

Mathematics

Year 6

Below Satisfactory

WORK SAMPLE PORTFOLIO

The 2012 portfolios are a resource to support teachers in planning and implementation of the Foundation to Year 10 Australian Curriculum in the learning area. Each portfolio comprises a collection of student work illustrating evidence of student learning in relation to the achievement standard. At every year level there are three portfolios illustrating satisfactory, above satisfactory and below satisfactory achievement in relation to the standard.

Each portfolio comprises a collection of different student work selected by state and territory nominees, and annotated and reviewed by classroom teachers and other curriculum experts. Each work sample in the portfolio varies in terms of how much time was available to complete the task and/or the degree of scaffolding provided by the teacher.

There is no pre-determined number of student work samples in a portfolio nor are they sequenced in any particular order. Together as a portfolio, the samples provide evidence of all aspects of the achievement standard unless otherwise specified.

As the Australian Curriculum is progressively implemented in schools, the portfolios will continue to be reviewed and enhanced in relation to their comprehensiveness in coverage of the achievement standard and their representation of the diversity of student work that can be used to highlight evidence of student learning.

THIS PORTFOLIO – Year 6 Mathematics

This portfolio comprises a number of work samples drawn from a range of assessment tasks, namely:

Sample 1	Number – Power
Sample 2	Number – How tall
Sample 3	Number – Abstract design
Sample 4	Number – My number line
Sample 5	Number – Fifth term
Sample 6	Geometry – Area
Sample 7	Number – Calculations
Sample 8	Geometry – 3D structure
Sample 9	Number – Percentages
Sample10	Geometry – Sam's square
Sample 11	Probability / Statistics – Spinner mania

This portfolio of student work demonstrates multiplying and dividing decimals by the power of 10 (WS1) and solving problems involving length and area using decimals (WS 2, WS 6). The student represents the same number as a fraction, decimal and percentage and locates fractions, decimals and percentages on number lines, calculates a fraction of a quantity and describes the use of fractions in everyday life (WS 3, WS 4). The student creates a sequence using whole numbers and fractions and explains the rule (WS 5), they calculate number sentences using whole numbers and decimals using all four operations involving brackets and order of operations (WS 7). The student draws nets and constructs a prism and a pyramid (WS 8) and plots a square on a Cartesian plane (WS10). The student uses reasoning to report probability using fractions, percentages and decimals (WS11) and calculates percentages of sale items (WS9).

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The annotated samples in this portfolio provide evidence of most (but not necessarily all) aspects of the achievement standard. The following aspects of the achievement standard are not evident in this portfolio:

- *recognise the properties of prime, composite, square and triangular numbers*
- *make connections between capacity and volume*
- *interpret timetables*
- *describe combinations of transformations*
- *solve problems using the properties of angles*
- *evaluate secondary data displayed in the media.*

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Number – Power

Relevant parts of the achievement standard

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.

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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 7.32×100 , 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 \times 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. $(8.98 \times 10 = 79.7)$

Why does this rule work?

?

Annotations

Writes the rule for multiplying by powers of 10.

Acknowledgement

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Number – Power

Can you prove that the rule works for any decimals?

$$0.078 \times 100 = 7.8$$

$$0.089 \times 10 = 0.89$$

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?

$$894 \div 10 = 89.4$$

$$883 \div 100 = 8.83$$

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.

Acknowledgement

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Number – How tall

Relevant parts of the achievement standard

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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.

Daniel is 22 cm taller than Rachel.

Adam is $5\frac{1}{2}$ cm shorter than Daniel.

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?

possibilities.

Yes, 8 more

Annotations

Calculates answer to problem.

Identifies the number of possible answers.

Acknowledgement

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Number – How tall

Task 3(b)

The area of a rectangle is 30.75 cm^2 .

What could the side lengths be?

$$\begin{array}{r} 3.025 \\ \times 10.003 \\ \hline \end{array}$$

- Are there any other possibilities?

Yes

- How do you know you are right?

I used guess and check to find the answers. And length times with

Annotations

Estimates the side lengths of the rectangle.

Acknowledgement

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Number – Abstract design

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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

Can you create an abstract design that is 50% blue, 25% green, 15% purple and 10% pink?

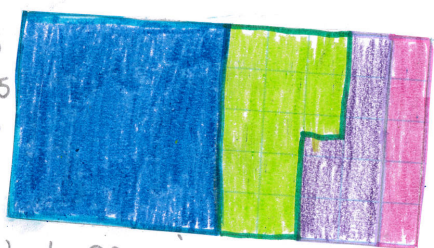
What shape might be best for your design?

Can you express your percentages as fractions and decimals?

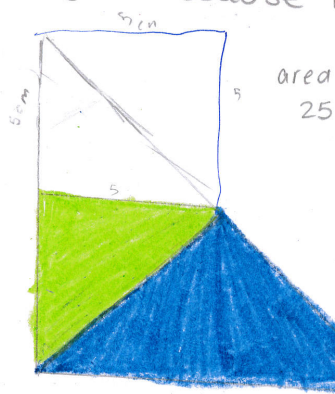
• How do you know that you are right?

Can you try and design another mural using a different shaped canvas?

$$\begin{aligned} 50\% &= \frac{50}{100} = 0.5 \\ 25\% &= \frac{25}{100} = 0.25 \\ 15\% &= \frac{15}{100} = 0.15 \\ 10\% &= \frac{10}{100} = 0.1 \end{aligned}$$



I know I am right because 1 Square = 2 Squares.



Annotations

Represents percentages as fractions and decimals.

Uses grid squares to divide a common shape into percentages.

Acknowledgement

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Number – My number line

Relevant parts of the achievement standard

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Summary of task

Students completed a unit of work on fractions, decimals, percentages and their connection and positive and negative numbers in every day contexts.

Students were given two tasks at the culmination of the unit to assess their understanding. The students were also asked to reflect on fractions and to explain how to calculate a fraction of a quantity.

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Number – My number line

Select 2 fractions with different denominators and a numerator which is greater than 1.

(Eg. $\frac{7}{4}$ and $\frac{3}{2}$)

Which is larger?

How can you prove you are right?

Can you rename any of your fractions as decimals and/or percentages?

Repeat a number of times.

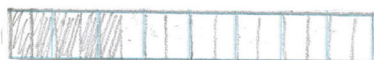
Can you order all of your fractions, decimals and percentages on a number line?

$$\frac{4}{8} = 50\% \quad \frac{3}{12} = 25\%$$

$$\frac{3}{4} = 75\% \quad \frac{4}{6} = 66.2\%$$

$$\frac{5}{16}$$

$$\frac{4}{8}$$



$$\frac{16}{22} \times \frac{100}{1} = \frac{1600}{22}$$

Annotations

Represents fractions as percentages.

Draws diagrams to show fractions.

Identifies the rule in calculating percentages.

Acknowledgement

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Number – My number line

Select 3 positive integers and 3 negative integers and place them all on a number line.

Can you use $<$, $>$ and $=$ to create some true sentences using some of your integers?

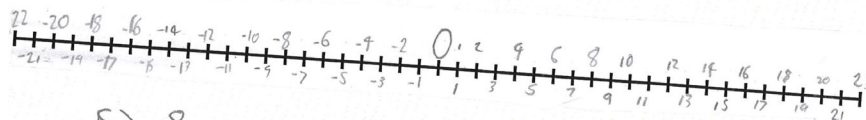
(Eg. $3 > -2$)

How do you know where to place your numbers on the number line?

Why does 0 hold a place on a number line?

When do we use negative integers in real life? Can you describe what some of these mean?

$$\left(\frac{-3}{22} = -7,33\right) \quad \frac{-14}{-2} = 7 \quad -5 + 2 = -3$$



$$-5 > -8$$

Annotations

Records some number sentences using positive and negative numbers.

Constructs a number line with positive and negative integers.

Acknowledgement

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Number – Fifth term

Relevant parts of the achievement standard

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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

$$1. \quad 33 - 0 = 33$$

$$2. \quad 3\frac{2}{4} - \frac{1}{2} = 2\frac{2}{4}$$

$$3. \quad 2\frac{2}{4} - \frac{1}{2} = 2$$

$$4. \quad 2 - \frac{1}{2} = 1\frac{1}{2}$$

$$5. \quad 1\frac{1}{2} - \frac{2}{4} = 1$$

Annotations

Creates a simple subtraction pattern using fractions to make the fifth term equal one.

Acknowledgement

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Geometry – Area

Relevant parts of the achievement standard

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Summary of task

Students had completed a unit of work on area of rectangles and compound shapes. The task was a mini assessment to guide the next phase of teaching for the students for the remainder of the unit of work. The students were required to calculate the area of rectangles and explain their thinking when calculating the area of a compound shape. The students were asked to complete the task in 20 minutes.

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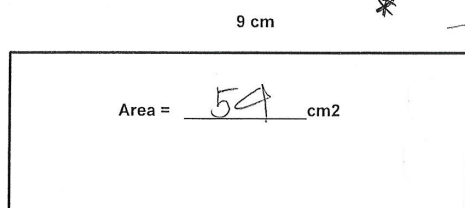
Year 6

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Geometry – Area

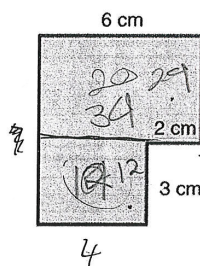
3. Calculate the area of the following shapes.

a.



6 cm

b.



Working Space. $6 \times 9 =$

36	1 3
6	6 9
Answer = 36	

Explain how you solved the problem above.

Annotations

Calculates the area of simple shapes.

Acknowledgement

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Number – Calculations

Relevant parts of the achievement standard

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Summary of task

Students had completed several units of work involving problem solving of 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 additions, subtraction, multiplication and division in single and multi-step problems.

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Number – Calculations

PART A KNOWLEDGE AND UNDERSTANDING

Solve these problems.

Addition

a.
$$\begin{array}{r} 47.2 \\ + 26.07 \\ \hline 73.27 \end{array}$$

b.
$$\begin{array}{r} 45.78 \\ + 36.55 \\ \hline 82.33 \end{array}$$

Subtraction

a.
$$\begin{array}{r} 42.5 \\ - 34.4 \\ \hline 08.1 \end{array}$$

b.
$$\begin{array}{r} 86.2 \\ - 34.6 \\ \hline 51.6 \end{array}$$

Multiplication

a.
$$\begin{array}{r} 23.7 \\ \times 4 \\ \hline 148.8 \end{array}$$

b.
$$\begin{array}{r} 224.5 \\ \times 6 \\ \hline 1470 \end{array}$$

Division

a.
$$8 \overline{) 85.6} = 10.7$$

b.
$$5 \overline{) 47.20} = 9.4$$

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

	$\times 10$	$\times 100$	$\times 1000$
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.

	$\div 10$	$\div 100$	$\div 1000$
50	5	2	20
25		0.25	
37.2			
48.5			0.0485
542			

Annotations

Uses knowledge of powers of 10 to multiply decimals.

Calculates division problems of decimals using whole numbers.

Calculates multiplication problems of decimals with whole numbers.

Calculates addition and subtraction problems with decimals.

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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.

1 cola.....	\$2.80
1 lime milkshake.....	\$3.25
4 dim sims.....	\$4.80
3 crab cakes.....	\$2.60
Total	\$13.45

My estimate is \$13.50

How did you get your estimate?

I plused up the dollars
than plused up
some cents then gused

Is your answer reasonable? Explain

yes I do think that it
is reasonable because its 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

c. Multiplication

$$\begin{array}{r} 51'8.375 \\ \times 7 \\ \hline 12.785 \end{array}$$

My estimate is 126.75
How did you get your estimate?

I guessed it
but i did a bit
of the sum in my head

Is your answer reasonable? Explain. yes i do

d. Division

$$\begin{array}{r} 0.2336 \\ 8 \overline{) 20.72060} \end{array}$$

My estimate is 0.2325
How did you get your estimate?

I guessed a bit
than i did a bit of
the sum in my head

Is your answer reasonable? Explain. yes i do

Annotations

Uses correct strategy to multiply however
with errors.

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Number – Calculations

PART B: APPLICATION

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

- 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?

Ticket prices	
Under 13	\$10.50
Adult	\$14.50
Refreshments	
Popcorn	S \$2.50 M \$3.50 L \$4.50
Drink	S \$2.50 M \$3.00 L \$3.50
Chocolate bar	\$1.95
Choc top	\$3.25
Water	\$1.95
Chips/Crisps	\$2.95

$$\begin{array}{r} \$10.50 \\ + 10 \\ + 10 \\ + 10 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ + 350 \\ + 1250 \\ \hline \end{array}$$

Annotations

Attempts to use repeated addition to solve the problem.

Calculates an addition problem using decimals.

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Geometry – 3D structure

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Summary of task

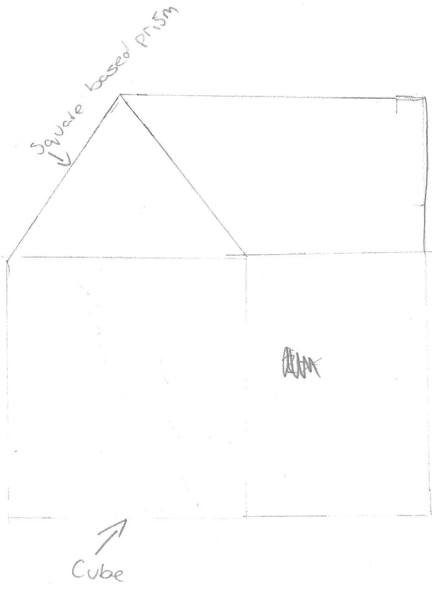
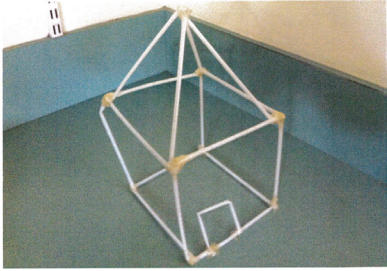
Students had completed a unit of work on shape that involved constructing nets, three-dimensional shapes and identifying two-dimensional shapes within a three-dimensional shape. The task was given to the students a week after they had finished the unit of work to assess their knowledge of three-dimensional shapes. Students were asked to construct the net of a prism and a pyramid and create the object using straws. This task took several class lessons to complete.

Mathematics

Year 6
Below Satisfactory

Geometry – 3D structure

Design and build a three dimensional structure

<p>Design your structure here</p> 	<p>Add a photo of your completed structure here</p>  <p>Describe the design features of your structure here</p> <p>It's a house</p> <p>It has 4 sides.</p> <p>there's a cube at bottom</p>
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Annotations

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

Labels a cube accurately .

Acknowledgement

ACARA acknowledges the contribution of Australian teachers and education authorities in providing the tasks and work samples. The annotations are referenced to the Australian Curriculum achievement standards.

Mathematics

Year 6

Below Satisfactory

Number – Percentages

Relevant parts of the achievement standard

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 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 class lesson.

Mathematics

Year 6

Below Satisfactory

Number – Percentages


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


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


Annotations


Uses reasoning and simple calculations to answer the question.


7. Calculate the discounted prices for these items.

a 10% off  \$300
\$30
2 \$100 - 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

Equates a percentage with a fraction.

Acknowledgement

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Mathematics

Year 6

Below Satisfactory

Geometry – Sam's square

Relevant parts of the achievement standard

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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 class lesson.

Mathematics

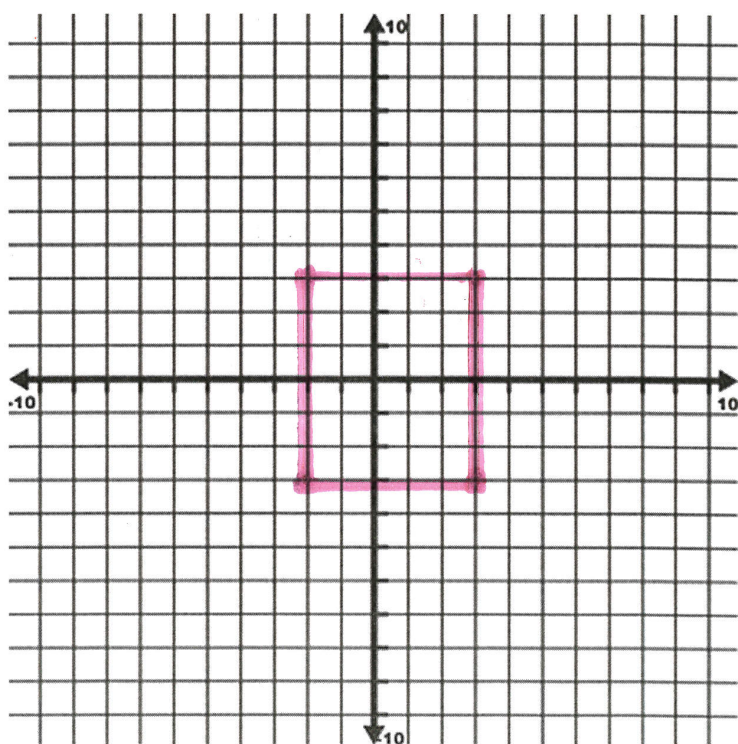
Year 6

Below Satisfactory

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.

Acknowledgement

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Mathematics

Year 6

Below Satisfactory

Probability / Statistics – Spinner mania

Relevant parts of the achievement standard

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.

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Summary of task

Students had completed lessons on relating probability to fractions, decimals and percentages so they could predict a mathematical chance of an event occurring.

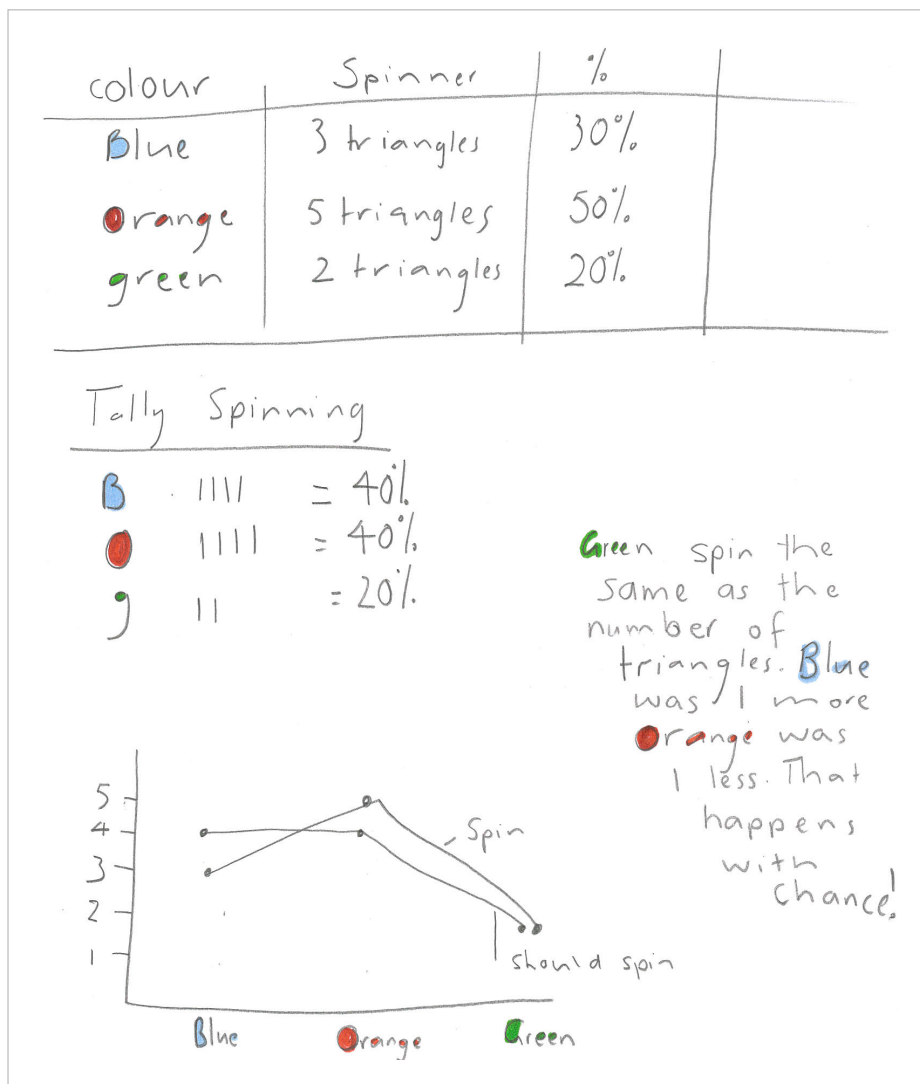
Students had to create a spinner with colours that would give an unfair chance of colours occurring when spun. They had to calculate the mathematical chance of colours being spun and then spin the spinner a number of times and record the actual times colours were spun. Students were asked to graph the expected and actual results and then compare and explain the results.

Mathematics

Year 6

Below Satisfactory

Probability / Statistics – Spinner mania



Annotations

Describes probability using percentages.

Calculates a percentage from the results of a chance event.

Describes the results of the chance event.

Acknowledgement

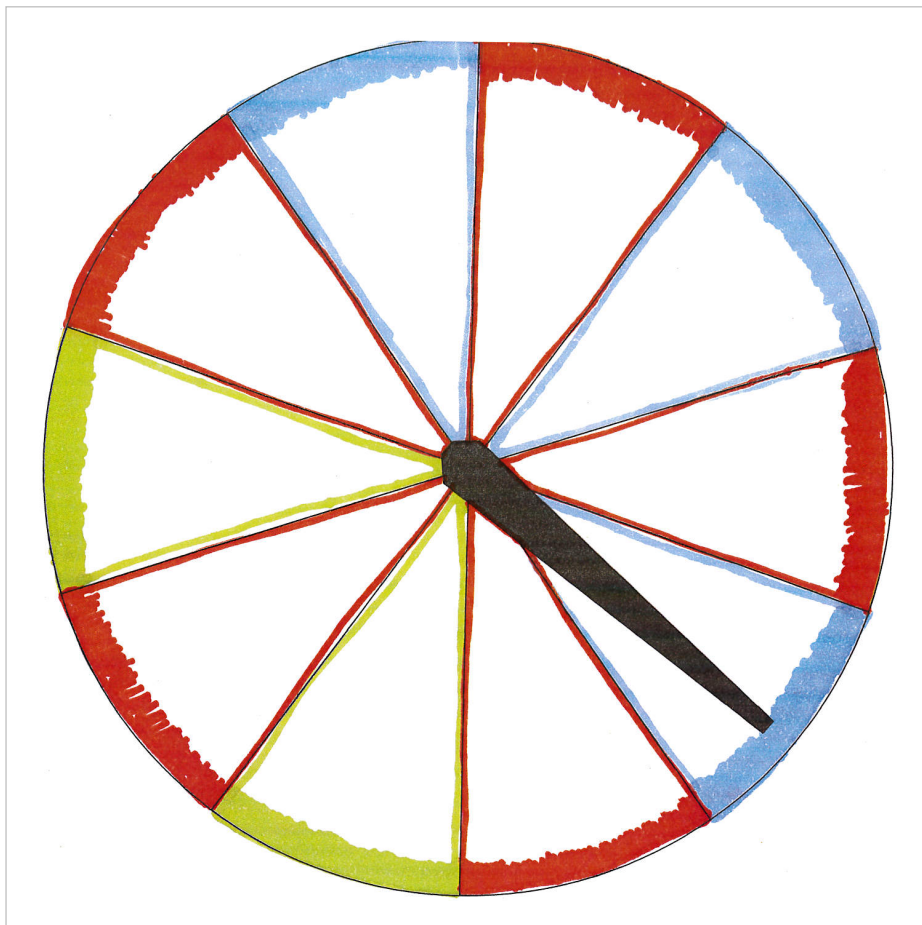
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Mathematics

Year 6

Below Satisfactory

Probability / Statistics – Spinner mania



Annotations

Acknowledgement

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