RICH MATHEMATICAL TASK BOOKLET

NUMBER & ALGEBRA

YEAR 5-6 ODD YEARS

Teacher Booklet

Task 1

Year Five option
Leah's family have been fundraising to go to a family celebration in Rarotonga. Last weekend they had a fundraising event at the market and raised $2198. They had already raised $867. How much money have they raised altogether?

Leah's family have been fundraising to go to a family celebration in Rarotonga. Last weekend they had a fundraising event at the market. Now they have raised $5432 altogether. Before the weekend they had $3789. How much money did the weekend event raise?

Leah's family have been fundraising to go to a family celebration in Rarotonga. Last weekend they had a fundraising event at the market. Now they have raised $6534 altogether. Before the weekend they had $3785. How much money did the weekend event raise?

Year Six option
A school has been fundraising for new furniture. Last weekend they had a fundraising event and raised $6748. They had already raised $39867. How much money have they raised altogether?

A school has been fundraising for a new sunshade. Last week they had a fundraising event and altogether they now have $48 432. Before the event they had $13 789. How much money did the event raise?

A school has been fundraising for a new classroom block. Last week they had a fundraising event and altogether they now have $235 534. Before the event they had $93 785. How much money did the event raise?

Teacher Notes

Before you launch the task, write 75 681 on the board.

Ask students, what is this number? How can you write and explain this number in different ways? Support the students to read the number correctly. Give them an opportunity to work in pairs and record and represent their reasoning. Explore concepts of place, face, and total value. Support students to discuss hundreds of thousands, tens of thousands, thousands, hundreds, tens, ones and make links to place, face, and total value. Introduce a place value house as a representation and have this on the wall or whiteboard for students to refer to. Repeat this as a warm-up throughout the year and increase the numbers up to 1 000 000.

Have available place value blocks for the students to use.

Ask students to solve each question and share back before moving to the next task.

Big Ideas

Our number system is based on groupings of ten or base ten. Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:
Round whole numbers to the nearest ten thousand, thousand, hundred, or ten, and round tenths to the nearest whole number.

Add and subtract whole numbers up to 10,000.

During Year 6:
Use rounding, estimation, and inverse operations to predict results and to check the reasonableness of calculations.

Add and subtract any whole numbers.

Teacher Notes continued

Notice use of place value and the ability to see hundreds as ten tens and tens as ten ones. Draw connections to represent these within the place value houses.

Expect students to use equations and the empty number line to represent their thinking.

Expect students to use the standard algorithm and ensure procedural and conceptual understanding, e.g., can they explain this in a sense-making way referring to place value and renaming.

For the independent task, have place value blocks available.

Shareback

For the first task, select student solution strategies that have used compensation and equivalence or place value and renaming.

For the second and third tasks, select student solution strategies that have used inverse relationships of addition and subtraction, or place value and renaming (column subtraction) – ask students to model using place value blocks.

Connect

Model to the students how to solve the task using a standard column algorithm with renaming and place value blocks. Through-out explicitly use place-value language and demonstrate the actions using the place value blocks. For example, use the place-value blocks to represent this number and then model renaming by swapping the blocks.

Ask the students to solve the following question and model this with place value blocks and record vertically:

4687 + 3536 =

Suggested Learning Outcomes

Explain the face, place, and total value of the digits in numbers.
Explain and justify the use of place value to solve subtraction problems.
Explain and justify the use of equivalence and compensation to solve subtraction problems.
Use and justify the inverse relationship between addition and subtraction to solve problems.
Represent equations on an empty number line, in notation and using a place value house.

Mathematical Language

Ones, tens, hundreds, thousands, add, subtract, place value, face value, total value, digit, addition, subtraction, inverse relationship.

Independent Tasks

Use a place value house and place value blocks and solve the following equations:

5157 + 742 =

4261 + 4728 =

1534 + 2564 =

14 393 + 361 =

554 328 + 12 491 =

What do you notice? Justify your thinking.

Anticipations

Solutions, Misconceptions

Task 2

Year Five option
Kaitiaki has been collecting Mine-coins.
He has $2225 and after buying content from the Minecraft marketplace, he has $539 left.
How much did he spend?

Kaitiaki is playing a computer game and has gained a score of 9837.
He is attacked and when the attack finishes, he is left with 968 points.
How many points did he lose in the attack?

Year Six option
Kaitiaki has been collecting Mine-coins.
He has $22 225 and after buying content from the Minecraft marketplace, he has $5539 left.
How much did he spend?

Kaitiaki is playing a computer game and has gained a score of 543 837.
He is attacked and when the attack finishes, he is left with 5968 points.
How many points did he lose in the attack?

Teacher Notes

Before you launch the task, write 835 947 on the board.
Ask students, what is this number? How can you write and explain this number in different ways? Support the students to read the number correctly. Give them an opportunity to work in pairs and record and represent their reasoning. Explore concepts of place, face, and total value. Support students to discuss tens of thousands, thousands, hundreds, tens, ones and make links to place, face, and total value. Introduce a place value house as a representation and have this on the wall or whiteboard for students to refer to. Repeat this as a warm-up throughout the year and increase the numbers up to 1 000 000.

Have place value blocks available.

Notice use of place value and the ability to see hundreds as ten tens and tens as ten ones. Draw connections to represent these within place value houses.

Introduce empty number line as a way to represent solution strategies.

Expect students to use equations to represent their thinking.

For the independent task, have place value blocks available.

Big Ideas

Our number system is based on groupings of ten or base ten.
Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

Curriculum Links

During Year 5:
Round whole numbers to the nearest ten thousand, thousand, hundred, or ten, and round tenths to the nearest whole number.

Add and subtract whole numbers up to 10,000.

During Year 6:
Round whole numbers to a specified power of 10, and round tenths and hundredths to the nearest whole number or one decimal place.

Use the order of operations rule with grouping, addition, subtraction, multiplication, and division.

Add and subtract any whole numbers.

Solve problems involving purchases (e.g., ensuring they have enough money)

Shareback

Select student solution strategies that have used inverse relationships of addition and subtraction or place value and renaming.

Connect

Model to the students how to solve the subtraction task using a standard column algorithm with renaming and place value blocks. Through-out explicitly use place-value language and demonstrate the actions using the place value blocks. For example, use the place-value blocks to represent this number and then model renaming by swapping the tens block for 10 ones.
2225 – 539 =
5 – 9 = ?
Rename one ten so 15 ones – 9 ones = 6 ones

Ask the students to solve the following question and model this with place value blocks and record vertically:

1543 – 626 =

Suggested Learning Outcomes

Explain the face, place, and total value of the digits in numbers.

Explain and justify the use of place value to solve subtraction problems.

Use and justify the inverse relationship between addition and subtraction to solve problems.

Represent equations on an empty number line, in notation and using a place value house.

Independent Tasks

Solve the following equations:

531 – 249 = __

735 – ___ = 326

__ – 432 = 278

4321 – 1795 = __

Mathematical Language

Ones, tens, hundreds, thousands, add, subtract, place value, face value, total value, digit, addition, subtraction, inverse relationship.

Anticipations

Solutions, Misconceptions

Task 3

Factors and multiples (2 player game)

The aim of this game is to be the last person to cross out a number.

1) The first players can choose a positive even number that is less than 50, and cross it out on the grid.
2) The second player must choose a number to cross out that is a factor or multiple of the first number.
3) Take turns to cross out numbers that are a factor or multiple of the number just crossed out.

Play the game a few times and see if you can find a way to win.

Now play again and challenge yourselves to find the longest chain possible.

Teacher Notes

Before you launch the task, write 24 on the board and ask the students to find all of the factors for 24. Model using a factor tree to record this.

To launch this task, explain and clarify what factors and multiples are.

Have multiplication charts available for students to use if needed, have multiple copies of the hundreds board available.

Introduce the game as a competitive game and ask students to play this a few times to see if they can notice ways to be the last player to cross a number out. Then transition the game to a collaborative game, where the two players work together to try and create the longest chain possible.

Strategies and rules that the students may notice include: avoid prime numbers, avoid using the numbers 1 to 10 until needed as they are common multiples and factors of any numbers between 1 to 100, bigger numbers have the most factors.

For the independent task, have multiplication charts available for students to use if needed, have multiple copies of the hundreds board available.

Shareback

Select students to share who have developed strategies and reasoning for the order of numbers to choose and have been able to use this to develop a long chain.

Big Ideas

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:
Recall multiplication facts for 7s, 8s, and 9s and corresponding division facts

During Year 6:
Recall multiplication facts to at least 10 × 10 and corresponding division facts.

Connect

What strategies and rules can you use to make the chain the longest?

Mathematical Language

Factors, multiples, prime numbers.

Suggested Learning Outcomes

Identify the factors of numbers to 100.

Identify the multiplies of numbers up to 100.

Independent Tasks

Play the factors and multiples game with a partner and try and find the longest chain. Remember the rules below:

1) The first players can choose a positive even number that is less than 50, and cross it out on the grid.
2) The second player must choose a number to cross out that is a factor or multiple of the first number.
3) Take turns to cross out numbers that are a factor or multiple of the number just crossed out.

Anticipations

Solutions, Misconceptions

Task 4

Year Five option
Mamia is helping her family pack t-shirts to sell at the market. 247 t-shirts will fit in each box without wrinkling any. They end up with 6 boxes. How many t-shirts have they got to sell at market?
Mamia is helping her family pack t-shirts to sell at the market. 435 t-shirts will fit in each box without wrinkling any. They end up with 9 boxes. How many t-shirts have they got to sell at market?

Year Six option
Mamia is helping her family pack t-shirts to sell at the market. 89 t-shirts will fit in each box without wrinkling any. They end up with 46 boxes. How many t-shirts have they got to sell at market?
Mamia is helping her family pack t-shirts to sell at the market. 286 t-shirts will fit in each box without wrinkling any. They end up with 15 boxes. How many t-shirts have they got to sell at market?

Teacher Notes

Before you launch the task, write numbers between 0 and 100 000 on the board. Remind students of the rules for rounding numbers to the nearest ten, hundred, thousand, and ten thousand. Ask students to identify the number and round the number to the nearest ten, hundred, thousand, and ten thousand. Repeat with different numbers. Complete this activity as a warm-up throughout the unit of work.

Notice student solution strategies either using distributive property or equivalence and compensation. Explicitly talk about the type of mathematical property they have used and use correct mathematical language.

Introduce students to representations using array/area model. Expect students to record their solutions using equations.

Shareback

Select student solution strategies which use the distributive property or equivalence and compensation.

Distributive property
$89 \times 26 = (80 \times 20) + (80 \times 6) + (9 \times 20) + (9 \times 6)$

Equivalence and compensation
$89 \times 26 = (90 \times 26) - (1 \times 26)$

Big Ideas

Our number system is based on groupings of ten or base ten. Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:
Recall multiplication facts for 7s, 8s, and 9s and corresponding division facts.

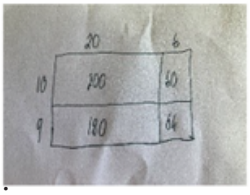
Multiply a three-digit by one-digit number and two two-digit whole numbers (e.g., 245 × 6, 34 × 83)

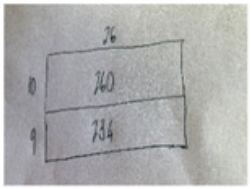
During Year 6:
Recall multiplication facts to at least 10 × 10 and corresponding division facts.

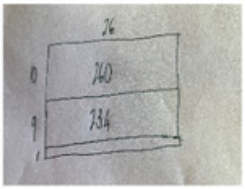
Multiply multi-digit whole numbers (e.g., 54 × 112).

Shareback continued

If either solution strategy has not been used, introduce this as a solution strategy that students have used previously. Record these as equations and model representing these using the area model (19 × 26 shown in example)







Connect

Ask students to describe how you would solve the following equation using either the distributive property or equivalence and compensation and represent it using the area model:

38 × 45 =

Model how this could be solved and recorded as a vertical algorithm.

Suggested Learning Outcomes

Explain and justify the use of the distributive property in multiplication.

Explain and justify the use of the associative property in multiplication.

Represent reasoning using different forms of notation including an area and an array model.

Independent Tasks

Year 5 option:
Solve the following equations:
346 × 5 =
663 × 6 =
489 × 8 =
Represent your solution strategy using equations and an area model.

Year 6 option
Solve the following equations:
346 × 54 =
663 × 69 =
489 × 81 =
Represent your solution strategy using equations and an area model.

Mathematical Language

Distributive property, area, associative property, factor, product.

Anticipations

Solutions, Misconceptions

Task 5

Year 5 option
A movie theatre has 24 seats in each row. There are 16 rows.
How many seats are in the movie theatre?
Show your solution using two different representations.

A movie theatre has 29 seats in each row. There are 31 rows.
How many seats are in the movie theatre?
Show your solution using two different representations.

Year 6 option
The shopping mall carpark has 288 parking spots on each floor. The carpark has 32 floors.
How many cars can fit in the carpark?
Show your solution using two different representations.

3467 × 495 =

Teacher Notes

Before you launch the task, ask students to find all of the common factors for 48 and record as a factor tree. Repeat this activity for different numbers between 1 to 125. Repeat this warm-up activity throughout this unit and for the rest of the year.

Expect students to record using equations and the area model.

Notice students' solution strategies using the distributive property or the associative property.

Explore what happens when using the associative property.

If students use the standard algorithm, links could be made between this and the distributive property.

Shareback

Select and sequence student solution strategies that use the distributive property or associative property.

Associative property
288 × 32 = (288 × 3 × 10) + (288 × 2)
29 × 31 = (29 × 3 × 10) + (29 × 1)

If either solution strategy has not been used, introduce this as a solution strategy that students have used previously.

Big Ideas

Our number system is based on groupings of ten or base ten. Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:
Recall multiplication facts for 7s, 8s, and 9s and corresponding division facts.

Multiply a three-digit by one-digit number and two two-digit whole numbers (e.g., 245 × 6, 34 × 83)

During Year 6:
Recall multiplication facts to at least 10 × 10 and corresponding division facts.

Multiply multi-digit whole numbers (e.g., 54 × 112).

Connect

Ask students to describe how the associative property would be used if multiplying by 50 or 80.

Ask students to describe how the equation below could be solved by using either the distributive and/or associative property:

348 × 151 =

Model links to standard written algorithm for multiplication.

Suggested Learning Outcomes

Explain and justify the use of the distributive property in multiplication.

Explain and justify the use of the associative property in multiplication.

Independent Tasks

Solve the following equations:
24 × 18 =
29 × 45 =
48 × 32 =

55 x 47 =
32 x 67 =
157 x 62 =

What patterns did you notice and use to help you solve the equations?

Would the patterns work for any numbers when multiplying?

Mathematical Language

Distributive property, inverse relationship, factor, product, quotient, divisor, dividend.

Anticipations

Solutions, Misconceptions

Task 6

Year 5 option
John sells t-shirts at the night market. At the end of the month, he banks $395 and that includes the float of change he started with. If he charges $7 per t-shirt, how many t-shirts has he sold and how much float did he start with?

What are three other exact amounts that John could have made including the float?

What rule or pattern could you use to find the amount John would make regardless of how many t-shirts he sold?

Year 5 option
John sells t-shirts at the night market. At the end of the month, he banks $3295 and that includes the float of change he started with. If he charges $7 per t-shirt, how many t-shirts has he sold and how much float did he start with?

What are three other exact amounts that John could have made including the float?

What rule or pattern could you use to find the amount John would make regardless of how many t-shirts he sold?

Teacher Notes

Select strategies that start at use of some form of multiplicative thinking.

If addition or subtraction used have students rework as multiplication or division.

Notice whether students draw on multiplying by ten when using the inverse relationship. Model use of x 10 then x 5 as an easy process.

Notice whether students have used partial quotients.

Note use of doubling and shift towards concept of multiplying by two as doubling.

Big Ideas

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Equations show relationships of equality between parts on either side of the equal sign. The properties of equality are: If the same real number is added or subtracted to both sides of an equation, equality is maintained; If both sides of an equation are multiplied or divided by the same real number (not dividing by 0), equality is maintained; Two quantities equal to the same third quantity are equal to each other.

Shareback

Select student solution strategies where they have used the inverse relationship of multiplication and division or the partial quotient/distributive property in the solution. If either solution strategy has not been used, introduce this as a solution strategy that students have used previously.
Inverse relationship
395 ÷ 7 =
7 × ? = 395

Distributive property/partial quotients
395 ÷ 7 = (140 ÷ 7) + (140 ÷ 7) + (70 ÷ 7) + (35 ÷ 7)

Connect

Ask students to describe how you would solve the following equation using either the inverse relationship or the partial quotient/distributive property:

567 ÷ 6 =

4892 ÷ 5 =

Suggested Learning Outcomes

Explain and justify the use of the partial quotients/distributive property in division.

Explain and represent the inverse relationship of multiplication and division.

Represent reasoning using different forms of notation.

Independent Tasks

Year 5 option
Solve the following equations:
646 ÷ 4 =
781 ÷ 9 =
965 ÷ 3 =

Year 6 option
Solve the following equations:
5646 ÷ 4 =
9781 ÷ 9 =
7965 ÷ 3 =

Curriculum Links

During Year 5:
Multiply a three-digit by one-digit number and two two-digit whole numbers (e.g., 245 × 6, 34 × 83)

Divide up to a three-digit whole number by a one-digit divisor, with a remainder (e.g., 83 ÷ 5 = 16, remainder 3)

During Year 6:
Multiply multi-digit whole numbers (e.g., 54 × 112).

Divide up to a four-digit whole number by a one-digit divisor, with a remainder (e.g., 198 ÷ 7, 4154 ÷ 8)

Mathematical Language

Distributive property, inverse relationship, factor, product, quotient, divisor, dividend.

Anticipations

Solutions, Misconceptions

Task 7

Our school is going to a park for an athletics day and using minivans for transport. Each minivan can take 8 passengers and there are 793 people to transport.

How many minivans do we need?

What numbers could you use with your solution strategy that would mean you had the same number of people in each minivan?

Year 6 option
The high school is going to a park for an athletics day and using minivans for transport. Each minivan can take 8 passengers and there are 4793 people to transport.

How many minivans do we need?

What numbers could you use with your solution strategy that would mean you had the same number of people in each minivan?

Teacher Notes

Notice students who are using addition or subtraction and support them to re-work as multiplicative thinking.

Notice students who use the inverse property or who are using partial quotients/distributive property in their calculations.

Shareback

Select student solution strategies where they have used the partial quotient/distributive property in the solution.

Connect

What numbers would you change these into when using partial quotient/distributive property to divide?
587 ÷ 4 =
783 ÷ 6 =
899 ÷ 7 =

Have children discuss possible number combinations without solving these. Model links to the relationship between the partial quotients/distributive property and the standard division algorithm.

Big Ideas

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship. Equations show relationships of equality between parts on either side of the equal sign.

The properties of equality are: If the same real number is added or subtracted to both sides of an equation, equality is maintained; If both sides of an equation are multiplied or divided by the same real number (not dividing by 0), equality is maintained; Two quantities equal to the same third quantity are equal to each other.

Suggested Learning Outcomes

Explain and justify the use of the partial quotients/distributive property in division.

Explain and represent the inverse relationship of multiplication and division.

Represent reasoning using different forms of notation.

Independent Tasks

Year 5 option
Solve the following equations:

486 ÷ 5 =

22 × 14 =

952 ÷ 6 =

38 × 21 =

898 ÷ 4 =

Year 6 option
Solve the following equations:

4386 ÷ 5 =

223 × 24 =

7952 ÷ 6 =

381 × 211 =

8982 ÷ 4 =

Curriculum Links

During Year 5:
Multiply a three-digit by one-digit number and two two-digit whole numbers (e.g., 245 × 6, 34 × 83)

Divide up to a three-digit whole number by a one-digit divisor, with a remainder (e.g., 83 ÷ 5 = 16, remainder 3)

During Year 6:
Multiply multi-digit whole numbers (e.g., 54 × 112).

Divide up to a four-digit whole number by a one-digit divisor, with a remainder (e.g., 198 ÷ 7, 4154 ÷ 8)

Mathematical Language

Distributive property, inverse relationship, factor, product, quotient, divisor, dividend.

Anticipations

Solutions, Misconceptions

Task 8

Solve these equations:

14 + 9 = _ + 8

_ + 17 = 26 + 15

93 – _ = 83 – 37

235 – 46 = _ – 48

375 + 28 – _ = 377

57 + 4 + 5 = 56 + _

Teacher Notes

Before you launch the task, ask the students to discuss these true and false number sentences and justify their thinking. Ensure that students understand what true and false means. Introduce notation of not equal (≠) for the number sentences that they think are false:

265 = 263	77 + 286 = 286 + 77
56 + 39 = 54 + 37	52 = 40 + 12
54 – 5 = 49 – 7	63 – 18 = 61 – 16

Use true and false and open number sentence tasks as a warm up throughout the year.

Students may initially treat the equals sign as an operator or indication to write the answer next.

Students also may compute each side to work out whether they are equal. Notice students who use the relationships across the equals sign to see whether there is balance.

Highlight to the students to look across the equals sign and find the relationships between numbers to the left and the numbers on the right. Notice students who use the relationships across the equals sign to see whether there is balance.

Press for use of arrows and notations to highlight the relationships.

Big Ideas

Equations show relationships of equality between parts on either side of the equal sign.

The properties of equality are: If the same real number is added or subtracted to both sides of an equation, equality is maintained; If both sides of an equation are multiplied or divided by the same real number (not dividing by 0), equality is maintained; Two quantities equal to the same third quantity are equal to each other.

Curriculum Links

During Year 5:
Add and subtract whole numbers up to 10,000.

Form and solve true or false number sentences and open number sentences involving all four operations (e.g., 674 + 56 – _ = 671).

During Year 6:
Add and subtract any whole numbers.

Form and solve true or false number sentences and open number sentences involving all four operations, using an understanding of equality or inequality (e.g.,8 × 7 < 8 × 5 + 8 (T or F?)

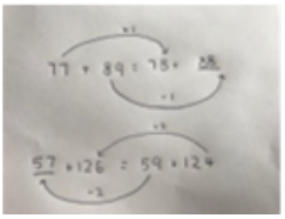
Shareback

Allow students to share misconceptions related to the equal sign (e.g., 14 + 9 = 23 + 8) to position them to engage in argumentation.

Select student solution strategies that use relational reasoning.

14 + 9 = 15 + 8 because 8 is one less than 9 so it has to be one more than 14.

If no students use a relational strategy, model this to them using arrows and explanations.



Connect

Ask students to solve the following problems using a relational solution:

198 + 174 = _ + 184

372 – _ = 72 – 58

Support students to notice the variation in directionality between addition equivalence problems (+1, -1) and subtraction equivalence problems (-300, -300).

Suggested Learning Outcomes

Explain and justify relationships between numbers in an equation.
Write statements of equivalence in words and using notation.
Solve equivalence problems and explain and justify the solutions.

Independent Tasks

Solve these equations:

27 + 16 = 29 + _

51 – _ = 61 – 37

_ + 137 = 274 + 139

145 – 69 = _ – 68

363 + 78 – _ = 365

85 + 7 + 2 = 85 + _

Mathematical Language

Equivalent, equal sign.

Anticipations

Solutions, Misconceptions

Task 9

Work together to decide which equations are true or false.
Make sure that everyone in your group agrees and can explain.

536 + 618 = 436 + 718

8 + 8 + 376 = 376 + 16

77 − 49 = 75 − 47

9 + 9 + (5 × 9) = (2 × 9) + (5 × 9)

16 × 8 = (16 × 10) − 16

9 + 10 + 11 + 12 = 13 + 14 + 15

Teacher Notes

Remind students of the notation of not equal (≠) for the number sentences that they think are false.

Students may initially treat the equals sign as an operator or indication to write the answer next. These misconceptions can be used to position students to engage in mathematical argumentation.

Students also may compute each side to work out whether they are equal. However, work with them to facilitate them to notice that you can use the relationships across the equals sign to see whether there is balance. Highlight the students' relational responses (e.g., noticing the + 2, − 2 relationships).

Press for use of arrows and notations to highlight the relationships.

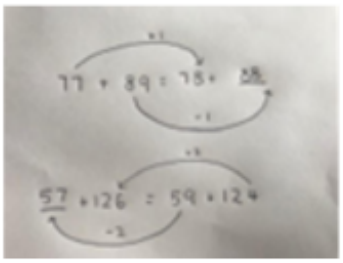
For the independent task, have cards or strips of paper ready for students to write on and create a space called the true and false number sentence wall.

Shareback

Select student solution strategies that use relational reasoning.

77 − 49 = 75 − 47 is true because 75 is two less than 77 and 47 is two less than 49.

If students do not use a relational strategy, model this to them using arrows and explanations.



Big Ideas

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Equations show relationships of equality between parts on either side of the equal sign. The properties of equality are: If the same real number is added or subtracted to both sides of an equation, equality is maintained; If both sides of an equation are multiplied or divided by the same real number (not dividing by 0), equality is maintained; Two quantities equal to the same third quantity are equal to each other.

Patterns and relationships can be used, represented, and generalised in a variety of ways.

Connect

Is the number that goes in the _, the same number in both of these equations?

2 × _ + 15 = 31

2 × _ + 15 − 9 = 31 − 9

Explain why or why not.

Suggested Learning Outcomes

Explain and justify relationships between numbers in an equation.
Write statements of equivalence in words and using notation.
Solve equivalence problems and explain and justify the solutions.

Independent Tasks

Explain and justify which number sentences are true and false:

55 = 49 + 5 + 2

29 + 34 = 27 + 32

314 − 148 = 214 − 48

32 − 15 = 34 − 13

42 − 13 = 29 − 9

15 + 6 + 77 = 4 + 17 + 67

Write your own true and false number sentences.

Curriculum Links

During Year 5:
Form and solve true or false number sentences and open number sentences involving all four operations (e.g., 674 + 56 – _ = 671).

During Year 6:
Form and solve true or false number sentences and open number sentences involving all four operations, using an understanding of equality or inequality (e.g.,8 × 7 < 8 × 5 + 8 (T or F?)

Mathematical Language

Equivalent, equal sign.

Anticipations

Solutions / Misconceptions

Task 10

Lotu solves 98 × 56 = 5488
Her teacher then asks her to solve the following equations:

56 × 98 =

5488 ÷ 56 =

5488 ÷ 98 =

Lotu looks at the equations and says that she already knows the answers without solving each of them.

What patterns do you think that Lotu noticed?

Do these patterns always work?

Does these patterns work with different operations?

Write your own sets of equations that use the same patterns.

Teacher Notes

Students may focus on finding the answers for each number sentence. Position them instead to recognise the inverse relationship between multiplication and division instead of calculating the answers.

For the independent activity, have appropriate equipment for students to build concrete models to prove their conjectures (e.g., counters, grid paper, peg boards).

Shareback

Select students who have used the inverse relationship between multiplication and division and can explain this relationship to work out the number sentences. Support students to explain how this relationship applies to multiplication and division with any numbers or addition and subtraction.

Big Ideas

There are arithmetic properties that characterise addition and multiplication as operations. These are the commutative, associative, distributive, and identity properties. Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

Use the order of operations rule with grouping, addition, subtraction, multiplication, and division.

Connect

Can you write a range of number sentences that would match the following number sentences using if and then:

If 1260 ÷ 28 = 45 then ...

If g × h = p then ...

Mathematical Language

Inverse relationship, commutative, equivalence, conjecture, generalisation.

Suggested Learning Outcomes

Explain and justify the distributive property of multiplication.

Use different representations to justify.

Independent Tasks

John said "When you are multiplying two numbers together it doesn't matter which order you multiply them in, the product will be the same".

Do you agree or disagree with John's conjecture.

Does this work for all numbers?

Does it work for addition, subtraction, and division?

Use the material to build a model to prove John's conjecture.

Anticipations

Solutions / Misconceptions

Task 11

Ticket prices for bus travel are presented in the table.

Ticket Options	Adult	Concession	Description
Single (paper ticket)	$3	$1.20	Unlimited bus travel for 3 hours from first use
Daily (paper ticket)	$7	$1.70	Unlimited bus travel until the last bus of the day.
Flexi trip (tap and ride)	$20	$7.50	10 single 3-hour trips are pre-loaded to the car.
Weekly (tap and ride)	$20	$7.50	Unlimited bus travel for 7 days from first use.

Isaiah will be catching the bus to Intermediate School next year. He will need to buy paper bus tickets or a 'Tap and Ride' card. As a student, he can get a concession far.

If Isaiah catches the bus to and from school every day, what is the best option? Explain your thinking.

Teacher Notes

Before you launch the task, have play money available and ask students to use the money to make a set amount using different notes and coins.

For the task, have available play money for the students to use to model the different options for payment.

Notice whether students can read the pricing table and make sense of this, support them if they have difficulty.

Expect the students to be systematic in working out the costs for each option and recording this either using equations or a table of data.

For the independent task, have play money available.

Shareback

Select student solution strategies where they have systematically worked out the costs for different options and use this to justify their reasoning.

Big Ideas

Our number system is based on groupings of ten or base ten. Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:

Represent money values in multiple ways using notes and coins

Estimate to the nearest dollar and calculate the total cost of items costing dollars and cents, and the change from the nearest ten dollars.

During Year 6:

Solve problems involving purchases (e.g., ensuring they have enough money)

Create simple financial plans (e.g., shopping lists, a family budget)

Connect

If Isaiah gets a ride home on some days of the week, at what point would it be better to change the ticket option that you selected?

Suggested Learning Outcomes

Investigate authentic financial situations and represent their findings using a table or equations.

Use play money to represent an amount.

Calculate different costs.

Independent Tasks

You have $25 to buy lunch from the school canteen for yourself and your friend.

What are some different ways to order lunch (food and drink) from the school canteen?

How much change would you have?

Food	
Sandwiches	$5.50
Pizza Slice	$6
Mac'n'cheese	$3.70
Pie	$6.50
Sushi	$8.90
Cookie	$2.80
Slice	$3
Museli Bar	$2.50
Chips	$2
Drinks	
Fruit Juice	$3.50
Milk	$2
Smoothie	$7.50

Mathematical Language

Dollars, cents, best value, change.

Anticipations

Solutions / Misconceptions

Task 12

Sam is ordering fish and chips for a family get-together. There will be 6 people – Sam, his wife, his 2 children, and his parents.

Sam's family usually order 2 hoki, 2 potato fritters, small chips, and 2 kids' packs.

Sam's parents share their order of 2 hoki, 2 potato fritters, and small chips.

a. Give two options how Sam might place the order? Explain which option offers the best value for money.

b. Should Sam suggest sharing the total cost of the bill? If so, how might the bill be shared?

Fish	
Hoki	$5.00
Terahiki	$6.00
Snapper	$7.00

Snacks	
Chicken Nuggets	$0.80 each
Dim sims	$1.00 each
Potato fritters	$0.80 each
Chips	$3.00 small $5.00 medium $7.50 large

Family Deal 1	
4 hoki 4 potato fritters Large Chips	$22.50

Family Deal 2	
6 hoki 6 potato fritters Large chips	$30.00

Kids Pack	
6 chicken nuggets small chips	$6.00

Big Ideas

Our number system is based on groupings of ten or base ten. Groupings of ones, tens, hundreds, and thousands can be taken apart in different ways.

Addition and subtraction and multiplication and division have an inverse relationship.

Curriculum Links

During Year 5:

Represent money values in multiple ways using notes and coins

Estimate to the nearest dollar and calculate the total cost of items costing dollars and cents, and the change from the nearest ten dollars.

During Year 6:

Solve problems involving purchases (e.g., ensuring they have enough money)

Create simple financial plans (e.g., shopping lists, a family budget)

Teacher Notes

Before you launch the task, have play money available and ask students to use the money to make a set amount using different notes and coins.

For the task, have available play money for the students to use to model the different options for payment.

Notice whether students can read the pricing table and make sense of this, support them if they have difficulty.

Expect the students to be systematic in working out the costs for each option and recording this either using equations or a table of data.

Shareback

Select student solution strategies where they have systematically worked out the costs for different options and use this to justify their reasoning.

Connect

If your family was ordering the meal, would you split the costs and how would you split them?

Support students to connect to their values and discuss how mathematical solutions and "real world" solutions related to money might be different.

Suggested Learning Outcomes

Investigate authentic financial situations and represent their findings using a table or equations.

Use play money to represent an amount.

Calculate different costs.

Create a simple financial plan for ordering a meal.

Independent Tasks

Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity:

Task 1: Addition and subtraction problems to solve.

Task 2: Addition and subtraction problems to solve.

Task 3: Multiplication and division problems to solve.

Task 4: Multiplication and division problems to solve.

Task 5: Properties of numbers and operations.

Task 6: Properties of numbers and operations.

Mathematical Language

Dollars, cents, best value, change

Anticipations

Solutions, Misconceptions

Assessment Task 1 - Number and Algebra - Year 5-6

Sose has 97 Pokemon cards in her collection. She wins another 48 Pokemon cards. How many Pokemon cards does Sose have altogether? Prove and justify your answer.

Brandon is playing a video game. He scores 522 points. His sister Louisa scores 385 points. How many more points did Brandon score? Prove and justify your answer.

At the athletics competition, Alexi jumped 3.35 metres for the long-jump. Sima jumped 2.8 metres. Who jumped further and by how much? Solve the problem and justify your answer.

Write one or more word problems for a friend involving addition or subtraction. Show how you would solve it.

Assessment Task 2 - Number and Algebra - Year 5-6

Litea collected 87 flowers to make leis. She already had 46 flowers. How many flowers does Litea have now? Prove and justify your answer.

Fetu's rugby team scored 334 points for the season. They scored 96 points more than the next closest team. What did the other team score for the season? Prove and justify your answer.

To get fit for indoor netball, Hemi ran 4.35km a day, while Maraea ran 3.82 km a day. Who ran further and by how much? Solve the problem and justify your answer.

Write one or more word problems for a friend involving addition or subtraction. Show how you would solve it.

Assessment Task 3 - Number and Algebra - Year 5-6

The school is going on a trip and has ordered 17 buses. Each bus can take 28 children. How many children can go on the trip?

The library is moving. They have 484 books and can fit 22 books into each box. How many boxes will be needed for the books?

Write your own multiplication or division problems. Show how you would solve them.

Assessment Task 4 - Number and Algebra - Year 5-6

Lola's family is setting up the hall for a family party. They have already set up 24 tables but need to put 18 chairs around each table. How many chairs will they need altogether?

The school is preparing for a school trip and booking buses. There are 426 people at the school. Each bus can take 24 people. How many buses are needed?

Write your own multiplication or division problems. Show how you would solve them.

Assessment Task 5 - Number and Algebra - Year 5-6

27 x 12. 567 + 39 72 ÷ 6 (27 x 6) + (27 x 6)

36 ÷ 3 12 x 27 95 – 27

85 – 17 567 + 39 + 1 = ☐ - 1 27 x 2 x 6

Look at the number sentences above
Describe what patterns you can find

- Why do your patterns work?
- Do they work with other numbers?
- Will they always work? Explain and justify your thinking

Assessment Task 6 - Number and Algebra - Year 5-6

26 x 14 479 + 58 84 ÷ 8 (26 x 10) + (26 x 4)

42 ÷ 4 14 x 26 73 – 28

83 – 38 479 + 58 – 5 = □ – 5 26 x 7 x 2

Look at the number sentences above

- Describe what patterns you can find
- Why do your patterns work?
- Do they work with other numbers?
- Will they always work? Explain and justify your thinking