

Mathematics

Year 7

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 7 Mathematics

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

Sample 1	Number and Algebra – Algebra and the Cartesian Plane
Sample 2	Number – Integers
Sample 3	Statistics – Statistics and probability
Sample 4	Number and measurement – Eggs for sale
Sample 5	Geometry – Build the structure
Sample 6	Statistics and probability – Seatbelt sampling

In this portfolio, the student represents numbers using variables, connects the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information (WS 1). The student solves simple linear equations and evaluates algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane and use formulas for the area and perimeter of rectangles and volume of rectangular prisms (WS1 and WS 4)The student solves problems involving the comparison, addition and subtraction of integers (WS 2). They describe the relationship between the median and mean in data displays (WS 3). The student determines the sample space for simple experiments with equally likely outcomes and assigns probabilities to those outcomes. They calculate mean, mode, median and range for data sets and construct stem-and-leaf plots and dot-plots (WS 3). The student compares the cost of items to make financial decisions (WS 4). They describe different views of three-dimensional objects (WS 5). They solve problems involving percentages and all four operations with fractions and decimals and express one quantity as a fraction or percentage of another (WS 6).

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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:

- *make connections between whole numbers and index notation and the relationship between perfect squares and square roots*
- *represent transformations on the Cartesian plane*
- *solve simple numerical problems involving angles formed by a transversal crossing two parallel lines*
- *identify issues involving the collection of continuous data*
- *classify triangles and quadrilaterals.*

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Number and Algebra – Algebra and the Cartesian Plane

Relevant parts of the achievement standard

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 $x=2$ $y=5$

$$x+y=7$$

c. t decreased by 2 $t=6$

$$t-2=4$$

b. The multiple of 6 and p $p=6$

$$6 \times p = 36$$

d. The product of 5, less x . $y=7$ $x=3$

$$y+5=12-x=9$$

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

a. $b-c$
 3

b. $6bc$
 652

c. $(b+c)+7$
 1

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

a. variable?
 5

b. operation?
 $+$

c. factor with the pronumeral?
 $3x$

4. Simplify the following expressions.

a. $2x+3x$
 $5x$

b. $2a+b+4a$
 $6ab$

c. $5x-3x+x$
 $2x$

d. $2 \times 4y$
 $8y$

e. $4a+2$
 $2a$

f. $2x+x^2+3x$
 $7x$

Annotations

Substitutes variables for values.

Uses the laws of addition, subtraction and multiplication to record and solve simple algebraic expressions.

Substitutes variables for values to solve simple algebraic equations.

Identifies the factor and variable in an expression.

Simplifies simple algebraic equations with one variable.

Acknowledgement

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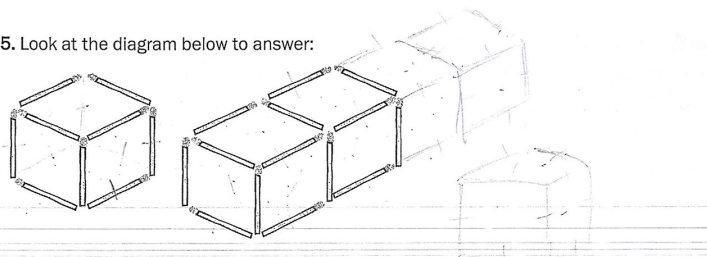
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Number and Algebra – Algebra and the Cartesian Plane

Annotations

5. Look at the diagram below to answer:



a.

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

Shapes	Matches
8	23

b.

Select pronumerals to stand for the two variables and express the rule in algebraic form. $8 = x$ $23 = y$

$$y = 4x - 1$$

c.

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

42 matches

d.

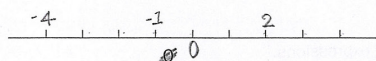
Find by substitution in the rule how many shapes can be formed from 49 matches.

15 shapes can be made.

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 -240.00 dollars

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

Demonstrates an understanding of the representation and modelling of information.

Locates integers on a number line.

Solves addition problems with negative and positive integers.

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Number and Algebra – Algebra and the Cartesian Plane

3. Add these directed numbers


a. $-15 + 7 = -8$

b. $-54 + 20 = -34$

c. $6 + -3 = -3$

d. $-12 + -5 = -17$

4. Subtract these directed numbers

a. $0 - 9 = -9$ 

b. $8 - 20 = -12$

c. $-3 - 5 = -8$

d. $-32 - (-8) = -24$

5. Evaluate

a. $(-3) \times 8 = -24$

b. $(-7) \times (-4) = 28$

c. $(-8)^2 = 64$

d. $25 \div (-5) = -5$

e. $(-16) \div (-8) = 2$

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

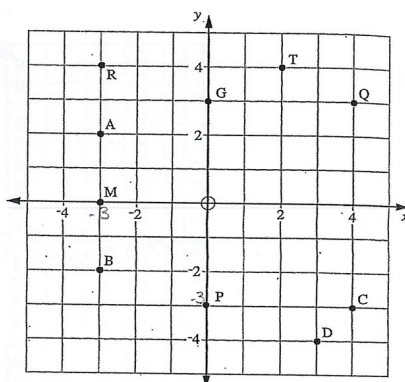
a. T $(2, 4)$

b. A $(-3, 2)$

c. C $(4, -3)$

d. P $(0, -3)$

e. M $(-3, 0)$



Annotations

Calculates addition equations with integers with few errors.

Uses a number line to calculate subtraction equations.

Solves some multiplication and division equations with integers.

Identifies coordinates on a Cartesian plane.

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Number and Algebra – Algebra and the Cartesian Plane

7. On the number plane below plot the following coordinates in each set. Join them in order and name the shape. (6 marks)

a. (7, 2) (7, 5) (4, 5) (4, 2)

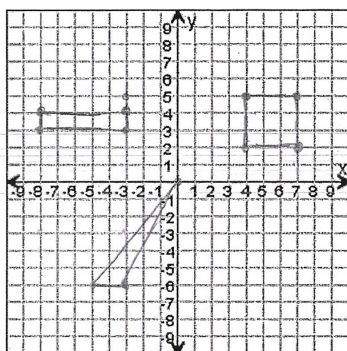
Shape: Square

b. (0, 0) (-5, -6) (3, -6)

Shape: triangle

c. (-8, 3) (-3, 3) (-3, 4) (-8, 4)

Shape: rectangle

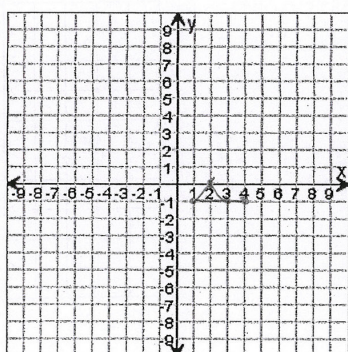


8. a. Complete the table of values using the rule given

$$y = x + 2$$

x	-1	0	1	2
y	1	2	3	4

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



Annotations

Identifies the shape given by plotting coordinates on a Cartesian plane.

Plots coordinates on a Cartesian plane.

Uses an algebraic rule to complete a table of values.

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Number – Integers

Relevant parts of the achievement standard

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Summary of task

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

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

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

a. -32 > -35

b. 0 > -4

c. -7 > -10

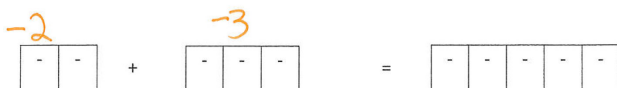
d. 12 > -29

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? When there are two -'s it equals plus.

Annotations

Orders integers on a line.

Orders integers from lowest to highest.

Compares integers using mathematical symbols.

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.

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Number – Integers

Annotations

6. Calculate the following using a number line.

- a. $-7 + 5 = -2$ b. $4 + (-8) = -4$
 c. $-24 + 34 =$ d. $-8 + 8 = 16$
 e. $11 + (-6) = 17$ f. $-7 + (-10) =$
 g. $5 + (-5) = 10$ h. $-6 + 7 + (-4) =$

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? because you add a pair.

8. Calculate the following using a number line.

- a. $6 - (-5) = 11$ b. $18 - (-10) = 28$
 c. $-3 - (-3) = 0$ d. $-2 - (-13) = 15$
 e. $6 - (-3) - 7 = 2$ f. $13 - 20 - (-5) = 3$

9. Complete the magic square.

-4	13	-7
-6	-1	-5
-8	-2	2

← + - →



Uses a number line to calculate some subtractions with integers.

Acknowledgement

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Number – Integers

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

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

7 kg

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

$-\$300$

Annotations

Demonstrates understanding of solving problems.

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Statistics – Statistics and probability

Relevant parts of the achievement standard

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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.

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Statistics – Statistics and probability

Statistics and Probability Assessment Task Year 7

Part A

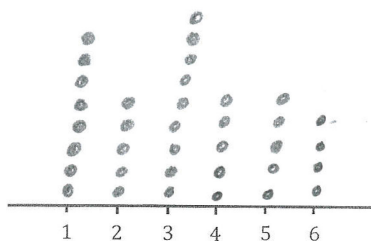
1. If you were to roll a standard six-sided die 36 times, how many sixes (6's) would you expect to get?

6 times

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

Number	Tally	Total
1		8
2		5
3		9
4		5
5		5
6		4

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



4. What is the mode of this data? = 3

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

No they weren't because it was meant to be rolled 6 times, but the results say it was rolled 4 times.

Annotations

Calculates the probability of an outcome in a simple experiment.

Constructs a dot-plot based on data gathered.

Identifies mode of data sets.

Compares observed results with calculated probability.

Acknowledgement

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Statistics – Statistics and probability

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

1 - $P(1) = \frac{3}{6}$

4 - $P(4) = \frac{1}{6}$

2 - $P(2) = \frac{1}{8}$

5 - $P(5) = \frac{7}{12}$

3 - $P(3) = \frac{1}{2}$

6 - $P(6) = \frac{1}{6}$

Part B

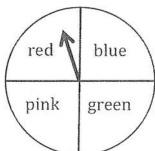
A single coin is tossed.

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

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 increase the amount to red on the spinner by changing Blue to red.

Annotations

Identifies probability in experiments with equally likely outcomes.

Demonstrates understanding of increasing the probability of an outcome.

Acknowledgement

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Statistics – Statistics and probability

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, 45, 47, 29, 31, 15, 48, 29, 3

- 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

- What is the range of the results?

39.

- What is the mode of the results?

29.

- What is the median of the results?

29

- What is the mean of the results?

559 8 3 1 4 7 3 6 8 4 2.

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

I think range best represents the class results because it shows the difference between the highest and the lowest scores.

Annotations

Constructs a stem-and-leaf plot.

Calculates the range, mode and median in data sets.

Makes comment on choice of measure.

Acknowledgement

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Number and measurement – Eggs for sale

Relevant parts of the achievement standard

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Summary of task

Students had completed units of work on perimeter and area and problem solving. They were given the task “Eggs 4 Sale – Eggonomical” to complete in class under timed conditions.

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Number and measurement – Eggs for sale

Year 7 Mathematics Assessment Task

EGGS 4 SALE - "Eggonomical"

PART A

Draw 4 different polygons with a total perimeter of 80 metres

The diagrams show four polygons drawn by hand:

- A rectangle with a top side labeled 10m, a right side labeled 30cm, a bottom side labeled 10m, and a left side labeled 30cm.
- A square with all four sides labeled 20m.
- A regular octagon with all eight sides labeled 10m.
- A rectangle with a top side labeled 5m, a right side labeled 35m, a bottom side labeled 5m, and a left side labeled 35m.

Annotations

Calculates possible dimensions of polygons with a given perimeter.

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Number and measurement – Eggs for sale

- Q3. If each chicken lays (on average) one egg per day, how many eggs will the chickens produce all together each month? (assume 30 days per month)

1800 eggs per month.

- Q4. The local supermarket 'Gillies' sells free-range eggs for the advertised price, as shown.

How much should the Frys sell their eggs per dozen to provide a better deal than the local supermarket, but still maximise their profit?

'Gillies' Eggs

Carton of 18 - \$8.40

They should sell their eggs per dozen for \$5.

PART C

To create an even larger enclosure, Kristina talked Jose into using an existing 32m wall at the back of their property as part of the chicken enclosure. They still have the 80 metre length of fencing wire to use.

Using your previous investigations, or otherwise, calculate the largest area that could **now** be constructed for the chickens.

The largest area constructed will still be 375m^2 , because if the wall is 32m the only number for the breadth you can use is 8m. So that will equal 256m^2 and 375m^2 is a larger area.

Annotations

Suggests a price to sell a product.

Demonstrates some reasoning process to justify their answer.

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Geometry – Build the structure

Relevant parts of the achievement standard

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Summary of task

Students were asked to complete a task involving building and sketching prisms.

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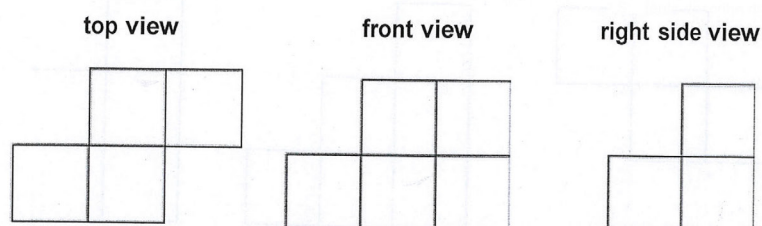
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Geometry – Build the structure

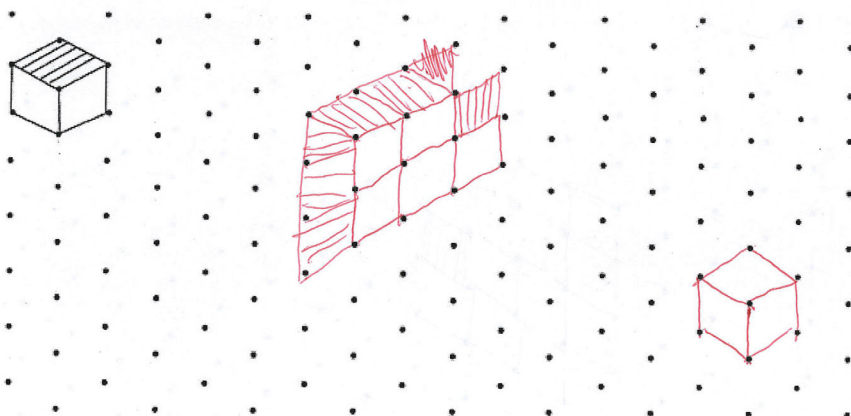
You Build the Structure

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



When I built the building, I found that it used a total of 7 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

Makes an attempt to draw the given prism.

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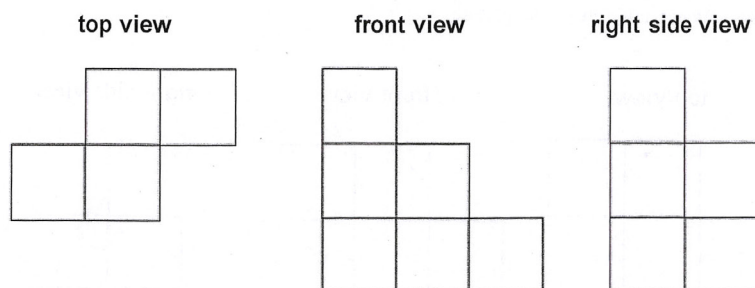
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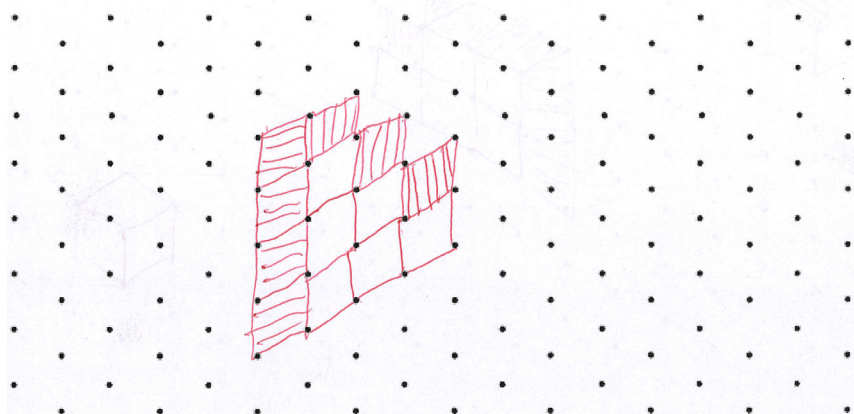
Geometry – Build the structure

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.



When I built the building, I found that it can be done with a minimum of 7 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

Identifies the minimum number of prisms to make a three-dimensional object based on different views.

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Statistics and probability – Seatbelt sampling

Relevant parts of the achievement standard

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 use information about seat belt use in Greenville to calculate the smallest number of cars in two months where its passengers wore seatbelts. They were required to explain their reasoning.

Mathematics

Year 7

Below Satisfactory

Statistics and probability – Seatbelt sampling

16. Seat Belt Sampling

This photograph was taken in Greenville (North Carolina), where the law states that everyone in a car must wear a seat belt. As part of a “Click-it or Ticket” campaign, each month, a certain number of cars is sampled to see if all the passengers are wearing seat belts.



1. Assuming that numbers have been rounded off to the nearest per cent, what is the smallest number of cars that could have been sampled to get the record seat belt use of 93%? Please explain, making all notes here as you explore possibilities.

Handwritten work for Question 1:

$$\frac{13}{14} \quad \frac{93}{100} \quad \frac{100}{93} \quad \text{greater than } \frac{101}{93}$$

Other notes: 93% , $\frac{93}{100}$, $\frac{101}{93}$

2. Similarly, what is the smallest number of cars that could have been sampled to get the previous month's seat belt use of 88%?

Handwritten work for Question 2:

$$\frac{8}{9} \quad \frac{8}{9} \quad 1 \quad \frac{4}{18} \quad \frac{2}{9} \quad \frac{7}{8}$$

3. We know that the record is 93% and that last month the figure was 88%. If the same number of cars is sampled each month, what is the smallest this number could be? (This answer will not necessarily be the same as either of the answers from parts 1 and 2). Please show your reasoning.

Handwritten work for Question 3:

$$14 \times 3 = \frac{37}{42}$$

Annotations

Uses trial and error to solve problems.

Records sample as a fraction.

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.