Bead Strings – Stage Six

Skill Number: 6:3

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:3	Recall groupings of twos, threes, fives, and tens that are numbers to 100 and the resulting remainders.	*MGSE.3.OA.7*

Required Resource Materials:

- Bead strings with 100 beads in groups of five. Supermarket bag tags.

Activity:

Show the students a bead string. Use bag tags to label the beginning and end of the string as 0 and 100. Ask the students to use grouping strategies to locate the multiples of 2,3,5, 10 beginning with 50 (half way) and other benchmarks depending on what multiples you are working on. Tag these numbers on the string.

Now record other numbers in the range 0–100 on tags, and ask the students to find efficient ways to locate the numbers. Encourage grouping strategies. For example, 75 is found by identifying the position half way between 50 and 100.

As an independent activity, give the students bead strings and a set of tags with numbers already on them. The students place each tag in its correct position on the string. Partners check each other's strings.

Repeat with several bead strings joined together to form a line extending into other multiples of 100. For example, five bead strings allow numbers from 0 to 500.

To extend this idea to fractions, and decimals, use tags to label the ends of the string as zero and one. Give the students tags with fractions to place on the string. Be sure that the denominators of the fractions are factors of 100. For example: $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{5}, \frac{3}{5}, \frac{9}{10}, \frac{1}{10} \cdots$

Join several bead strings together to create fraction lines that extend over one. For example, five bead strings allow fractional numbers from zero to five. Label the whole numbers with tags and ask the students to locate fractions like $\frac{9}{4}, \frac{13}{10}, \frac{24}{5} \cdots$

Extension Activity

Extend to fractions and decimals simultaneously. For example, on a 0 to 3 line (three bead strings joined), tag the whole numbers 0, 1, 2, 3. Ask the students to locate these numbers:
1.5, , 2.25, 0.99, $1.5, \frac{4}{5}, 2.25, \frac{19}{10}, 0.99, \frac{11}{4} \ldots$

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Beep – Stage Six

Skill Number: 6:1, 6:2

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:1	Recall the multiplication and division facts for the multiples of 2,3,5, and 10 *MGSE.3.OA.7*	*MGSE.3.OA.7*
6:2	Recall multiplication to 10 x 10, and the corresponding division facts.	*MGSE.3.OA.7*

Required Resource Materials:

- Hundreds board with flip capability.

Activity:

The students stand in a circle. Decide on a multiple of a given number that will be the "beep" numbers. Select a student to start counting from one. It is important that all the students count aloud. For example, for multiple of fives: "1, 2, 3, 4, beep, 6, 7, 8, 9, beep, 11 ..." When a student says "beep", they sit down. The game continues until only one student is left standing. This activity can be used to reinforce the forwards and backwards counting sequences. Use a hundreds board to assist the students to visualize the patterns. Flip over the spoken numbers but leave the "beep" numbers un-flipped.

Extension Activity

Have two multiples going at the same time. For example, threes (say "beep") and fives (say "buzz"). If the number is a multiple of both three and five, then the person says "buzz-beep". So the sequence goes "1, 2, beep, 4, buzz, beep, 7, 8,... 11, beep, 13, 14, buzz-beep ... " Begin the counting sequences at different starting numbers. For example, "3, 7, 11 ..." or "100, 97, 94, 91 ..." These patterns will help the students to recognize algebraic relationships.

Extension Activity

Repeat "Beep" for fractions (on multiples of four quarters), like, one-quarter, two-quarters, three-quarters, beep, five-quarters ..., in decimals (on multiples of0.25), like 0.05, 0.1, 0.15, 0.2, beep ...

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Bowl a Fact – Stage Six

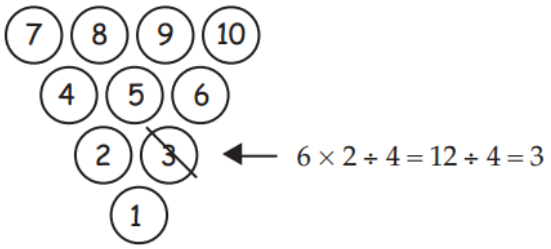
Skill Number:

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:1	Recall the multiplication and division facts for the multiples 2,3,5,10	*MGSE.3.OA.7*
6:2	Recall multiplication to 10 x 10, and the corresponding division facts	*MGSE.3.OA.7*
6:28	Solve problems using a combination of addition, subtraction, multiplication, division mental strategies.	*MGSE.3.OA.8*

Required Resource Materials:
Whiteboard and whiteboard marker. Three dice.

Activity:
Each player draws the 10-pin bowling triangle with the numbers 1 to 10 inside each circle. They take turns to roll three dice and record the numbers that come up. The students use the three numbers once only and combine them with any of the four operations, and brackets if needed, to make up a number sentence that "bowls out" numbers in the triangle. For example, if 6, 4, and 2 are thrown, a number sentence might be 6 2 ÷ 4 = 12 ÷ 4 = 3, so the ball with 3 in it is "bowled out". Similarly, 8 might be bowled out with 6 + 4 – 2. The students try to "bowl out" as many numbers as possible with each turn, but need to wait for their next turn to have another throw when they are stuck. For the students at the early strategy stages, the focus should be on addition and subtraction, but the activity can be extended for more able students.



Extension Activity – Advanced Multiplicative and Beyond
3 factorial or 3! means 3 x 2 x 1.
The recurring decimal 0.3 = 0.333333333... = 1/3.

Change the numbers in the circles to 11 to 20. Include the four operations +, –, x, ÷ and decimals, recurring decimals, and factorials.

For example, a student might roll 3, 3, and 6. They can work out:
3! ÷ 3 x 6 = 12 3! + 3! + 6 = 18 3 ÷ 0.3 + 6 = 15

Source URL:
http://nzmaths.co.nz/resource/bowl-fact

Bridges – Stage Six

Skill Number: 6:17, 6:19, 6:20

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:17	Solve addition and subtraction problems by going through tens.	*MGSE.3.NBT.2*
6:19	Solve addition and subtraction problems by looking for compatible numbers.	*MGSE.3.NBT.2*
6:20	Solve addition and subtraction problems by compensating with tidy numbers.	*MGSE.3.NBT.2*

Required Resource Materials:
Strings of 100 beads in color groups of five with the decades 0, 10, 20 ... marked with supermarket tags. Dice marked 5, 6, 7, 8, 9, 10. Pegs. Dominoes. Bridges game (Material Master 4–34).

Activity:

Give each small group of students a bead string, a dice, and a different colored peg for each player. Players take turns to roll the dice and work out where their peg will go when the number of beads is jumped. For example, a player who has their peg at bead 18 and throws a seven must predict that jumping seven beads will get their peg to 25, then check this by moving their peg.

Focus the students on bridging tens. For example, for 18 + 7, firstly 18 + 2 = 20. This leaves five of the seven. So 20 + 5 = 25. If the player incorrectly predicts which bead they will land on, they lose that turn. The player who gets over 100 first wins.

Play the game backwards as well, starting with the pegs in front of 100 and taking the dice number off. This involves going back through tens. For example, to find 83 – 9, firstly do
83 – 3 = 80 leaving six to take off. Then 80 – 6 = 74.

The students should play the game Bridges to consolidate up through 10 and back through 10 strategies.

Source URL:

Card Ordering – Stage Six

Skill Number: 6:6, 6:7

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:6	Order whole numbers in the range of 0-1,000,000	*MGSE4.NBT.4*
6:7	Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths	*MGSE4.NF.6*

Required Resource Materials:

- A pack of decimal playing cards (attached)

Activity:

The object of the game is to play the cards in order and be the student to play the card that has 1.0 on it.

Place the "one-tenth" cards face up to begin four stacks. Shuffle the cards. Deal each student five cards. A student with a "two=tenths" card begins by placing it on top of the "one-tenth" card. Students take turns putting one card on a stack of their choice. They must add to the stacks in sequence from 0.1 to 1.0. After each student has had their turn, they pick up a new card from the pack.

If a student cannot play a card, then they keep picking up cards from the pack until they get a card that they can play. The student who plays the 1.0 card collects the stack. They receive a point and put that stack of cards to one side. The students continue to play their cards until there are no cards left and four stacks of 0.1 to 1.0 have been completed.

Extension

This game may also be played with different packs of cards using different patterns of numbers. For example,
1 to 3 (in quarters), 2.31 to 3.3 (in hundredths), etc. Also, cards can be created to use fractions and decimals together.

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

This is one set of cards for 2-3 players.

0.1	0.2
0.3	0.4
0.5	0.6
0.7	0.8

0.5	0.3	0.1	0.9
0.6	0.4	0.2	1.0

0.3	0.1	0.9	0.7
0.4	0.2	1.0	0.8

0.1	0.9	0.7	0.5
0.2	1.0	0.8	0.6

0.9	0.7	0.5	0.3
1.0	0.8	0.6	0.4

This is one set of cards for 2-3 players.

0.125	1 | 4
3 | 8	0.5
0.625	6 | 8
0.875	1.0

$1\frac{7}{8}$	$\frac{13}{8}$	1.375	$\frac{9}{8}$
2	1.75	$1\frac{1}{2}$	$\frac{5}{4}$

0.875	0.625	$\frac{3}{8}$	0.125
1.0	$\frac{6}{8}$	0.5	$\frac{1}{4}$

$1\frac{7}{8}$	$\frac{13}{8}$	1.375	$\frac{9}{8}$
2	1.75	$1\frac{1}{2}$	$\frac{5}{4}$

0.875	0.625	$\frac{3}{8}$	0.125
1.0	$\frac{6}{8}$	0.5	$\frac{1}{4}$

$1\frac{7}{8}$	$\frac{13}{8}$	1.375	$\frac{9}{8}$
2.0	1.75	$1\frac{1}{2}$	$\frac{5}{4}$

0.875	0.625	$\frac{3}{8}$	0.125
1.0	$\frac{6}{8}$	0.5	$\frac{1}{4}$

$1\frac{7}{8}$	$\frac{13}{8}$	1.375	$\frac{9}{8}$
2	1.75	$1\frac{1}{2}$	$\frac{5}{4}$

Counting– Stage Six

Skill Number: 6:5

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:5	Say the forwards and backwards whole number word sequences by ones, tens, hundreds, and thousands in the range of 0-1,000,000 including finding numbers that are 10, 100, and 1,000 more or less than a given number.	*MCC.4.NBT.2*

Required Resource Materials:

- Hundreds board with flip capability. Slavonic abacus (optional). Flip strip (Material Master 4–2), or robust commercial version.

Opener:

Use body "percussion" to skip-count in twos. For example, the students touch their knees and silently think "One", then clap and say "Two", then touch their knees and think "Three", then clap and say "Four" ...

Repeat skip-counting by twos by flipping over every second number on the hundreds board. Similarly skip-count by fives and tens.

Repeat skip-counting by twos by moving pairs of beads on the Slavonic abacus. Relate the counting sequence to sets of objects and ask the students to give the total number of beads. Similarly skip-count by fives and tens.

Activity:

Repeat the above with skip-counting by threes and fours.

Ask the students to predict whether a given number will be in the pattern of multiples as shown on the hundreds board. For example, "Will 335 be in our fives pattern? Why do you think so?" or "What is the twentieth number in our tens pattern?"

Source URL: **http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf**

Dividing: Thinking About Multiplication– Stage Six

Skill Number: 6:1, 6:2, 6:25, 6:27

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to CCGPS
6:1	Recall the multiplication and division facts for the multiples of 2,3,5, and 10	*MGSE3.OA.7*
6:2	Recall multiplication to 10 x 10, and the corresponding division facts	*MGSE.3.OA.7*
6:25	Change the order of the factors to make multiplication facts	*MGSE.3.OA.7*
6:27	Solve multiplication and division problems by using multiplication facts	*MGSE.3.OA.7*

Required Resource Materials:

- Counters or similar objects

Activity:

Set a problem involving a multiplication fact that the students know by instant recall: "Five children have 15 sweets altogether. How many does each have?" Let the students model 15 objects in pairs or small groups. Ask how many groups have to be created (5). Without touching the 15 objects, ask the students to imagine how many each child gets and to discuss why they think this is so. Check by sharing out the objects. Record 15 ÷ 5 = 3 on the board or modelling book. Link this problem to the multiplication fact 5 x 3 = 15 (not 3 x 5 = 15). Repeat for other multiplication facts that the students know by instant recall.

Set a problem like: "Thirty-seven lollipops are shared among 12 children. How many will each child get?" Suppose an answer like two comes up, record 12 x 2 = 24 on the board or modelling book and ask, "How many will be left over?" "Is there enough for everyone to have another lollipop?" (Yes.) "How many does everyone now have?" (Three.) "Now is there enough for everyone to have another lollipop?" (No.) "Why not?"

Now record 37 ÷ 12 = 3 with 1 left over on the board or modelling book.
Repeat with similar examples.

Source URL:

Fraction Pieces– Stage Six

Skill Number: 6:13

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:13	Identify symbols for any fractions, including tenths, hundredths, thousandths, and those greater than 1.	*MGSE.5.NBT.3)*

Required Resource Materials:

- Fraction pieces (Material Master 4-19), or commercially made fraction sets.

Activity:

Background

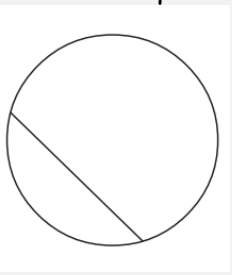
How to name fractions is not obvious for many students. It is important that the students know that most fraction words end in a "th". For such words, the link to the symbol is clear. For example, one-eighth links to 1/8 (the denominator is eight). Unfortunately the fractions that are most commonly encountered do not obey this rule; halves, thirds, and quarters are not clearly linked to their symbols $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ by the "th" clue at the end of the word. Linking the words to their symbols needs constant repetition throughout all fraction activities.

Activity

Get the students to sort similar fraction pieces and then create whole circles. Record the words for the unit fractions and their symbols on the board or modelling book. Ask the students to choose the matching piece and describe what the whole (1) looks like. Extend this to writing non-unit fractions like $\frac{3}{4}$, $\frac{2}{3}$, and $\frac{3}{5}$ for the students to model.

Activity

Draw a circle on the board or modelling book with two unequal pieces. Discuss why these pieces are not halves. Extend this to three and four equal and non-equal divisions and ask the students to identify the thirds and quarters (fourths).



Source URL:

Hundreds Boards and Thousands Book– Stage Six

Skill Number:

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6.5	Say the forwards and backwards whole number word sequences by ones, tens, hundreds, and thousands in the range of 0-1,000,000 including finding numbers that are 10, 100, and 1,000 more or less than a given number.	*(MGSE.4.NBT.2)*

Required Resource Materials:

- Hundreds board. Thousands book (Material Master 4–7). Snake pieces (Material Master 4–36).

Activity:

Take a pencil for a walk on a page of the thousands book. As the teacher points to the symbols in the chart below students identify the place of the identified number. In the case of pages that have many numbers missing, the students will need to image the numbers.

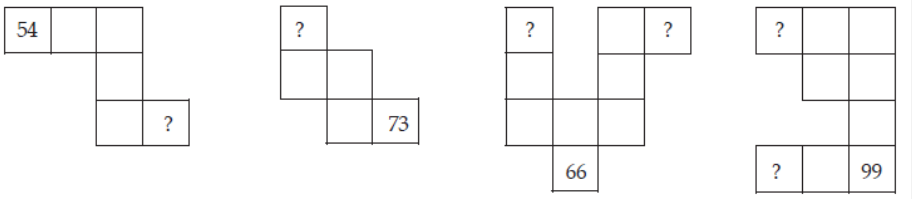
Discuss what moving one square to the right or left does to the size of the number (increases/decreases by one). Ask what moving one square down or up does (increases/decreases by 10), and what moving through to the next/previous page does (increases/decreases by 100).

Pose written problems using these symbols:

← left,	→ right,	↑ up,	↓ down,
⟹ forwards one page (add 100),		⟸ back one page (subtract 100)	

Examples: 25 ↓↓↓ ← (start at 25, go down three squares to 55 and to the left one square to arrive at 54), 487 ⟸⟸ ↑ (start at 487, go back two pages to 287, and up one square to 277), 67 ↓↓↓ ← ↑↑ ←← ↓ ...

Use snake pieces, or draw them on the board or modeling book:



The students work out the "mystery numbers". Ask the students "How did you work out what the mystery number was? What different ways could we have used?"

Extension Activity

Repeat the snake pieces activity but now show pages from the thousands book where very few reference numbers are visible.

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

In and Out – Stage Six

Skill Number:

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:27	Solve multiplication and division problems by using multiplication facts.	*(MGSE3.OA.7)*
6:28	Solve problems using a combination of addition, subtraction, multiplication, and division mental strategies.	*(MGSE.3.OA.8)*

Required Resource Materials:

- A whiteboard and a whiteboard marker. A calculator (on an overhead projector if possible)
- Rule a grid on the whiteboard as shown.

IN	OUT

Activity:

Determine a rule before engaging students (doubles, doubles +/- 1, multiply 3 and subtract 2, etc…).

- Have your students give you a number and record it in the first "in" box
- Apply your created rule to the number given by students and record the sum/product in the "out" box. Do not tell students the rule.
- Repeat 4 more times or until students are able to identify your rule.

After modeling the game a couple of times all the way through have the students play the game in small group.

Extension Activity

Repeat the same directions as above but have your rule include decimal numbers (multiply by 1.5, multiply by 2 and add 1.5)

Source URL:

Linking Money and Decimal Fractions – Stage Six

Skill Number: 6:11, 6:12

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:11	Find the number of tenths and hundredths in decimals to two places.	MGSE4.NF.6, MGSE5.NBT.3a
6:12	Round decimals with up to two places to the nearest whole number.	MGSE5.NBT.4

Required Resource Materials:

- Calculators. Play money, coins (optional).

Activity:

Give the students calculators. Pose the problem "Jane has $6 to share among five people. How much does each person get?" Write $6 ÷ 5 on the board or modelling book. The students carry out the operation 6 ÷ 5 = on the calculator, and get 1.2. Ask the students what 1.2 means in money. Discuss, with the aid of 10-cent coins if needed, why one-tenth of a dollar is 10 cents. So two-tenths of a dollar is 20 cents, and so 1.2 = $1.20.
Record $6 ÷ 5 = $1.20 on the board or modelling book.
Repeat for: $7 ÷ 5, $6 ÷ 4, $4 ÷ 5, $14 ÷ 4, $13 ÷ 2 ...

"Sarah pays $5 for 4 kilograms of apples. How much is this per kilogram?" Get the students to work out 5 ÷ 4 on a calculator. The answer of 1.25 looks familiar in money. Discuss why one whole and two-tenths and five-hundredths is one dollar 25 cents.
Repeat for: $7 ÷ 4, $13 ÷ 4, $3 ÷ 4, $14 ÷ 8, $20 ÷ 16.

Extension Activity
The students use calculators to solve problems like $23 ÷ 16; $13.89 ÷ 11; $345.78 ÷ 17; $14,567.67 ÷ 32; $290 ÷ 64 ...
The students then round the answers to the nearest one cent, or to the nearest five cents.
Drawing decimal number lines may help the students visualize the rounding.

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Loopy – Stage Six

Skill Number: 6:28

Skill Descriptions Aligned to GSE:

	Skill Descriptions	Aligned to GSE
6:28	Solve problems using a combination of addition, subtraction, multiplication, and division mental strategies	MGSE.5.NBT.7

Required Resource Materials:

- Sets of loopy cards (Attached)

Activity:

Share the loopy cards out among all the students in the group. All cards must be used. Any person may begin the game by reading their card aloud. The person reads their card aloud to the group. The rest of the group thinks about the number the first student is asking for. One person has that answer on their card. This student reads their card aloud. This continues until someone asks for the number on the first card that started the game.

Source URL: http://nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

This is one class set of loopy cards.

I have 20. Who has 10 times this?	I have 200. Who has 50 less?	I have 150. Who has this number divided by 30?
I have 5. Who has this number times 12?	I have 60. Who has $\frac{1}{4}$ of this number?	I have 15. Who has this number times 3?
I have 45. Who has double this number?	I have 90. Who has $\frac{1}{3}$ of this number?	I have 30. Who has $\frac{1}{5}$ of this number?
I have 6. Who has 8 times this number?	I have 48. Who has double this number?	I have 96. Who has this number divided by 3?

I have 32. Who has this number times 4?	I have 128. Who has half of this number?	I have 64. Who has this number divided by 8?
I have 8. Who has this number times 15?	I have 120. Who has this number minus 21?	I have 99. Who has this number divided by 11?
I have 9. Who has this number times 18?	I have 162. Who has half of this number?	I have 81. Who has this number times 3?
I have 243. Who has this number divided by 9?	I have 27. Who has double this number?	I have 54. Who has this number divided by $\frac{1}{2}$

I have 108. Who has $\frac{1}{4}$ of this number?	I have 27. Who has this number divided by 9?	I have 3. Who has this number multiplied by 31?
I have 93. Who has this number minus 17?	I have 76. Who has this number divided by 4?	I have 19. Who has this number times 9?
I have 171. Who has this number minus 73?	I have 98. Who has this number minus 18?	I have 80. Who has $\frac{1}{4}$ of this number

Make It Addition – Stage Six

Skill Number: 6:18, 6:19

Skill Descriptions Aligned to MGSE:

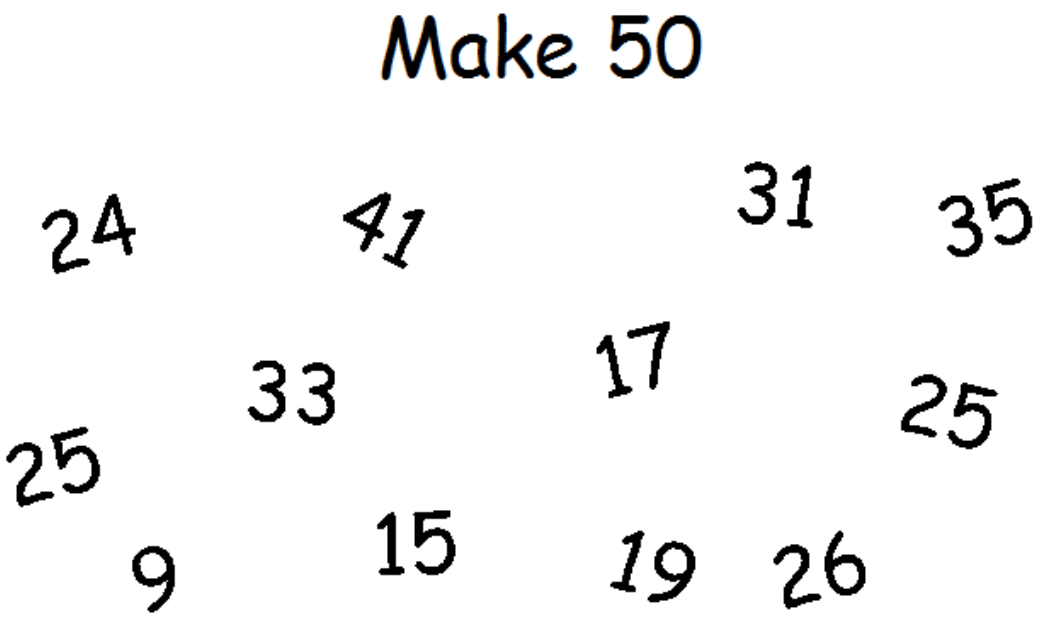
	Skill Descriptions	Aligned to MGSE
6:18	Solve addition and subtraction problems by using place value	MGSE3.NBT.2
6:19	Solve addition and subtraction problems by looking for compatible numbers	MGSE3.NBT.2

Required Resource Materials:

- Make 50, 100, 500, 1000 (Attached)

Activity:

Show the students one of the cards. For example, Make 50, the student will find pairs of numbers that will produce a sum of 50.



Make 50

24 41 31 35

33 17 25

25

9 15 19 26

Make 100

15 9 45 72

84

55 28 91

65 16 35 85

Make 500

240 415 350 375 165 335 125 150 85 260

Make 1000

815 445 720 90 555 910 635 365 280 185

Money Changes– Stage Six

Skill Number: 6:10

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:10	Find out how many ones, tens, hundreds, and thousands are in all of a whole number.	*MGSE.4.NBT.2*

Required Resource Materials:

- Blank Ten Frames
- Film Canisters or small Dixie© Cups
- Beans
- Play Money

Activity:

Using Materials

Initially use beans or other single items, such as linking cubes, to model numbers because this is a proportional representation of place value, that is, a canister of ten beans is really ten times more than a single bean and a tens frame holding ten canisters really contains ten times more than a single canister. Numeracy money is a non-proportional representation but is useful because it is easier to manipulate for larger numbers.

Ask the students to make three-digit numbers using beans, e.g., 258 would be modelled as:

2 hundreds 5 tens 8 ones

Ask the students "nested" place value questions such as:

• "How many tens are in our number altogether? Where are all of those tens?"

(There are 20 tens in the 2 hundreds, and 5 tens in the tens, that's 25 tens.)

• "How many ones are in our number altogether? Where are all of those ones?"

(There are 200 ones in the 2 hundreds, 50 ones in the 5 tens, and 8 ones, that's 258 ones.)

Provide several examples and record students' statements about the same number using words and symbols:

• 3 hundreds and 6 tens and 4 ones 36 tens and 4 ones 364 ones

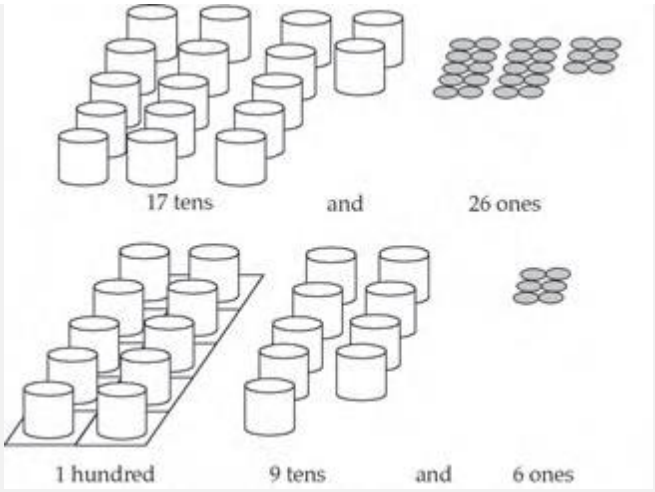
• 4 hundreds and 7 tens and 3 ones 47 tens and 3 ones 473 ones.

Ask the students to think in reverse by getting them to combine ones and tens, e.g.,

"Make this number: 17 tens and 26 ones. Find the simplest way you could say this number."

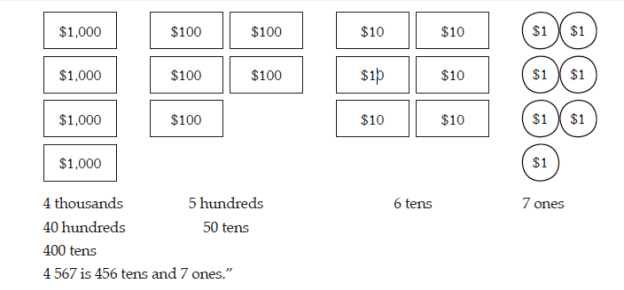
Look for students to combine ten ones as tens, ten tens as hundreds, and so on.

Other



Other examples might be, "Make 29 tens and 13 ones (303). Make 38 tens and 38ones (418). "Extend the nested place value concept to thousands and ten thousands, modeling with play money, e.g., "Make 5 671. How many hundreds are there altogether?" (56)
"Where are all the hundreds?" "How many tens are there altogether?" (567) "Where are all the tens?" and so on. Students may need to build the amounts with hundred dollar bills and ten dollar bills respectively to see these relationships: "Make 18 hundreds, 26 tens, and 35 ones. What is the simplest way to make this number with money?"

Using Imaging
In this phase of the lesson, the focus is on students anticipating the actions on materials, either beans or play money. If students experience difficulty with anticipating, it may be necessary to fold back to manipulating materials or drawing diagrams to model the physical situation. In the process of this imaging phase, recording in word form needs to be connected to the formal arithmetic symbols.
Pose problems such as:
• "Tess has $4,567. She thinks she will feel richer if she changes all her $1,000 and $100 bills for $10 bills. How many $10 bills will she have?"
• "Alecia has this in his money box: seven $100 bills, sixty-seven $10 bills, and twenty-five $1 coins. She goes to the bank. How much money is she depositing?"
Allow students to record diagrams to work out the problems and record their thinking using words and symbols, e.g.:
"Tess's money is 4 thousands, 5 hundreds, 6 tens, and 7 ones.



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More Geoboard Fractions– Stage Six

Skill Number: 6:13, 6:30

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:13	Identify symbols for fractions, including tenths, hundredths, thousandths, and those greater than 1.	MGSE3.NF.1
6:30	Find fractions of regions.	MGSE3.NF.1, MGSE3.G.2

Required Resource Materials:

- Sheets of paper, Geoboards available commercially
- Rubbers bands. Geoboard recording sheets (Material Master 4–20).

Activity:

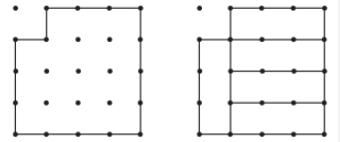
Background

Creating unit fractions for thirds, fifths, sixths, sevenths ... on geoboards requires the students to use multiplicative thinking to define what one whole means.

For example, with fifths, only 15, 10, and five squares on the geoboard may be used to represent a whole. The diagram shows a whole with an area of 15 squares that has been divided into fifths.

Activity

- Get the students to create a variety of unit fractions for thirds, fifths, sixths, and sevenths. Record the answers on geoboard sheets.



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Multiplication Cards– Stage Six

Skill Number:
6:2

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:2	Recall multiplication to 10 x 10, and the corresponding division facts	GSE.3.OA.7 GSE.3.OA.4

Required Resource Materials:

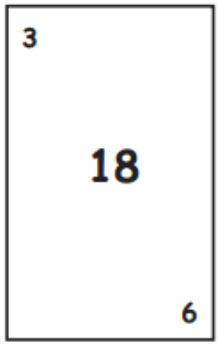
- Factor Cards. (Material Master 4-37).

Activity:
Show the students a factor card, for example, the card shows 3, 18, and 6. Practice all 12 combinations of every basic fact. Ask problems like:

6 x 3, 18 ÷ 6, ... The complete list of 12 questions needed for each card is like this:

6 × 3, 18 ÷ 6, ... The complete list of 12 questions needed for each card is like this:

$3 \times 6 = \square$	$\square \times 6 = 18$	$3 \times \square = 18$
$6 \times 3 = \square$	$\square \times 3 = 18$	$6 \times \square = 18$
$18 \div 6 = \square$	$\square \div 6 = 3$	$18 \div \square = 3$
$18 \div 3 = \square$	$\square \div 3 = 6$	$18 \div \square = 6$



Source URL: http://nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Multiplication Madness – Stage Six

Skill Number: 6:25

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:25	Change the order of the factors to make multiplication facts.	MGSE4.NBT.5

Required Resource Materials:

- Game boards (Material Master 4–16). Three dice. Counters.

Activity:

Divide the class into groups of three. Give each group a game board, three dice, and counters. Players take turns to roll the three dice. Using a strategy, multiply the three numbers together and check to see if the product is on the game board. If it is, they place a counter of their color on that number. The player who is the first to get three counters in a row is the winner.

Source URL:

Multiplying Tens– Stage Six

Skill Number: 6:26

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:26	Multiply by 10s, 100s, 1000s and other multiples of 10.	*MGSE.3.NBT.3* *MGSE.4.NBT.5* *MGSE.5.NBT.2*

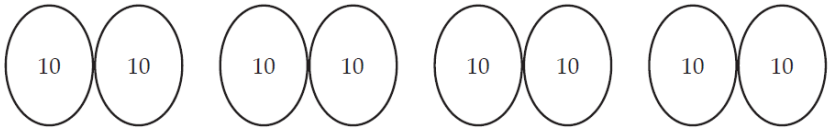
Required Resource Materials:

- Beans held as groups of 10 in separate film canisters
- 10 canisters to a plastic container (making hundreds) or popsicle sticks/linking cubes bundled into tens and hundreds, or place value blocks, or numeracy money
- ice cream containers
- calculators

Multiplying Tens

Activity:

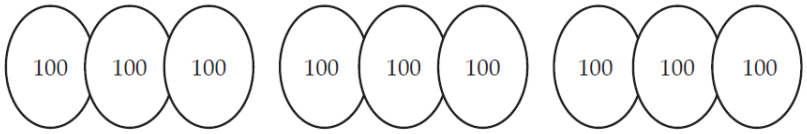
Set up 4 x 20 as a model, using the place value equipment you have chosen:



Ask the students to work out the total number in the collection. Discuss their strategies with a view to connecting 4 x 2 = 8 to 4 x 20 = 80. Pose other similar problems, modelling them each time with place value materials.

Examples could be:
3 x 30 = 90 from 3 x 3 = 9 2 x 40 = 80 from 2 x 4 = 8
6 x 50 = 300 from 6 x 5 = 30 5 x 30 = 150 from 5 x 3 = 15

Extend the problems to involve hundreds. Pose the problem 3 x 300.

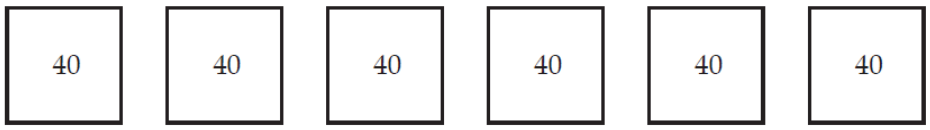


Link the problem to 3 x 3 = 9. Pose similar problems, such as:
4 x 200 = 800 from 4 x 2 = 8 or 2 x 300 = 600 from 2 x 3 = 6

Ask the students to explain the pattern they use to solve these types of problems.

Using Imaging

Shielding: Require the students to image the problems by masking the canisters or stacks with ice cream containers. Label each container with the number involved, using sticky notes. Ask the students to detail the structure of the numbers, for example, "Forty is four tens." "What is 6 × 40?"



Good examples to use are:

2 × 70 8 × 50 4 ×30 7 × 500 5 × 400 6 × 500

Using Number Properties

Use calculators to explore more complex examples so that the students can observe patterns in the answers. Have the students predict answers before they use a calculator. Connected examples might be:

7×50	70×5	500×7	70×50	500×70	700×500
60×2	20×60	200×6	60×200	600×200	$2\,000 \times 60$

Look for the students to generalize the number patterns. Some will focus on the role of zero in describing how many digits the number will have. Develop estimation ideas through questions like "I have a number that is a multiple of 10 less than 100 multiplied by a number that is a multiple of 100. How many digits might the answer have?" (one, two, three, or four)

Source URL: http://nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk6.pdf

Number Fans – Stage Six

Skill Number: 6.4, 6.5, 6.6, 6.7

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:4	Identify all of the numbers in the range 0-1,000,000.	*MGSE.4.NBT.2*
6:5	Say the forwards and backwards whole number word sequences by ones, tens, hundreds, and thousands in the range of 0-1,000,000 including finding numbers that are 10, 100, and 1,000 more or less than a given number.	*MGSE.4.NBT.2*
6:6	Order whole numbers in the range of 0-1,000,000.	*MGSE.4.NBT.4*
6:7	Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths.	*MGSE.4.NF.6*

Required Resource Materials:

- A number fan for each student (Material Masters 4–10 and 4–18), or commercially made number fans.

Activity:

Whole Numbers

The students use the fans to show numbers. As the students' knowledge develops, bigger whole numbers may be used. For example: 8, 4, 7 ..., then 24, 48 ..., then 134, 178 ..., then 2 345, 8 034 ..., then 45 702, 803 856 .... Normally no digit can be repeated in a number because the fans have no repeated digits.
However, some commercial fans do have repeated digits.

Decimal Numbers

Repeat the previous activity. Material Master 4–18 contains a decimal point, or a loose card with a dot printed on it may be used as the decimal point. With decimals, be careful not to say "six point seventy-five" as this may confuse decimals fractions with other uses of the decimal point in money and measurement such as six dollars seventy-five cents and 6.75 meters. Instead say "six point seven, five".

Number Sequence and Order

Extend the use of number fans to the Number Sequence and Order part of the Number Framework by using problems like:
Show the number that comes after or before 6, 17, 19 ... 456 ...
Show the number 10 after or before 46 ... 783 ... 41 895 ...
Show the number 100 after or before 357 ... 92 863 ...
Show the number two greater than 30, 45, 247 ... 64 723 ... 3.5 ...
Show the number in between 23 and 25 ... 456 and 458 ...
Show the decimal one-tenth more or less than 2.3, 5.7, 8.03, 43.092 ...
Show the decimal one-hundredth more or less than 1, 5.62, 3.8 ...
Show the decimal for , , , ...
Show the decimal for 40%, 85%, 123%, 12.5% ...

URL: http://nzmaths.co.nz/resource/number-fans

Number Hangman– Stage Six

Skill Number: 6:4

Skill Descriptions Aligned to MGSE:

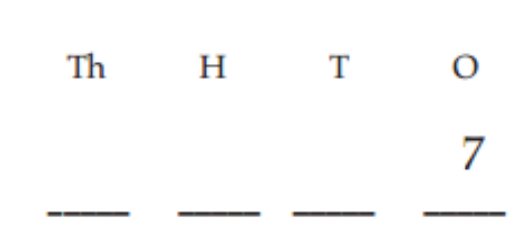
	Skill Descriptions	Aligned to MGSE
6:4	Identify all of the numbers in the range 0-1,000,000.	*MGSE.4.NBT.2*

Required Resource Materials:

- Whiteboard and pen

Activity:

Place dashes on the whiteboard to indicate how many digits are in the number.



The students can ask questions about specific places, like, "Is there a five in the tens place?"
They may also ask digit related questions, like, "Does the number have the digit eight anywhere?", "Is the tens digit odd?", or, "Is the 7 hundreds digit greater than five?"
Each time you answer "No" to their question, add a piece to the hangman. If they guess the correct digit, place that digit above the appropriate dash in the correct column. Once the students have guessed the digits correctly, have them read the number aloud.
Encourage the students to be systematic by using lists of digits and eliminating as they receive answers.

Extension Activity:
Repeat the activity above with decimal numbers.

Source URL:

Place Value Houses – Stage Six

Skill Number: 6:4

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:4	Identify numbers in the range 0-1,000,000	MGSE 4.NBT.2

Required Resource Materials:

- Place Value Houses (Material Master 4-11)
- Numeral Cards (Material Master 4-1)

Activity:

Explain to the students how each place-value house is broken into hundreds, tens, and ones.

Help the students to read the numbers in their house positions. In particular, assist the students to read numbers like 3,080,068 where the zeros must be noticed but are not read out loud.

Notice the first house needs no name. (It is called "The Trend Setter House" in Material Master 4–11 because it starts the pattern of column names within every house.)

Give the students a number and get them to add the place-value houses then read aloud the number. Once the students' knowledge is secure ask them to read numbers like 3,345,002 without houses.

Source URL: http://www.nzmaths.co.nz/resource/place-value-houses

Reading of Decimal Fractions – Stage Six

Skill Number: 6:7

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:7	Read decimals with tenths	MGSE5.NBT.3

Required Resource Materials:

- None

Activity:

Draw a table with 3 columns on the board or math journal. Write "Ones" in the middle column, then, going to the left, "Tens", and to the right of the "Ones" column, not the decimal point. Discuss how tens map onto the Tenths. Enter a number like 56.8 in the table and get the students to read it as 56 + 8 x (1/10).

Repeat for other numbers.
Repeat without the table: The students read numbers like 49.4 by imaging the column place values.

Source URL:

Rocket – Where Will It Fit? – Stage Six

Skill Number: 6:7,

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6.7	Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths.	*MGSE.4NF.6*

Required Resource Materials:

- A piece of scrap paper. Standard 1–6 dice or dodecahedral 0–9 dice.

Activity:
Each student needs to draw a "rocket" playing board like the one shown. The number of floors on the rocket can be increased where larger whole numbers or decimals are involved. The aim of the game is to fill every floor of the rocket with numbers in order.
If a player cannot place a number they have thrown, they miss that turn. Players take turns to roll a dice twice. From the numbers thrown, the students decide which two digit number they will use. For example, if five and three is thrown, the student could use 53 or 35. The students then record the number on a level of the rocket where they think it best fits between 10 and 67. Once a number is written it cannot be moved.

Activity:
Repeat: The students can throw the dice three times to make a three-digit whole number and place that number between 110 and 667. Use other variations like using the three throws to make decimals and placing them between 1.1 and 6.67.

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Skip-counting on the Number Line – Stage Six

Skill Number: 6:3, 6:5, 6:7

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6.3	Recall groupings of twos, threes, fives, and tens that are numbers to 100 and the resulting remainders.	*(MGSE.3.OA.7)*
6.5	Say the forwards and backwards whole number word sequences by ones, tens, hundreds, and thousands in the range of 0-1,000,000 including finding numbers that are 10, 100, and 1,000 more or less than a given number.	*(MGSE.4.NBT.2)*
6:7	*Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths.*	(MGSE5.NBT.7)

Required Resource Materials:

- Large number lines (Material Master 4–8), or decimal number lines (Material Master 4–30). Pegs.

Activity:
Put pegs on the number line to show the multiples of two, five, and 10 being learned by skip counting. Say the sequence as you point to the pegs. Ask the students to predict what other numbers would be pegged if the skip-counting continued.
Pose problems like, "When skip-counting by twos (or fives or tens), will the number 27 have a peg put on it? How do you know?"
Gradually remove the pegs until the skip-counting sequence is known. Mask parts of the number line with a strip of card. Point to the position of each multiple and ask the students say it. Repeat the activity by skip-counting backwards. Include skip-counting from new starting points, for example, skip-counting by fives starting at three gives 3, 8, 13, 18 ...

Activity:
Develop the idea of common multiples by pegging two sets of skip-counting numbers on the same number line, for example, two, four, six ..., and three, six, nine ... Use different-colored pegs for each sequence. (Some numbers will have two pegs on them.) Ask the students to predict what other numbers occur in both sequences, for example, 6, 12, 18 ...

Activity:
Use the same method to skip-count on the decimal number line. The students need to skip-count in tenths and hundredths. Counting in multiples of two-tenths, three-tenths, five-hundredths ... Repeat the skip-counting sequences starting in different places. For example, 0.3, 0.34, 0.38, 0.42 ...

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Squeeze – Guess My Number - Stage Six

Skill Number: 6:7

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:7	Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths.	*(MGSE.4.NF.6)*

Required Resource Materials:

- Two pegs. A decimal number line (Material Master 4–31).

Activity:

A peg is put at each end of a number line, for example, on 0 and 4. A student chooses a number between the pegs and writes it on a piece of paper. The rest of the students ask "less than" or "greater than" questions to find the mystery number. With each question, a peg is moved to eliminate numbers. For example, if "Is it greater than 1?" is answered by "Yes", then the zero peg is shifted up to 1 to eliminate all the numbers 1 and under.

If "Is it less than 3?" is answered by "Yes", then the top peg is shifted to 3 to eliminate all the numbers 3 and over.
This continues until the mystery number is finally found by squeezing in from above and below.
Note that this game can be played on various number lines, including whole-number lines starting at other than zero, and decimal or fraction number lines.
Alternatively, use a flip hundreds board, showing all the numbers in black and flipping the numbers over to red as they are eliminated.
When the students are confident, remove the number line and do the activity by visualizing. List the numbers on the whiteboard:

"I'm thinking of a number between 0 and 5."	Write	0	5
"Is it greater than 2.5?" "Yes"	Write	2.5	5
"Is it less than 3.6?" "Yes"	Write	2.5	3.6
"Is it greater than 3.0?" "No"	Write	2.5	3.0

The game continues until the number is found. Note that the question, "Is it greater than 3.0?" did not eliminate 3.0 itself as the answer was "No." The underlining of 3.0 shows the mystery number *could* be 3.0.
Where the mystery number is a three-place decimal, like 0.456, draw a very long number line on the board or modeling book showing 0 to 1 at either end. Progressively subdivide the number line until the decimal is found.

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Using Calculators – Stage Six

Skill Number: 6:1, 6:7

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:1	Recall the multiplication and division facts for the multiples of 2,3,5, and 10	*(MGSE.3.OA.7)*
6:7	*Read decimals with tenths, counts forwards and backwards in tenths, order decimals with tenths.*	*(MGSE5.NBT.7)*

Required Resource Materials:

- Calculators. Hundreds board with flip capability. Number flip strip (Material Masters 4–12 and 4–31).

Activity:

The constant function on the calculator can be used to develop counting patterns. Ask the students to key in the sequence 5 + = = = = ... It will produce a display of increasing multiples of five. Challenge your students to work out the sequence. Note that with some calculators, like Casio, the + key must be pressed twice to activate the constant function.

Use the hundreds board to record the skip-counting sequence. For example, flip over every fifth number. This can also be done by recording the sequence on the blank side of a strip and sliding it into a number flip strip.

Seat the students in pairs and get one of the pair to put in the first few terms of a sequence, using + (a number) = = =. The student hands the calculator to their partner to push = = = ... The partner tries to work out what number is being repeatedly added. Continue this activity introducing decimals. Have the students enter 2 + 0.4 = = = and then hand the calculator their partner. The partner should press the = key a few more times to determine the amount that is being added each time and predict what the total would be if you hit the = 3 more times. Example: 2 + 0.4 = 2.4. Press the = key a few more times to determine the pattern, 2.8, 3.2, 3.4, _, _, _

Tell the students to key in + number but not to press =.

For example, + 0.5 (0.2, 0.1, etc.). Instruct them to hold their finger over the equal button, and, without looking, press equals until they think a target number has been reached in the window. For example, aim for 5. This is good practice for skip-counting sequences and multiplication facts.

This can be extended to sequences of two-digit numbers and decimals.

For example, + 23 = = = ..., + 99 = = = ..., + 0.3 = = = ..., + 1.6 = = = ...

Repeat for subtraction. For example: 46 – 5 = = = ... produces the sequence 41, 36, 31, ... on most calculators.

Extension Activity

The students investigate calculator inputs like 4 + 5 = = = ... In this example, most calculators produce the sequence 9, 14, 19, 24, ...

Examples: 0.9 + 0.3 = = = ..., 2.45 + 0.02 = = = ..., 48 – 4 = = = ..., 8.4 – 0.5 = = = ..., 7.5 – 0.25 = = = ..., 2.602 – 0.002 = = = ...

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf

Who Has More Cake? – Stage Six

Skill Number: 6:15

Skill Descriptions Aligned to MGSE:

	Skill Descriptions	Aligned to MGSE
6:15	Order and compare unit fractions	*(MGSE.4.NF.2)*

Required Resource Materials:

- Fraction pieces (Material Master 4–19) or commercial ones.

Activity:

Background

The key idea in unit fractions follows the general rule that the larger the denominator, the smaller the fraction. This is because the larger the denominator becomes, the more equal parts the whole (one) is divided into. Therefore the pieces must be smaller as the denominator increases.

Present the students with the idea that there are two cakes. One is sliced into fifths and one is sliced into eighths. "Robyn wants a piece of cake, and so does Dale. Who will eat more cake?" Provide fraction pieces, and let the students model fifths and eighths by building both cakes. Discuss which fraction is larger.

Ask the students to develop an inequality statement such as "One-eighth is less than one-fifth," and "One-fifth is greater than one-eighth". As the students are writing their statements, record with symbols underneath $\frac{1}{8} < \frac{1}{5}$

Repeat this for additional unit fractions such as fourths, thirds, sixths, and eighths

$\frac{1}{4}$ and $\frac{1}{3}$, $\frac{1}{6}$ and $\frac{1}{8}$, $\frac{1}{5}$ and $\frac{1}{3}$, $\frac{1}{8}$ and $\frac{1}{4}$ ...

Repeat without materials. Discuss which is larger in the following pairs and why this is true: $\frac{1}{10}$ and $\frac{1}{3}$, $\frac{1}{12}$ and $\frac{1}{8}$, $\frac{1}{15}$ and $\frac{1}{23}$, $\frac{1}{50}$ and $\frac{1}{27}$, $\frac{1}{67}$ and $\frac{1}{68}$, $\frac{1}{59}$ and $\frac{1}{95}$ ...

Source URL: http://www.nzmaths.co.nz/sites/default/files/Numeracy/2008numPDFs/NumBk4.pdf