

Mathematics

Year 3

Above satisfactory

WORK SAMPLE PORTFOLIO

Annotated work sample portfolios are provided to support implementation of the Foundation – Year 10 Australian Curriculum.

Each portfolio is an example of evidence of student learning in relation to the achievement standard. Three portfolios are available for each achievement standard, illustrating satisfactory, above satisfactory and below satisfactory student achievement. The set of portfolios assists teachers to make on-balance judgements about the quality of their students' achievement.

Each portfolio comprises a collection of students' work drawn from a range of assessment tasks. There is no pre-determined number of student work samples in a portfolio, nor are they sequenced in any particular order. Each work sample in the portfolio may vary in terms of how much student time was involved in undertaking the task or the degree of support provided by the teacher. The portfolios comprise authentic samples of student work and may contain errors such as spelling mistakes and other inaccuracies. Opinions expressed in student work are those of the student.

The portfolios have been selected, annotated and reviewed by classroom teachers and other curriculum experts. The portfolios will be reviewed over time.

ACARA acknowledges the contribution of Australian teachers in the development of these work sample portfolios.

THIS PORTFOLIO: YEAR 3 MATHEMATICS

This portfolio provides the following student work samples:

Sample 1	Number: Addition and subtraction
Sample 2	Number: All about a fraction
Sample 3	Measurement: How much is there?
Sample 4	Geometry: What is on my island?
Sample 5	Number: Neighbourly numbers
Sample 6	Geometry: Symmetry
Sample 7	Geometry: Smaller than a square
Sample 8	Statistics: Ice-cream flavours
Sample 9	Number: Apple orchard
Sample 10	Algebra: 20 Charlie
Sample 11	Measurement: Time
Sample 12	Number: Market stall
Sample 13	Probability: Chance experiment

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This portfolio of student work demonstrates addition and subtraction computation strategies (WS1, WS12) and the classification of odd and even numbers (WS5). The student identifies and creates number patterns (WS5, WS10) and models unit fractions (WS2). The student measures capacities (WS3) and draws maps and locates features (WS4). The student identifies symmetry and angles in their environment (WS6, WS7) and creates tables and graphs from given information (WS8). The student solves problems using multiplication and addition (WS9) and calculates the cost of items in a class shop including giving change from different amounts tendered (WS12). The student creates a presentation to teach others how to tell the time to the minute (WS11). The student conducts a chance experiment and identifies possible outcomes (WS13).

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Number: Addition and subtraction

Year 3 Mathematics achievement standard

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Students count to and from 10 000. They classify numbers as either odd or even. They recall addition and multiplication facts for single digit numbers. Students correctly count out change from financial transactions. They continue number patterns involving addition and subtraction. Students use metric units for length, mass and capacity. They tell time to the nearest minute. Students make models of three-dimensional objects. Students conduct chance experiments and list possible outcomes. They carry out simple data investigations for categorical variables.

Summary of task

The assessment task was given at the end of a unit of work where students explored the relationships and connections between addition and subtraction.

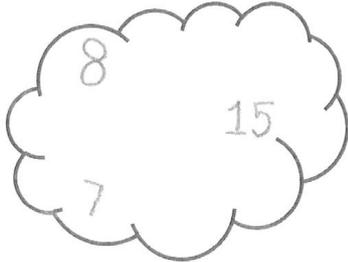
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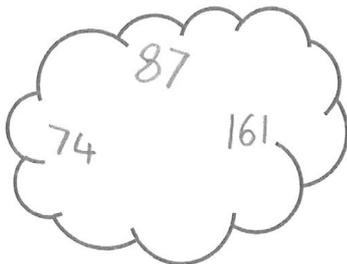
Number: Addition and subtraction

Use the numbers in the cloud to write three different number sentences.



$$\begin{array}{l} 7+8=15 \quad 8=15-7 \\ 8+7=15 \quad 7=15-8 \\ 15-8=7 \\ 15-7=8 \\ 15=7+8 \\ 15=8+7 \end{array}$$

Choose three other numbers that you can use the same pattern to write number sentences.



$$\begin{array}{l} 161-74=87 \quad 87=161-74 \\ 161-87=74 \\ 87+74=161 \\ 74+87=161 \\ 161=87+74 \\ 161=74+87 \\ 74=161-87 \end{array}$$

Charlie choose the numbers 1, 2, 3 and 6 and wrote some number sentences. He found out that

$1 + 2 = 6 - 3$ How many other sentences can you find?

$$\begin{array}{l} 2+1=6-3 \quad 6=2+1+3 \\ 6=1+2+3 \quad 1+2+3=6 \\ 6=1+3+2 \quad 1+3+2=6 \\ 6=3+2+1 \\ 6=3+2+1 \\ 6=2+3+1 \end{array}$$

Can you choose four different numbers for Charlie to write number sentences?

$$\begin{array}{l} 6+4=12-2 \quad 12=4+6+2 \quad 12=4+2+6 \\ 4+6=12-2 \quad 12=4+2+6 \\ 12-4=6+2 \quad 12=2+4+6 \\ 12-6=2+4 \quad 12=2+6+4 \\ 12=6+4+2 \\ 12=6+2+4 \end{array}$$

Annotations

Represents addition and related subtraction facts, using the equals sign to indicate the result of an operation.

Uses the equals sign to indicate the equivalence of a single number to an operation involving two numbers.

Selects two- and three-digit numbers to create addition and related subtraction facts.

Generates a range of equivalent number sentences involving addition.

Represents the connection between addition and subtraction using equivalent number sentences.

Number: Addition and subtraction

Can you explain a connection between addition and subtraction?

Addition and subtraction are inverses which means they undo each other. Once you know one you know more for instance

if I have $7+3=10$ I also know
 $3+7=10$ $10=3+7$
 $10-7=3$ $7=10-3$
 $10-3=7$ $3=10-7$
 $10=7+3$

if I have
 $9+4=13$
 and I want to get back to 9
 undo the sum with subtraction
 $13-4=9$

Annotations

Explains the connection between addition and subtraction.

Uses and describes the meaning of mathematical terminology in explanations.

Uses examples to support explanations.

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Number: All about a fraction

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Summary of task

Students had completed a unit of work on fractions, looking at fractions as part of a whole and fractions as part of a collection. They had also investigated which fractions are bigger and smaller and where they fit on a number line.

Students were asked to choose a fraction and record everything they knew about it. They were given access to all classroom resources to complete the task. They were also asked to answer the following question:

- Explain how fractions are useful in everyday life.

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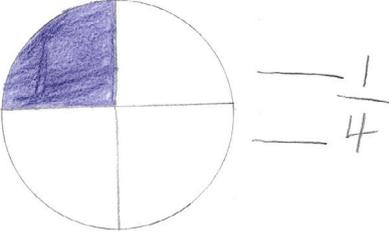
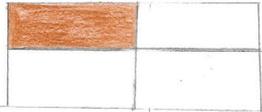
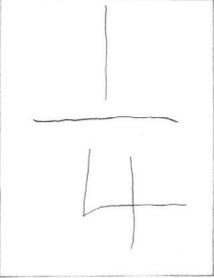
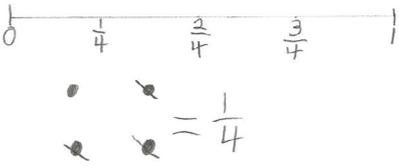
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Number: All about a fraction

we use fractions to break food up into equal parts. we use fractions for cooking. we use fractions to make things easy.

my fractions denominator is 4 and my numerator is 1.


In this collection there is $\frac{1}{4}$ the orange is $\frac{1}{4}$ the others are $\frac{3}{4}$.

If John had 4 lollies and lost 3 what fraction would he have left?

Annotations

Explains the use of fractions in everyday life.

Demonstrates an understanding of the terms 'denominator' and 'numerator'.

Represents and models a unit fraction.

Locates a unit fraction on a number line.

Creates a number story to match a given fraction.

Locates fractions on a number line.

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Measurement: How much is there?

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Summary of task

Students had completed a unit of work on metric units for capacity, including hefting buckets of water, predicting, measuring using scales, reading and working with millilitres and litres.

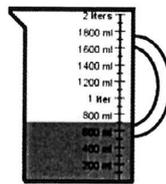
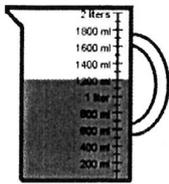
Students were asked to complete a series of questions based on the previous classwork on estimating and reading capacity levels.

Measurement: How much is there?

Millilitres and litres

1. How many millilitres are in 1 litre? 1000

2. How much liquid is in each of the 3 jugs below? Write your answer below each jug.



<u>700</u> ml <u>1</u> L	<u>1500</u> ml <u>1</u> L	<u>100</u> ml <u>0</u> L
-----------------------------	------------------------------	-----------------------------

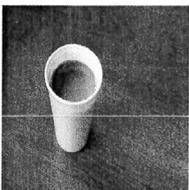
3. How much liquid would each container roughly hold below. Write down your estimate (eg: 200ml - 250ml).

A cup of coffee

A water bottle

A bottle of milk

A can of fizzy cordial



200 ml 1 L 2 L 375 ml

Annotations

Demonstrates an awareness of the relationship between metric units.

Reads and records capacity using appropriate measurements.

Reads and records capacity using appropriate measurements.

Measurement: How much is there?

4. The jugs below can hold 1 litre each when filled to the top. Colour in each jug for each different measurement below:



1 L



500ml



250 ml



750 ml

Annotations

Estimates the relative capacity of containers demonstrating the use of fractions to assist thinking.

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Geometry: What is on my island?

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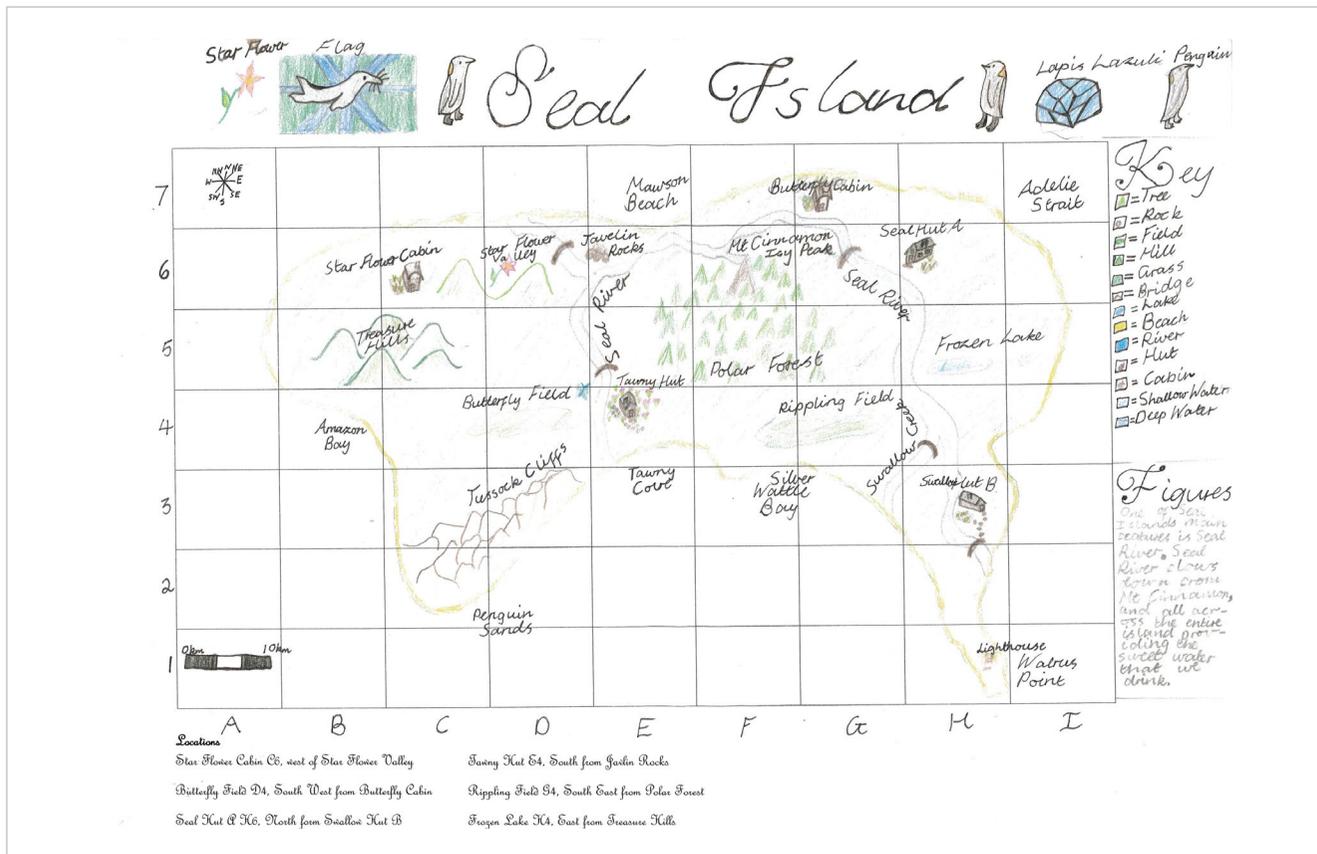
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Summary of task

Students had completed a unit of work on mapping that involved exploration of a range of maps with interactive whiteboard activities, atlases and games such as Battleships.

Students were given grid references linked to entry and exit points of locations on a map. From the information given, they had to draw a map and write directions for locations on the map.

Geometry: What is on my island?



Annotations

Creates a legend to convey information on a map.

Demonstrates an understanding that maps require scale.

Locates features on a map using coordinates.

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Number: Neighbourly numbers

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Summary of task

Students had investigated odd and even numbers and whether they could be grouped into twos. They had also investigated the results of adding two even and two odd numbers.

Students brainstormed all they knew about odd and even numbers. They then completed the task. They were encouraged to try adding mentally first and to check their total using a calculator for larger calculations. Students used colour to highlight patterns they identified. Neighbourly numbers had been discussed and investigated.

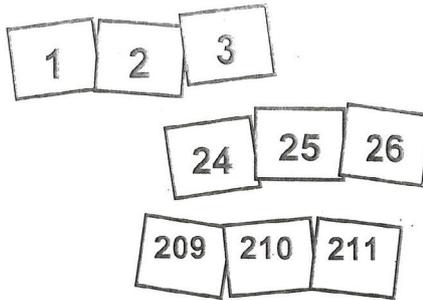
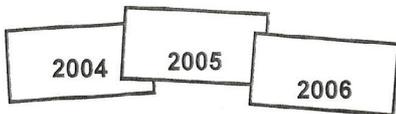
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Number: Neighbourly numbers

My neighbourly numbers



What happens when you add three numbers in a row?
 Use blocks or square paper or just add up in your head!
 Choose your own numbers and write down the sums you make.

1	+	2	+	3	=	6
3	+	4	+	5	=	12
5	+	6	+	7	=	18
7	+	8	+	9	=	24
9	+	10	+	11	=	30
11	+	12	+	13	=	36
13	+	14	+	15	=	42
15	+	16	+	17	=	48
17	+	18	+	19	=	54

□ = even
 □ = odd

50	+	51	+	52	=	153
52	+	53	+	54	=	159
54	+	55	+	56	=	165
56	+	57	+	58	=	171
58	+	59	+	60	=	177
60	+	61	+	62	=	183
62	+	63	+	64	=	189
64	+	65	+	66	=	195
66	+	67	+	68	=	201

□ = even
 □ = odd

Annotations

Uses a key to classify numbers as odd or even.

Number: Neighbourly numbers

ODD and Even numbers

1. If you add an odd number and an odd number you get an even number.
2. If you add an even number and an even number you get an even number.
3. If you add an odd number and an even number you get an odd number.
4. If a number ends in 0, 2, 4, 6, 8 or a it is an even number.
5. If a number ends in 1, 3, 5, 7 or 9 it is an odd number.

Annotations

Explains circumstances of odd and even numbers in addition.

Describes the conditions required for a number to be odd or even.

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Geometry: Symmetry

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Summary of task

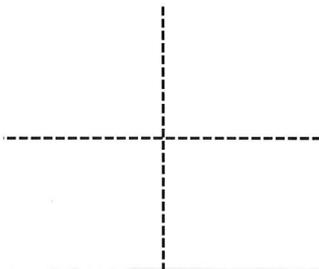
Students had completed a unit of work on identifying symmetry in shapes and objects in the environment.

Students were given two lines of symmetry and asked to find shapes and objects that had the lines of symmetry and to record their findings.

Geometry: Symmetry

Annotations

Here are 2 lines of symmetry.



What shapes and objects can you find that they could belong to?

50 cent coin diamond square circle

The 50c coin is symmetrical in two ways. It is symmetrical in shape but not in print.

The calendar is symmetrical in two ways but like the 50c coin it is not symmetrical in print.

This rangoli is an example of symmetry.

The letter O is an example of symmetry.

The letter B is not an example of symmetry because it is only symmetrical in one way. To be symmetrical it would have to be a mirror image looking from two angles.

Makes the connections that an object can be symmetrical but once the design is included on the object it may no longer be symmetrical.

Identifies a range of shapes and objects with given axes of symmetry.

Explains how a shape may only have one axis of symmetry.

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Geometry: Smaller than a square

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Summary of task

Students had completed a unit of work on identifying angles as measures of turn and the comparison of angle sizes.

Students were asked to identify angles that were smaller than, the same as and larger than a corner of a square.

Geometry: Smaller than a square

What angles can you find that are smaller than the corner of a square?

6:30 on the clock

100 deg a protractor

the inside of two paddle sticks put on top of each other

acute

the vertex is the part in an angle where the 2 arms meet

the inside of an angle is called an arc. The 2 lines that meet together are called arms

edge near our class room

obtuse is the angle bigger than right angle.

acute is the smaller than a right angle. spread almost fully out.

the feet of a plastic counter bear.

I know these are all acute angles from the obtuse, because right angles are all straight, right angles are all even.

acute

can divide

Obtuse

the inside of my triangular ruler.

Annotations

Identifies angles in everyday contexts.

Uses mathematical language to describe angles.

Describes obtuse and acute angles.

Identifies obtuse and acute angles in everyday objects.

Makes reference to straight lines, not straight angles.

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Statistics: Ice-cream flavours

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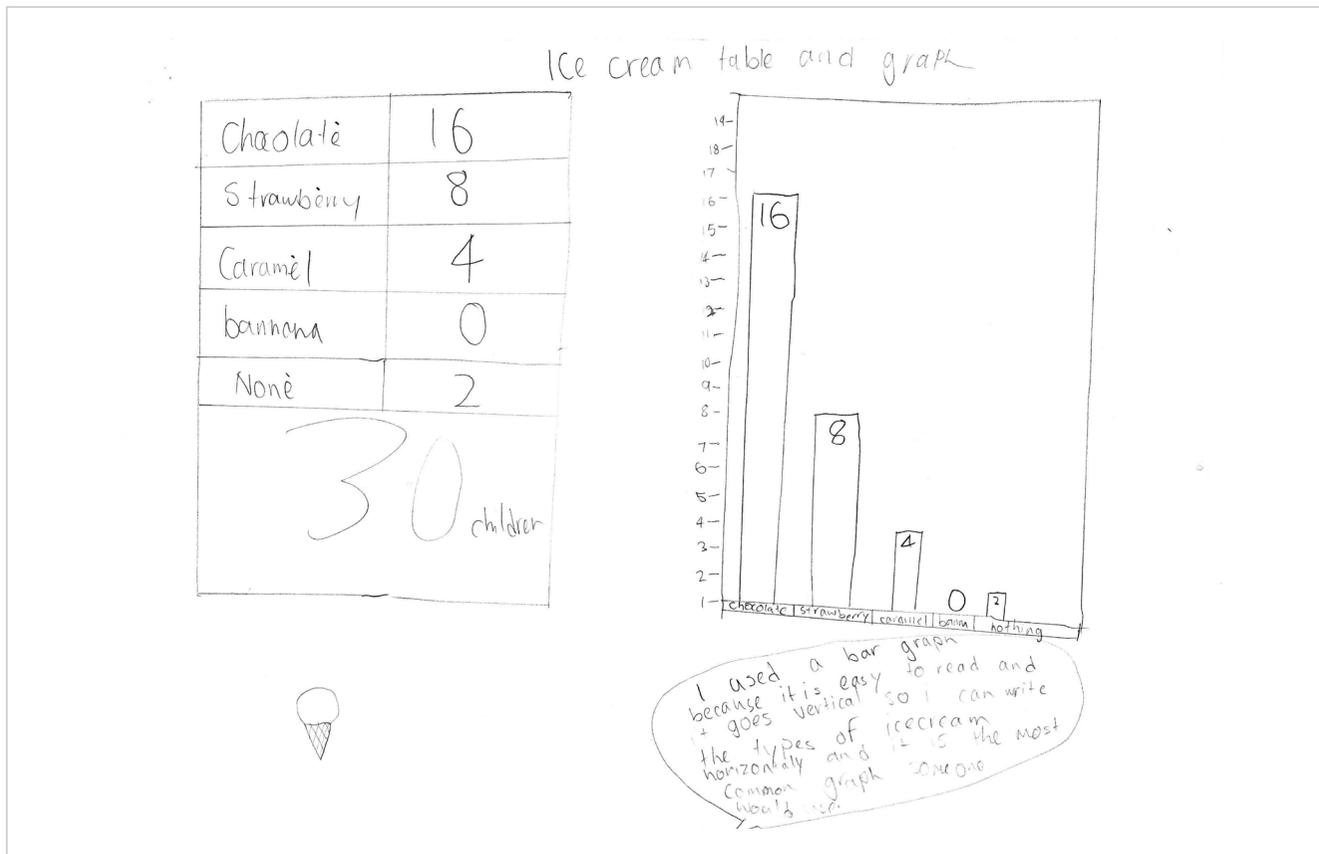
Summary of task

Students had completed a unit of work that included collecting data, drawing tables and graphs and discussing their findings compared with other students.

Students were given a task to survey the class about their favourite ice-cream flavour. Using the data they had collected they were asked the following questions:

- Can you create a table and a graph to show what these findings could look like?
- What type of graph is most suitable and why?
- How will you record your work?
- How can you explain your graph?
- How do your results compare with others?

Statistics: Ice-cream flavours



Annotations

Interprets and organises data in a table.

Uses data from a table to construct a simple column graph.

Describes why a column graph is appropriate to represent data.

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Statistics: Ice-cream flavours

Sonny

Graces graph had 14 on chocolate, 6 on straw berry, 4 on Caramel, 0 on banana and 6 people didn't like any. So her graph was correct but had different numbers mine. and she used a tally table and I used a number table. We both had 4 on Caramel and 0 on banana. We got different numbers because there is more than one way to answer, and most people got different answers.

Annotations

Compares results with others, identifying similarities and differences in data representations.

Recognises that a given problem may have different possible solutions.

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Number: Apple orchard

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Summary of task

Students had completed a unit of work on addition, multiplication and their connection and also using efficient mental and written strategies to solve problems.

Students were asked to answer the following question:

- Sandie grew apple trees in orchards. One sunny Sunday she picked 24 apples from the trees in one of her orchards. Each tree had the same number of apples on it. How many trees could be in that orchard and how many apples on each tree?

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Number: Apple orchard



Annotations

Draws pictures to demonstrate all the possible combinations.

Demonstrates a connection between a picture representation and a multiplication number sentence.

Uses repeated addition to demonstrate the solution to the problem.

Demonstrates the connection between addition and multiplication.

Demonstrates the relationship between addition and multiplication.

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Algebra: 20 Charlie

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Summary of task

Students had completed a unit of work identifying the rules for number patterns and then continuing the patterns or creating patterns.

Students were asked to solve the following problem:

- Charlie created an addition number pattern which contained the number 20. What could the pattern be?
- What other possibilities are there? Can you describe the rules for each of your patterns? How do you know if you have found all of the possibilities? What if your pattern also had to contain the number 36? If you had to create a subtraction pattern containing the number 20, explain why or why not the patterns could be the same as before.

Algebra: 20 Charlie

Charlie created an addition number pattern which contained the number 20.

What could the pattern be?

4, 8, 12, 16, 20, 24, 28

Rule = +4

4, 5, 9, 10, 14, 15, 19, 20

Rule = +4 +1

2, 6, 8, 12, 14, 18, 20, 22, 26, 28, 32

Rule = +2 +4

5, 10, 15, 20, 25, 30, 35, 40

Rule = +5

10, 20, 30, 40, 50, 60

Rule = +10

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

Rule = +1

I do not have every pattern that could include the number twenty because there is many patterns that could add up to the number twenty.

There are only a few patterns that include twenty using single numbers but using two numbers such as 4+1 as demonstrated above. you can use many more which is why you cannot use every pattern.

Annotations

Creates and continues number patterns involving addition.

Identifies the rule in the number pattern.

Creates and continues a number pattern with two addition values.

Recognises there are many possible solutions to the problem.

Mathematics

Year 3

Above satisfactory

Algebra: 20 Charlie

You can switch the numbers around and you can do them straight forward you can also use subtraction to change the sum.

20 and 36

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48

This pattern has twenty and thirty six and the rule is +4.

50, 45, 40, 35, 30, 25, 20, 15, 10, 5

Rule = -5

This subtraction sum is different to the other patterns because instead of the numbers getting bigger as they would in an addition sum the numbers get smaller and eventually fall into single digits because you are taking away. Then after single digits it would go into negative numbers.

Annotations

Explains alternative ways to create and continue number patterns involving a given number.

Creates and continues a number pattern involving subtraction.

Compares and explains the difference between number patterns involving addition and subtraction.

Mathematics

Year 3

Above satisfactory

Measurement: Time

Year 3 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

By the end of Year 3, students recognise the connection between addition and subtraction and solve problems using efficient strategies for multiplication. They model and represent unit fractions. They represent money values in various ways. Students identify symmetry in the environment. They match positions on maps with given information. Students recognise angles in real situations. They interpret and compare data displays.

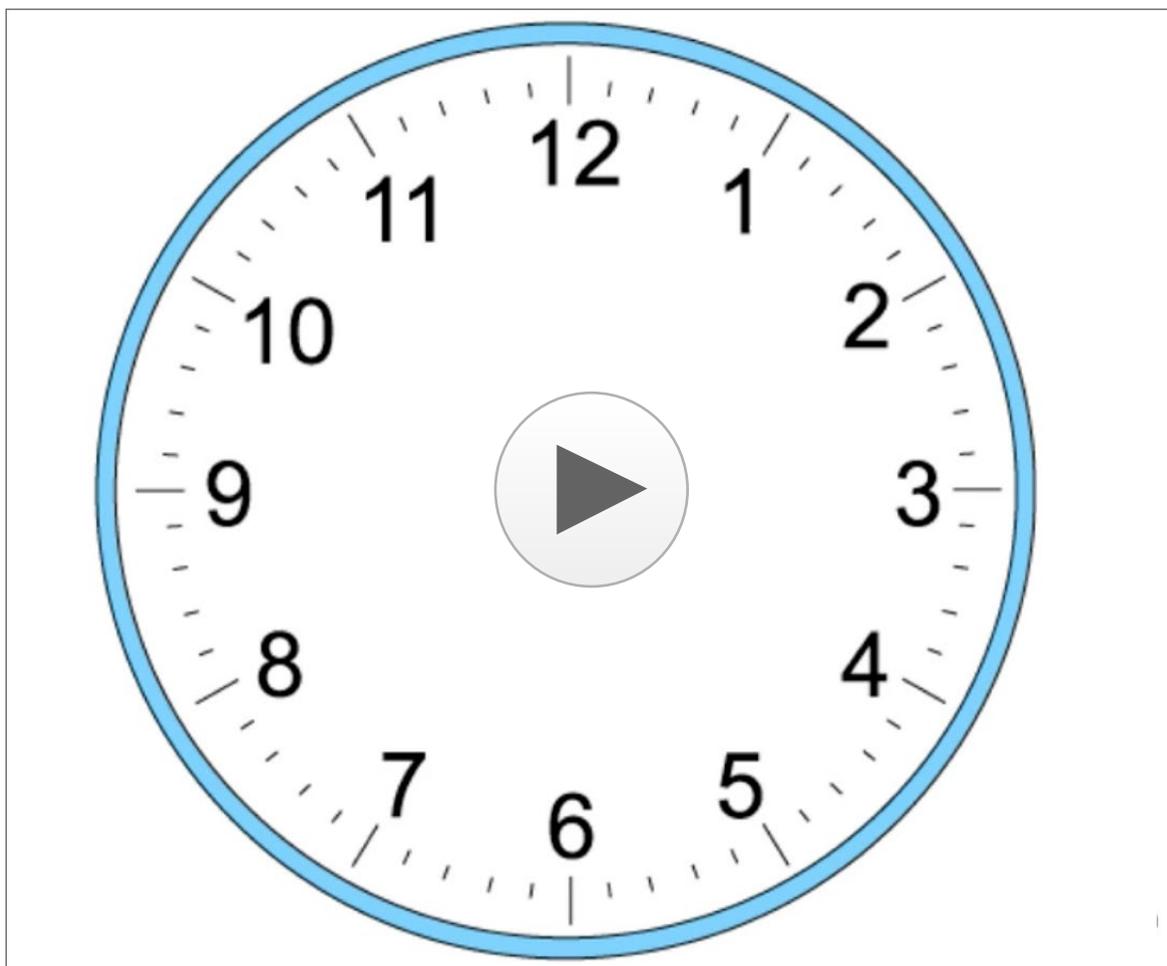
Students count to and from 10 000. They classify numbers as either odd or even. They recall addition and multiplication facts for single digit numbers. Students correctly count out change from financial transactions. They continue number patterns involving addition and subtraction. Students use metric units for length, mass and capacity. They tell time to the nearest minute. Students make models of three-dimensional objects. Students conduct chance experiments and list possible outcomes. They carry out simple data investigations for categorical variables.

Summary of task

Students completed a unit of work involving o'clock, half past, quarter to and quarter past, as students didn't have this prior knowledge. The class progressed to telling the time to five minute intervals and to the minute.

Students were asked to use an interactive environment to teach someone how to tell the time to the minute.

Measurement: Time



Annotations

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Mathematics

Year 3

Above satisfactory

Number: Market stall

Year 3 Mathematics achievement standard

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By the end of Year 3, students recognise the connection between addition and subtraction and solve problems using efficient strategies for multiplication. They model and represent unit fractions. They represent money values in various ways. Students identify symmetry in the environment. They match positions on maps with given information. Students recognise angles in real situations. They interpret and compare data displays.

Students count to and from 10 000. They classify numbers as either odd or even. They recall addition and multiplication facts for single digit numbers. Students correctly count out change from financial transactions. They continue number patterns involving addition and subtraction. Students use metric units for length, mass and capacity. They tell time to the nearest minute. Students make models of three-dimensional objects. Students conduct chance experiments and list possible outcomes. They carry out simple data investigations for categorical variables.

Summary of task

Students had completed a unit of work on developing effective mental and written methods to solve addition and subtraction problems and exploring money.

Students investigated how many ways they could make \$1. They discussed the most appropriate choice of coins, explaining their choices. They investigated and represented different ways to show money values up to \$20. They counted money collections and explored money problems involving addition and subtraction. They created and solved 'spending stories' choosing and using their own methods.

For this particular task students first took part in a class market stall afternoon where they ran their own shop along with two of their peers. They were given the opportunity to shop at other stalls as well as run their own stall. They were encouraged to buy multiple items to give the opportunity for the addition of money. There was also a bank where stallholders could change their money if they wished to have more coins.

Market stall role play

Students were asked to individually run the class market stall. They were told they could use mental strategies or the whiteboard provided to assist them in their calculations. The customer (their teacher) would come to purchase some items.

Each student was asked to solve a transaction problem involving a single item (calculating change: subtraction) and then a transaction involving two items (adding together values and then calculating change, or two subsequent subtractions). They were also asked to explain their thinking and asked how to give the change in a different way (representing money values in various ways).

Mathematics

Year 3
Above satisfactory

Number: Market stall



Annotations

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Mathematics

Year 3

Above satisfactory

Probability: Chance experiment

Year 3 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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Students count to and from 10 000. They classify numbers as either odd or even. They recall addition and multiplication facts for single digit numbers. Students correctly count out change from financial transactions. They continue number patterns involving addition and subtraction. Students use metric units for length, mass and capacity. They tell time to the nearest minute. Students make models of three-dimensional objects. Students conduct chance experiments and list possible outcomes. They carry out simple data investigations for categorical variables.

Summary of task

The assessment task was given at the end of a unit of work in which students had completed different experiments to identify the possible outcomes of events. They were introduced to the mathematical term 'outcome'. The students were instructed to play a game of chance using two dice and then investigate if the game was fair.

Probability: Chance experiment

Annotations

Chance Experiment.....



Is it Fair?

Game: This is a 2 person game. You and your partner roll 2 ordinary six-faced dice at the same time and then add the two numbers together.

Player A wins if 2
 Player B wins if 3 4 5 6 7
 (I will reveal these totals after you have answered the questions below.)

Before you start: List some of the results you could get.

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Does this game seem fair to you?

No
 because B's outcomes are easier to roll than A's

Play the game: The first person to 10 throws is the overall winner.
 Record your results below:

(A)

H

|||| |

B

|||| |

Share the results with your group. Record your groups results below:

A=27 B=29

What do you think now? Was this game fair?

Yes A and B's outcomes were very similar

	1	2	3	4	5	6	
1	2	3	4	5	6	7	Chances 2-1 3-2 4-3 5-4 6-5 7-6 8-5 9-4 10-3 11-2 12-1
2	3	4	5	6	7	8	
3	4	5	6	7	8	9	
4	5	6	7	8	9	10	
5	6	7	8	9	10	11	
6	7	8	9	10	11	12	

Do you have more chance of getting one answer than any other? If so, what is that answer? And why?

7, because it has lots of outcomes

Identifies all possible outcomes of a chance experiment.

Provides an opinion about the fairness of a game and explains their thinking using appropriate mathematical terminology.

Conducts a simple chance experiment and records a tally of the outcomes.

Constructs a table to show all possible outcomes of a chance experiment.

Selects and justifies the outcome with the highest chance of occurring with reference to the table of outcomes.