Mathematics

Year 7
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 7 MATHEMATICS

This portfolio provides the following student work samples:

Sample 1	Number and algebra: Algebra and the Cartesian plane
Sample 2	Number: Integers
Sample 3	Number: Indices
Sample 4	Geometry: Geometry Review
Sample 5	Geometry: Emily's castle
Sample 6	Geometry: Build the structure
Sample 7	Statistics and probability: Assessment task
Sample 8	Measurement: Measurement investigation

This portfolio of student work represents numbers using variables, connects the laws and properties for numbers to algebra and evaluates algebraic expressions after numerical substitution (WS1). They represent authentic information using linear models, and represent and plot points on the Cartesian plane (WS1). They use formulas for the area of rectangles and the volume of rectangular prisms (WS8). The student solves problems involving the comparison, addition and subtraction of integers (WS2).

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They interpret different views of three-dimensional objects (WS5, WS6). They use index notation to represent the prime factorisation of whole numbers and recognise the relationship between perfect squares and square roots (WS3). They classify triangles and describe quadrilaterals, solve simple numerical problems in geometry, including those involving angles formed by transversals crossing pairs of parallel lines (WS4). The student determines the sample space for simple experiments with equally likely outcomes and assigns probabilities to those outcomes (WS7). They construct stem-and-leaf plots and dot plots, calculate the mean, mode, median and range for data sets and interpret these statistics in the context of the data (WS7).

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Number and algebra: Algebra and the Cartesian plane

Year 7 Mathematics achievement standard

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

> *By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.*
>
> *Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.*

Summary of task

Students had completed units of work on algebra and the Cartesian plane. The task consisted of a series of written questions on the topic and students were asked to complete the task under test conditions in a lesson.

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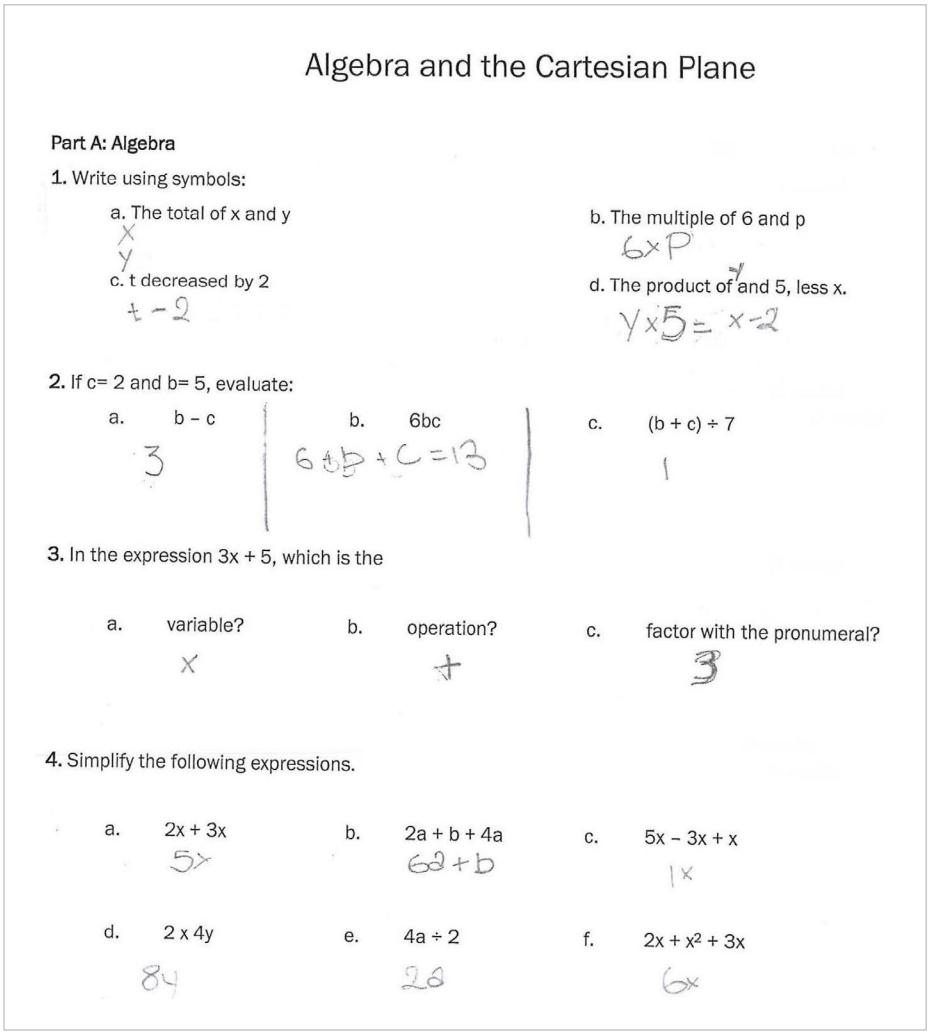
Number and algebra: Algebra and the Cartesian plane



Algebra and the Cartesian Plane

Part A: Algebra

1. Write using symbols:

a. The total of x and y

x
y

b. The multiple of 6 and p

6×P

c. t decreased by 2

t − 2

d. The product of y and 5, less x.

y×5 = x−2

2. If c= 2 and b= 5, evaluate:

a. b − c

3

b. 6bc

6+5+C=13

c. (b + c) ÷ 7

1

3. In the expression 3x + 5, which is the

a. variable?

x

b. operation?

+

c. factor with the pronumeral?

3

4. Simplify the following expressions.

a. 2x + 3x

5x

b. 2a + b + 4a

6a+b

c. 5x − 3x + x

1x

d. 2 x 4y

8y

e. 4a ÷ 2

2a

f. 2x + x² + 3x

6x

Annotations

Demonstrates some understanding of mathematical terminology when writing algebraic representations of word phrases.

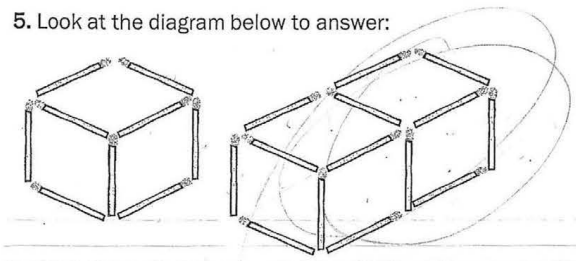
Substitutes given values for variables to evaluate some simple algebraic expressions correctly.

Distinguishes between variables, their coefficients and operations.

Simplifies some algebraic expressions but does not always collect like terms correctly.

Number and algebra: Algebra and the Cartesian plane

5. Look at the diagram below to answer:



a.

Draw up a table showing number of shapes and number of matches used.

Shapes	1	2	3	4	5	6	7	8
matches	4	8	12	16	20	24	28	32

b.

Select pronumerals to stand for the two variables and express the rule in algebraic form.

$y = 4x$

c.

Calculate from the rule the number of matches needed to form 15 shapes.

$15 = 60$

d.

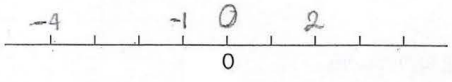
Find by substitution in the rule how many shapes can be formed from 49 matches.

12 and 1 left over.

PART B: The Cartesian Plane

1. Graph the set of numbers onto the number line given

{2, -1, -4, 0}



2. Penny checks her bank account balance and it reads $ - 240.00 .

a. What does this mean for Penny? She has lost money.

b. If she deposits $40, what is her new balance? -200.00

Annotations

Constructs a table of values to record a number pattern but does not use the intended number pattern.

Writes a rule to represent the pattern in the table of values but does not define what each variable represents.

Substitutes into own rule to obtain the number of matches required for a given number of shapes.

Uses own rule to obtain the number of shapes for a given number of matches.

Locates integers on a number line.

Solves a simple problem involving integers.

Number and algebra: Algebra and the Cartesian plane

3. Using the number plane below, write the coordinates for the following letters:

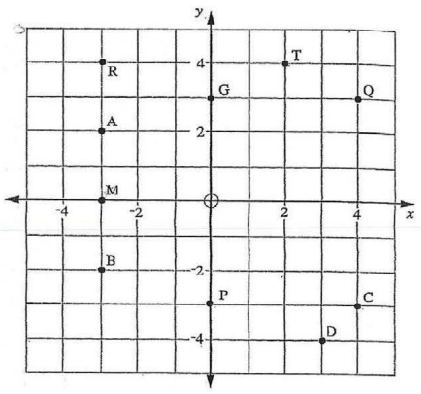
a. T 2, 4

b. A -3, 2

c. C 4, -3

d. P 0, 3

e. M -3, 0

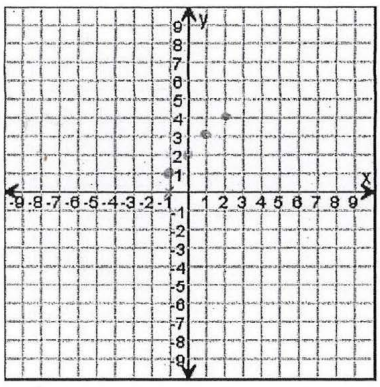


4. a. Complete the table of values using the rule given

$y = x + 2$

x	-1	0	1	2
y	1	2	3	4

b. Plot these coordinates on the grid below to graph the straight line



Annotations

States the coordinates of points on the Cartesian plane but does not use use the mathematical convention of brackets.

Uses an algebraic rule to complete a table of values.

Plots points on the Cartesian plane.

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Number: Integers

Year 7 Mathematics achievement standard

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

By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.

Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.

Summary of task

Students were asked to complete a quiz in class after completing a revision of integers and their application in authentic situations.

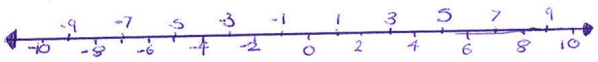
Number: Integers

Integers

Integers are all of the positive and negative whole numbers including zero.

A number line is very useful when working with integers.

1. Draw a number line from -10 to +10



As you move right along the number line, the numbers ascend or get larger.

2. Arrange the following integers in ascending order:

   a. 8, -3, 6, 0, 2, -4, -7

   -7, -4, -3, 0, 2, 6, 8

   b. 34, 23, -6, 4, -65, 3, -63

   -65, -63, -6, 3, 4, 23, 34

3. Samantha was keeping score for a card game she and her friends were playing. The scores are listed below. Rank each player according to their score from lowest score to highest score.

   Jack -100, Josh 200, Casey -500, Claire –50, Chris 1500, Blake 1600 and Lara -10

   -500, -100, -50, -10, 200, 1500, 1600

4. Write '>' or '<' to make the following statements correct.

   a. -32 __>__ -35

   b. 0 __>__ -4

   c. -7 __>__ -10

   d. 12 __>__ -29

Adding and Subtracting Integers

ADDITION

-2 + (-3) = **-5**

2 negatives plus 3 negatives equals 5 negatives.

5. The above example shows you the result of -2 + (-3). What addition rule do you learn from the above example? You plus -2 and -3 together and because it is negative 3 you turn the plus to a take away and you get -5.

Annotations

Constructs a number line showing positive and negative integers.

Orders integers from smallest to largest.

Compares integers using mathematical symbols.

Demonstrates understanding of the effect of adding two negative integers together.

Number: Integers

6. Calculate the following using a number line.

a. -7 + 5 = -2
b. 4 + (-8) = -4
c. -24 + 34 = 10
d. -8 + 8 = 0
e. 11 + (-6) = 5
f. -7 + (-10) = -17
g. 5 + (-5) = 0
h. -6 + 7 + (- 4) = -3

SUBTRACTION

When you subtract integers, think of the problem as 'take – away'.

-4 – (-2) = **-2**

4 negatives take away 2 negatives equals 2 negatives.

-	-	-	-	- (take – away)	-	-	=	-	-

7. The above example shows you the result of -4 – (-2). What subtraction rule do you learn from the above example? 2 -s turn into a plose.
thats how it is -2.

8. Calculate the following using a number line.

a. 6 – (-5) = 11
b. 18 – (-10) = 28
c. -3 – (-3) = 0
d. -2 – (-13) = 11
e. 6 – (-3) – 7 = 2
f. 13 – 20 – (-5) = -2

9. Complete the magic square.

-4	0	1
4	-1	-6
-3	-2	2

10. The temperature in Canberra at midday was 12°C. By midnight it had dropped to -5°C. By how much did the temperature drop?
17°c

Annotations

Calculates addition number sentences with positive and negative integers.

Demonstrates understanding of the effect of subtracting a negative integer.

Calculates subtraction number sentences involving positive and negative integers.

Solves problems involving the addition of integers.

Number: Integers

11. What is the combined effect of a gain in weight of 5 kg and then a loss of 12 kg?

18kg

12. What will be the net result if Tara deposits $400 in her account followed by a withdrawal of $700?

$200

Integers and Golf

In golf, **par** is the pre-determined number of strokes that a golfer requires to complete a hole. Your score is 0 if you get the ball in the hole using par number of strokes. If your number of shots for the hole is less than par then your score is negative. If your number of shots for the hole is greater than par then your score is positive. Play 5 holes golf with your friend and complete the table below to determine who won.

Instructions:

Throw a set of three dice until you roll a double. **The double represents the hole** and each throw is counted as a stroke you take to get the ball in that hole.
Example: Strike one : 2, 5, 3. Strike two : 3, 1, 6. Strike three : 4, 5, 4. It has taken this player a total of 3 strokes to get the ball in the hole. Record this in the shots column and then allow your opponent to do the same. Repeat the above procedure for the rest of the holes. After the 5th hole, get the total of the **par score** column to find out who won.

13.

		Name: Beth		Name: Talitha	
HOLE	**PAR**	**SHOTS**	**PAR SCORE**	**SHOTS**	**PAR SCORE**
1	3	2	-1	2	-1
2	4	2	-2	2	-2
3	3	2	-1	1	-2
4	5	2	-3	1	-4
5	2	3	+1	4	+2
TOTAL	**17**	11	-6	10	-8

What is the difference between the TOTAL of PAR and your Total number of SHOTS?

Check if this answer is the same as the total of PAR SCORE.

They are ether between the par and 0 or above. Some times if your luckey you will get the same as par.

Annotations

Calculates the addition of multiple integers.

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Number: Indices

Year 7 Mathematics achievement standard

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Summary of task

Students had completed a unit of work on indices with whole numbers, including writing whole numbers as a product of their prime factors, the connection between perfect squares and square roots, and the calculation of square roots of whole numbers.

Students were asked a series of questions that involved identifying factors of numbers, calculating perfect squares and their squares roots, and finding the greatest common divisor (highest common factor) using whole numbers written as a product of their prime factors. The use of calculators was not permitted and students were given 25 minutes of class time to complete the task.

Number: Indices

Indices **Calculators are NOT permitted**

1) Which dot pattern represents the first four square numbers? Circle the correct answer.

(A) 

(B) 

(C) 

(D) 

2) In the expression 5^{20}, what is the mathematical term used to describe the numeral 5? Circle the correct answer.

(A) base (B) bottom (C) index (D) power

3) Write down any two square numbers that are larger than 60: 100 and 81

4) Write down all the factors of each number.

a) 48 1, 48, 2, 24, 6, 8, 4, 12

b) 66 1, 66, 2, 33, 3, 22, 11, 6,

5) What is the highest common factor of 48 and 66? 6

6) Write down 7^8 in expanded form (ie without index notation). You do not need to evaluate the expression.

7x7x7x7x7x7x7x7

7) To work out the value of 18^2, Anh drew a diagram. Part of his diagram is shown below.

	10	+ 8
10	100	80
+ 8	80	64

100
160
64
324

a) Place the correct value in each part of the diagram.

b) Write down a numerical expression that shows how the diagram can be used to evaluate 18^2 and use this to find the value of 18^2.

100+80+80+64=324; 324 is the value of 18^2

Annotations

Identifies a visual representation of square numbers.

States two square numbers.

Identifies pairs of factors of given whole numbers but omits the factor pair 3 × 16 of the number 48.

Identifies the greatest common divisor (highest common factor) of two given two-digit numbers from lists of their factors.

Demonstrates understanding of index notation.

Uses an area diagram to show how the square of a two-digit number can be calculated.

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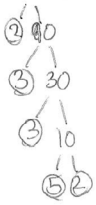
Number: Indices

8) Consider the numbers 180 and 600.

a) Draw a factor tree or factor ladder for the number 180.



b) Use your factor tree or factor ladder to express 180 as a product of its prime factors.

$2 \times 3_x{}^3 \times 5 \times 2$

c) Given that $600 = 2^3 \times 3 \times 5^2$, find the highest common factor of 180 and 600.

60 is the HCF

9) Given that $529 = 23^2$, what is the value of $\sqrt{529}$? 23

10) Given that $1764 = 2^2 \times 3^2 \times 7^2$, what is the value of $\sqrt{1764}$? 336

$^2 14_x$ $^1 84_x$
$\frac{6}{84}$ $\frac{1}{336}$

11) Given that $18\,662\,400 = 2^{10} \times 3^6 \times 5^2$, find $\sqrt{18\,662\,400}$. Leave your answer as a product of primes in simplest index form.

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5$

12) Jenny wrote:

'All numbers have an even number of factors because factors always come in pairs.'

Is Jenny correct? Give a reason for your answer, and provide at least one example to support your decision.

Jenny is wrong. not every number has an even number of factors. For example 4. 4 has 3 factors 1, 2, 4.

Annotations

Constructs a factor tree for a three-digit number.

Uses a factor tree to write the given number as a product of primes.

Finds the greatest common divisor (highest common factor) of a pair of three-digit whole numbers.

Finds the square root of a whole number given its equivalent as a perfect square.

Demonstrates understanding of index notation but is unable to use this to calculate the square root of a whole number given its prime factors.

Comments on the validity of a statement and justifies their response with an appropriate example.

Geometry: Geometry review

Year 7 Mathematics achievement standard

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Summary of task

Students had completed a unit of work on geometric reasoning.

Students were asked a series of questions that involved applying:

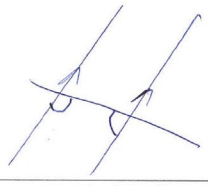
- the angle and side properties to classify triangles and describe quadrilaterals
- the properties of angles on a straight line, angles at a point and vertically opposite angles to solve numerical problems with appropriate reasoning
- the angle relationships formed when parallel lines are crossed by a transversal to solve numerical problems with appropriate reasoning
- the angle sum of a triangle to solve numerical problems with appropriate reasoning.

The use of calculators was permitted and students were given 40 minutes of class time to complete the task.

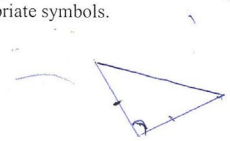
Geometry: Geometry review

Geometry Review

1) Draw and label a pair of **parallel lines** and a **transversal** and clearly indicate the location of **ONE pair of co-interior angles**. Your diagram does not have to be drawn to scale.



2) Make a neat sketch of an **obtuse-angled isosceles triangle**, labelling any equal sides or angles with appropriate symbols.



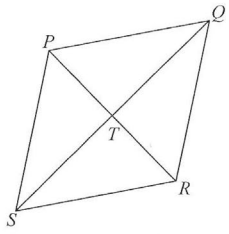
3) Name the **quadrilateral** that has opposite sides are parallel **AND** diagonals that are equal in length.

Name of quadrilateral: Rectangle

4) Can a triangle have **more than one** right angle? Give a reason for your answer.

No a triangle can not because a triangle can't have more than 180° and 2x right angles = 180°

5) Which **one** of these statements about rhombus $PQRS$ is **not true**?



(A) $QS \perp PR$

(B) $PT = TQ$

(C) $PQ = QR$

(D) $\angle PQS = \angle RQS$

(E) $\angle PST = \angle TQR$

(F) $PQ \parallel SR$

Annotations

Draws and labels parallel lines using appropriate geometrical notation and indicates the position of a pair of co-interior angles formed by a transversal.

Draws and labels an obtuse-angled triangle. Uses appropriate geometrical conventions to indicate the equal sides of an isosceles triangle.

States the most inclusive classification of a quadrilateral with the given properties.

Provides an answer with reasoning that refers to the angle sum of a triangle.

Geometry: Geometry review

6) Circle **true or false** for each statement.

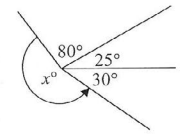
a) All rectangles are squares. true (false)

b) Some rhombuses are parallelograms. (true) false

c) All squares are rhombuses. true (false)

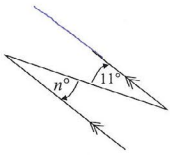
7) Find the **value** of each pronumeral, giving a **reason** for each. [Diagrams are not drawn to scale.]

a)



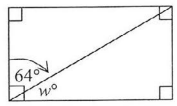
$x = 225°$ [Angles on a point add to 360°]

b)



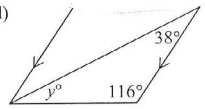
$n = 11°$ [Alternate angles are equal]

c)



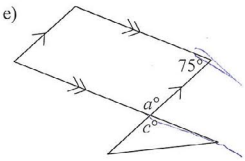
$w = 26°$ [Right angle adds to 90°]

d)



$y = 26°$ [Angle sum of a triangle is 180°]

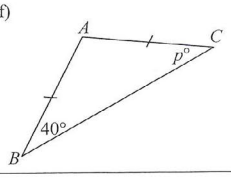
e)



$a = 106°$ [Co-interior angles add to 180°]

$c = 106°$ [Angles on a point are equal]

f)



$p = 40°$ [base angles are equal on a isoceles △]

Annotations

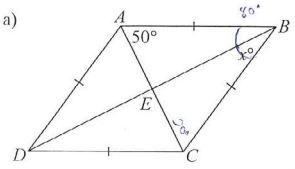
Calculates correct values in simple numerical problems.

States appropriate angle relationships when providing reasons for numerical calculations.

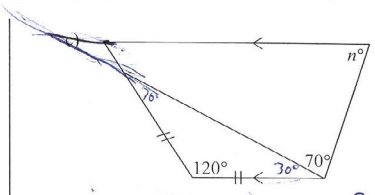
Geometry: Geometry review

8) Find the value of each pronumeral. Reasons **not** required. [Diagrams are not drawn to scale.]

a)

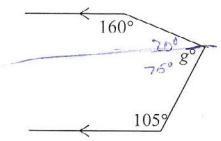


$x =$ 40°



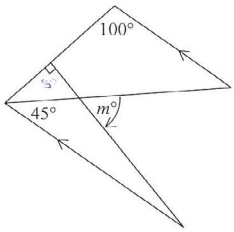
$n =$ 80°

b)



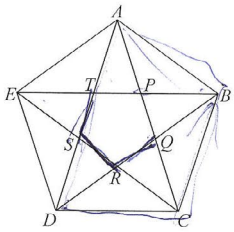
$g =$ 95°

d)



$m =$ _____

9) The diagram shows the regular pentagon *ABCDE* and all of its diagonals. The diagram IS drawn to scale.



a) Name a pair of parallel lines ∠EB and ∠DC

b) Name a rhombus ∠AERB

c) Name a kite ∠AERB

d) Name a pair of equal alternate angles ∠SDR and ∠PBQ

e) Name a pair of equal corresponding angles ~~∠TSR~~ ∠TSR and ∠QSR

Annotations

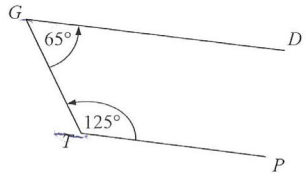
Uses angle relationships to solve some multi-step numerical problems.

Identifies and names a pair of parallel lines but uses the notation of angles instead of lines.

Identifies and names quadrilaterals but uses the notation of angles instead of lines.

Geometry: Geometry review

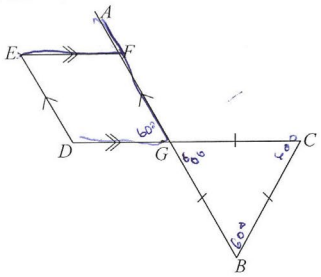
10) The diagram below is not drawn to scale.



Are the lines DG and PT parallel? Give a reason why or why not.

No. If they were parallel the angles would add to 180

11) In the diagram below, AB and DC are straight lines intersecting at the point G. EF is parallel to DC. The diagram is not drawn to scale.



Jamie was asked to find the size of $\angle EFA$ and wrote the following in his workbook.

Complete the gaps in his work.

$\angle CGB = 60°$ [$\triangle$'s equalateral]

$\angle FGD = 60°$ [~~$\triangle$~~ Alternate angles are equal]

$\angle EFA = 60°$ [Corresponding angles are equal]

Annotations

Determines whether or not a pair of straight lines are parallel.

Applies a sequence of angle properties to obtain an answer to a multi-step numerical problem, referring to two correct angle relationships.

Geometry: Emily's castle

Year 7 Mathematics achievement standard

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

> *By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.*
>
> *Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.*

Summary of task

Students had completed a unit on geometry that including drawing and interpreting different views of three-dimensional objects. Students learned how to use a virtual drawing tool to construct three-dimensional objects and represent these objects in two dimensions.

In the task, students were asked to:

- draw front, right side and top views of three-dimensional objects constructed from centicubes on square grid paper and also on isometric grid paper
- use a virtual drawing tool to construct a variety of three-dimensional objects (and represent this object in two-dimensions) given a particular set of front, top and side views and certain conditions.

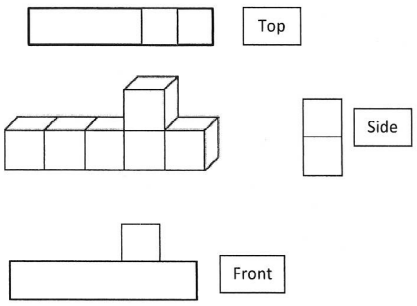
Students were given two lessons with access to the virtual drawing tool to complete the task.

Geometry: Emily's castle

Part A: Knowledge and Understanding

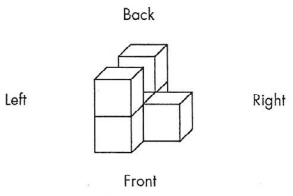
Question One: Front / Side / Top Views of 3 Dimensional Objects

In architecture and many other fields 2 dimensional drawings are used to represent 3 dimensional objects. In this question you are required to draw 2 dimensional drawings which represent what can be seen if you are looking at a 3 dimensional object from either the front, one of the sides, the back or from above the object. An example is shown below.

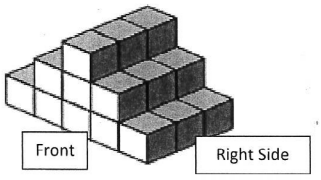


On the square paper provided draw the front, right side and top views of the solids shown.

(a)

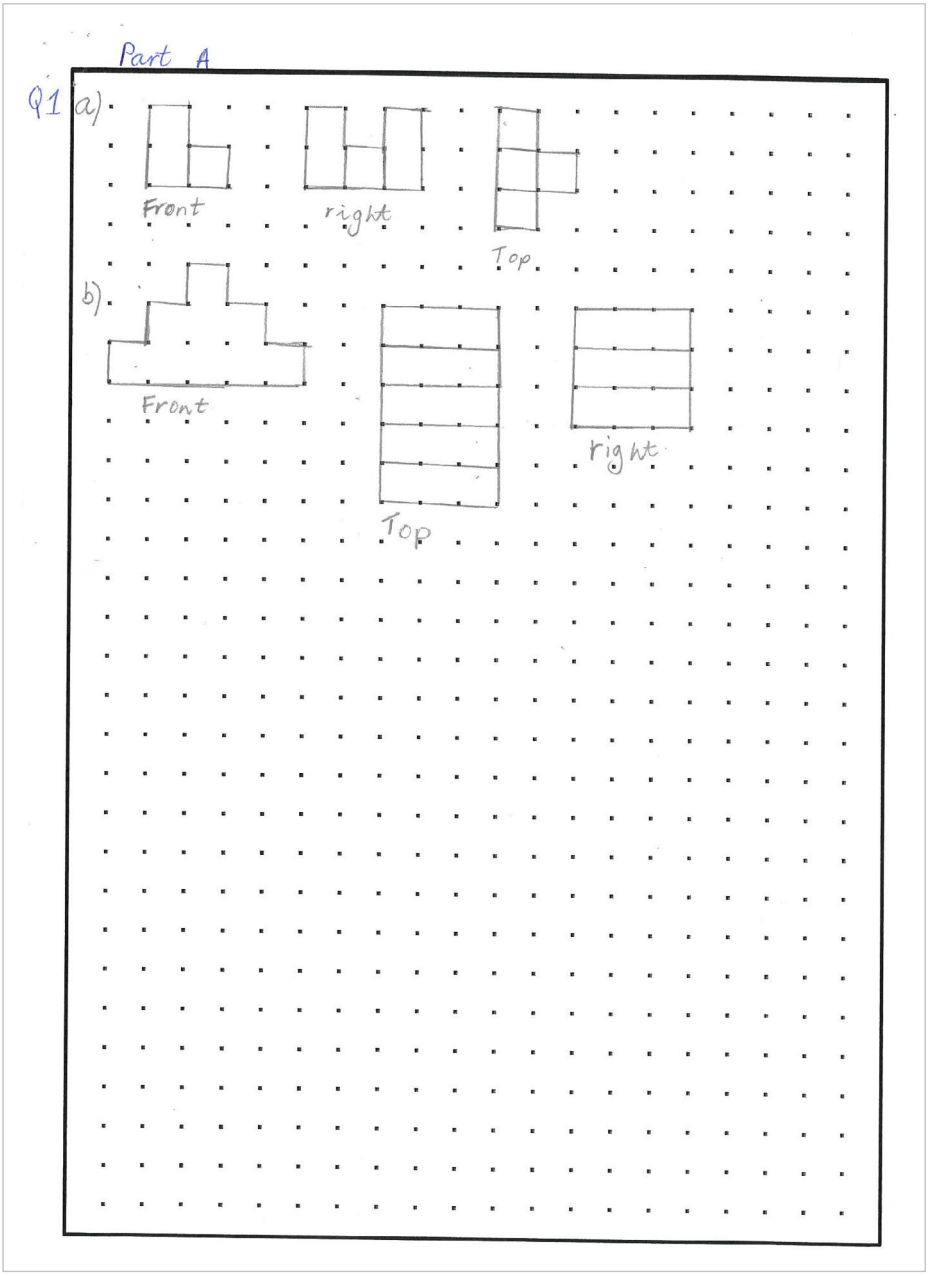


(b)



Annotations

Geometry: Emily's castle



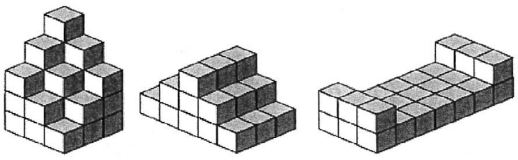
Annotations

Draws different views of a three-dimensional object, indicating changes in height but with one error.

Geometry: Emily's castle

Question Two: Isometric Drawings

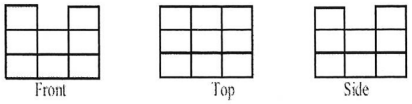
Isometric drawing is a method of representing 3 dimensional objects using 2 dimensions. Use the isometric drawing paper attached to reproduce the drawings below. Use colours to indicate the faces which would appear in the top view, front, right side and left side views. Include a legend with your diagrams.



crystal stairs bed

Part B: Problem Solving and Reasoning

Emily has designed plans for a castle that show the front, top, and side views. Unfortunately she has not used the system of identifying different heights using lines, so you are unable to discern whether or not blocks are on the same or different levels from her digarams.



Question Three:

What is the largest number of cubes that you can use in the construction of a castle from Emily's plans?

- Clearly explain how you obtained your answer.
- Use the virtual isometric drawing tool provided to draw the castle with the maximum amount of blocks.
- Use the 2-D feature of the drawing tool to show that the top, front and side perspectives are correct.

Question Four:

What is the smallest number of cubes that you can use in the construction of a castle from Emily's plans?

- Clearly explain how you obtained your answer.
- Use the virtual isometric drawing tool provided to draw the castle with the minimum number of cubes.
- Use the 2-D feature of the drawing tool to show that the top, front and side perspectives are correct.

Question Five:

How many symmetrical castles can you build to that satisfy Emily's specifications? [Your solution must be accompanied by an explanation]

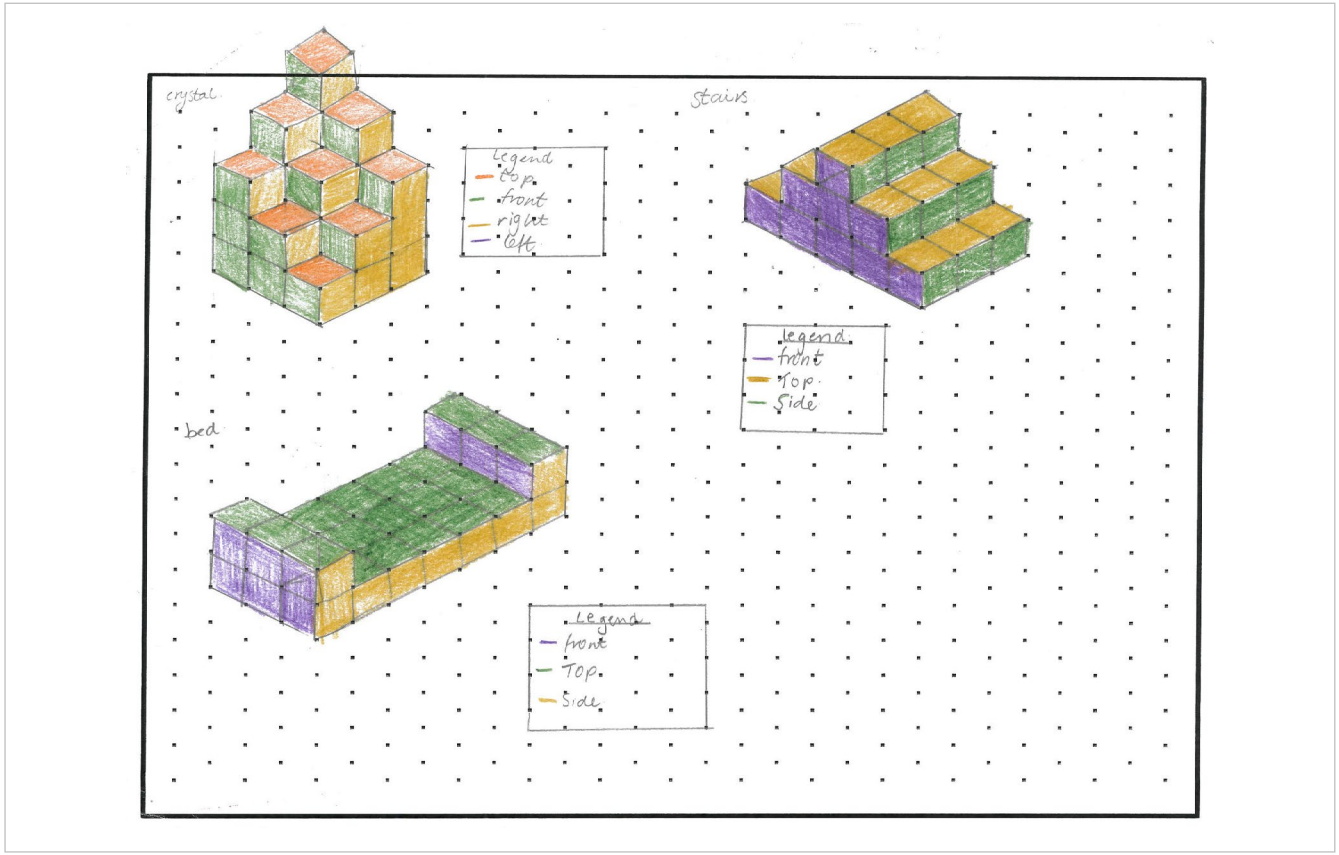
- Use the virtual isometric drawing tool provided to draw the castles which match Emily's design and are symmetrical
- Use the 2-D feature of the drawing tool to show that the top, front and side perspectives are correct.

Annotations

Mathematics

Year 7
Satisfactory

Geometry: Emily's castle



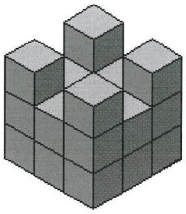
Annotations

Draws three-dimensional objects on isometric paper, indicating faces but with some unnecessary intervals.

Geometry: Emily's castle

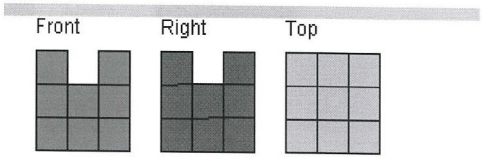
Maths Assignment

Question 3: the largest number of cubes Emily could have used to construct her castle is 22 cubes. I came to this answer by manually building Emily's castle based on the top, front and side perspectives given, I then created the front view with the building blocks and then I built the side and the top views (also with the building blocks). After I had constructed all views I pieced them together into an object in which contained as many cubes as possible and I came to the conclusion that Emily had 22 cubes and that he castle looks like the object to the left of the page.

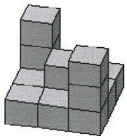


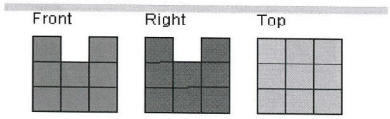
Castle with maximum number of blocks

2-D feature



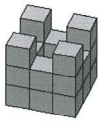
Question 4: the smallest number of cubes which can be used for Emily's castle is 14 cubes. I obtained this answer by again, creating the front, side and top view with building blocks and then creating the object. After I had created the object I looked at it from all the angles and took out the blocks not needed when looking at the different sides, I then counted up the sides and I arrived at the answer of 14.

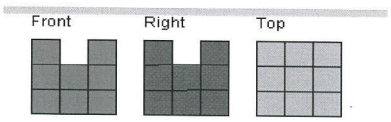




Question 5: to satisfy Emily's specifications when creating symmetrical castles you would find 28 combinations so I only created around 6 castles on the virtual isometric drawing tool, I came to this conclusion by creating the front and side view and then used the trial and error technique to uncover the rest of the shapes, when testing if the shapes are symmetrical I cut the shapes down the middle and this was how I tested the symmetry. In these shapes I have drawn I cut the symmetry line differently, for example across the middle or diagonally.

Shape 1:





Annotations

Determines the maximum number of cubes that can be used to construct a three-dimensional object with the required front, top and side views.

Explains how to determine the maximum number of cubes that can be used.

Uses the virtual drawing tool to draw the three-dimensional object and its different views.

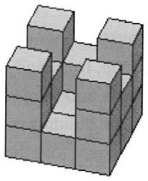
Determines the minimum number of cubes that can be used to construct a three-dimensional object with the required front, top and side views.

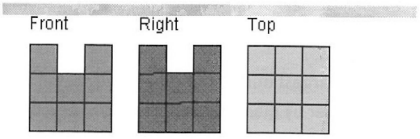
Explains how to determine the minimum number of cubes that can be used.

Gives an indication of how many different three-dimensional objects satisfy the required front, top and side views but does not show all of these different solutions.

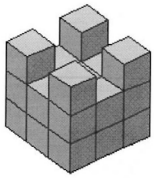
Geometry: Emily's castle

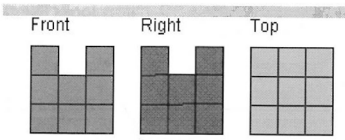
Shape 2:



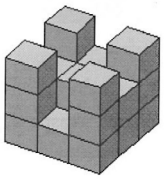


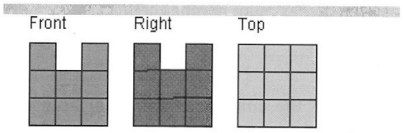
Shape 3:



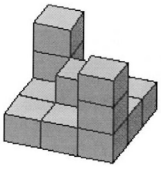


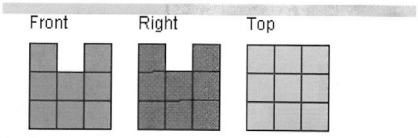
Shape 4:



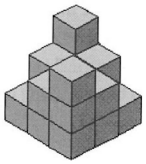


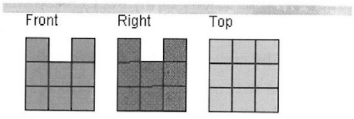
Shape 5:





Shape 6:





Annotations

Mathematics

Year 7
Satisfactory

Geometry: Build the structure

Year 7 Mathematics achievement standard

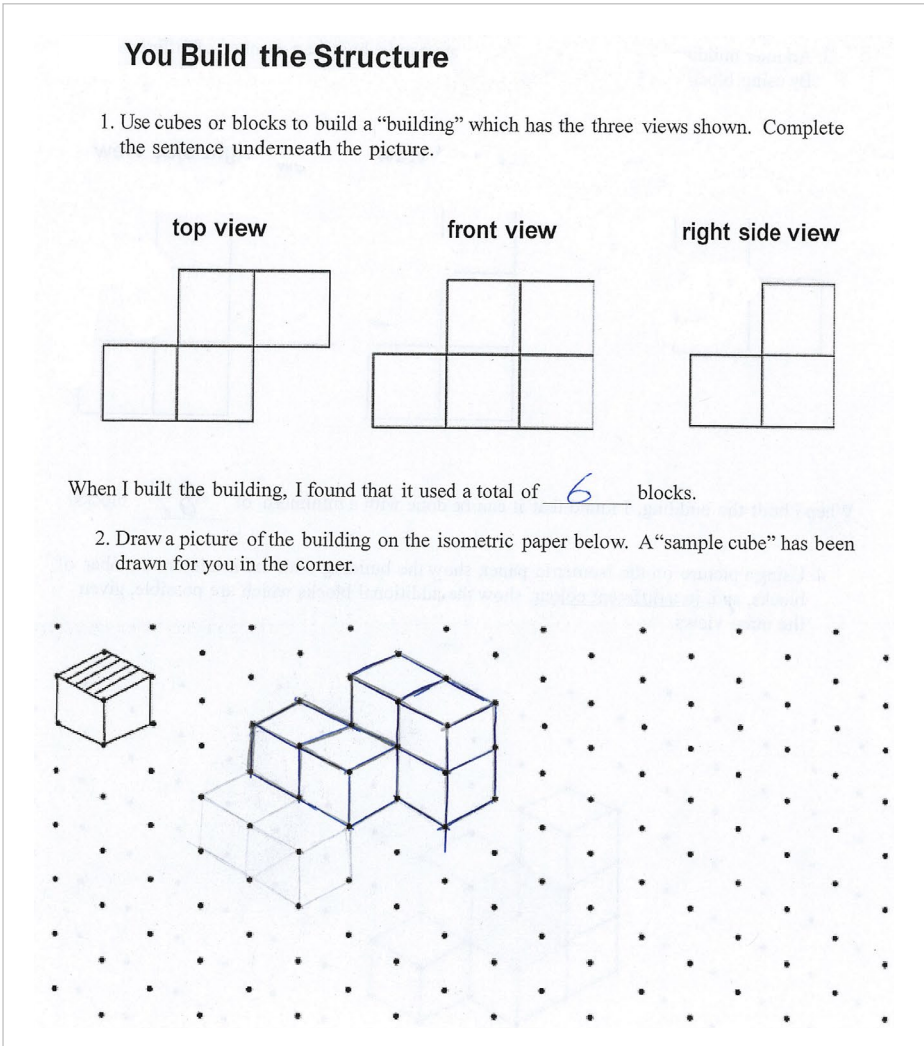
The parts of the achievement standard targeted in the assessment task are highlighted.

> *By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.*
>
> *Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.*

Summary of task

Students were asked to complete an investigation involving building and sketching prisms. They were required to use the different views of a ‘building’ and isometric paper to draw two-dimensional representations of it.

Geometry: Build the structure



You Build the Structure

1. Use cubes or blocks to build a "building" which has the three views shown. Complete the sentence underneath the picture.

top view

front view

right side view

When I built the building, I found that it used a total of 6 blocks.

2. Draw a picture of the building on the isometric paper below. A "sample cube" has been drawn for you in the corner.

Annotations

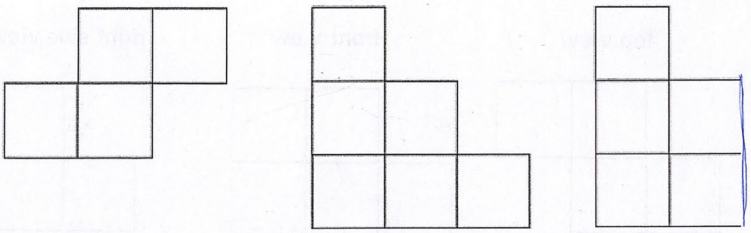
Identifies the number of prisms to construct a three-dimensional object from different viewpoints.

Draws a three-dimensional object constructed by multiple prisms on isometric paper.

Geometry: Build the structure

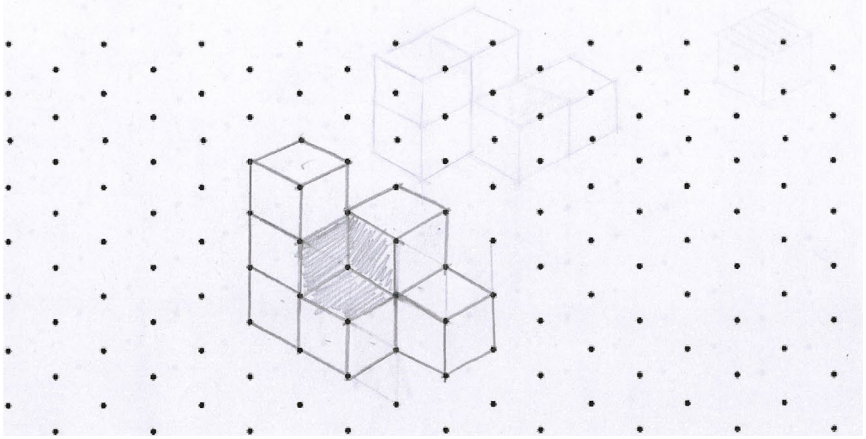
3. Another building, which has the views below, can be built in a number of different ways. By using blocks or cubes, write down the minimum number of blocks needed to build it.

top view | front view | right side view



When I built the building, I found that it can be done with a minimum of 87 blocks.

4. Using a picture on the isometric paper, show the building with the minimum number of blocks, and, in a different colour, show the additional blocks which are possible, given the three views.



Annotations

Uses different views of a three-dimensional object to draw possible arrangements of prisms.

Mathematics

Year 7
Satisfactory

Statistics and probability: Assessment task

Year 7 Mathematics achievement standard

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

> *By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.*
>
> *Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.*

Summary of task

Students had completed a unit of work on statistics and probability. They completed an experimental investigation in class, recorded and graphed results and responded to questions formulated as a short test.

Statistics and probability: Assessment task

Statistics and Probability Assessment Task Year 7

Part A

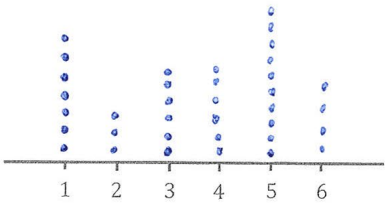
1. If you were to roll a standard six-sided die 36 times, how many sixes (6's) would you expect to get?

6

2. Experiment: Roll a standard six-sided die 36 times and record your results in the table below.

Number	Tally	Total
1	𝍸 ||	7
2	|||	3
3	𝍸 |	6
4	𝍸 |	6
5	𝍸 𝍸	10
6	||||	4

3. Graph a dot-plot of your data on the line below.



4. What is the mode of this data?

5

5. Were the results what you expected? Explain your reasoning.

No. because it would even/fair if you got six rolls for every no. but I didn't. for some I got 3 and then for another I got 10.

Annotations

Calculates expected frequency of outcome in a simple experiment.

Constructs a dot-plot based on data gathered.

Identifies the mode of a data set.

Explains what was expected and compares expected frequency with observed frequency.

Statistics and probability: Assessment task

6. Based on the results of your experiment, calculate the experimental probability (as a fraction) of rolling a:

1 - P(1)= $\frac{7}{36}$

2 - P(2)= $\frac{3}{36}$

3 - P(3)= $\frac{6}{36}$ / $\frac{3}{18}$

4 - P(4)= $\frac{6}{36}$ / $\frac{3}{18}$

5 - P(5)= $\frac{10}{13}$ / $\frac{5}{18}$

6 - P(6)= $\frac{4}{36}$ / $\frac{2}{18}$

Part B

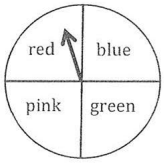
A single coin is tossed.

The sample space is: {Head, Tail}

The probability of tossing a Head is $P(H) = \frac{1}{2}$

The probability of tossing a Tail is $P(T) = \frac{1}{2}$

For the spinner shown:



1. List the sample space

{Red, Blue, Pink, green}

2. What is the probability of spinning red?

$\frac{1}{4}$

3. What is the probability of spinning red or blue?

$\frac{2}{4}$

4. How could you change the spinner to increase the chance of spinning red? Explain your reasoning.

You could upgrade! which means you can change anyone or more (blue, pink, green) to red which increas the chance of spinning a red.

Annotations

Determines experimental probabilities for outcomes and attempts to leave fractions in simplest form.

Identifies sample space for a simple experiment.

States probabilities in experiments with equally likely outcomes.

Explains how to increase the probability of an outcome in a simple experiment.

Statistics and probability: Assessment task

Part C

A Year 7 Maths class sat a test and the following results were recorded:

42, 36, 23, 40, 18, 29, 26, 25, 38, 33, 35, 35, 27, 29, 31, 15, 48, 29, 9

1. Complete the stem-and-leaf plot below using the above information.

Stem	Leaf
0	9
1	5,8
2	3,5,6,7,9,9,9
3	1,3,5,5,6,8
4	0,2,8

2. What is the range of the results?

39

3. What is the mode of the results?

29

4. What is the median of the results?

29

5. What is the mean of the results?

29.89473684

6. Which measure (mode, median or mean) best represents the results of the class ? Explain your reasoning.

The measure of the Mean is the one that best represents the results of the class because it is the average of ALL the scores together

Annotations

Constructs an ordered stem-and-leaf plot and attempts to align the digits of the leaf vertically.

Calculates the range, mode, median and mean of a data set.

Identifies the statistical measure that best represents the data set.

Measurement: Measurement investigation

Year 7 Mathematics achievement standard

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

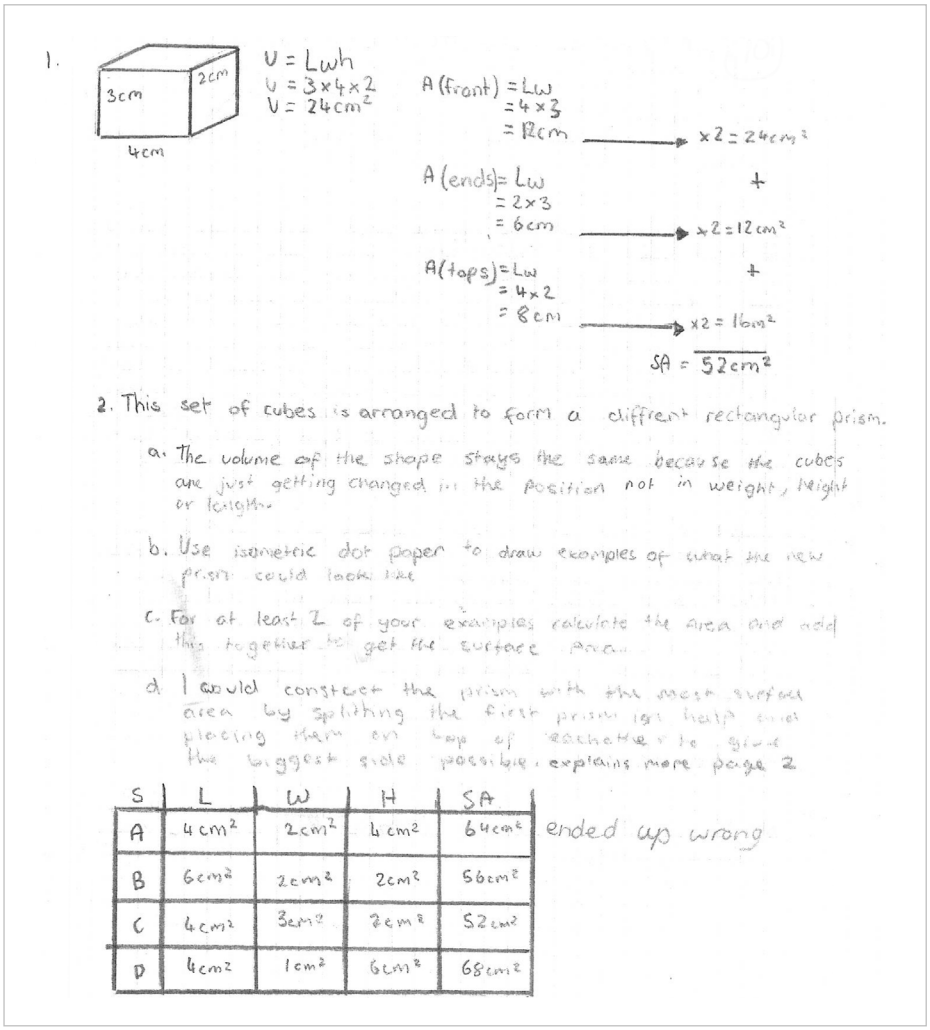
> *By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.*
>
> *Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.*

Summary of task

Students were asked to complete the following task as a culminating activity on a unit of work.

1.  Calculate the volume and surface area of this rectangular prism made from cubes with edge lengths of 1 cm.
2. This set of cubes is arranged to form a different rectangular prism.
   a. What do you know about the volume of the new prism?
   b. Use isometric dot paper to draw examples of what the new prism may look like.
   c. For at least two of your examples, calculate the area of each face of the prism and add these to find the total surface area.
   d. Explain how you would construct the rectangular prism using all of these cubes, so that it had the largest possible surface area.
   e. Collate your calculations in a table to demonstrate your answer.
   f. Provide a written explanation of your reasoning.
   g. Write a conclusion about what you discovered and how you discovered it.

Measurement: Measurement investigation



1.

$V = Lwh$
$V = 3 \times 4 \times 2$
$V = 24cm^2$

A (front) = Lw
= 4 × 3
= 12cm → × 2 = 24cm²

A (ends) = Lw
= 2 × 3
= 6cm → × 2 = 12cm²

A (tops) = Lw
= 4 × 2
= 8cm → × 2 = 16cm²

SA = 52cm²

2. This set of cubes is arranged to form a diffrent rectangular prism.

a. The volume of the shape stays the same because the cubes are just getting changed in the position not in weight, height or length.

b. Use isometric dot paper to draw examples of what the new prism could look like

c. For at least 2 of your examples calculate the area and add this together to get the surface area

d. I would construct the prism with the most surface area by splitting the first prism in half then placing them on top of eachother to give the biggest area possible, explains more page 2

S	L	W	H	SA
A	4cm²	2cm²	4cm²	64cm²
B	6cm²	2cm²	2cm²	56cm²
C	4cm²	3cm²	2cm²	52cm²
D	4cm²	1cm²	6cm²	68cm²

ended up wrong

Annotations

Uses formulas for volume and area.

Calculates the volume of a prism.

Finds the area of each face of a rectangular prism in order to calculate its total surface area.

Demonstrates understanding of conservation of volume.

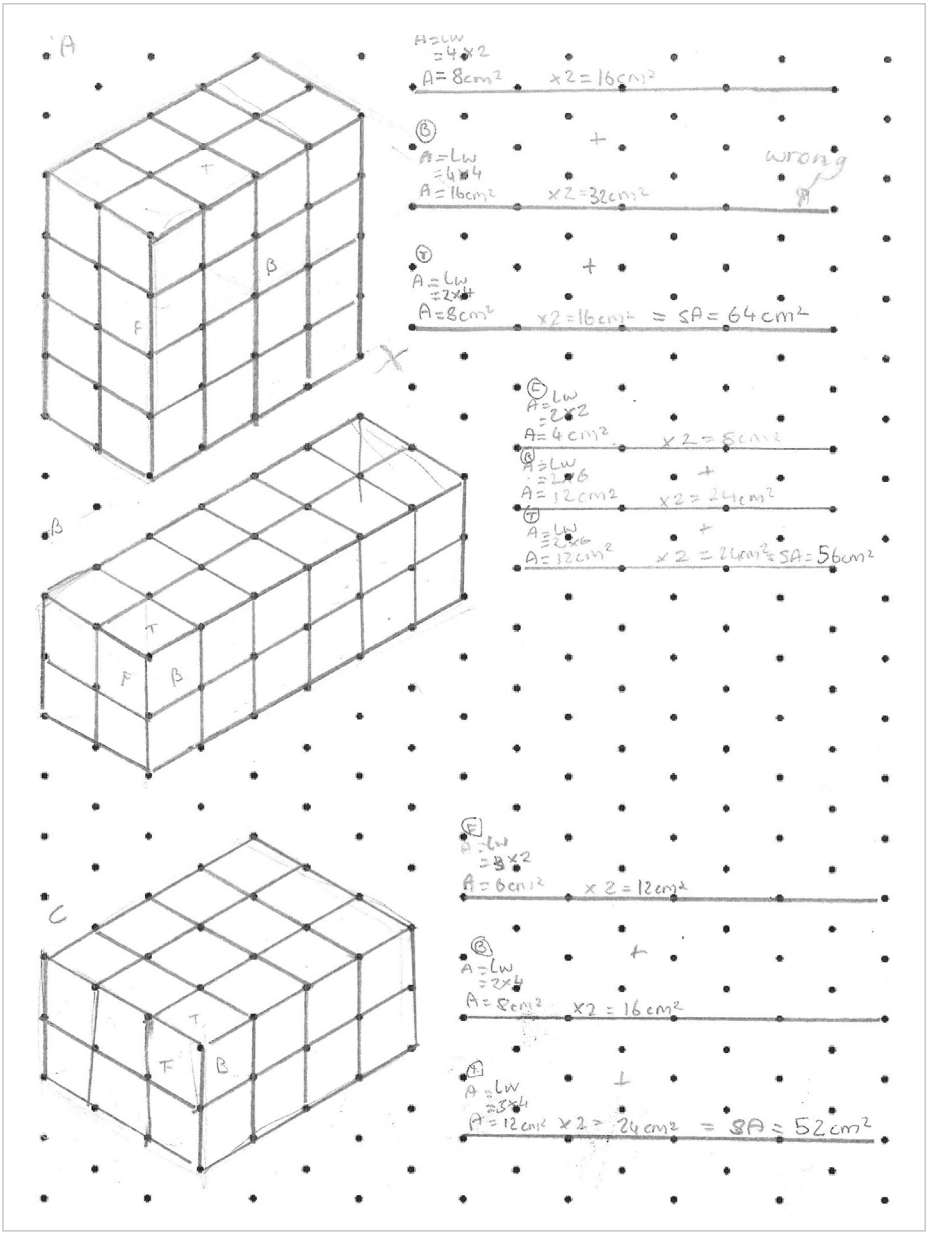
Describes how the surface area of a prism can be increased.

dimensions and surface areas of rectangular prisms.

Mathematics

Year 7
Satisfactory

Measurement: Measurement investigation

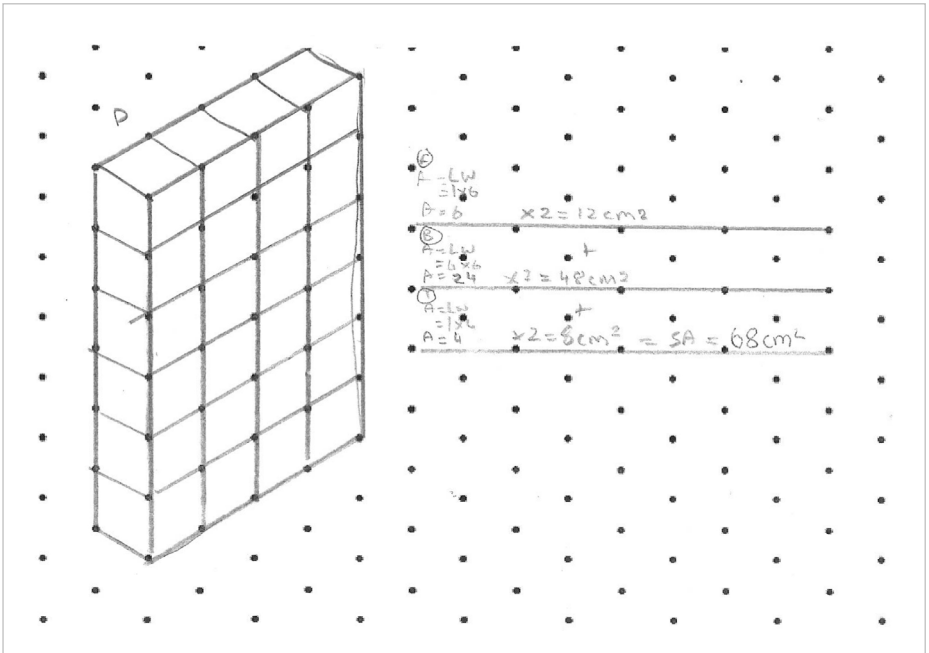


Annotations

Draws some alternative prisms with the required volume of 24 cubic centimetres on isometric paper.

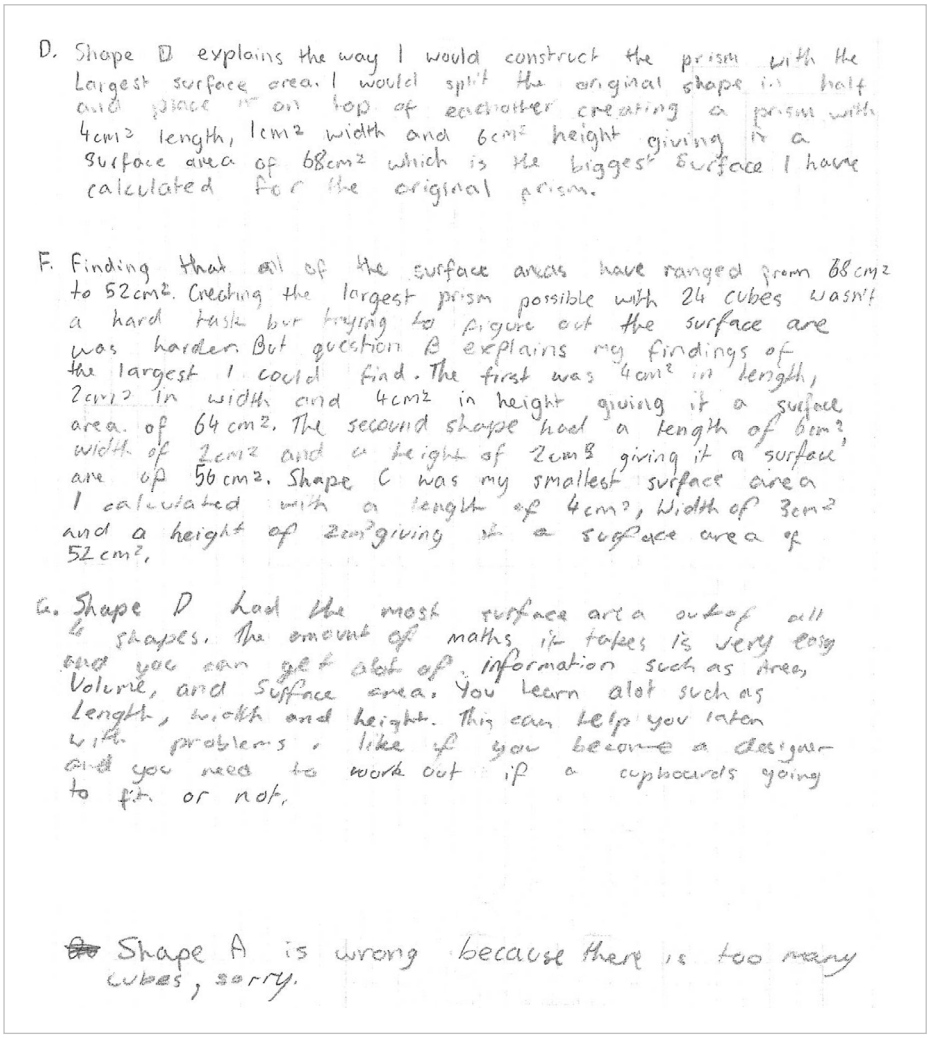
Finds the area of each face of a rectangular prism in order to calculate its total surface area.

Measurement: Measurement investigation



Annotations

Measurement: Measurement investigation



D. Shape D explains the way I would construct the prism with the Largest surface area. I would split the original shape in half and place it on top of eachother creating a prism with 4cm² length, 1cm² width and 6cm² height giving it a surface area of 68cm² which is the biggest surface I have calculated for the original prism.

F. Finding that all of the surface areas have ranged from 68cm² to 52cm². Creating the largest prism possible with 24 cubes wasn't a hard task but trying to figure out the surface area was harder. But question B explains my findings of the largest I could find. The first was 4cm² in length, 2cm² in width and 4cm² in height giving it a surface area of 64 cm². The second shape had a length of 6cm², width of 2cm² and a height of 2cm² giving it a surface are of 56 cm². Shape C was my smallest surface area I calculated with a length of 4cm², Width of 3cm² and a height of 2cm² giving it a surface area of 52 cm²,

G. Shape D had the most surface area out of all 4 shapes. The amount of maths it takes is very easy and you can get alot of information such as Area, Volume, and Surface area. You learn alot such as length, width and height. This can help you later with problems, like if you become a designer and you need to work out if a cupboards going to fit or not,

~~Sh~~ Shape A is wrong because there is too many cubes, sorry.

Annotations

Reflects on investigation.