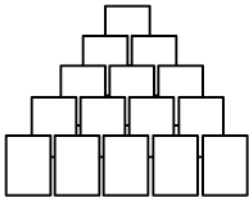
GRADE 1
All **picture cards** = 10, Ace = 1

- **Layout** 15 cards **FACE UP** in 5 rows as shown
- Keep the rest of pack **face up** on the table
- Look for pairs of cards in the pyramid or on top of the pile that **make 10**. Remove these from the pyramid or the pile and put to one side.
- Only cards that are "free" (not covered by other cards) may be used.
- Keep looking for free cards that make 10. If you cannot find any in the pyramid, turn over 1 card from the pack. The pack can be used with cards from the pyramid to add to 10.

VARIATIONS
- Find pairs that **add to 11 or 12**

GRADE 2 and 3
Play as for Grade 1 but two cards **must add to 13**
King = 13, Queen = 12, Jack = 11, Ace = 1

PFP (EXTENSION) AND VARIATIONS
- Make up your own variations by adding to other numbers e.g. 20, 30 etc.
- Add another row of cards to the bottom of the pyramid to make the layout 21 cards in 6 rows to start

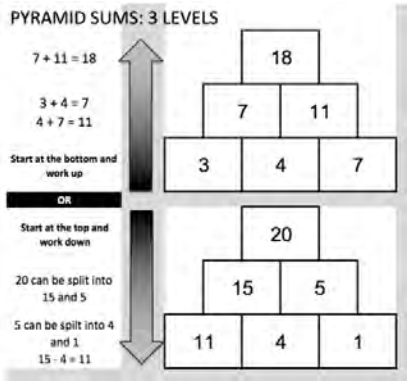


Activity: PYRAMID SUMS – 30 minutes

Object of learning: This activity provides the learners with lots of practice in adding and subtracting. When a number is placed at the top of the pyramid, they must understand how to use addition to help work out subtraction.

For FP learners, use only the the 3 level pyramids and use various methods to provide numbers for them to add up, starting with single digit numbers at the bottom.

PFP (EXTENSION)
Putting a number at the top brings in subtraction strategies.



IP	Maths Club Whole Session Planning Sheet	Session Four
Purpose of the session / object of learning	The object of learning in this session is to help learners to understand the reciprocal relationship between addition and subtraction.	

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• Chalk / blackboard for showing learner workings • ADD 5 CARDS: Packs of cards	Give the learners a pack of cards to take home. Explain that these belong to them and are for playing maths club games. Ask them to play ADD 5 CARDS at home.
Organisational requirements	**Your approach to running the session**
• ADD 5 CARDS: Pair work	Demonstrate the Roll & Fill activity to the whole group 1st using the stories on page 6

Mental: FIZZ POP DOUBLES AND HALVES – 5 minutes

- Start with ***doubling***. Say "I will say a number and you must double it".
  - The game starts with leader saying "FIZZ", club responds with "POP"
  - Say the number and club responds. E.g. "5" and club responds with "10"
  - These are good sequences to use: 2, 4, 8, 16, 32 … or 3, 6, 12, 24, 48 … keep going until the learners cannot go any further.
  - If you get an answer with the harder numbers, ask the learner to share their method, then ask group to try the method for the next number.
- Move onto ***halving***
  - Useful sequence: 80, 40, 20, 10, 5, 2½, 1¼… keep going… ask for methods

Game: ADD 5 CARDS – 15 minutes

OBJECT OF LEARNING: 1 and 2-digit addition and addition strategies
Learners work with a partner using 1 pack of cards.
King = 13, Queen = 12, Jack = 11, Ace = 1

- Deal out 5 cards face up as shown (or start with 3 cards first)

  hbFKX

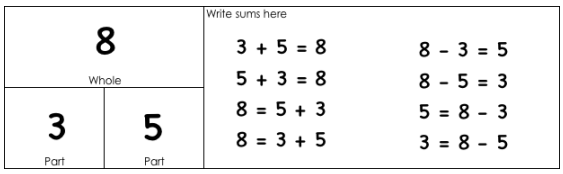
- Both players **mentally** add up the values of the cards. For this example, the total would be 38
- Check each other's totals and discuss the strategies used to add
- Play again with 5 different cards

Formative assessment aspects
Observe the following

Social	Mathematical
• Listening to each other • Checking each others answers	• Learners are working mentally • Using strategies to group numbers together

Activity: ROLL AND FILL – 30 to 40 minutes

Object of learning: Understanding the reciprocal relationship between addition and subtraction and the role of the equal sign
Each learner is provided with the whole-part grid (see below) and two dice



- They roll both dice
- Write the two numbers rolled in the bottom of the whole-part diagram.
- Add the two numbers together and write the total at the top of the diagram.
- They must write all the number sentences they can as demonstrated on page 7 above.

ALTERNATE WAYS TO GENERATE NUMBERS
- See options at the bottom of the learner activity sheet

IP	Maths Club Whole Session Planning Sheet	Session Five

Purpose of the session / object of learning	The focus here is on fluency with adding numbers as well as working with number ranges using less than, more than and between which is often an area of struggle.

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• Have the grid of numbers to write up for number sense activity • SALUTE: Pack of cards per three players • CROSS OUT SINGLES: Laminated game boards, kokis, cloth, pencils and scrap paper	Play SALUTE with people at home
Organisational requirements	**Your approach to running the session**
• NUMBER SENSE: NUMBER SENSE: Individual and then group • CROSS OUT SINGLES: work in pairs	

Number sense: COMBINATIONS THAT ADD TO 50 – 15 minutes

Put these numbers up on the board / flipchart for the learners
They must look for combinations of numbers that make 50 using addition only
Example: 22 + 8 + 20
After 10 minutes, gather contributions from learners and write them on the board. Try not to judge if right or wrong – let the club learners take responsibility for doing that.

15	22	14
18	25	20
8	15	10

GAME: SALUTE – 15 minutes

- Play with a pack of cards using only the cards 2 to 10. Play with 3 players
- Dealer deals one card each, face down.
- When the dealer says "salute", each player raises the card to his or her forehead. The dealer states the total of the cards.
- Each player has to determine the value of the card being held to his or her forehead by looking at the other person's card and subtracting this amount from the total.

Activity: CROSS OUT SINGLES – 30 to 40 minutes

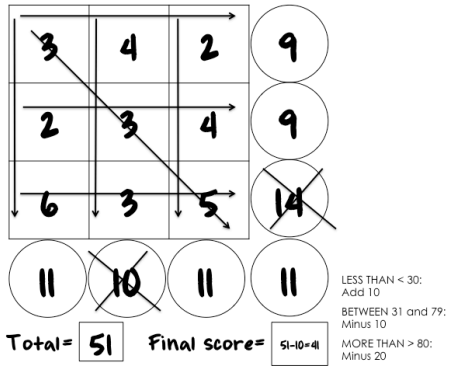
Learners play with a partner. They need a dice. Use the laminated game boards

- One player rolls the dice
- BOTH players write the number in one of the squares in their grid
- Another player rolls the dice
- BOTH players write the number on their grid
- Continue until all squares are filled

TO WORK OUT SCORES

- Add up the numbers in rows, columns and diagonal and write them in the circles
- Any answer that is shown once, must be crossed out
- Add up all the other answers to get a total
- Then work out final score using the guidelines
- Play 2 more games
- Add up all scores

EXAMPLE



Workings	
11+11+11=33 9+9=18 33+18=51	51 is between 31 and 79, so subtract 10 51-10=41

IP	Maths Club Whole Session Planning Sheet	Session Six
Purpose of the session / object of learning	Pyramid sums brings the focus back to the relationship between addition and subtraction.	

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• FLIP OUT: Packs of cards / sections of packs for each learner, scrap paper and pencils • PYRAMID SUMS: activity sheets inside plastic sleeves, kokis, cloth	Ask learners to play FLIP OUT at home with their own pack of cards
Organisational requirements	**Your approach to running the session**
• FLIP OUT: pair work • PYRAMID SUMS: individual work	Demonstrate one or two Pyramid sums on the board. Allow learners to work with Pyramid sums from bottom to top first. Then introduce how you work backwards with a number at top and how this brings in counting back and counting down to strategies.

Mental warmup: HOW MANY TO MAKE 50 – 5 minutes

- Practice numbers that add to 50. Say "I will say a number and you must say how many more to make 50"
- The game starts with leader saying "FIZZ", club responds with "POP"
- Say the number and club responds. E.g. "10" and club responds with "40"
- Start with decade numbers
- Then move onto numbers that have 5 in the units place e.g. 25, 35 etc
- If learners are coping, try other numbers.
- If they struggle, remind them of the 'friends of 10'. So if you say 37, encourage them to think of the friend for 7, which is 3, so answer is 23.

Game: FLIP OUT – 15 minutes

Play with a partner or a group Of 3 or 4.
Use 1 deck of cards per player (or equal parts of a deck each), scrap paper & pencil
Picture cards = 10, Ace = 1

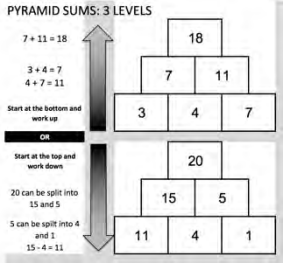
- Each player shuffles his/her deck and lays it **FACE DOWN**
- A timer calls out: "Go!" and times 1 minute.
- Each player flips over one card at a time and calculates a running total of the values on the cards.
- After one minute the person keeping time shouts "Stop!"
- Players write down their total
  e.g. 32 for this set of cards:
  1 + 4 = 5; 5 + 10 = 15; 15 + 3 = 18; 18 + 10 = 28; 28 + 4 = 32
  aDMcLD
- Players check each others totals
- The winner is the one with the highest total. You cannot win if your total is wrong.

PFP (EXTENSION) AND VARIATIONS
- You can change the time depending on the players' abilities
- Make the picture cards: King = 13, Queen = 12, Jack = 11. A joker can be used to equal 20 or 50.

Activity: PYRAMID SUMS - 30 to 40 minutes

Object of learning: This activity provides the learners with lots of practice in adding and subtracting. When a number is placed at the top of the pyramid, they must understand how to use addition to help work out subtraction.
Start by giving learners the 3 level pyramids and use various methods to provide numbers for them to add up, starting with single digit numbers at the bottom.

When they are more fluent, move onto the 4 level pyramids and use a mixture of 1 and 2-digit numbers as this will extend the number range.



IP	Maths Club Whole Session Planning Sheet	Session Seven

Purpose of the session / object of learning	Pattern activities such as these are important pre-cursors to early algebra work.

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• PATTERNS ACTIVITY: copies of the activity sheet in plastic sleeves, kokis and cloth, scrap paper and pencils • Toothpicks might also be helpful for learners who need to model the patterns	Homework books
Organisational requirements	**Your approach to running the session**
• PATTERNS ACTIVITY: learners can work alone but may be more productive in pairs as they can share ideas	As pattern work such as this is important for pre-algebra work, support / push the learners to work out the 10th and 100th patterns and to verbalise them.

Mental: PATTERNS WHAT COMES NEXT? – 5 minutes

You say the sequence of numbers. Learners must say which numbers came next or before by using the thumb technique. Learners must be prepared to give the next numbers and also **justify** their answer.

START

- Start with straightforward forward and backward sequences such as:
  2; 4; 6; … / 1; 3; 5; … / 6; 5; 4; … / 10; 8; 6; …
- The move onto sequences with bigger jumps such as:
  2; 6; 10; … / 5; 10; 15; … / 3; 6; 9; … / 2; 5; 8; …
  2; 4; 8; … / 4; 8; 12; …
- Try some sequences with numbers before the pattern:
  __; __; 6; 8; 10 / __; __; 5; 7; 9; / __; __; 6; 4; 2

PfP (EXTENSION)

- Start with some of the simpler sequences, then try some of these
  20; 16; 12; … / 33; 30; 27; … / 7; 15; 23; …
  28; 21; 14; … / 10; 18; 26; 34; 42; … / 90; 80; 70; …
- Try some sequences with numbers before the pattern:
  __; __; 25; 30; 35 / __; __; 12; 16; 20
- __; __; 59; 69; 79 / __; __; 24; 32; 40
- Find the next 2 numbers in the pattern
  1; 1; 2; 3; 5; 8; … / 180; R90; R45; …
  ½ day; 6 hours; 3 hours; …

Activity – 30 to 40 minutes

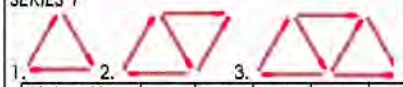
PATTERNS

ACTIVITY 1 – Matchstick Patterns

- Talk about the pattern with the learners. Ask them to explain the pattern and try to build or draw the next picture.
- Fill in the table.

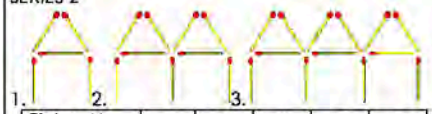
CHALLENGE: Predict the number of matchsticks needed for the 10th & 100th number.

SERIES 1



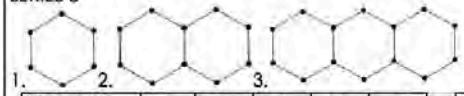
Picture No	1	2	3	4	5	…	10	100
No of matchsticks	3	5 3+2						

SERIES 2



Picture No	1	2	3	4	5	…	10	100
No of matchsticks	5							

SERIES 3

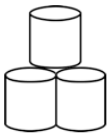


Picture No	1	2	3	4	5	…	10	100
No of matchsticks								

Make up other patterns with matchsticks? Predict how many matchsticks you need for the 10th picture in each pattern.

ACTIVITY 2

A shelf stacker at the supermarket has been asked to display the soup tins in the shop window. Each tin must rest on 2 tins underneath it, to make a triangular shape.



If he builds a pile 2 tins wide on the bottom row, he has a total of 3 tins in the pile like this:

- How many tins would there be in a pile that has 5 tins on bottom row?
- Fill in the table & discuss the patterns you see in the table.

Number of tins in bottom row	2	3	4	5	6	10
Number of tins in pile altogether	3					

IP	Maths Club Whole Session Planning Sheet	Session Eight

Purpose of the session / object of learning	This session focuses on addition. The key focus is to help learners find more efficient strategies for adding s series of numbers to encourage looking for friendly numbers etc.

What resources / manipulatives will you need?	Home sharing/ Pay It Forward task
• NUMBER SENSE: Pencils and scrap paper • JOINING NUMBERS: Copies of the grids in plastic sleeves relevant to your grade, kokis and cleaning cloth	Homework books
Organisational requirements	**Your approach to running the session**
• NUMBER SENSE: Individual and then group • JOINING NUMBERS: Pair work	As learners work on Joining Numbers activity, rotate around the pairs to push them beyond counting all to use more efficient strategies.

Number sense: COBINATIONS THAT MAKE 70 – 15 minutes

Put these numbers up on the board / flipchart for the learners

They must look for combinations of numbers that make 70 using + and –

Example: 15 + 35 + 20

After 10 minutes, gather contributions from learners and write them on the board. Try not to judge if right or wrong – let the club do that.

26	10	17	2	75
42	20	35	4	90
14	15	18	5	84

PFP (EXTENSION) AND VARIATIONS

Extension activities on page 21

Activity: JOINING NUMBERS – 30 to 40 minutes

Learners work on their own or with a friend. If they work with a friend, take turns

- Join any 4 numbers. Add them together to find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is **6 + 4 = 10, then 35 + 15 = 50, 10 + 50 = 60**
- Write down the sums made starting with the total / answer to encourage learners understanding of equivalence e.g. 60 = 35+15+4+6

PFP (EXTENSION) AND VARIATIONS

- Find the **highest** possible total with 4 numbers
- Find the **lowest** possible total with 4 numbers
- Join 5 numbers
- Join 6 numbers
- Look for numbers that add **exactly** to a decade number such as 20, 30, 40, 50 etc.

GRADE 4 and above

35	20	5	10
4	17	12	23
15	8	3	7
6	30	18	2

Encourage learners to look for pairs of numbers that can be friends i.e. numbers that may add to 10 (or a decade), doubles and so on

For example here: 6+4=10; 35+15=50; then 50+10=60

IP	Maths Club Whole Session Planning Sheet	Session Nine

Purpose of the session / object of learning	Again, this session focuses on addition. The key focus is to help learners find more efficient strategies for adding s series of numbers to encourage looking for friendly numbers etc.

What resources / manipulatives will you need?	**Home sharing/ Pay It Forward task**
• ALPHABET NUMBER WORDS ACTIVITY: Sets of activity pages in plastic sleeves, kokis, cloths • Scrap paper and pencils	Learners do Alphabet Number words at home. Ask parents / family for a word, which they must work out. If they find any that add to 50 or 100, they can bring them to club.
Organisational requirements	**Your approach to running the session**
• ALPHABET NUMBER WORDS: Learners can work alone or in pairs	As learners work on Alphabet Number Words activity, rotate around learner to push them beyond counting all to use more efficient strategies for addition.

Mental warmup: FIZZ POP HOW MANY TO MAKE 100 – 5 minutes

- Practice numbers that add to 100. Say "I will say a number and you must say how many more to make 100"
- The game starts with leader saying "FIZZ", club responds with "POP"
- Say the number and club responds. E.g. "50" and club responds with "50"
- Start with decade numbers
- Then move onto numbers that have 5 in the units place e.g. 25, 35 etc
- If learners are coping, try other numbers.
- If they struggle, remind them of the 'friends of 10'. So if you say 97, encourage them to think of the friend for 7, which is 3, so answer is 3.

Activity: ALPHABET NUMBER WORDS – 40 to 50 minutes

- The goal is for the learners to find as many words as they can that add up to **EXACTLY 20, 30, 40 or 50**
- Choose a word from the given list.

TOE = 40	**HIM = 30**	**MAP = 30**	**DIG = 20**	**KIT = 40**	**APPLE = 50**
WEB = 30	**GO = 22**	**BED = 11**	**WAX = 48**	**LION = 50**	**CHEETAH = 50**
MAN = 28	**EAT = 26**	**SAT = 40**	**JAM = 24**	**DRAG = 30**	**STOVE = 81**

- Learners use the chart below to work out the numeric value for each letter
- Add the letters together that make up a word
- FOR EXAMPLE: TOE = 40 (20 + 15 + 5)

a	b	c	d	e	f	g	h	i	j	k	l	m
1	2	3	4	5	6	7	8	9	10	11	12	13
n	o	p	q	r	s	t	u	v	w	x	y	z
14	15	16	17	18	19	20	21	22	23	24	25	26

PFP (EXTENSION) AND VARIATIONS

- Learners use their own iXhosa / Afrikaans words and find their value. Keep searching for words that equal 50 and 100.
- Make up a **sentence** that adds to EXACTLY 100
- Make up a **sentence** that adds to a number between 100 and 120
- Sort the word values into categories. This is very good practice for less / more than, between. For example:
-

Less than 20	Between 20 and 49	Exactly 50	Between 50 and 99	Exactly 100
bed	toe	lion	stove	

ADDITIONAL TEACHER ACTIVITY INFORMATION

Target number combinations for number sense sessions

How many combinations can you find that add up to 10?

1	6	3	5
8	7	4	2
5	2	3	9

Example: 5 + 5 = 10

Target number: 10

How many combinations can you find that add up to 20?

3	12	14	2
6	4	13	18
8	7	10	16

Example: 12 + 8 = 20

Target number: 20

How many combinations can you find that add up to 24?

12	5	2	6
14	12	20	7
4	15	10	18

Example: 12 + 12 = 24

Target number: 24

How many combinations can you find that add up to 50?

15	22	14
18	25	20
8	15	10

Example: 22 + 8 + 20

Target number: 50

How many combinations can you find to make 70?

26	10	17	2
42	20	35	4
14	15	18	5

Example: 15 + 35 + 20

Target number: 70 Using + and x

How many combinations can you find to make 70?

26	10	17	2	75
42	20	35	4	90
14	15	18	5	84

Example: 15 + 35 + 20

Target number: 70 Using combinations of + and -

How many combinations can you find to make 70?

26	10	17	2
42	20	35	4
14	15	18	5

Example: 15 + 35 + 20

Target number: 70 Using combinations of + and x

How many combinations can you find to make 90?

16	20	18	108	2
43	10	120	45	4
24	15	27	100	5

Example: 15 + 45 + 20 + 10

Target number: 90 Using combinations of + and -

How many combinations can you find to make 90?

16	20	18	2
43	10	45	4
24	15	27	5

Example: 15 + 45 + 20 + 10

Target number: 90 Using combinations of + and x

Beach ball activity

If you have access to a plastic beach ball, you can use it as part of a mental warmup session.

You can use it to practice bonds to 10, 20, 30 or 100, doubling and halving and so on.

- Decide what you would like to practice.
- Using a dry wipe marker, write a number of sums on the ball, about a hands width apart.
- Throw the ball to a learner who must catch it and answer the question that is closest to their right hand.
- If the learner gets the answer correct, they get to throw the ball to another learner.
- If they get the answer wrong, they must throw the ball back to you and you throw it to another learner.
- Keep throwing the ball until everyone has had a turn.

ACTIVITY MASTER COPIES

In this section you will find the master copies for the activities used in the planning sheets above for both the Foundation and Intermediate Phases. You may photocopy these.

To save paper, it is suggested that you copy a set for the club:

- 12 if the activity is for individual work
- 6 if the activity is for pair work

Put them into plastic sleeves (or laminate for extra durability)

Learners use dry-wipe markers to work on the sleeve.

FP FIND SUBTRACTION SUMS

How many subtraction sums can you find in the grid?

Some go across and back. Some go up and down. Some go diagonally.

Circle the ones you can find. Write down all the subtractions you can see.

8	5	3	11	1	10	49
4	17	9	4	26	43	15
4	11	4	7	6	13	34
24	19	5	14	20	29	17
15	33	40	6	41	9	13
9	28	7	8	5	20	8
6	5	1	26	20	6	21

BUILD A SNAKE DIRECTION CARDS		
Add 3 more	Take away 4	+ 2
Add 4 more	- 2	Take away 5
-1	+ 1	Add nothing
Take away nothing	Plus 4	Plus 5
+ 3	- 3	Plus 1
Minus 1	+ 0	- 0

ALL PHASES ROLL AND FILL

EXAMPLE	8 (Whole) 3 (Part) 5 (Part)	Write sums here 3 + 5 = 8 5 + 3 = 8 8 = 5 + 3 8 = 3 + 5 8 – 3 = 5 8 – 5 = 3 5 = 8 – 3 3 = 8 – 5	Whole Part Part	Write sums here
	Whole Part Part	Write sums here	Whole Part Part	Write sums here
	Whole Part Part	Write sums here	Whole Part Part	Write sums here
	Whole Part Part	Write sums here	Whole Part Part	Write sums here
	Whole Part Part	Write sums here	Whole Part Part	Write sums here

Ways to fill in numbers for the 'part's	1. Roll 2 dice. Put one number in each PART box	2. Roll 1 normal dice. Roll a 1-20 dice. Put one number in each PART box	3. Close your eyes. Choose 2 random numbers from a 100 chart. Put one number in each PART box	4. Choose 2 random numeral cards. Put one number in each PART box
Ways to fill in numbers for the 'whole's	1. Roll 2 dice. Add them together. Put the number in the WHOLE box	2. Roll a 1-20 dice. Put the number in the WHOLE box	3. Choose 1 random number from a 100 chart that is bigger than 50. Put the number in the WHOLE box	4. Choose 1 random numeral card. Put the number in the WHOLE box

FP NUMBER SEARCHES (1)

Find 2 numbers which add up to **10**. The numbers must touch each other.
One has been done for you

10	0	11	7	5	9	5	5
2	3	8	3	3	1	4	6
11	7	12	8	2	5	3	7
1	0	7	11	0	5	2	8
9	10	3	10	6	3	3	6
2	13	6	3	8	4	7	9
6	7	12	10	1	2	1	8
2	4	4	11	1	9	3	7

FP NUMBER SEARCHES (2)

Find 2 numbers which add up to **20**. The numbers must touch each other.
One has been done for you

9	11	10	6	3	17	15	5
2	6	4	13	7	10	10	4
18	8	12	5	6	0	20	16
0	20	3	17	14	19	2	18
13	4	16	10	1	6	14	9
5	15	11	9	12	8	19	1
13	1	3	10	10	1	8	3
7	19	2	8	4	5	2	17

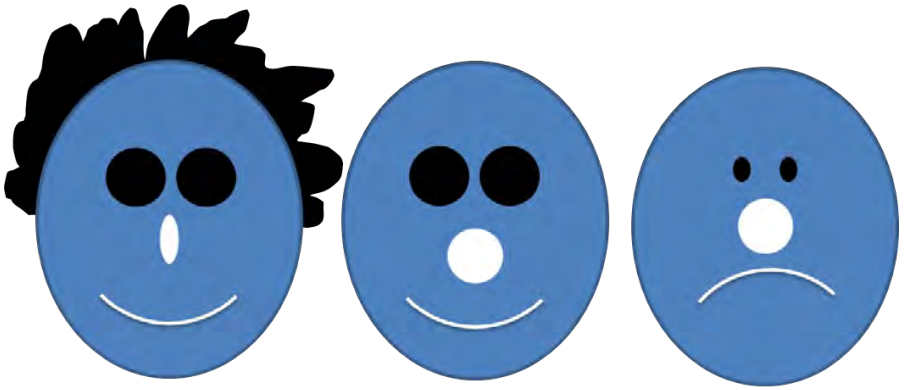
FP NUMBER SEARCHES (3)

Find 2 numbers which add up to **30**. The numbers must touch each other.
One has been done for you

19	11	10	6	13	17	15	15
22	6	14	23	7	20	10	24
8	18	12	4	26	0	30	6
0	30	23	7	29	19	22	8
13	14	16	10	1	16	14	9
15	15	11	19	12	8	29	21
13	11	3	10	20	25	28	13
17	19	12	26	4	5	2	17

Give each face a name

These are the faces of **SAM, SINO AND SIYA**.

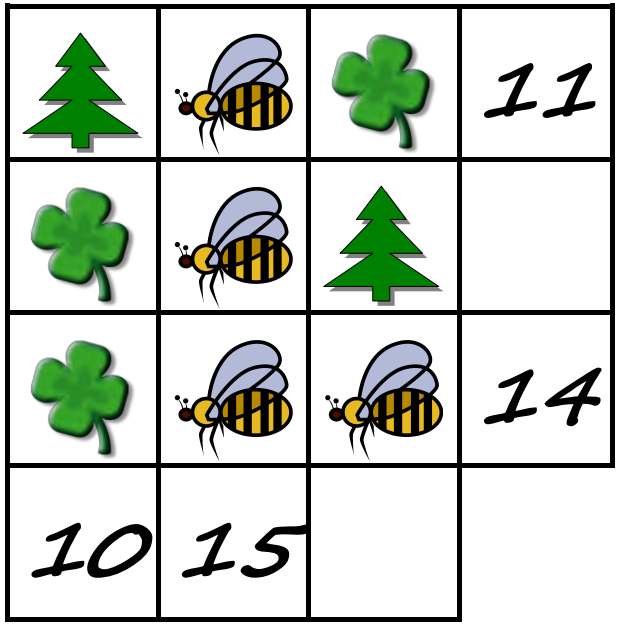


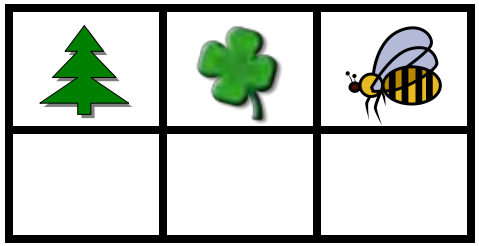
Use the clues to work out which name goes with each face.

Clues

- Sino and Siya are smiling
- Siya and Sam have big noses
- Sam is sad
- Sino has hair

- In this grid, each shape stands for a number.
- The numbers shown are the totals of the line of three numbers in the row or column.
- Find the remaining totals.
- Say what number each shape stands for





FP JOINING NUMBERS

Work on your own or with a friend
If you work with a friend, take turns

- Join any four numbers. Find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is **9 + 4 + 9 + 14 = 36.**

GRID 1

GRADE 1

3	2	4
4	7	6
1	5	3

GRID 2

GRADE 2 and above

9	12	4	10
4	7	6	8
1	5	3	13
20	10	11	2

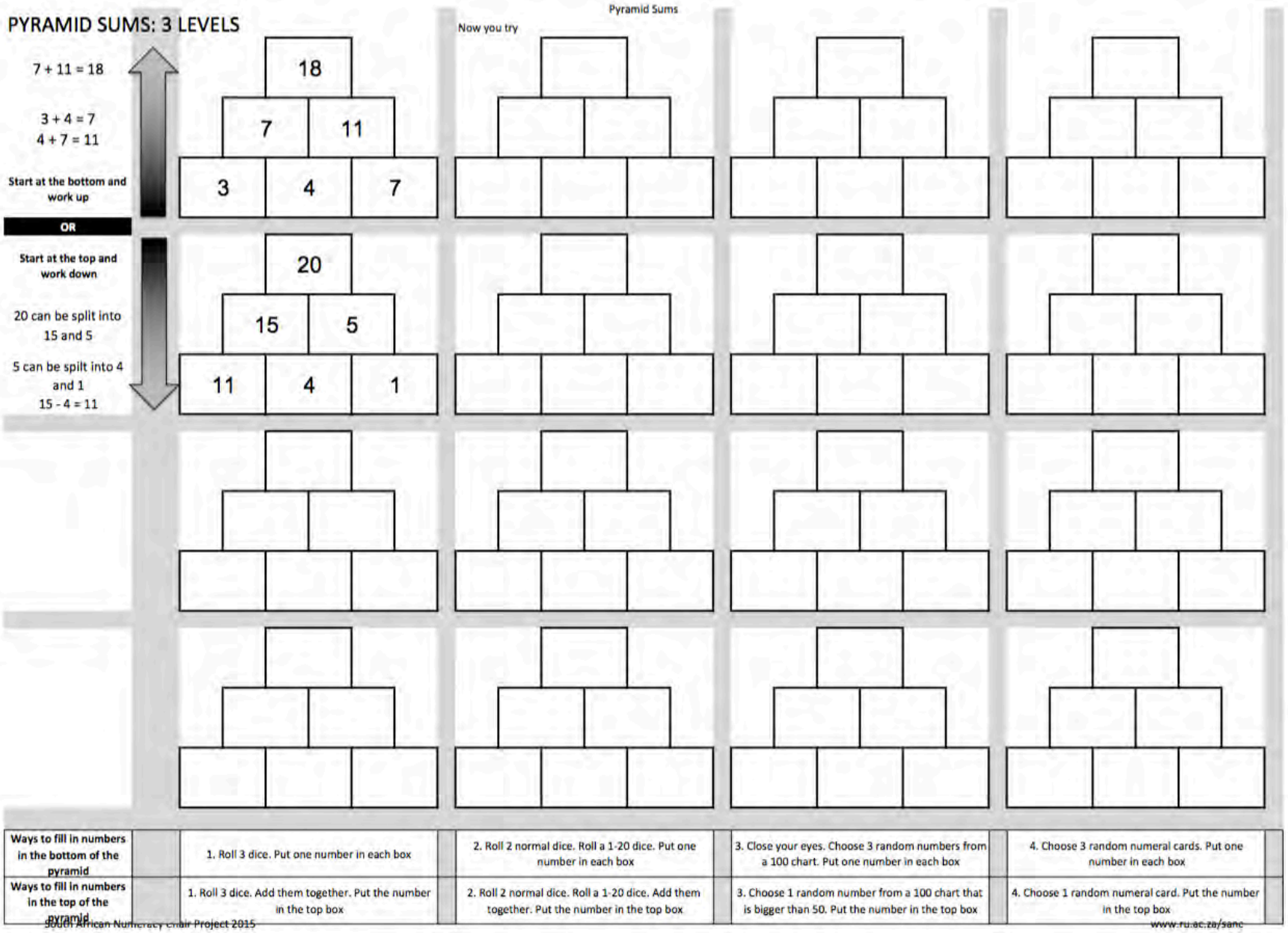
CHALLENGES

- Find the highest possible score with 4 numbers
- Find the lowest possible score with 4 numbers

- Now try joining five numbers up, down, across and diagonally.
- The score for the example: **15 +10 + 3 + 5 + 14 = 47**

GRID 3

1	20	5	10
4	17	12	13
15	8	3	7
6	10	18	2


PYRAMID SUMS: 3 LEVELS
Pyramid Sums
Now you try
7 + 11 = 18
3 + 4 = 7
4 + 7 = 11
Start at the bottom and work up
OR
Start at the top and work down
20 can be split into 15 and 5
5 can be spilt into 4 and 1
15 - 4 = 11
18
7
11
3
4
7
20
15
5
11
4
1
Ways to fill in numbers in the bottom of the pyramid
1. Roll 3 dice. Put one number in each box
2. Roll 2 normal dice. Roll a 1-20 dice. Put one number in each box
3. Close your eyes. Choose 3 random numbers from a 100 chart. Put one number in each box
4. Choose 3 random numeral cards. Put one number in each box
Ways to fill in numbers in the top of the pyramid
1. Roll 3 dice. Add them together. Put the number in the top box
2. Roll 2 normal dice. Roll a 1-20 dice. Add them together. Put the number in the top box
3. Choose 1 random number from a 100 chart that is bigger than 50. Put the number in the top box
4. Choose 1 random numeral card. Put the number in the top box
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PYRAMID SUMS: 4 LEVELS

24 + 28 = 52

11 + 13 = 24
13 + 15 = 28

6 + 5 = 11
5 + 8 = 13
8 + 7 = 15

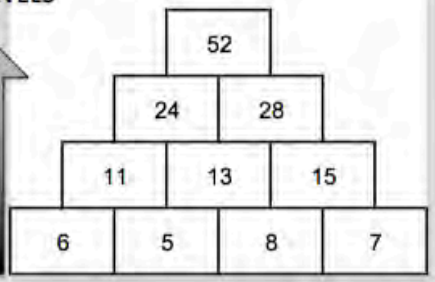
Start at the bottom and work up

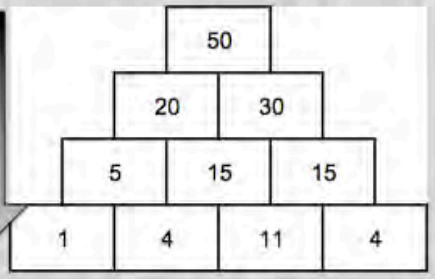
OR

Start at the top and work down

20 can be split into 20 & 30
20 can be spilt into 5 & 15,
30 can be spilt into 15 & 15

15 - 4 = 11, 5 - 4 = 1





Now you try

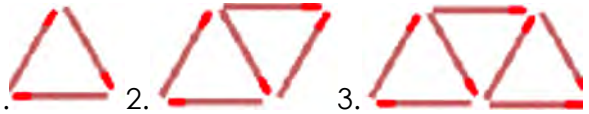
Ways to fill in numbers in the bottom of the pyramid	1. Roll 4 dice. Put one number in each box	2. Roll 3 normal dice. Roll a 1-20 dice. Put one number in each box	3. Close your eyes. Choose 4 random numbers from a 100 chart. Put one number in each box	4. Choose 4 random numeral cards. Put one number in each box
Ways to fill in numbers in the top of the pyramid	1. Roll 4 dice. Add them together. Put the number in the top box	2. Roll 3 normal dice. Roll a 1-20 dice. Add them together. Put the number in the top box	3. Choose 1 random number from a 100 chart that is bigger than 70 Put the number in the top box	4. Choose 1 random numeral card. Put the number in the top box

ACTIVITY 1 – Matchstick Patterns

- Talk about the pattern with the learners. Ask them to explain the pattern and try to build or draw the next picture.
- Fill in the table.

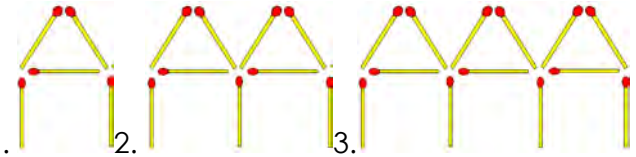
CHALLENGE: Predict the number of matchsticks needed for the 10th & 100th number.

SERIES 1



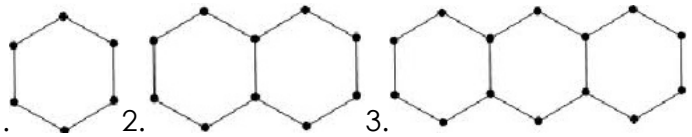
Picture	1	2	3	4	5	…	10	100
No of matchst	3	5 3+						

SERIES 2



Picture No	1	2	3	4	5	…	10	100
No of matchsticks	5							

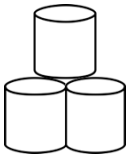
SERIES 3



Picture No	1	2	3	4	5	…	10	100
No of matchsticks								

ACTIVITY 2

A shelf stacker at the supermarket has been asked to display the soup tins in the shop window. Each tin must rest on 2 tins underneath it, to make a triangular shape.



If he builds a pile 2 tins wide on the bottom row, he has a total of 3 tins in the pile like this:

- How many tins would there be in a pile that has 5 tins on bottom row?
- Fill in the table & discuss the patterns you see in the table.

Number of tins in bottom row	2	3	4	5	6	10
Number of tins in pile altogether	3					

CHALLENGE

Make up other patterns with matchsticks? Predict how many matchsticks you need for the 10th

FP JOINING NUMBERS

Work on your own or with a friend
If you work with a friend, take turns

- Join any **four** numbers. Find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is: **35 + 15 = 50; 6 + 4 = 10' then 50 + 10 = 60.**

GRADE 4 and above

35	20	5	10
4	17	12	23
15	8	3	7
6	30	18	2

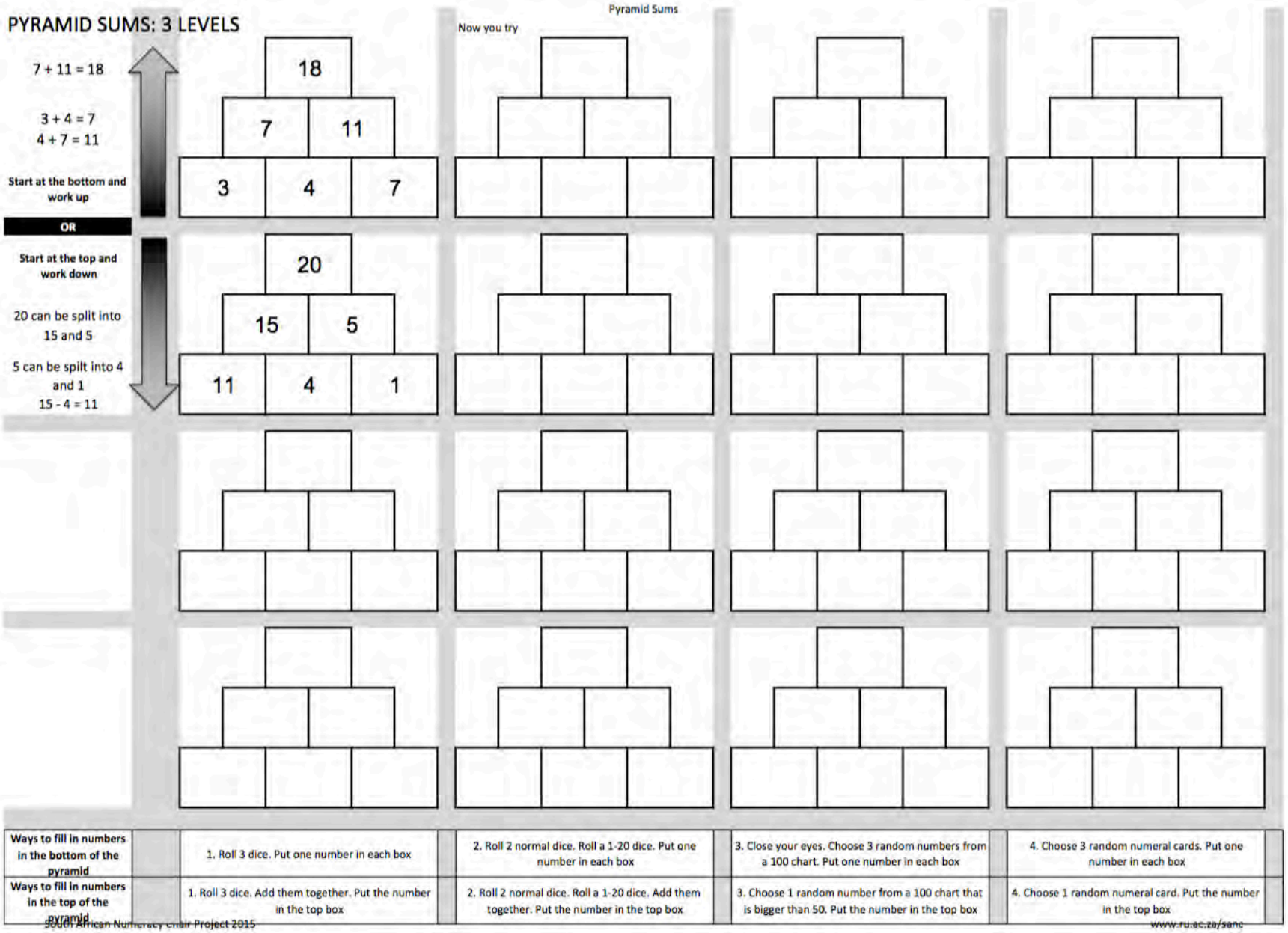
CHALLENGES

- Find the highest possible score with 4 numbers
- Find the lowest possible score with 4 numbers

- Now try joining five numbers up, down, across and diagonally.

GRID 2

1	20	5	10
4	17	12	13
15	8	3	7
6	10	18	2


PYRAMID SUMS: 3 LEVELS
Pyramid Sums
Now you try
7 + 11 = 18
3 + 4 = 7
4 + 7 = 11
Start at the bottom and work up
OR
Start at the top and work down
20 can be split into 15 and 5
5 can be spilt into 4 and 1
15 - 4 = 11
18
7
11
3
4
7
20
15
5
11
4
1
Ways to fill in numbers in the bottom of the pyramid
1. Roll 3 dice. Put one number in each box
2. Roll 2 normal dice. Roll a 1-20 dice. Put one number in each box
3. Close your eyes. Choose 3 random numbers from a 100 chart. Put one number in each box
4. Choose 3 random numeral cards. Put one number in each box
Ways to fill in numbers in the top of the pyramid
1. Roll 3 dice. Add them together. Put the number in the top box
2. Roll 2 normal dice. Roll a 1-20 dice. Add them together. Put the number in the top box
3. Choose 1 random number from a 100 chart that is bigger than 50. Put the number in the top box
4. Choose 1 random numeral card. Put the number in the top box
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PYRAMID SUMS: 4 LEVELS

24 + 28 = 52

11 + 13 = 24
13 + 15 = 28

6 + 5 = 11
5 + 8 = 13
8 + 7 = 15

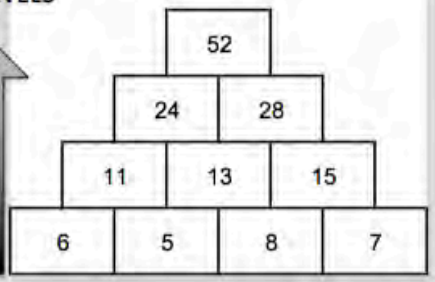
Start at the bottom and work up

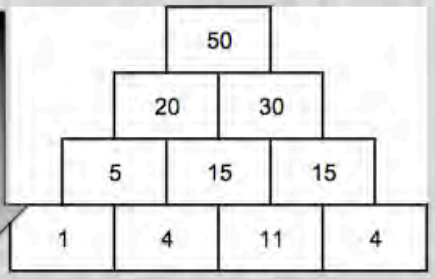
OR

Start at the top and work down

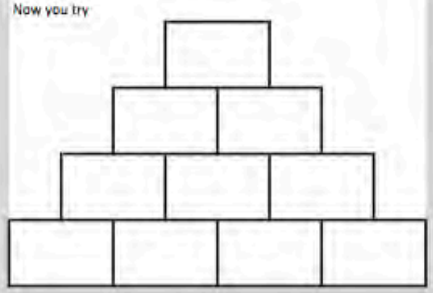
20 can be split into 20 & 30
20 can be spilt into 5 & 15,
30 can be spilt into 15 & 15

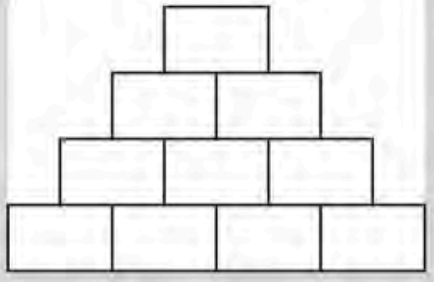
15 - 4 = 11, 5 - 4 = 1

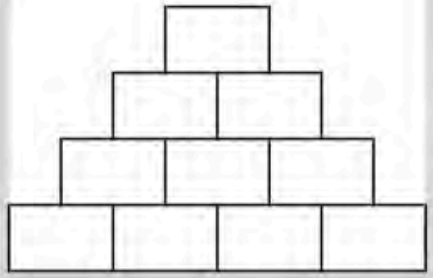


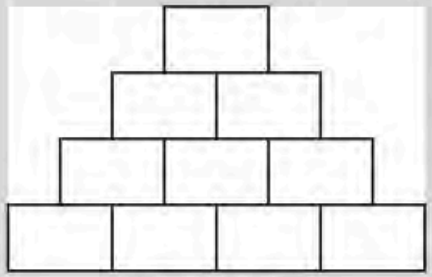


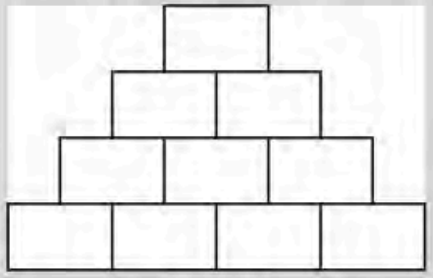
Now you try

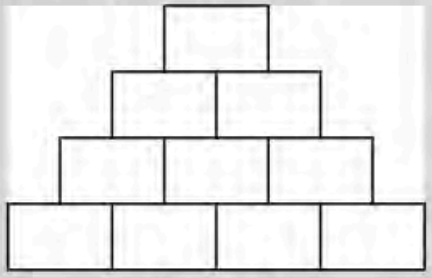


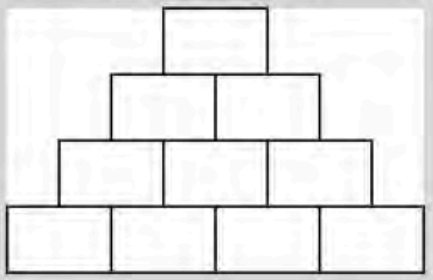


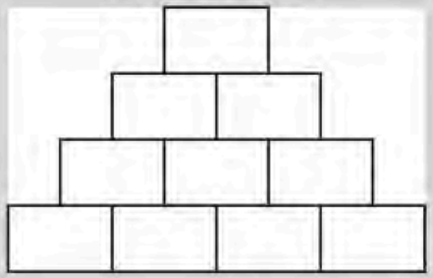


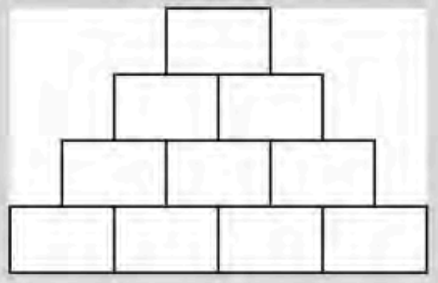


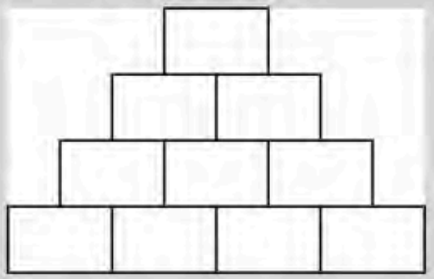












Ways to fill in numbers in the bottom of the pyramid	1. Roll 4 dice. Put one number in each box	2. Roll 3 normal dice. Roll a 1-20 dice. Put one number in each box	3. Close your eyes. Choose 4 random numbers from a 100 chart. Put one number in each box	4. Choose 4 random numeral cards. Put one number in each box
Ways to fill in numbers in the top of the pyramid	1. Roll 4 dice. Add them together. Put the number in the top box	2. Roll 3 normal dice. Roll a 1-20 dice. Add them together. Put the number in the top box	3. Choose 1 random number from a 100 chart that is bigger than 70 Put the number in the top box	4. Choose 1 random numeral card. Put the number in the top box

IP JOINING NUMBERS

Work on your own or with a friend
If you work with a friend, take turns

- Join any four numbers. Find their total.
- Joins can go up, down, across and diagonally.
- The score for the example is **9 + 4 + 9 + 14 = 36.**

GRID 1

GRADE 4 and above

35	20	5	10
4	17	12	23
15	8	3	7
6	30	18	2

GRID 2

1	20	5	10
4	17	12	13
15	8	3	7
6	10	18	2

CHALLENGES

- Find the highest possible score with 4 numbers
- Find the lowest possible score with 4 numbers

- Now try joining five numbers up, down, across and diagonally.
- The score for the example: **15 +10 + 3 + 5 + 14 = 47**

GRID 3

9	12	4	10	14
4	7	6	5	8
1	15	3	12	13
20	10	11	2	10
15	8	21	5	2

IP CROSS OUT SINGLES

Play with a partner. You need a dice

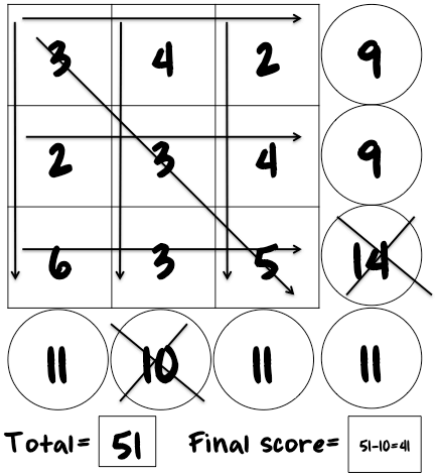
Instructions:

1. One player rolls the dice
2. **BOTH** players write the number in one of the squares in their grid
3. Another player rolls the dice
4. **BOTH** players write the number on their grid
5. Continue until all squares are filled

NOW

1. Add up the numbers in rows, columns and diagonal and write them in the circles
2. Any answer that is shown once, must be crossed out
3. Add up all the other answers to get a total
4. Then work out final score using the guidelines
5. Play 2 more games
6. Add up all your scores

EXAMPLE



Workings

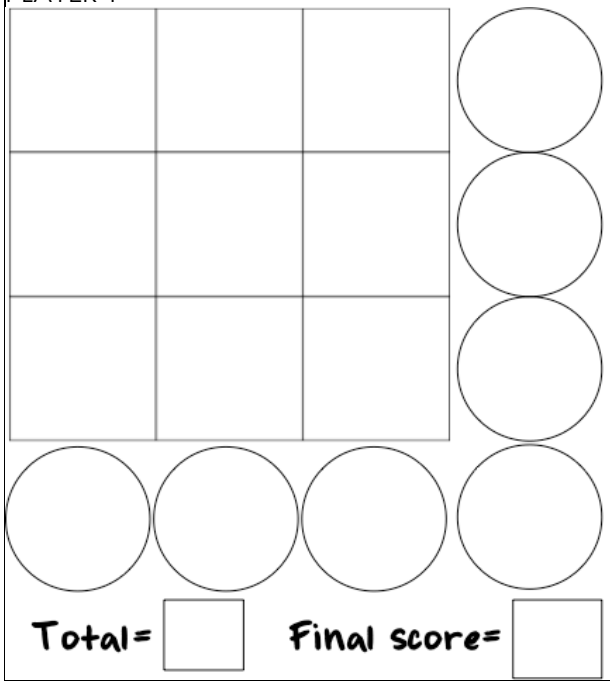
11+11+11=33

9+9=18

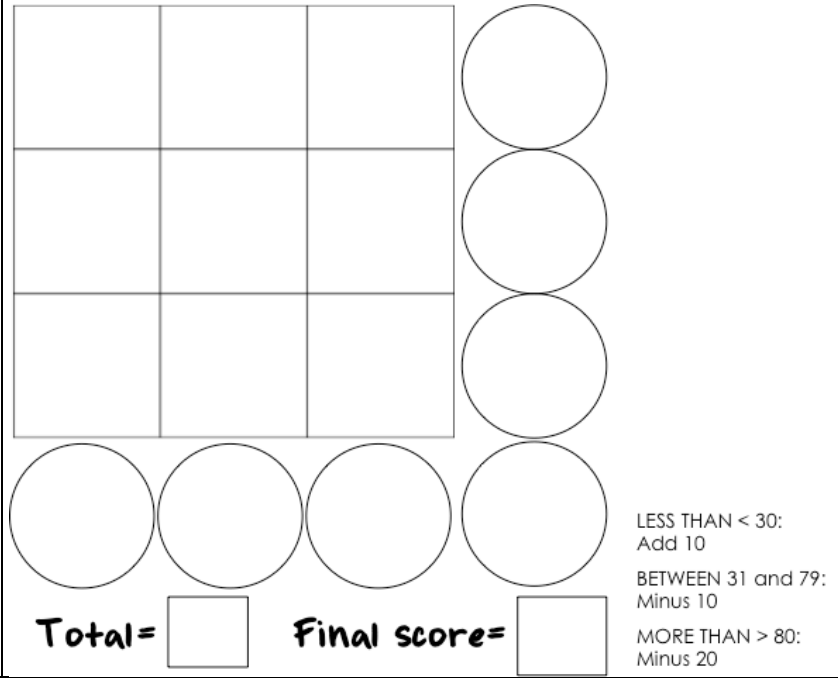
33+18=51

51 is between 31 and 79.

PLAYER 1



PLAYER 2



ALPHABET NUMBER WORDS - INSTRUCTIONS

- The goal is to find as many words as you can that add up to EXACTLY 20, 30, 40 or 50
- Choose a word
- Use the chart below to work out the numeric value for each letter
- Add together the letters that make up a word
- **FOR EXAMPLE: TOE = 40 (20 + 15 + 5)**

If you work with a friend, see if they agree with your adding for each word

ALPHABET AND CORRESPONDING NUMBERS CHART

a	b	c	d	e	f	g	h	i	j	k	l	m
1	2	3	4	5	6	7	8	9	10	11	12	13
n	**o**	**p**	**q**	**r**	**s**	**t**	**u**	**v**	**w**	**x**	**y**	**z**
14	15	16	17	18	19	20	21	22	23	24	25	26

TRY THESE: write the value after each word. **Circle** the words that that add up to EXACTLY 20, 30, 40 or 50

TOE = 40	**HIM =**	**MAP =**	**DIG =**	**KIT =**	**APPLE =**
WEB =	**GO =**	**BED =**	**WAX =**	**LION =**	**CHEETAH =**
MAN =	**EAT =**	**SAT =**	**JAM =**	**DRAG =**	**STOVE =**

- What is the value of your name?
- What is the highest value word you can find?