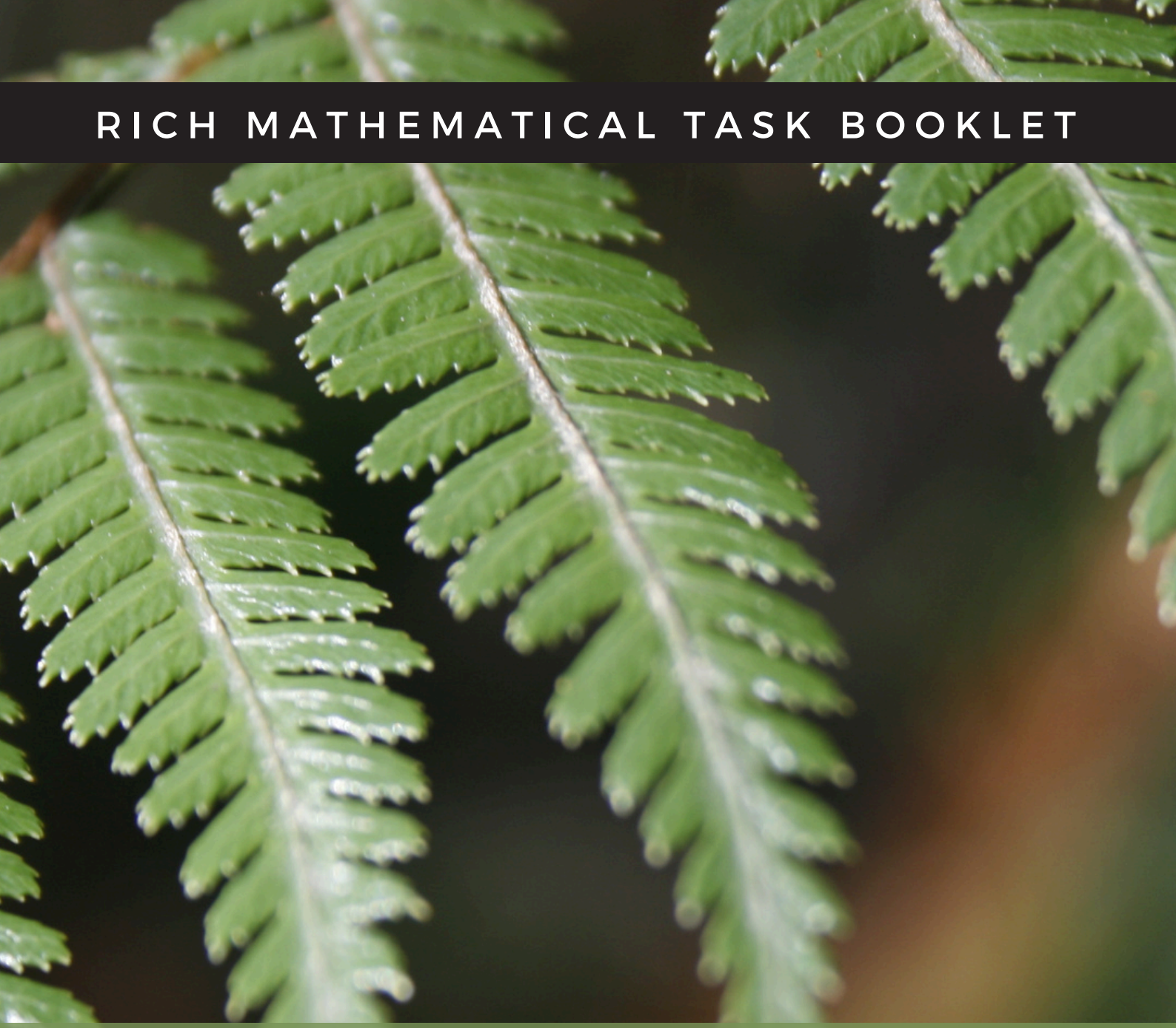
RICH MATHEMATICAL TASK BOOKLET



NUMBER Decimals, Percentages

YEAR 5-6 ODD YEARS

Teacher Booklet

Task 1

Use the 3 bottles to explore the different amounts of water they can hold.

Discuss what percentage of each of your one whole bottle is filled with water? Discuss what percentage of water would need to be added to fill the bottle completely.

Be ready to explain and justify how you know.

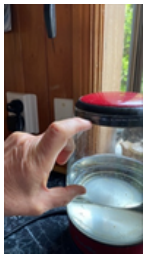
Teacher Notes

This can be done as either a whole class activity or half class activity. Have available a range of different size bottle which can hold water. Have the students fill the bottles with a range of water levels. Ask students to discuss and agree on a numerical value from one to hundred to estimate percent 'fullness' of the container. Tell them that they must be able to explain and justify their estimate. Repeat the discussion a number of times using different levels of water to estimate the percentage.

Facilitate the students to think of other names they could call the percent fullness. Ensure that they notice that we are always talking about one whole and part of a whole whether we are using fractions, decimals or percentages. For example, 50% of the one whole bottle. Encourage students to co-ordinate their intuitive understandings of percent with strategies fo7r operating on numbers 1-100 (Strategies such as numerical halving using fingers to represent on the container 100, 50, 25, and composition 100=75+25)

Monitor for students using vocabulary within the language of rational number...half full, or fifty per cent and that we are always talking about out of one hundred.

Notice the use of numerical splitting used by students to explain and justify the value they have put on the fullness of the container. Use these to show other students how to measure if they are not using this strategy.



Record in symbols the fractional language students use as they explain. When a half or a quarter or other fractions are used have students re-explain using percent and record as equivalent rational numbers.

Big Ideas

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line.

Percent is relative to the size of the whole.
A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

Curriculum Links

During Year 5

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write and represent tenths and hundredths as fractions and decimals

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Shareback

Select students to share after who have three different amounts of water in their bottles and are able to explain and justify the numerical value that they have agreed on using their fingers to show numerical splitting and fraction or percent terms.

Connect

If you have one glass of water 75% full. How much more water do you need to make it 100% full? What about 10%? 36%? 99%? 100%? 1%?

Describe and explain the pattern you can see.

Suggested Learning Outcomes

Explain and justify the comparison of a part to the whole.
Represent reasoning using different forms of notation, including words.

Independent Tasks

1. Jenny has a box of 30 M&Ms that she shares with her friends. She gives 25% to one friend and 20% to another and she keeps the rest?
How many does she keep?
How many of her M&Ms do each of her friends have?

2. Jenny has a box of 50 M&Ms that she shares with her friends. She gives 10% to one friend and 40% to another and she keeps the rest?
How many does she keep?
How many of her M&Ms do each of her friends have?

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Independent Tasks

3. Jenny has a box of 60 M&Ms that she shares with her friends. She gives 75% to one friend and 10% to another and she keeps the rest?
How many does she keep?
How many of her M&Ms do each of her friends have?

4. Jenny has a box of 100 M&Ms that she shares with her friends. She gives 40% to one friend and 5% to another and she keeps the rest? How many does she keep?
How many of her M&Ms do each of her friends have?

5. Jenny has a box of 75 M&Ms that she shares with her friends. She gives 25% to one friend and 30% to another and she keeps the rest?
How many does she keep?
How many of her M&Ms do each of her friends have?

6. Jenny has a box of 90 M&Ms that she shares with her friends. She gives 55% to one friend and 5% to another and she keeps the rest? How many does she keep?
How many of her M&Ms do each of her friends have?

Anticipations

Solutions, Misconceptions

Task 2

What percentage of that computer game have you downloaded? How much more would you need to download to complete it? Record using a range of different representations including symbols and be ready to explain and justify how they are equivalent.

Teacher Notes

Have a long and unmarked tape on the floor of the classroom to represent the way in the bar on a computer represents how much of a computer game has been downloaded. Use a white board marker to mark a point on the tape which indicates the level of download reached. Repeat the activity many times always ensuring that the mark on the line is above 10%.

Facilitate the students to notice that when talking about percentages and decimals we are always talking about one whole and that we use tenths and hundredths when we represent percentages and decimals as fractions. Numbers are grouped into multiples of powers of tens (tens, hundreds, thousands, tenths, hundredths, thousandths, and so on.

Expect students to represent using a range of different representations including justifying using percent, decimals, fractions and pictures of water bottles, chocolate bars, lines. If the students do not use decimals re-represent the measure as equivalent decimals and fractions.

Shareback

Select students to share after each estimation who can explain and justify the numerical value that they have agreed on using an informal measure and have represented their estimation in multiple ways.

Connect

What are the fraction, percentage, or decimal equivalences for:
75%, 20%, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, 33%, .99, .11, .54, .1, .5, .7?
What patterns can you notice?

Big Ideas

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line.

Percent is relative to the size of the whole.
A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

Curriculum Links

During Year 5

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Identify, read, write and represent tenths and hundredths as fractions and decimals

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Suggested Learning Outcomes

Explain and justify the comparison of a part to the whole.

Represent reasoning using different forms of notation, including words.

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Independent Tasks

1. Ayla has a 500ml pump bottle. By playtime she has drunk 25% of the bottle. How many ml of water are left in her bottle?

2. Ayla has a 750ml pump bottle. By playtime she has drunk 45% of the bottle. How many ml of water are left in her bottle?

3. Sam has a 15L container with water at the beach. By midday he has used 75% of the water in the container. How much water has he used (ml/l) how much water is left in the container (ml/l)?

4. Sam has a 12L container with water at the beach. By midday he has used 25% of the water in the container. How much water has he used (ml/l) how much water is left in the container (ml/l)?

5. Two friends go out for a run. They run 5km in total. Jane runs 65% of the distance before stopping to catch her breath. Max runs of the distance before stopping to catch his breath. How far did each of them run before stopping to catch their breath? Who ran the longest distance before stopping?

Anticipations

Solutions, Misconceptions

Task 3

You and your friends are running on the athletics track in the park. This tape represents the track you run on.

If I put the 0-digit card down at the start of it that indicates so far you have run 0 metres and the 1-digit card indicates that you have not reached 1 metre yet.

As a percentage of the metre how far have you run exactly?

How far have you run now?

Record using a range of different representations including symbols and be ready to explain and justify how they are equivalent.

Teacher Notes

Have available and use the long-unmarked tape on the floor of the classroom to represent a running track used in athletics and digit cards to represent whole numbers. Use a white board marker to mark a point on the tape which indicates where they have reached on the running track between numbers. Repeat the activity two times with a focus on numbers between numbers. The third time put down the 0-digit card at the start and the 1-digit card at the end. Mark on the line a place around 5%. Repeat a number of times always putting the mark below 10%.

Facilitate the students to notice that there are numbers between numbers and that includes between 0 and .1. Ensure extensive discussion including student explanation and justification of why for example 1% is recorded as $\frac{1}{100}$ and .01 and expect students to experience cognitive conflict related to numbers below .1.

Big Ideas

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line.

Percent is relative to the size of the whole.
A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

Curriculum Links

During Year 5

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write and represent tenths and hundredths as fractions and decimals

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Teacher Notes

Expect students to explain and represent using a range of different representations to justify why for example 5% = .05 = $\frac{5}{100}$ .These should include water bottles, chocolate bars and lines but may include a place value chart. Notice students who voice cognitive conflict about why numbers under 10% are represented as hundredths and recorded to three decimal places with a zero to represent the tenths.

Shareback

Select students to share after each estimation who can explain and justify the numerical value that they have agreed on and have represented their estimation in multiple fractional ways.

Connect

What are the fraction and decimal equivalence for these numbers:
10%, 1%, 5%, 50%, 9%, 99%, 100%

What patterns do you notice?

Suggested Learning Outcomes

Explain and justify the comparison of a part to the whole.
Represent and explain reasoning using corresponding points on a number line.
Represent reasoning to explain and justify equivalence using different forms of notation, including symbols and words.

Independent Tasks

What are their equivalent fractional numbers?

1. 75%= =
2. $\frac{1}{4}$ = =
3. 0.7 = =
4. $\frac{3}{4}$ = =
5. 23% = =
6. 0.45 = =
7. Two-thirds= =
8. $\frac{1}{5}$ = =
9. 70% = =
10. Three-fifths= =

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 4

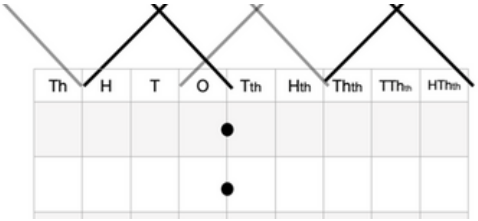
Mike and Jonah were competing to see who could push toy cars further across the floor. Mike measured the distance each car went, and he said that Jonah won because although both their cars reached 3.45 metres and neither of them reached 3.46 metres Jonah's car went further.

Can you record at least 12 different distances for his car which shows Jonah's car went further.

Be ready to explain and justify your answers using number lines, diagrams, drawings, fractions, and decimals.

Teacher Notes

Have place value houses (which include decimal places) displayed on the wall but do not direct students' attention to it until the sharing back.
See overlap of decimals with the ones place holder below



Explore the notion that places to the left of the decimal point are powers of ten.

The place values to the right of the decimal place are also powers of ten:

$10 = 10^1$
$100 = 10^2$

When numbers are written with decimal notation, the relationship between the pl$.1 = 10^{-1}$ e right of the decimal point is the same as the relationship betwe$.01 = 10^{-2}$ t of the decimal point-each place has a value that is ten times that o$.001 = 10^{-3}$ e to its right.

Facilitate the students to notice that you are always talking about a fraction or decimal of one whole and therefore in the place value houses the decimal dot does not separate the ones house from the tenths but rather overlaps across it.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Teacher Notes

Notice students who recognise that there are infinite numbers between numbers.

Expect students to represent using symbols and in the end to the place in the place value houses.

Shareback

Select students to share who have given a range of explanations which cause need for wide student discussion and justification including the use of the place value houses to support reasoning.

Connect

What are some numbers between:
1 and 2? 2.12 and 2.13? .09 and .1?
What do you notice? Can you make a conjecture about numbers between numbers?

Suggested Learning Outcomes

Explain and justify the comparison of a part to the whole.

Represent and explain reasoning using corresponding points on a number line.

Represent reasoning to explain and justify equivalence using different forms of notation, including symbols and words.

Independent Tasks

What numbers can you record between:

1. .1 and .2
2. 50% and 51%
3. 5% and 6%
4. .4 and .5
5. .51 and .56
6. .11 and .12
7. .541 and .542
8. 1.3 and 1.4
9. 478.51 and 478.52

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

Compare and order tenths and hundredths as fractions and decimals, and convert decimal tenths and hundredths to fractions

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Compare and order fractions, decimals (to two places), and percentages, and convert decimals and to fractions

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 5

Ella and Ethan were playing at the local swimming pool. Their dad gave them scores for their dives into the swimming pool. They agreed that the person with the highest total score out of three dives would win.
Ella scored 8.96, 7.046, 8.23 for her 3 dives.
Ethan's total score was 24.973.
Who won?

Can you explain and justify what her score was in more than one way?

Teacher Notes

During the launch, revisit the use of a numberline to add whole numbers. Use numbers which combine to make the next 10, 100, and 1000. Explore with the students how they can relate these to place value of whole numbers.

Have a place value house for whole and decimal numbers on the wall.

Facilitate the students to notice that when recombining decimals to make the next hundredth, tenth or one that the shift in the place value chart is from right to left the same as when adding whole numbers.

Expect students to represent their reasoning using informal notation across the page and on a numberline and not using a formal algorithm where the line up the numbers after the decimal dot.

Shareback

Select students to share who have used a numberline to represent their reasoning and combined these in groupings of ten and can explain and justify why they used numbers in groupings of ten.

Connect

Represent these on a numberline
.7 + .3 = 1
.07 + .03 = .1
.007 + .003 = .01
What patterns do you notice? Be prepared to explain and justify the pattern you notice using the place value house.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Suggested Learning Outcomes

Solve problems involving decimal by adding or subtracting and explain and justify the solution.

Represent reasoning to explain and justify place value involving decimal numbers.

Independent Tasks

Put these decimal numbers in order from largest to smallest:

1. 1.00000, .900000, .99, .9
2. .90146, .9015, .9000000, .99
3. .4405, .4, .321, .99999, .41, .9
4. .50000, .45100, .510, .52, .5200009
5. 1.2, 1.209, 1.21, 1.20099

Write an explanation to explain the rules you were using to order each row.

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

Compare and order tenths and hundredths as fractions and decimals, and convert decimal tenths and hundredths to fractions

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Compare and order fractions, decimals (to two places), and percentages, and convert decimals and to fractions

Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 6

Gaylene is training for a fund-raising walkathon. She aims to slowly build up the distance she can walk at pace. For the first week she decides she needs to walk 25 km in total across all the days of the week.

On Monday she walks 1.9310km. On Tuesday she walks 2.9km. On Wednesday she walks 3.101. On Thursday she walks 4.0398km. On Friday she walks 1.2. On Saturday she walks 5. 1km. On Sunday she does a big burst and walks 7.03km

How far has she walked over the week? Did she reach her target goal? If not, how much more would she need to walk to reach her target?

Shareback

Select students to share who have used a numberline to represent their reasoning and combined these in groupings of ten and can explain and justify why they used numbers in groupings of ten.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Teacher Notes

Connect

Represent these on a numberline

.7 + .3 = 1
.07 + .03 = .1
.007 + .003 = .01

What patterns do you notice? Be prepared to explain and justify the pattern you notice using the place value house.

Suggested Learning Outcomes

Solve problems involving decimal by adding or subtracting and explain and justify the solution.

Represent reasoning to explain and justify place value involving decimal numbers.

Independent Tasks

Put these numbers in order from smallest to largest:

1. $\frac{1}{2}$, .49999, 49% $\frac{3}{4}$
2. $\frac{1}{3}$,$\frac{1}{2}$, 93% .510, .003, 51%
3. .2409, .2, 25%,$\frac{1}{4}$, .2000001,
4. 1$\frac{1}{2}$, 1.9, 1.09, 125%, 100%

Write an explanation about the rules you used to order them.

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

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Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 7

Georgia wants to play elastics with her friends. Her mother has a piece of elastic which measures 5.07 metres long. Georgia uses 3.063 metres to make elastics for herself. She wants to make another set for her friend. How much elastic does she have left to make her friend's elastic?

Teacher Notes

Facilitate the students to notice that when subtracting using decimals they need to be recombined to make the next hundredth, tenth or one and that the shift in the place value chart is from right to left the same as when adding whole numbers.

Expect students to represent their reasoning using informal notation across the page and on a numberline and * * not using a formal algorithm where they line up the numbers after the decimal dot. * *

Shareback

Select students to share who can explain and justify their solutions drawing on a range of representations and using place value to justify what they did.

Connect

What pattern can you see?

.1 - .09
.1 - .099
.1 - .0999

Be ready to explain and justify the pattern you see using place value.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

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Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Suggested Learning Outcomes

Solve problems involving decimal by adding or subtracting and explain and justify the solution.

Represent reasoning to explain and justify place value involving decimal numbers.

Independent Tasks

Represent these on a numberline

.99 + .01 = 1
.909 + .091 = 1
.9009 + .0991 = 1

What patterns do you notice? Continue the pattern you notice three more times.

Represent your reasoning to explain and justify the pattern you notice using the place value house.

Curriculum Links

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Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 8

At her stall at the night market Tupou makes on average $75.95 each night. How much does she make if she has her stall open for 6 nights?

Teacher Notes

Facilitate the students to notice that when multiplying using decimals they need to be combined and recombined.

Monitor for students using vocabulary tenth, hundredth and who recognise that cents are a fractional part of a whole dollar.

Shareback

Select students to share who can have used informal strategies to solve the equation and can explain their reasoning using place value for decimals.

Connect

True or false? Be ready to use place value to justify your reasoning.

5 x .5 = 25
5 x .6 = 3

Suggested Learning Outcomes

Solve problems involving decimal by adding or subtracting and explain and justify the solution.

Represent reasoning to explain and justify place value involving decimal numbers.

Explain and justify reasoning using notation, symbols, and words.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

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Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Independent Tasks

With a partner, use your flash cards to practice your multiplication facts. Check any that you don't know automatically and discuss patterns that you can use to remember them and then practice saying those out loud to yourself.

Solve the following:

.1 x 2 =
.2 x 2 =
.3 x 2 =
.4 x 2 =
.5 x 2 =

Complete the pattern five more times.

What do you notice? Write an explanation about what you notice.

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 9

Alani is going to a family reunion in Tuvalu. She has some money saved up. In Tuvalu they use Australian dollars but their own coins. The exchange rate is $1 New Zealand for $.9301 Australian.

How much Australian money will she get in exchange for NZ$10?

How much Australian money will she get in exchange for NZ$100?

How much Australian money will she get in exchange for NZ$550?

Teacher Notes

Facilitate the students to notice that when multiplying decimals you are using powers of ten

Expect students to represent using place value and symbols

Shareback

Select students to share who are able to explain and justify their reasoning using groupings (powers) of tens and hundreds.

Connect

As you solve these, think about their place on the place value chart.

9 x 1 =
9 x 10 =
9 x 100 =
.9 x 1 =
.9 x 10 =
.9 x 100 =

Can you identify and explain the pattern you notice in the shifts in place value?

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

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Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Suggested Learning Outcomes

Solve problems involving decimal by adding or subtracting and explain and justify the solution.

Represent reasoning to explain and justify place value involving decimal numbers.

Explain and justify reasoning using notation, symbols, and words.

Independent Tasks

With a partner, practice your times-tables with the flash cards. For any that you do not know automatically, write them out and say them out loud at least four times.

In Samoa the exchange rate is $1 New Zealand for 1.5204 tala.

How much tala will you get in exchange for NZ$10?

How much tala will you get in exchange for NZ$100?

How much tala will you get in exchange for NZ$550?

In Tonga the exchange rate is $1 New Zealand for 1.43976 pa'anga

How much pa'anga will you get in exchange for NZ$10?

How much pa'anga will you get in exchange for NZ$100?

How much pa'anga will you get in exchange for NZ$550?

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent, ratio

Anticipations

Solutions, Misconceptions

Task 10

Maui wants to copy part of a pattern from a large siapo. He needs a piece of paper the same size or larger. The part of the pattern he is copying is 1.05cm in width and 1.8cm in length. What is the area of the tile he is copying?

Teacher Notes

During the launch, explore the place value related to multiplication and division of whole numbers, and fractional numbers

Facilitate the students to notice that when multiplying a rational number by a rational number in contrast to multiplying whole numbers by whole numbers the product gets smaller rather than bigger.

Shareback

Select students to share who are able to explain and justify their reasoning using a range of representations including place value and notation

Connect

As you solve these, think about their place on the place value chart.

.4 x .1 =
.4 x .01 =
.4 x .001 =

What comes next in the pattern? Why?

Suggested Learning Outcomes

Solve area problems involving decimal numbers by multiplying and explain and justify the solution.

Represent reasoning using notation to explain and justify place value involving decimal numbers.

Big Ideas

A decimal is another name for a fraction and thus can be associated with the corresponding point on the number line.

A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Independent Tasks

Write these as decimals:

- 1 and $\frac{5}{10}$
- 12 and $\frac{7}{10}$
- 23 and $\frac{3}{10}$
- 4 and $\frac{83}{100}$
- 1 and $\frac{10}{100}$
- 2 and $\frac{3}{100}$
- 9 and $\frac{831}{1000}$
- 5 and $\frac{83}{1000}$
- 4 and $\frac{1}{1000}$

.

What is the tenths digit in these?

9.92
0.02
7.816
0.30198
1.33333
1.00009

Which 2 has the biggest value in 0.022? Represent your reasoning to explain your ideas.

How many thousandths are there altogether in 0.022?

Curriculum Links

During Year 5

Identify, read, write and represent tenths and hundredths as fractions and decimals

Compare and order tenths and hundredths as fractions and decimals, and convert decimal tenths and hundredths to fractions

Divide whole numbers by 10 and 100 to make decimals

During Year 6

Use rounding, estimation, and inverse operations to predict results and to check the reasonable of calculations.

Identify, read, write, and represent fractions, decimals (to two places), and percentages, and convert decimals and percentages to fraction

Compare and order fractions, decimals (to two places), and percentages, and convert decimals and to fractions

Add and subtract whole numbers and decimals to two decimal places (e.g., 250.11 + 135.29 = 385.4)

Mathematical Language

Percent, percentage, whole, fraction, fractional number, decimal number, rational number, equal, equivalent

Anticipations

Solutions, Misconceptions

Task 11

Whoops! There is a problem with the multiplication of these decimal multiplication.

1.23 x 4 = 25.92
2.36 x 41 = 11.80

Find the mistake and correct them.

Teacher Notes

Notice students who use informal reasoning before formal reasoning.

Shareback

Select students to share who are able to explain and justify their reasoning using a range of ways to represent their reasoning.

Connect

When you multiply a whole number by a decimal, what do you notice happens?

Suggested Learning Outcomes

Solve area problems involving decimal numbers by multiplying and explain and justify the solution.

Represent reasoning using notation to explain and justify place value involving decimal numbers.

Big Ideas

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A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Independent Tasks

As you solve these, think about their place on the place value chart.

1. 32.8 x 6
2. 73 x 9
3. 1.43 ÷ 1.6
4. 4. 0009 ÷ 1.9991
5. 6.5 – 1.9
6. 12. 32 – 0.31

Identify, record, and explain the pattern you notice in the shifts in place value?

Curriculum Links

During Year 5

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Anticipations

Solutions, Misconceptions

Task 12

Estimate where you think the decimal dot goes and then computer to check that you have put it in the right place.

0.24 x 6 = 104
10 x .05 = 50
24 x 0.3 = 720
2.4 x 100 = 240
0.2 x 1 = 20
0.24 x 0.63 = 1512
0. 8 x 0.9 = 72

What did you notice?

Teacher Notes

Facilitate the students to notice that sometimes it is quicker and easier to use fractional equivalents to multiply with.

Shareback

Select students to share who are able to explain and justify their reasoning using a range of ways to represent their reasoning.

Connect

Explore whether this conjecture is true or false:

When multiplying a whole number by a whole number the product gets bigger but when multiplying a whole number by a decimal number the product gets smaller.

Be ready to explain and prove your response.

Big Ideas

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A percent is another way to write a decimal that compares part to a whole where the whole is 100 and thus can be associated with the corresponding point on the number line. Percent is relative to the size of the whole. A percent is a special type of ratio where a part is compared to a whole and the whole is 100.

Benchmark fractions like $\frac{1}{2}$ (0.5) and $\frac{1}{4}$ (0.25) can be used to estimate calculations involving fractions and decimals.

If two quantities vary proportionally, the quantities are either directly related (as one increases the other increases) or inversely related (as one increases the other decreases).

Suggested Learning Outcomes

Solve area problems involving decimal numbers by multiplying and explain and justify the solution.

Represent reasoning using notation to explain and justify place value involving decimal numbers.

Independent Tasks

Assessment tasks

Task 1: Ordering decimals, fractions, and percentages from smallest to biggest.

Task 2: Decimals.

Task 3: Fractions, Decimals, Percentages.

Curriculum Links

During Year 5

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Assessment Task 1 - Ordering Decimals - Year 5-6

Put these decimals, fractions, and percentages in order from smallest to biggest.

$\frac{24}{48}$ 0.781 0.9 $\frac{1}{4}$ 80% 0.009 25%

Explain and show how you know this.

Assessment Task 2 - Decimals - Year 5-6

Give 12 examples of different sized decimal numbers. Put them in order from smallest to largest. Prove that they are in the correct order by using three different representations.

Assessment Task 3 - Fractions, Decimals, Percentages - Year 5-6

Write some word problems for a friend involving any of the operations (addition, subtraction, multiplication, division) using fractions, decimals, or percentages. Show how you would solve the problems.