Mathematics

Year 6
Below 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 6 MATHEMATICS

This portfolio provides the following student work samples:

Sample 1	Number: Power
Sample 2	Number: How tall?
Sample 3	Number: Abstract design
Sample 4	Number: Fractions, decimals, percentages and integers
Sample 5	Number: Fifth term
Sample 6	Measurement: Area
Sample 7	Number: Calculations
Sample 8	Geometry: 3D structure
Sample 9	Number: Percentages
Sample 10	Geometry: Sam's square
Sample 11	Statistics and probability: Spinner mania
Sample 12	Measurement: Fill it up
Sample 13	Number: Brackets and the order of operations
Sample 14	Geometry: Understanding angles

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This portfolio of student work demonstrates multiplying and dividing decimals by a power of 10 (WS1, WS7) and solving problems involving length and area using decimals (WS2, WS6). The student connects fractions, decimals and percentages as representations of the same value (WS3, WS4). The student describes the use of positive and negative numbers in everyday life (WS4) and calculates the discounted price of sale items (WS9). The student creates a sequence using whole numbers and fractions and explains the rule (WS5). The student performs calculations with whole numbers and decimals using all four operations (WS7). The student draws nets and constructs a prism and a pyramid (WS8) and plots points on a Cartesian plane (WS10). The student uses reasoning to report probability using fractions, percentages and decimals (WS11). The student calculates the volume and capacity of a container (WS12) and creates number sentences using the order of operations and brackets (WS13). The student investigates the relationships between angles on straight lines (WS14).

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Number: Power

Year 6 Mathematics achievement standard

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

By the end of Year 6, students recognise the properties of prime, composite, square and triangular numbers. They describe the use of integers in everyday contexts. They solve problems involving all four operations with whole numbers. Students connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students make connections between the powers of 10 and the multiplication and division of decimals. They describe rules used in sequences involving whole numbers, fractions and decimals. Students connect decimal representations to the metric system and choose appropriate units of measurement to perform a calculation. They make connections between capacity and volume. They solve problems involving length and area. They interpret timetables. Students describe combinations of transformations. They solve problems using the properties of angles. Students compare observed and expected frequencies. They interpret and compare a variety of data displays including those displays for two categorical variables. They evaluate secondary data displayed in the media.

Students locate fractions and integers on a number line. They calculate a simple fraction of a quantity. They add, subtract and multiply decimals and divide decimals where the result is rational. Students calculate common percentage discounts on sale items. They write correct number sentences using brackets and order of operations. Students locate an ordered pair in any one of the four quadrants on the Cartesian plane. They construct simple prisms and pyramids. Students list and communicate probabilities using simple fractions, decimals and percentages.

Summary of task

Students had completed a unit of work on number involving multiplying decimals by multiples of powers of ten. Students were given an open-ended task to relate their reasoning skills to answer the posed problem. Students were given one class lesson to complete the task.

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Number: Power

Sam says that when you multiply 7.32 x 100, the answer is 73 200 because you add 2 zeros.

Will says that can't be right and that the answer is 732 because the decimal place moves.

Is anybody correct?

How do you know who is right?

Will is Right

Can you try and multiply other decimals by 10, 100 and 1000 and find a pattern with the answers?

The pattern is when you x it by a tens number you move the decimal to the right for every zero.

What is the rule for multiplying decimals by powers of 10?

It moves the decimal to the right - eg. (8.98 x 10 = 79.7)

Why does this rule work?

?

Annotations

Writes the rule for multiplying by powers of 10.

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Number: Power

Can you prove that the rule works for any decimals?

0.078 × 100 = 7.8
0.089 × 10 = 0.89

What do you think might happen when you divide decimals by powers of 10?

You move the decimal to the left when dividing.

Is there a rule for dividing decimals by powers of 10?

You must move the decimal to the left.

Can you prove that your rule works for any decimals?

894 ÷ 10 = 89.4
883 ÷ 100 = 8.83
Keep going ...

How can you check if you are right?

You do the sum twice and see if you get the same answer.

Annotations

Writes the rule for dividing by powers of 10.

Applies the rule for dividing by powers of 10.

Offers a reasonable strategy to check a calculation.

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Year 6

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Number: How tall?

Year 6 Mathematics achievement standard

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

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Summary of task

Students had completed a unit of work on decimals and their connection to the metric system. They had solved problems involving length and area using decimals. Students were asked to use their reasoning skills combined with their mathematical knowledge to solve several problems. They were given one lesson to complete the task as an assessment at the end of the unit.

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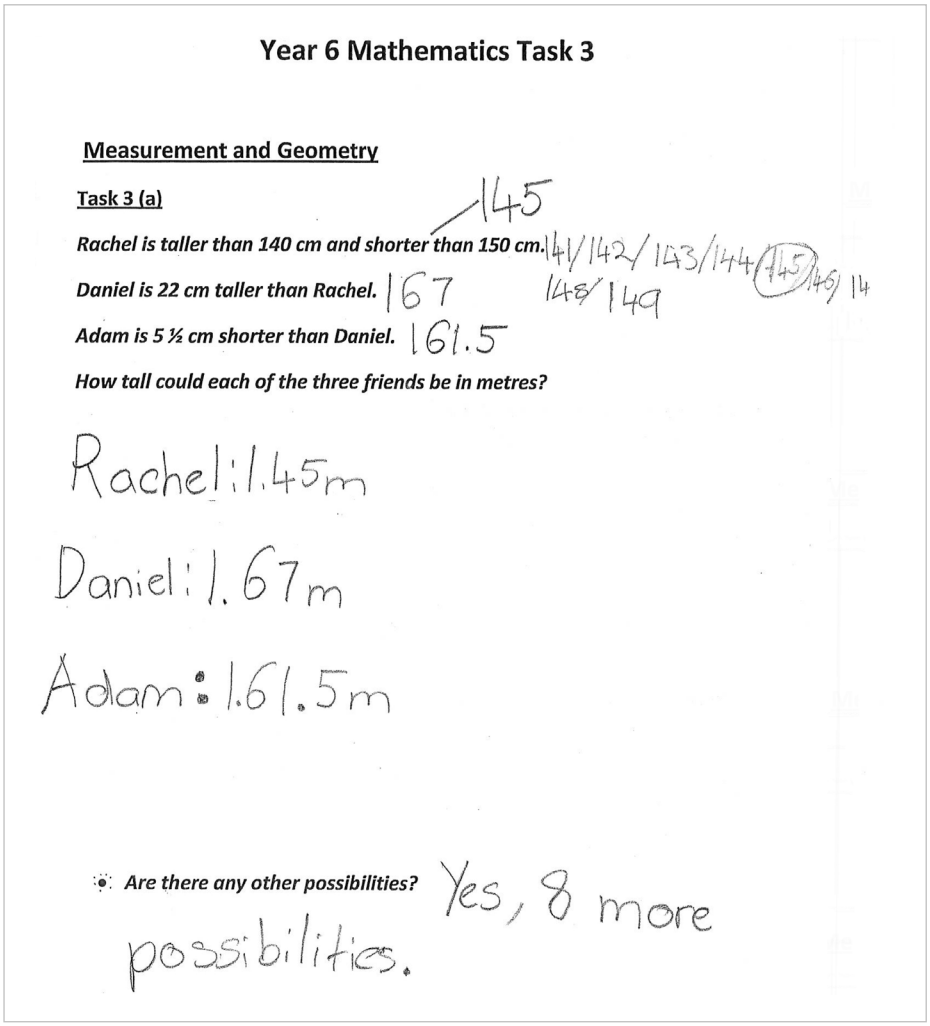
Number: How tall?



Year 6 Mathematics Task 3

Measurement and Geometry

Task 3 (a)

Rachel is taller than 140 cm and shorter than 150 cm. 145 141/142/143/144/145/146/147/148/149

Daniel is 22 cm taller than Rachel. 167

Adam is 5 ½ cm shorter than Daniel. 161.5

How tall could each of the three friends be in metres?

Rachel: 1.45m

Daniel: 1.67m

Adam: 1.61.5m

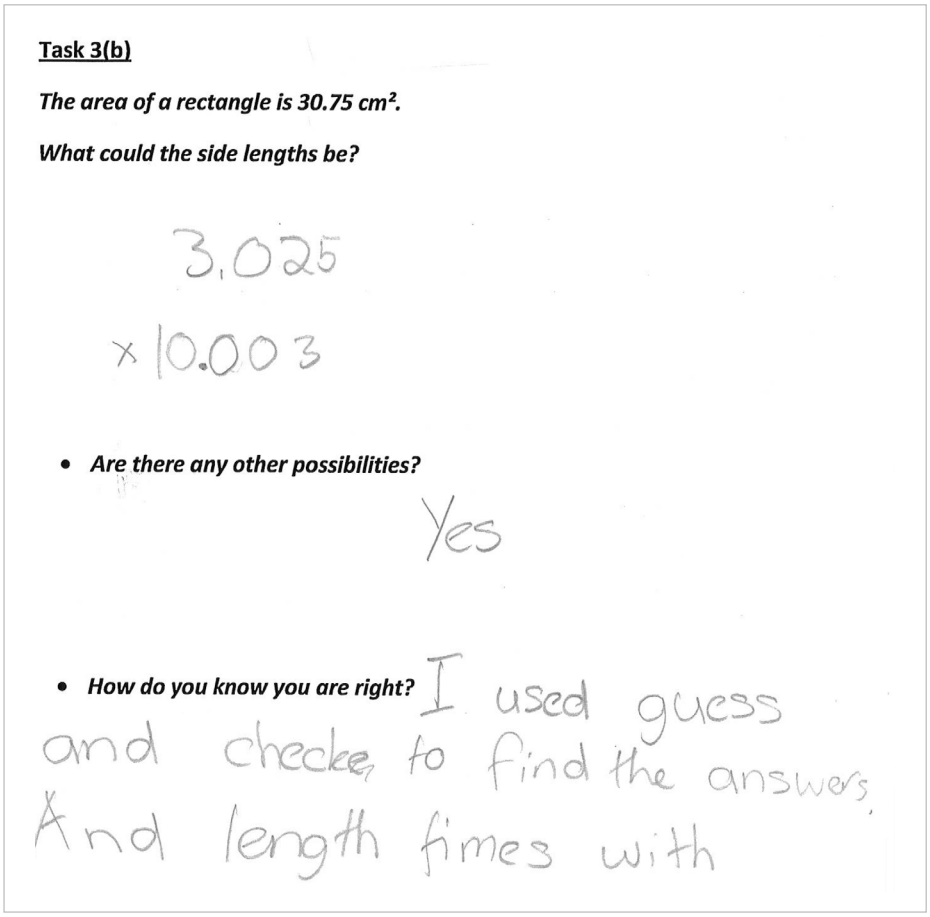
Are there any other possibilities? Yes, 8 more possibilities.

Annotations

Calculates answer to problem.

Identifies the number of possible answers.

Number: How tall?



Task 3(b)

The area of a rectangle is 30.75 cm².

What could the side lengths be?

3.025

× 10.003

- ***Are there any other possibilities?***

Yes

- ***How do you know you are right?*** I used guess and checke, to find the answers. And length times with

Annotations

Estimates the side lengths of the rectangle.

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Number: Abstract design

Year 6 Mathematics achievement standard

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Summary of task

Students had completed a unit of work on equivalent fractions, decimals and percentages. Students were asked to create an abstract design, dividing it into percentage parts and demonstrating a connection with fractions and decimals. Questions were written for the students to help them direct their mathematical thinking.

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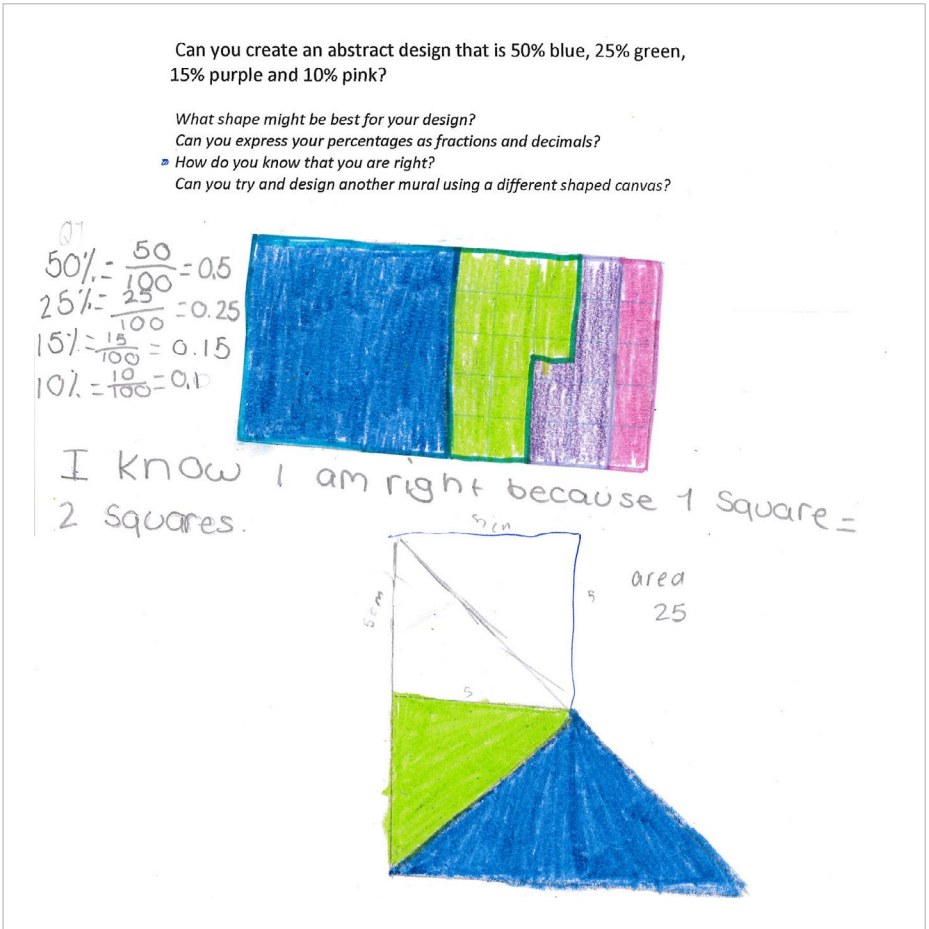
Number: Abstract design



Annotations

Represents percentages as fractions and decimals.

Uses grid squares to divide a common shape into percentages.

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Number: Fractions, decimals, percentages and integers

Year 6 Mathematics achievement standard

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Summary of task

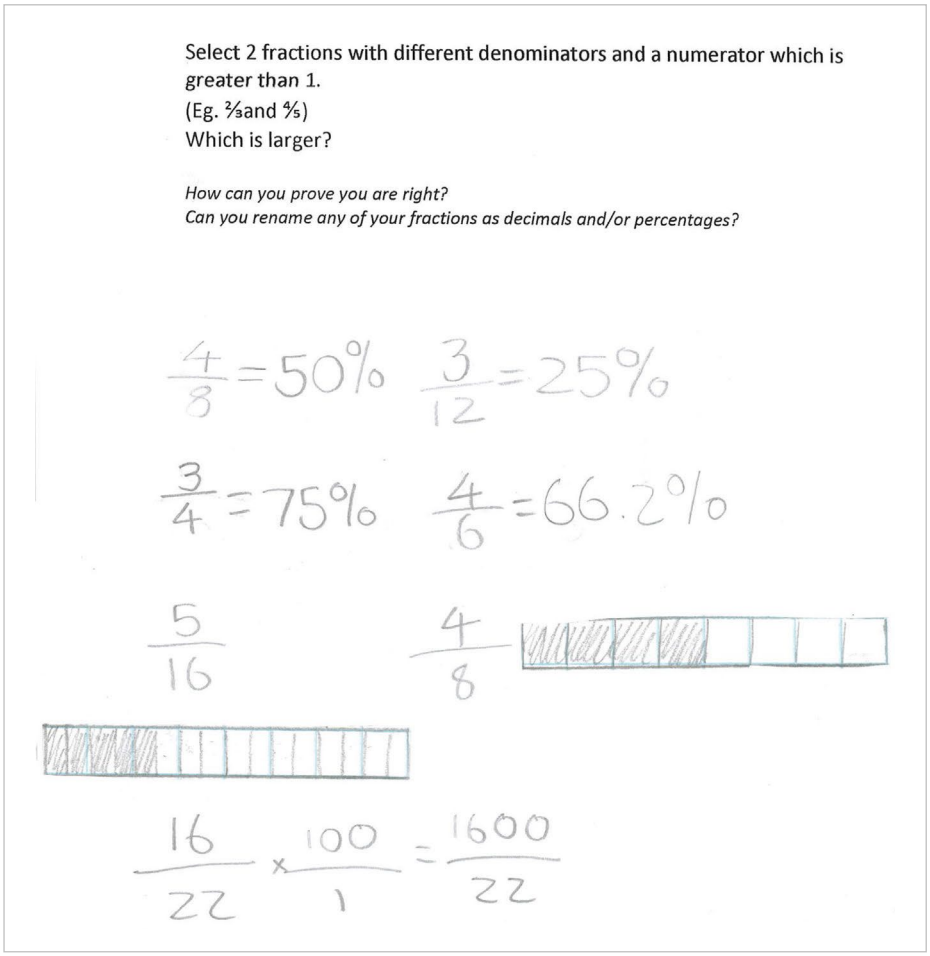
Students completed a unit of work on fractions, decimals, percentages and the connections between them. They also investigated positive and negative numbers in everyday contexts.

Students were given a task to assess their understanding that consisted of two parts:

Part 1: Select two fractions, determine which one has the larger value and explain why.

Part 2: Select three positive numbers and three negative numbers, place them on a number line and use <, >, = to create number sentences with them.

Number: Fractions, decimals, percentages and integers



Annotations

Represents fractions as percentages.

Draws diagrams to show fractions.

Attempts to convert a fraction into a percentage.

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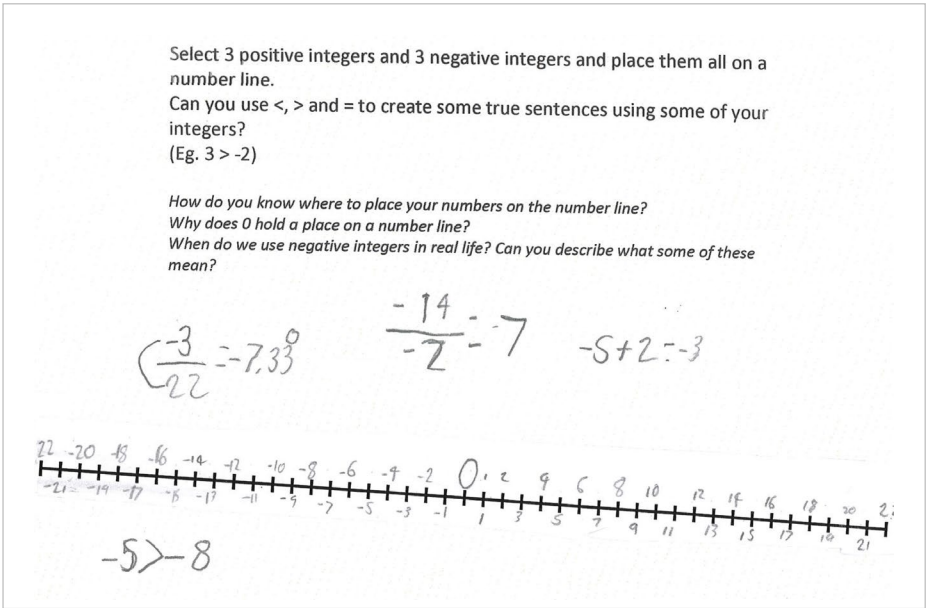
Number: Fractions, decimals, percentages and integers



Annotations

Records some number sentences using positive and negative numbers.

Constructs a number line with positive and negative integers.

Number: Fifth term

Year 6 Mathematics achievement standard

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

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Summary of task

Throughout the term students had completed several units of work, one on the addition and subtraction of fractions with different denominators and another on creating and identifying patterns in number sequences. Students were given the following question as an assessment of concepts at the end of both units of work:

> Kate created a subtraction pattern using fractions with different denominators. If the fifth term in Kate's pattern was 1, what could her pattern look like?

The teacher asked the following questions to guide students through their thinking and working:

- What is the rule for your pattern?
- How did you work it out?
- What other patterns can you create where 1 is the fifth term?
- Can you convert any of your fractions to decimals?

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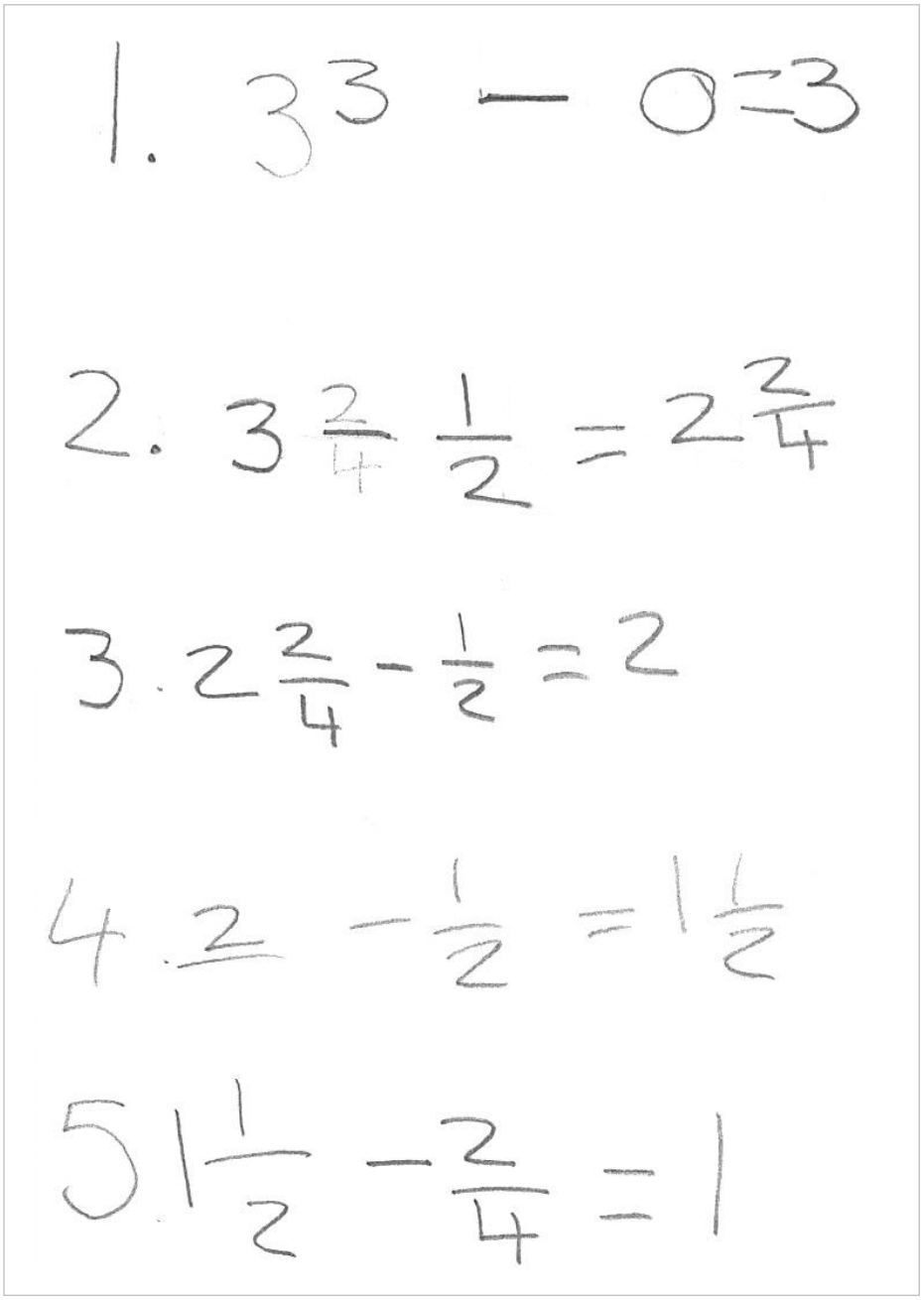
Number: Fifth term



Annotations

Creates a subtraction pattern involving mixed numbers and proper fractions with denominators that are multiples of two.

Uses a simple pair of equivalent fractions.

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Measurement: Area

Year 6 Mathematics achievement standard

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

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Summary of task

Students had started a unit of work on calculating the area of rectangles. The task was used to assess understanding during the unit so that it could be used to guide the next phase of teaching. The students were required to calculate the area of rectangles and explain their thinking when calculating an area that could be split into rectangles. The students were asked to complete the task in 10 minutes.

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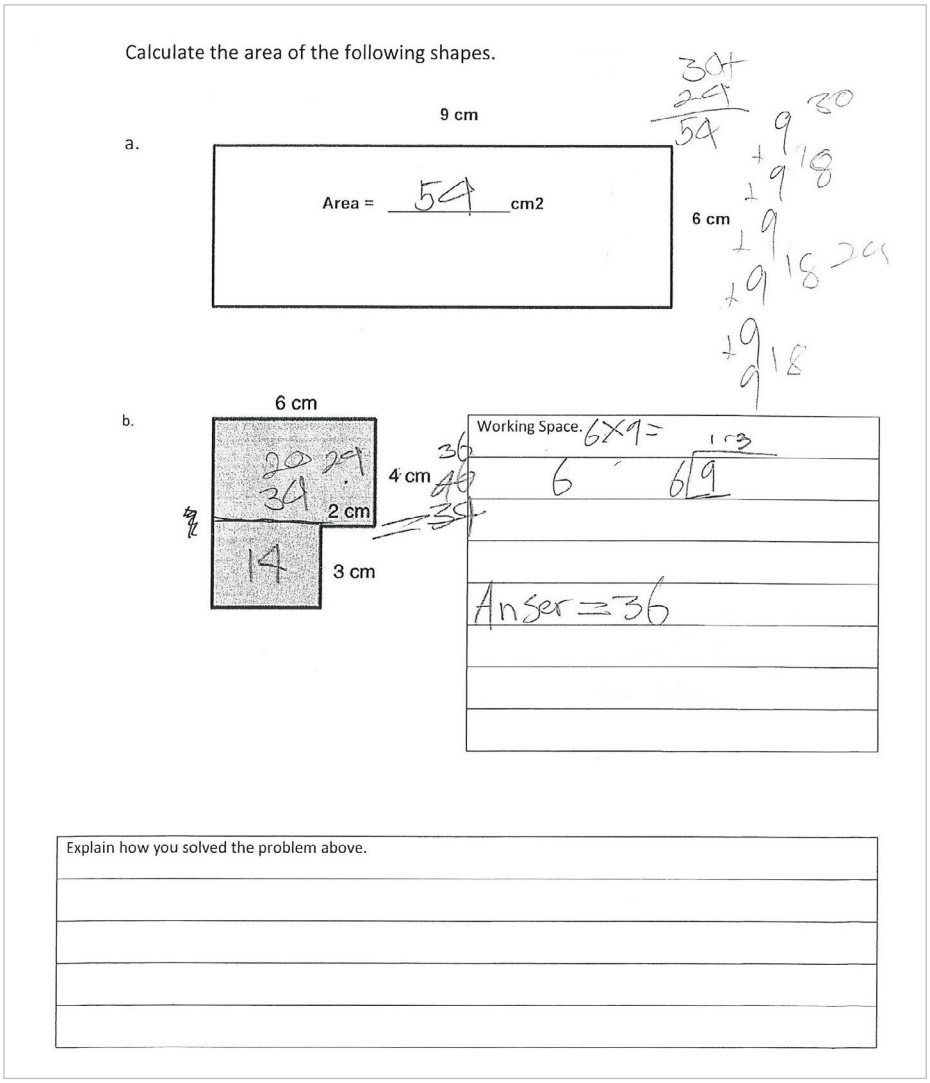
Measurement: Area



Annotations

Calculates the area of a rectangle.

Partitions a composite shape into rectangles in order to find its area but confuses area and perimeter.

Obtains the correct answer but is not able to show appropriate working or explain how to calculate the area of a composite shape.

Mathematics

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Number: Calculations

Year 6 Mathematics achievement standard

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Summary of task

Students had completed several units of work involving problem-solving with addition, subtraction, multiplication and division of whole numbers and decimals. Students on this occasion were given a formal pen and paper test that covered many of the concepts in the unit. They were required to estimate answers and demonstrate their thinking, using addition, subtraction, multiplication and division in single and multi-step problems.

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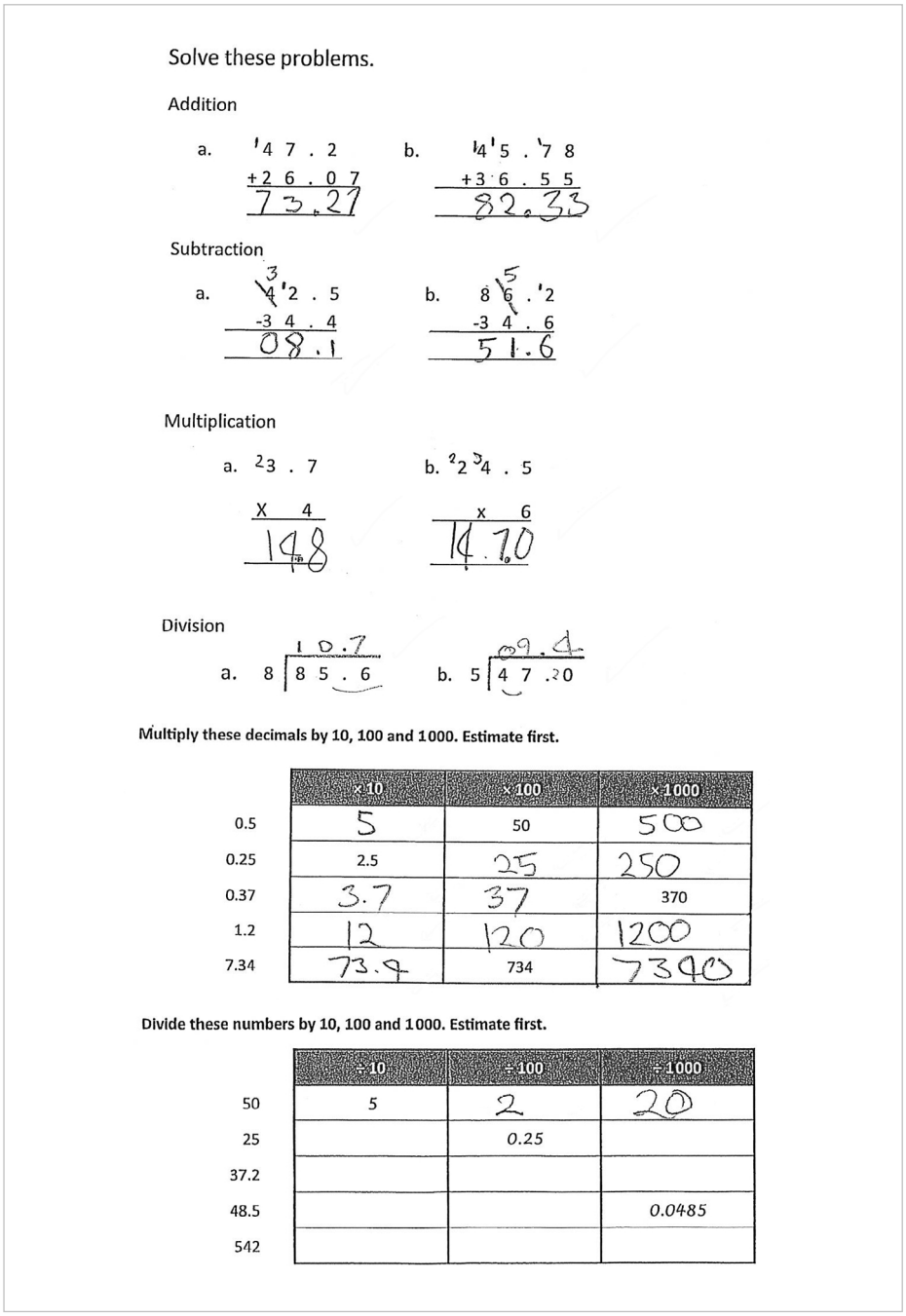
Number: Calculations



Solve these problems.

Addition

a. 47.2 + 26.07 = 73.27

b. 45.78 + 36.55 = 82.33

Subtraction

a. 42.5 − 34.4 = 08.1

b. 86.2 − 34.6 = 51.6

Multiplication

a. 23.7 × 4 = 148

b. 24.5 × 6 = 14.70

Division

a. 85.6 ÷ 8 = 10.7

b. 47.20 ÷ 5 = 09.4

Multiply these decimals by 10, 100 and 1000. Estimate first.

	×10	×100	×1000
0.5	5	50	500
0.25	2.5	25	250
0.37	3.7	37	370
1.2	12	120	1200
7.34	73.4	734	7340

Divide these numbers by 10, 100 and 1000. Estimate first.

	÷10	÷100	÷1000
50	5	2	20
25		0.25	
37.2			
48.5			0.0485
542			

Annotations

Calculates addition and subtraction problems involving decimals.

Calculates answers to problems involving the multiplication of decimals by whole numbers.

Calculates answers to problems involving the division of decimals by whole numbers.

Uses knowledge of powers of 10 to multiply decimals.

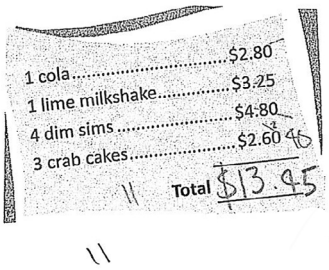
Number: Calculations

For the following operations you are required to complete three steps.

1. Estimate an answer and explain how you arrived at your estimate.
2. Calculate an answer.
3. Comment on whether your answer appears reasonable.

Addition

a.



My estimate is $13.50

How did you get your estimate?

I plused up the dolers than plused up . Some cens then gused

Is your answer reasonable? Explain yes I do think that it is reasonable because it's 5c off

Subtraction

b. What is the difference between 3.4 and 7.171?

My estimate is

How did you get your estimate?

Is your answer reasonable? Explain.

Annotations

Makes estimations.

Records the strategy in estimating.

Calculates the addition of numerous decimals.

Compares estimation and calculated answer and states the reasonableness of estimation.

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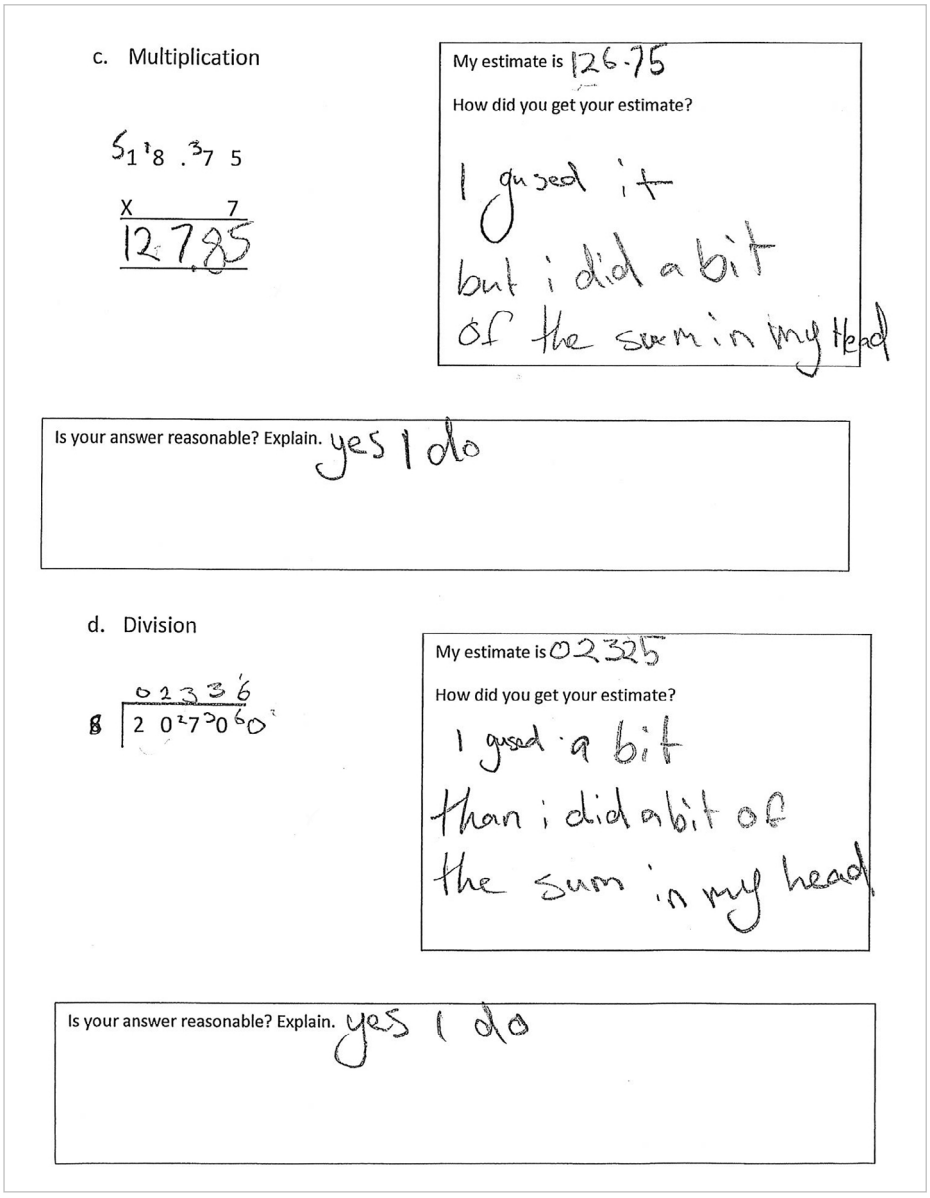
Number: Calculations



Annotations

Uses correct strategy to multiply deciimal by a single-digit whole number but makes errors.

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Number: Calculations

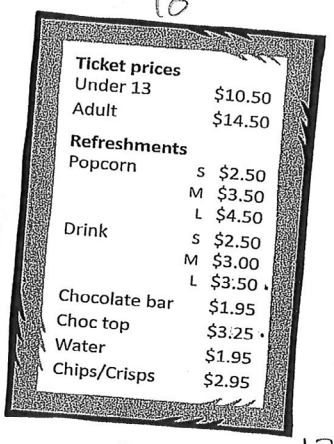
PART B: APPLICATION

$10.50
+ 10
10
10

You and your friends are going to the movies and it's your shout. Look at the price list below and use a multiplication strategy of your choice to answer the following questions. Show your thinking:

a How much will it cost you for 4 "Under 13" tickets?

$60



b Two of your friends each want a large drink and a medium popcorn. What will that cost you?

$10.50

c You and your other friend want a choc top and a large drink each. What will that cost?

$13.50

7 + 3 50 = 50c

12 +

d Halfway through the movie, you are all dying of thirst and you go out and buy 4 bottles of water. You pay for them with a $20 note. How much change do you receive?

Annotations

Attempts to use repeated addition to solve the problem.

Calculates the solution to an addition problem involving decimals.

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Geometry: 3D structure

Year 6 Mathematics achievement standard

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Summary of task

Students had completed a unit of work on shape that involved constructing nets, three-dimensional objects and identifying two-dimensional shapes within three-dimensional objects.

The task was given to the students the week after they had finished the unit of work to assess their knowledge of three-dimensional objects. Students were asked to construct the net of a prism and a pyramid and create the object using straws. This task took several lessons to complete.

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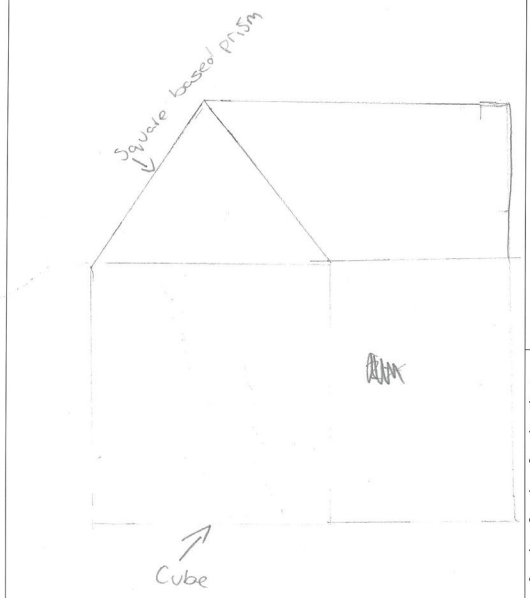
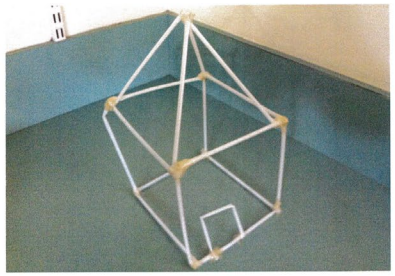
Geometry: 3D structure

Design and build a three dimensional structure

Design your structure here



Add a photo of your completed structure here



Describe the design features of your structure here

It's a house
It has 5 4 sides.
theres a cube at bottom

Annotations

Constructs a three-dimensional object using a prism and a pyramid.

Labels a cube accurately .

Mathematics

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Number: Percentages

Year 6 Mathematics achievement standard

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Summary of task

Students had completed several units of work on fractions, decimals and percentages. One component was to calculate percentages of whole numbers, typically using shopping items on sale. Students were given the task to complete during a lesson.

Number: Percentages

6. Explain how you would calculate 20% of 250.

10% of $250 is 25 so 25+25=50

7. Calculate the discounted prices for these items.

a 10% off $300 — $30, 2 $10 - 30, $270

b 25% off $200 — $ 100 50 1/4 50

c 75% off $120 — $

d 20% off $50 — $

e 50% off $60 — $30 1/2

Annotations

Uses reasoning and simple calculations to answer the question.

Equates a percentage with a fraction.

Geometry: Sam's square

Year 6 Mathematics achievement standard

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

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Summary of task

Students had completed a unit of work on integers and coordinates.

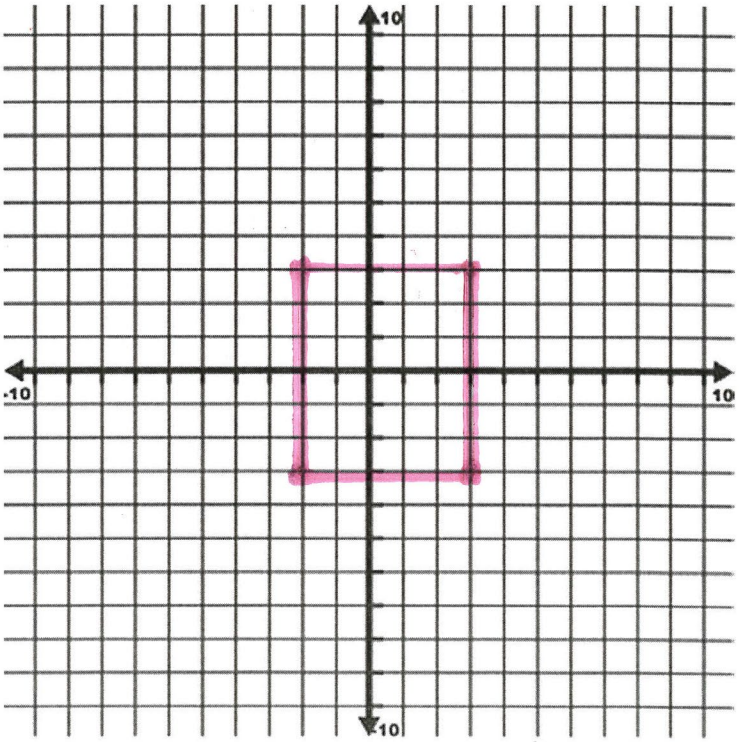
At the end of the unit they were given the task to complete during one lesson. Teacher questioning with task:

- Are there other possibilities?
- Is there a pattern in your answers?
- How will you record your responses?
- What if he created other types of quadrilaterals? What would the coordinates be?

Geometry: Sam's square

Sam plotted one point in each quadrant of a Cartesian plane. When he drew lines joining the points, they formed a square. What could the coordinates be?

they could be (3,3)(-3,3)(-3,-3)(3,-3)



Annotations

Calculates some correct coordinates for a rectangle on the Cartesian plane.

Draws a rectangle on the Cartesian plane.

Mathematics

Year 6

Below satisfactory

Statistics and probability: Spinner mania

Year 6 Mathematics achievement standard

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

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Summary of task

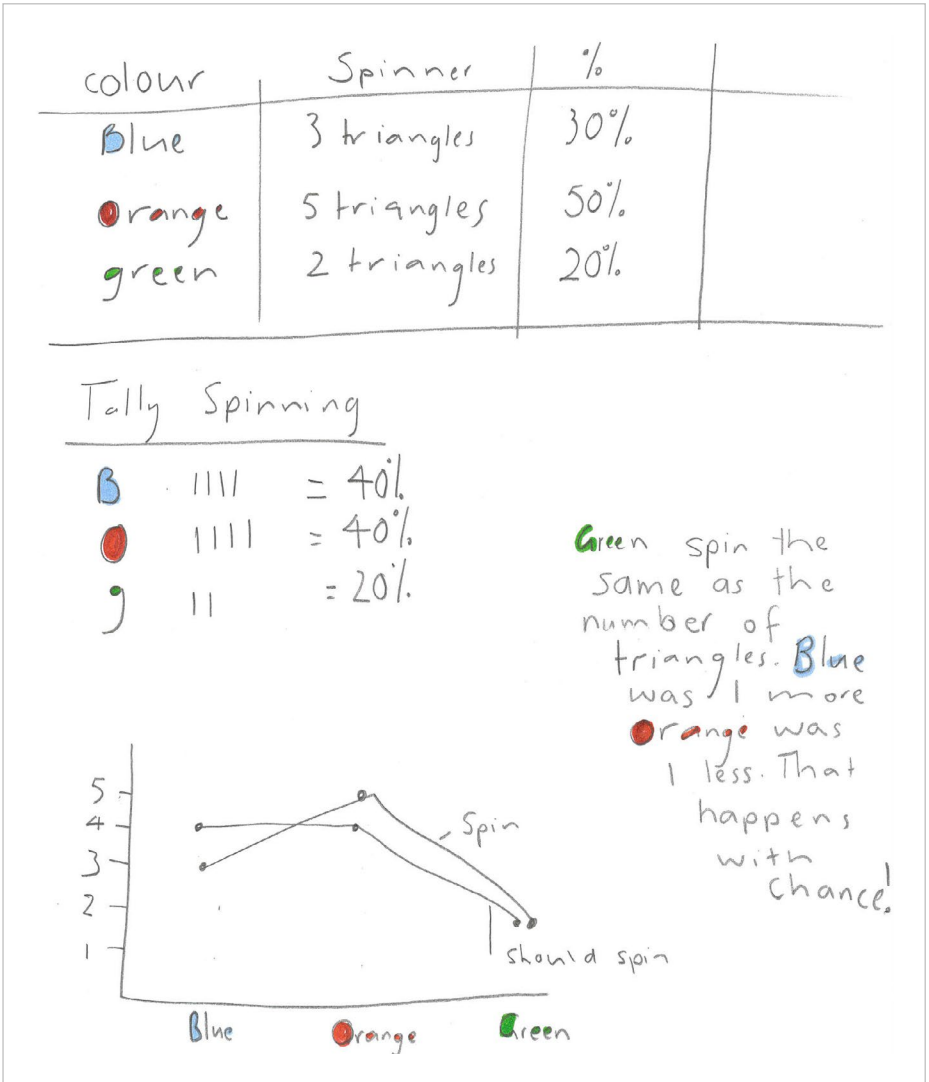
Students had completed lessons on relating probability to fractions, decimals and percentages so they could calculate the theoretical probability of an event occurring.

Students were asked to create a spinner using colours so that the colours had an unequal chance of occurring when it was spun. They were asked to calculate the probability of each colour being spun and then spin the spinner a number of times and record the observed frequency of each colour. Students were asked to graph the expected results and the observed results and then compare and explain any differences.

Mathematics

Year 6
Below satisfactory

Statistics and probability: Spinner mania



colour	Spinner	%
Blue	3 triangles	30%
Orange	5 triangles	50%
green	2 triangles	20%

Tally Spinning

B |||| = 40%
O |||| = 40%
G || = 20%

Green spin the same as the number of triangles. Blue was 1 more Orange was 1 less. That happens with Chance!

Annotations

Describes probability using percentages.

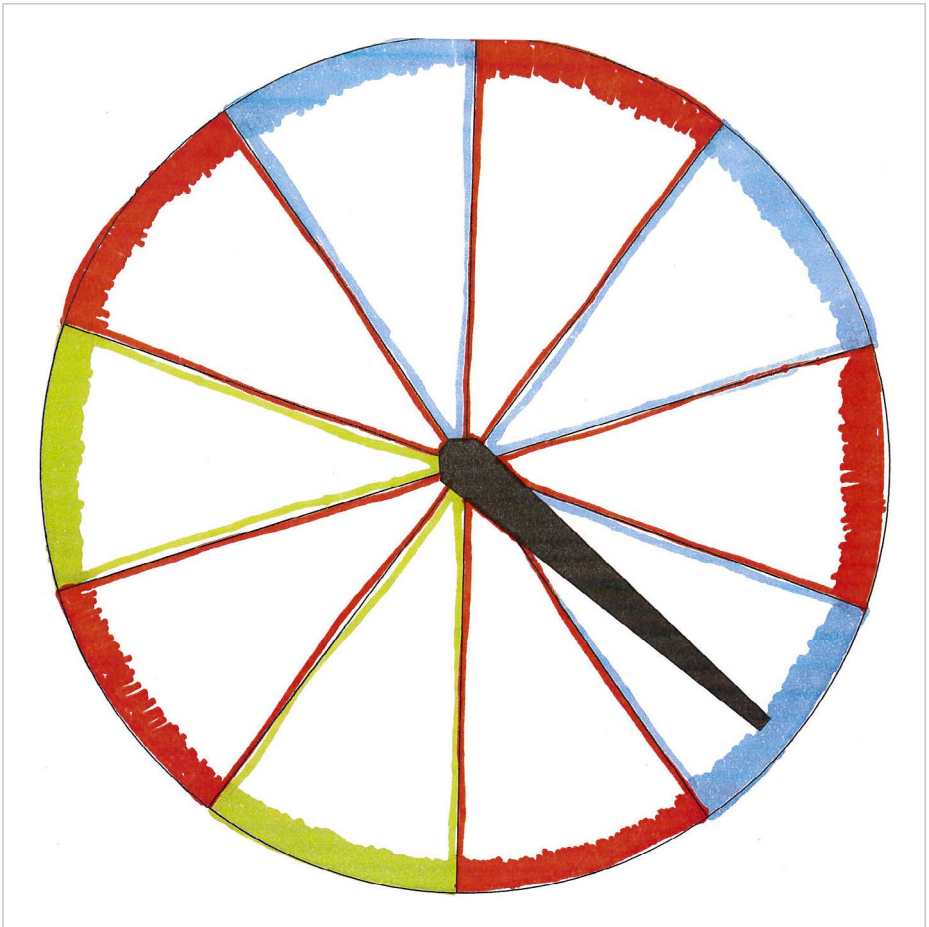
Calculates a percentage from the results of a chance experiment.

Describes the results of the chance experiment.

Mathematics

Year 6
Below satisfactory

Statistics and probability: Spinner mania



Annotations

Measurement: Fill it up

Year 6 Mathematics achievement standard

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Summary of task

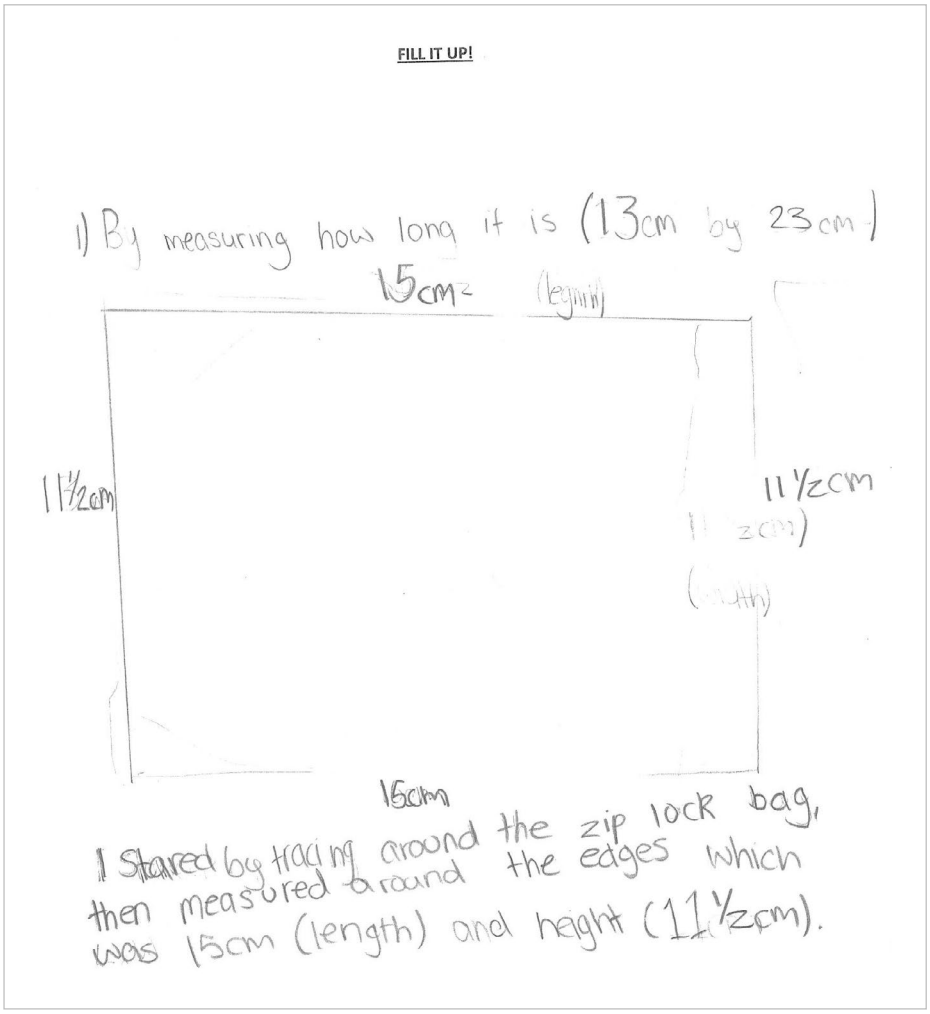
Students were asked to explain how to measure the capacity of a snap lock bag. When they had explained their reasoning, they were asked to measure the capacity and make a connection with volume.

Mathematics

Year 6

Below satisfactory

Measurement: Fill it up



Annotations

Measures the lengths of the sides of a snap lock bag in order to attempt to calculate the capacity.

Mathematics

Year 6

Below satisfactory

Number: Brackets and the order of operations

Year 6 Mathematics achievement standard

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Summary of task

Students had completed a unit of work on the order of operations and brackets. At the end of the unit, students were given an open-ended assessment task to demonstrate their understanding. The questions asked were:

- What different number sentences can you create that equal 35?
- Can you include brackets and order of operations in your number sentences?
- Can you explain the rules for the order of operations?
- Can you now try and create number sentences that equal 11?
- How do you know each of your number sentences is right?
- Can you use any decimals?

Number: Brackets and the order of operations

What different number sentences can you create that equal 35?

30 + 5 = 35

12 + 23 = 35

10 + 25 = 35

45 - 10 = 35

11 + 24 = 35

35 - 0 = 35

Can you include brackets and order of operations in your number sentences?

Yes

(1 x 5) + 30 = 35

Can you explain the rules for order of operations?

1 Do brackets

2 If no brackets then multiplication and division

3 Then addition and subtraction

Brackets Division Addition

Order Multiplication Subtraction

Can you now try and create number sentences that equal 11?

10 + 1 = 11

(11 x 1) + 0 = 11

How do you know each of your number sentences is right?

Because I can backtrack my working out or check it.

Can you use any decimals?

Yes

10.5 + 24.5 = 35

1.5 + 1.5 = 3

Annotations

Generates number sentences using addition and subtraction.

Writes one simple number sentence and uses brackets to indicate the order in which the operations must be performed.

Explains the order of operations.

Writes simple number sentences.

Explains a strategy to check that working is correct.

Adds decimals.

Mathematics

Year 6

Below satisfactory

Geometry: Understanding angles

Year 6 Mathematics achievement standard

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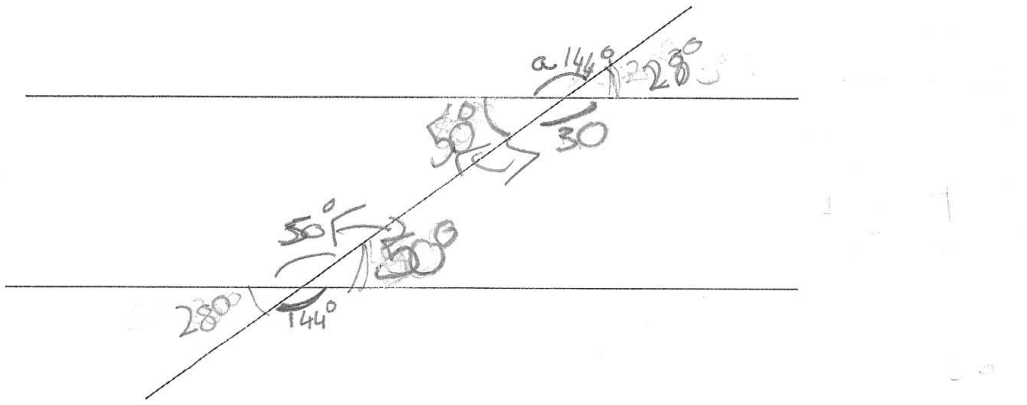
Summary of task

Students were given a diagram that consisted of a pair of parallel lines and another line that intersected the parallel lines. They were given the size of one of the angles formed and asked to calculate the size of all of the other angles without using measurement. They were asked to explain their reasoning.

Mathematics

Year 6
Below satisfactory

Geometry: Understanding angles



In the above diagram angle a= 144°. Can you, without a protractor, work out the size of all the other angles?

Please explain your reasons.

all the angles that are corsponds must be the same.

the angles must add up to 360°

Annotations

Identifies that angle a = 144°.

Attempts to calculate the size of an unknown angle.