HANGAIA TE URUPOUNAMU MŌ TĀTOU

Taumata 4 (Tau 7-8)
Tau me te Taurangi

Teacher Booklet
ODD YEARS

Rapanga 1	I tetahi pāmu rōpere,78 ngā rōpere ki ia rārangi. 212 ngā rārangi. E hia ngā rōpere katoa? Whakaatuhia au rautaki e rua. I tetahi pāmu rōpere,143 ngā rōpere ki ia rārangi. 389 ngā rārangi. E hia ngā rōpere katoa? Whakaatuhia au rautaki e rua.
Whakaaro Matua Pāngarau ***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. 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.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-6:** Know the relative size and place value structure of positive and negative integers and decimals to three places. **NA4-8:** Generalise properties of multiplication and division with whole numbers.
Whāinga Ako ***Learning Outcomes***	Explain and justify the use of the distributive property in multiplication. Explain and justify the use of the associative property in multiplication. Explain and justify the use of equivalence and compensation in multiplication. Represent reasoning using different forms of notation including equations and an area model.
Reo Matatini Pāngarau ***Mathematical Language***	Distributive property, associative property, area, equivalence, compensation, factor, product

Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that have used the distributive property, associative property or equivalence and compensation. Use the correct mathematical language to describe these. *Distributive property* *78 × 212 = (70 × 200) + (70 × 10) + (70 × 2) + (8 × 200) + (8 × 10) + (8 × 2)* *Associative property* *78 × 212 = (212 × 10 × 7) + (212 × 8)* *Equivalence and compensation* *78 × 212 = (80 × 212) – (2 × 212)* Ask students to record these as equations and model representing these using the area model. If no student solves the task using the distributive property or equivalence and compensation, then introduce either solution strategy as an alternative model previously used by other students. **Connect**: Ask students to describe how the following equation could be solved using the distributive property and equivalence and compensation: 164 × 56 =
Kōrero Tautoko ***Teacher Notes***	Prior to launching the task, ask students to calculate the following problems: 18 × 10 = 100 × 25 = 40 × 4000 = Ask the students to discuss what they notice. Be aware of students who rely on ‘just add a 0’ when dealing with base 10 multiplication. Explore what is happening to the numbers (getting bigger by base (10)) rather than rely on a misconception/rule. • Expect students to use equations and an area model to record solution strategies. • If students are using standard algorithm, check for procedural knowledge with understanding. The standard algorithm can be connected with the distributive property.

Ngohe whakaharatau ***Independent Tasks***	Solve the following equations: 194 × 55 = 176 × 42 = 131 x 329 = 215 x 197 = Explain what patterns you used to help solve the equations. Would the patterns always work?
Ngā matapae ***Anticipations***	

Rapanga 2	$3818 te putea kua kohia e tētahi whanau mo tētahi haerenga hākinakina. 53 ngā tīma. E hia te pūtea mo ia tīma? He aha ngā tau neke atu i te 1000 e āhei ana ki te tīmata i tau rautaki?
Whakaaro Matua Pāngarau ***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.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-6:** Know the relative size and place value structure of positive and negative integers and decimals to three places. **NA4-8:** Generalise properties of multiplication and division with whole numbers.
Whāinga Ako ***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
Reo Matatini Pāngarau ***Mathematical Language***	Distributive property, inverse relationship, equivalence, factor, product, quotient, divisor, dividend.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies where they have used the inverse relationship of multiplication and division or the partial quotient/distributive property (or a mixture of both) in the solution. If either solution strategy has not been used, introduce this as a solution strategy that students have used previously. *Inverse relationship* *3818 ÷ 53 = ?*

	53 x ? = 3818 *53 x 10 = 530 ....* *Partial quotient/Distributive property* *3818 ÷ 53 = (1060 ÷ 53) + (1060 ÷ 53) + (1060 ÷ 53) + (530 ÷ 56) + (108 ÷ 53)* **Connect:** Ask students to describe how you would solve the following equation using the inverse relationship and the partial quotient/distributive property: 6626 ÷ 28 =
Kōrero Tautoko ***Teacher Notes***	Prior to launching the task, ask students to calculate the following problems: 98 ÷ 33 = 998 ÷ 331 = 700 ÷ 175 = 1÷1= Ask students to discuss what they notice. • Notice students who are using addition or subtraction and support them to re-work as multiplicative thinking. • Notice students who use doubling and support them to recognise this as multiplying by two. Press students to use larger factors such as 5 or 10.
Ngohe whakaharatau ***Independent Tasks***	Have a go at solving the following tasks involving exponents. $2^4 = 2 \times 2 \times 2 \times 2 = 16$ $4^5 =$ $8^4 =$ $5^6 =$ $7^{3.} =$ $6^8 =$ Check your answer with a calculator. What patterns do you notice?

Ngā matapae ***Anticipations***	

Rapanga 3	304 ngā pēke pehikete ki ia pouaka i tētahi Ki ia 15 miniti ka toha tētahi mīhini 6808 ngā pēke pehikete. E hia ngā pouaka ki ia 15 miniti, ā, e hia ngā pēke pehikete e toe ana? He aha te nama ka whakamahia rautaki kia kore ai he toenga pēke pehikete?
Whakaaro Matua Pāngarau ***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.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-6:** Know the relative size and place value structure of positive and negative integers and decimals to three places. **NA4-8:** Generalise properties of multiplication and division with whole numbers.
Whāinga Ako ***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.
Reo Matatini Pāngarau ***Mathematical Language***	Distributive property, inverse relationship, equivalence, factor, product, quotient, divisor, dividend.

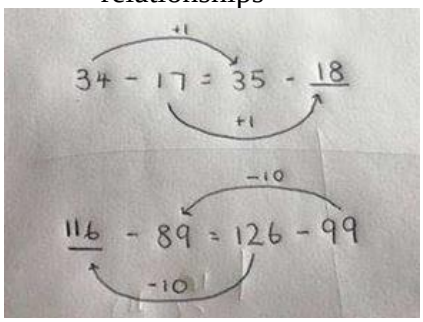
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies where they have used the partial quotient/distributive property in the solution. **Connect:** Ask students to describe how you would solve the following equation using partial quotients/distributive property: 6206 ÷ 304 = Use modelling to show connections between the use of the partial quotients/distributive property and the standard division algorithm
Kōrero Tautoko ***Teacher Notes***	• Prior to launching the task, ask students to calculate the following problems: 95 ÷ 42 = 995 ÷ 442 = $\frac{1}{2} \div \frac{1}{8} =$ Ask students to discuss what they notice. • 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.
Ngohe whakaharatau ***Independent Tasks***	Solve the following equations: 678 ÷ 25 = 8575 ÷ 405 = 6344 ÷ 28 = 9333 ÷ 322 = $\frac{1}{3} \div \frac{1}{6} =$ $\frac{1}{4} \div \frac{1}{8} =$
Ngā matapae ***Anticipations***	

Rapanga 4 (Whole Class Option)	Ko ngā tau pukahu ko ngā tau/ nama e whanauhia i ngā tauwehe anake. He mahi ā rōpū: He tau pukahu te nama 10? Pehea te nama 48? Kimihia ngā nama katoa i 1-100 he tau pukahu. He aha nga tauira e puta mai ana? Whakarite ētahi rautaki kia taunakihia au rautaki.
Whakaaro Matua Pāngarau ***Big Ideas***	Relationships can be described and generalisations made for mathematical situations that have numbers or objects that repeat in predictable ways.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-8:** Generalise properties of multiplication and division with whole numbers. **NA5-2:** Use prime numbers, common factors and multiples, and powers (including square roots).
Whāinga Ako ***Learning Outcomes***	Identify that factors are the numbers that multiply to make a product with no remainder. Calculate factors for different numbers. Explain and justify patterns and relationships in factors and abundant numbers.
Reo Matatini Pāngarau ***Mathematical Language***	Factor, multiple, abundant numbers, product, digit, conjecture.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select and sequence student solutions which identify patterns and ask students to explain and justify these. *All abundant numbers are even.* *Abundant numbers have six factors or fewer.* Ask students to investigate the conjectures about abundant numbers and prove or disprove these.

	Connect: Use a 100s board and colour in all the abundant numbers. Ask students to make conjectures about further patterns they notice. Can a prime number be an abundant number?
Kōrero Tautoko ***Teacher Notes***	● Prior to launching the task, explain to the students that factors are the numbers that multiply to make a product with no remainder. For example, the factors of 10 are 1, 10, 5, 2. Ask students to work with a partner and list all of the factors for the following numbers: 36 12 49 81 25 ● Provide students with a 100 square to support their exploration. ● Facilitate students to identify the patterns that they notice and describe and test these. ● Abundant numbers are numbers which are less than the sum of its factors (without itself). Deficient numbers are numbers that are more than the number of its factors (without itself). Perfect numbers are numbers that equal the sum of their factors (without itself). ● For the independent task, provide students with a 100 square to record the patterns.
Ngohe whakaharatau ***Independent Tasks***	People throughout history have always looked for patterns in numbers. Mathematicians noticed that some numbers are equal to the sum of all of their factors (but not including the number itself). These are called **perfect** numbers. Another pattern is prime numbers which can only be divided by itself and by 1 without remainders. On the 100 square use different colours to mark the following: perfect numbers; prime numbers; abundant numbers. What patterns do you notice?

Ngā matapae ***Anticipations***	

Rapanga 5 (Whole Class Option)	He mahi a rōpū: Wānangahia ēnei whārite mēnā ka tika, ka hē rānei ēnei whārite Me maumahara ki te whakarite tētahi whakamārama. 547 + 368 = 549 + 366 487 + 8 + 7 = 487 + 16 63 - 47 = 61 - 45 387 = 385 7 x 9 = (5 x 9) + 9 8 x 6 = (10 x 6) - 6 - 6 20 + 21 + 22 + 23 + 24 = 25 + 26 + 27 + 28
Whakaaro Matua Pāngarau ***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.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-8:** Generalise properties of multiplication and division with whole numbers. **NA4-7:** Form and solve simple linear equations.
Whāinga Ako ***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.
Reo Matatini Pāngarau ***Mathematical Language***	Equivalent, equal sign.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that use relational reasoning. *63 – 47 = 61 – 45 is true because 63 is two more than 61 and 47 is two more than 45.* **Connect:** Can you work out whether the following are true or false without calculating each side? 472 – 287 = 462 – 277 586 + 467 = 686 + 367

Kōrero Tautoko ***Teacher Notes***	• Ensure that students understand what true and false means. Introduce 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. • Notice students who 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/notations to highlight the relationships 
Ngohe whakaharatau ***Independent Tasks***	Work out which number sentences are true or false and explain your reasoning. 566 + 388 = 564 + 386 73 – 38 = 71 – 36 288 + 16 = 288 + 8 + 9 53 – 27 = 63 – 17 385 = 385 6 × 12 = (6 × 10) + 6 + 6 9 × 7 = (10 × 7) – 7 – 7 8 + 9 + 10 = 11 + 12 + 13 + 14
Ngā matapae ***Anticipations***	

Rapanga 6	I tetahi pāmu rōpere,78 ngā rōpere ki ia He mahi a rōpū: Wānangahia ēnei whārite mēnā ka tika, ka hē rānei ēnei whārite Me maumahara ki te whakarite tētahi whakamārama. 167 + 48 = 169 + __ 153 – 86 = __ – 76 545 + 78 – __= 543 __ × 14 = 32 × 7 72 ÷ 12 = (48 ÷ 12) + (__ ÷ 12)
Whakaaro Matua Pāngarau ***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.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-8:** Generalise properties of multiplication and division with whole numbers. **NA4-7:** Form and solve simple linear equations.
Whāinga Ako ***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.
Reo Matatini Pāngarau ***Mathematical Language***	Equivalent, equal sign.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that use relational reasoning. **Connect:** Is the number that goes in the _, the same number in both of these equations? 4 × __ + 12 = 24 4 × __ + 12 – 6 = 24 – 6 Explain why or why not. Can you make a conjecture about this relationship?

Kōrero Tautoko ***Teacher Notes***	· 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. · Highlight the students relational responses (e.g., noticing the + 2 – 2 relationships). · Press for use of arrows and notations to highlight the relationships.
Ngohe whakaharatau ***Independent Tasks***	Find the missing numbers: 58 + 37 = ___ + 39 ___ + 436 = 579 + 426 512 – 269 = 412 – __ __ – 346 = 621 – 348 15 × 38 = 38 × 5 × __ 378 ÷ 18 = 378 ÷ __ ÷ 3 ÷ 3
Ngā matapae ***Anticipations***	

Rapanga 7	He aha ngā momo uara o *wh* + *w*h = 14? He aha ngā momo uara o *ng* + *a* = 12? Wānangahia ēnei whārite ki au rōpū. Me mātua mōhio te rōpū katoa ki ngā whakamārama. $y - 12 = 8$ $15 - c + 4 - c = 9$ $y \times 4 + y - y + 3 = 27$ $8g + 7 = 39$ $12b - 23 = 49$
Whakaaro Matua Pāngarau ***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. A solution to an equation is a value of the unknown or unknowns that makes the equation true. Properties of equality and the inverse property can be used to generate equivalent equations and find solutions.
Hononga Marautanga ***Curriculum Links***	**NA4-7:** Form and solve simple linear equations.
Whāinga Ako ***Learning Outcomes***	Explain and justify how when the value of one variable is known the value of the other variable can be found by solving the equation. Use inverse relationships and understanding of properties of equality to solve equations.
Reo Matatini Pāngarau ***Mathematical Language***	Unknown, variable, inverse relationships, equivalence, equation, values.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that use inverse relationships and the properties of equality. **Connect:** The solution to $5k + 23 = 68$ is n = 9 What is the solution to $5k + 23 + 14 = 68 + 14$? What conjecture can you make from this?

	Conjecture could be represented as: If $a + b = c$ then $a + b – d = c – d$ or If $a + b = c$ then $a + b + d = c + d$
Kōrero Tautoko ***Teacher Notes***	Before you launch the problem, ask the students to work with a partner and write an expression to match these situations: a) I have some stickers and I give seven away. b) I have some stickers and I get four more. c) I have some stickers and I get three more and then I get four more. d) I have some stickers and I get six more and then I triple the total amount of stickers I have. Introduce each one and share student solutions that use a variable to model the equation. If all students put numbers, then problematise this by asking, do we know how many? If we don't know, we can use a letter to represent any number. Introduce to students that $2n = 2 \times n$ as notation. · Launch the first part of the problem and then bring the students back to share ideas. Highlight that *b* will be the same number so only one solution. Address potential misconception that *y* and *g* cannot both equal 6. Highlight that $y + g$ has multiple solutions including $y = 6$ $g = 6$ · Values of variables: Variables can have any values - a letter is assigned to this value. The same variable has the same value in an equation. Different variables can have the same value. Discuss and explore with the students that equations remain balanced as long as you use the properties of equality. An operation conducted on one side of the equal sign must be applied on the other. Apply the inverse of an operation to cancel it out or remove it. The goal in solving linear equations is to isolate the unknown variable by applying the inverse to remove other known variables.
Ngohe whakaharatau ***Independent Tasks***	Solve the following equations: $7a = 49$ $y – 14 = 8$ $19 = p – 4$ $32 \div m = 8$ $5f + 6 = 31$ $11r – 18 = 48$ $3q + 7 = 25$ $9d – 5 = 76$

Ngā matapae ***Anticipations***	

Rapanga 8	Wānangahia ēnei whārite ki au rōpū. Me mātua mōhio te rōpū katoa ki ngā whakamārama. $8m = 3m + 25$ $4 \times h + 7 \times h = 40 + 26$ $24 = 4 - 16v + v$ $6n + 5 = 29 - n + 3n$ $4j - 6 = 2j + 4$ Whakaatuhia au rautaki e rua.
Whakaaro Matua Pāngarau ***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. A solution to an equation is a value of the unknown or unknowns that makes the equation true. Properties of equality and the inverse property can be used to generate equivalent equations and find solutions.
Hononga Marautanga ***Curriculum Links***	**NA4-7:** Form and solve simple linear equations.
Whāinga Ako ***Learning Outcomes***	Explain and justify how when the value of one variable is known the value of the other variable can be found by solving the equation. Use inverse relationships and understanding of properties of equality to solve equations.
Reo Matatini Pāngarau ***Mathematical Language***	Unknown, variable, inverse relationships, equivalence, equation, values.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that use inverse relationships and the properties of equality to isolate and solve for the unknown. **Connect:** Ask students to describe the steps that you could take to solve the following: $12f - 13 = 9f + 5$

Kōrero Tautoko ***Teacher Notes***	· Before you launch the task, revisit the conjectures made in the previous lesson that established that equations remain balanced as long as you do the same thing to both sides. Ask the students: Malia said "$t + 3$ is always less than $5 + t$" Is this always, sometimes, or never true? · Discuss and explore with the students that equations will remain balanced as long as you use the properties of equality. An operation conducted on one side of the equal sign must be applied on the other. Apply the inverse of an operation to cancel it out or remove it. The goal in solving linear equations is to isolate the unknown variable by applying the inverse to remove other known variables.
Ngohe whakaharatau ***Independent Tasks***	Solve the following equations: $13 + r = 30$ $k - 8 = 14$ $7d = 42$ $6b + 5 = 23$ $4k - 3 = 17$ $42 + 5t = 8t$ $7d + 4 = 2d + 29$ $7k - 13 = 2y + 12$
Ngā matapae ***Anticipations***	

Rapanga 9	He mahi ā rōpū Ānei ētahi whārite. Mā tāu rōpū e wanangahia tētahi pūrākau/ pakitau e hono ai ki ēnei whārite.
Whakaaro Matua Pāngarau ***Big Ideas***	Mathematical situations can be represented as equations which include both positive and negative integers. A real quantity having a value less than zero is negative. Positive and negative numbers are opposites.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-2:** Understand addition and subtraction of fractions, decimals and integers
Whāinga Ako ***Learning Outcomes***	Represent in a mathematical story a situation in a problem which has both negative and positive numbers. Explain and justify how integers are an extension of whole numbers and include both positive and negative whole numbers
Reo Matatini Pāngarau ***Mathematical Language***	Integers, negative number, positive number.
Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solutions that can be compared for key similarities and differences. **Connect:** Ask students to compare the stories and notice similarities and differences.
Kōrero Tautoko ***Teacher Notes***	Before you launch the task, ask students to brainstorm everything that they know about negative numbers and record their ideas. Integers are an extension of whole numbers which include positive and negative whole numbers that are opposites (...-2, -1, 0, 1, 2,...). Possible story contexts: height above sea level, scoring in sports/games e.g. golf, Bridge, positive/negative spaces e.g. digging holes, lifts which go below ground, temperatures below zero.

Ngohe whakaharatau ***Independent Tasks***	Look at the equations and develop one or more stories that match each equation. -3 + -1 = - 15 – __ = 11 __ + 24 = 0 -15 – 18 =
Ngā matapae ***Anticipations***	

Rapanga 10	Ānei ētahi whārite. -7 + 2 = -19 – -11 = -4 – -9 = -12 + 8 = 6 – 15 = -12 + -4 = Whakaatuhia au whakautu ki tētahi rarangi tau.
Whakaaro Matua Pāngarau ***Big Ideas***	Mathematical situations can be represented as equations which include both positive and negative integers. A real quantity having a value less than zero is negative. Positive and negative numbers are opposites.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-2:** Understand addition and subtraction of fractions, decimals and integers. **NA4-6:** Know the relative size and place value structure of positive and negative integers and decimals to three places.
Whāinga Ako ***Learning Outcomes***	Solve simple addition and subtraction equations using integers. Use a number line to represent the relationship between positive and negative integers in equations. Explain and justify the role of zero as neither positive nor negative. Explain and justify the use of - as an operation symbol (subtraction) and direction symbol (direction/size of movement) for negative numbers.
Reo Matatini Pāngarau ***Mathematical Language***	Integers, negative number, positive number.

Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that will support a discussion of the relationship between addition and subtraction when working with integers. **Connect:** What patterns did you notice when you were adding and subtracting positive and negative numbers?
Kōrero Tautoko ***Teacher Notes***	Before you launch the task, ask students to share when they see negative numbers in life? [Lifts, mortgages, temperature] Model an empty number line on the board and ask students to discuss where the numbers would go if you were counting from negative 5 to positive 5. Use the number line to represent the location/relationship of negative/positive numbers to each other. Highlight that two integers that are the same distance from the origin in opposite directions are called opposites and when added cancel each other making 0. Highlight difference between the use of - as an operation symbol (subtraction) and direction symbol (direction/size of movement) for negative numbers. Consider using physical materials to represent positive and negative numbers e.g. black counters (positive) and red counters (negative).
Ngohe whakaharatau ***Independent Tasks***	Solve these equations (use an empty line if it helps): 17 + -9 = - 16 – -24 = -36 + -16 = 21 – -43 = -265 – 78 = -273 + -168 = -144 – -223 =

Ngā matapae ***Anticipations***	

Rapanga 11 (Whole class option) (Optional task)	Kei te whakautu a Tiare i tētahi whārite 352 ÷ 16 = Ka pēnei tana rautaki: 352 ÷ 16 = (160 ÷ 16) + (160 ÷ 16) + (32 ÷ 16) Ka whakaae koe ki te rautaki a Tiare? Whakarite tētahi whakamārama mēnā ka whakaae, kare I te whakaae rānei. Ka taea e kouotu te whakarite ētahi atu tauira? Ka tika tēnei rautaki ki te whakarea?
Whakaaro Matua Pāngarau ***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
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-8**: Generalise properties of multiplication and division with whole numbers. **NA4-7**: Form and solve simple linear equations. **NA5-2**: Use prime numbers, common factors and multiples, and powers (including square roots).
Whāinga Ako ***Learning Outcomes***	Explain and justify how you can solve division problems by splitting the divisor into factors. Represent that the equals sign as a statement of balance and show which operations to both sides of an equation preserve that balance.
Reo Matatini Pāngarau ***Mathematical Language***	Factors, divisor, dividend, associative property.

Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select students who use the relationship and properties rather than calculating. Highlight to the students that you do not need to calculate but can use the relationship to solve different equations. **Connect:** Taine thought that Tiare should have solved the problem like this: 352 ÷ 16 = 352 ÷ 2 ÷ 4 ÷ 2 Do you agree with Taine? Which way works and why? How would Taine solve the following problem 528 ÷ 24?
Kōrero Tautoko ***Teacher Notes***	• Facilitate students to focus on the solution strategy and generalisation rather than calculating the solution. • Notice and highlight the conjectures that students develop
Ngohe whakaharatau ***Independent Tasks***	Find the missing numbers: 54 x __ = (54 × 5) + (54 × 10) + (54 × 3) 288 ÷ 3 ÷ 2 ÷ __ = 288 ÷ 12 38 × 42 = 38 × 3 × __ × 7 __ ÷ 24 = (240 ÷ 24) + (48 ÷ 2) + (48 ÷ 2)
Ngā matapae ***Anticipations***	

Rapanga 12 (Optional task)	He mahi a rōpū: Wānangahia ēnei whārite mēnā ka tika, ka hē rānei ēnei whārite Me maumahara ki te whakarite tētahi whakamārama. $-5 + 5 = -5 - 5$ $5 + 1 = -1 + -5$ $-9 + 5 = 5 + -9$ $6 - 2 = 6 - -2$ $5 + -3 = -5 - -3$ $-7 - -7 = -7 - -8$ Wānangahia ngā tauira e puta mai ana. Kia rite ki te tohatoha au whakaaro.
Whakaaro Matua Pāngarau ***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. Mathematical situations can be represented as equations which include both positive and negative integers. A real quantity having a value less than zero is negative. Positive and negative numbers are opposites.
Hononga Marautanga ***Curriculum Links***	**NA4-1:** Use a range of multiplicative strategies when operating on whole numbers. **NA4-2**: Understand addition and subtraction of fractions, decimals and integers **NA4-6:** Know the relative size and place value structure of positive and negative integers and decimals to three places
Whāinga Ako ***Learning Outcomes***	Solve simple addition and subtraction equations using integers. Use a number line to represent the relationship between positive and negative integers in equations. Explain, justify and represent reasoning related to maintaining equality between operations which involve integers
Reo Matatini Pāngarau ***Mathematical Language***	Integers, negative number, positive number.

Tohatoha Whakaaro/Wā Hononga ***Sharing back/ Connect***	Select student solution strategies that use the properties of equality and understanding of negative numbers. **Connect:** What conjectures can you make that will always work about adding and subtracting negative and positive numbers?
Kōrero Tautoko ***Teacher Notes***	• Notice student solution strategies that use the properties of equality. • Highlight the difference between the use of - as an operation symbol (subtraction) and direction symbol (direction/size of movement) for negative numbers.
Aromatawai ***Assessment Tasks***	Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity: N45: Multiplication and division problems to solve. N45A: Multiplication and division problems to solve. NA5: Properties of numbers and operations. NA5A: Properties of numbers and operations. N4: Integers and negative numbers. N4A: Integers and negative numbers.
Ngā matapae ***Anticipations***	
