Mathematics

Year 7

Above 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	Statistics and probability – Seatbelt sampling
Sample 6	Measurement – Measurement investigation

In this portfolio, the student represents numbers using variables, connects the laws and properties for numbers to algebra. The student interprets simple linear representations and models authentic information (WS1). The student solves simple linear equations and evaluates algebraic expressions after numerical substitution. The student assigns ordered pairs to given points on the Cartesian planes and uses formulas for the area and perimeter of rectangles and volume of rectangular prisms (WS1, WS4 and WS6). The student solves problems involving the comparison, addition and subtraction of integers (WS2) and describes the relationship between the median and mean in data displays (WS3). The student determines the sample space for simple experiments with equally likely outcomes and assigns probabilities to those outcomes. The student calculates mean, mode, median and range for data sets and constructs stem-and-leaf plots and dot-plots (WS3). The student compares the cost of items to make financial decisions (WS4), solves problems involving percentages and all four operations with fractions and decimals, and expresses one quantity as a fraction or percentage of another (WS5).

Mathematics

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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*
- *describe different views of three-dimensional objects*
- *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.*

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.

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

$6 \times p = 6p$

c. t decreased by 2

$t - 2$

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

$y \times 5 - x$
$= 5y - x$

(3 marks)

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

a. b – c

$5 - 2 = 3$

b. 6bc

$6 \times b \times c$
$= 6 \times 5 \times 2$
$= 60$

c. (b + c) ÷ 7

$(5+2) \div 7$
$= 7 \div 7$
$= 1$

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

a. variable?

X

b. operation?

$+$

c. factor with the pronumeral?

3 ~~x~~

is this the same as the coefficient? I guess so

4. Simplify the following expressions.

a. 2x + 3x

$= 5x$

b. 2a + b + 4a

$= 6a + b$

c. 5x – 3x + x

$= 3x$

d. 2 x 4y

$= 8y$

e. 4a ÷ 2

$= 2a$

f. 2x + x² + 3x

$= 5x + x^2$

Annotations

Writes numbers algebraic sentences using symbols.

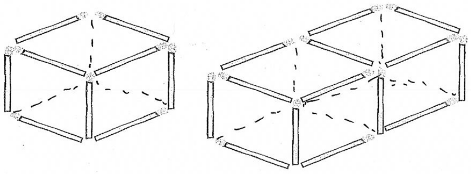
Demonstrates understanding of the terminology used in algebra.

Collects like terms.

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.

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.

I didn't know whether this meant all matches or just the showing ones

matches showing

Shapes	s	1	2	3	4	5	6	7	8	9
Number of matches	m	9	14	19	24	29	34	39	44	49

All matches

Shapes	s	1	2	3	4	5	6
Number of matches	m	12	20	28	36	44	52

b.
Select pronumerals to stand for the two variables and express the rule in algebraic form. shapes – s number of matches – m

matches showing $m = 5 \times s + 4$
$m = 5s + 4$

all matches $m = 8 \times 6 + 4$
$= 8s + 4$

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

matches showing $m = 5 \times 15 + 4$
$= 75 + 4$
$= 79$

all matches $m = 8 \times 15 + 4$
$= 124$

d.
Find by substitution in the rule how many shapes can be formed from 49 matches. see tables in 5a

matches showing
9 shapes can be made. from 49 matches

all matches. you can't make an exact number of whole shapes from 49 matches, so question must mean showing matches only

Total

PART B: The Cartesian Plane

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

{2, -1, -4, 0}

-4 -1 0 0 2

0 must be below a dash, not in a gap, I think.

2. Penny checks her bank account balance and it reads $ - 240.00 .
   a. What does this mean for Penny? She has overdrawn her account by $240
   b. If she deposits $40, what is her new balance? $ - 200 . 00

Annotations

Completes table and demonstrates mathematical insight by questioning the intent of the question.

Writes rules based on tables developed.

Calculates the number of matches from the rule.

Questions the rule based on reasoning determined from the nonspecific question.

Graphs numbers on number line with correction to the placement of 0.

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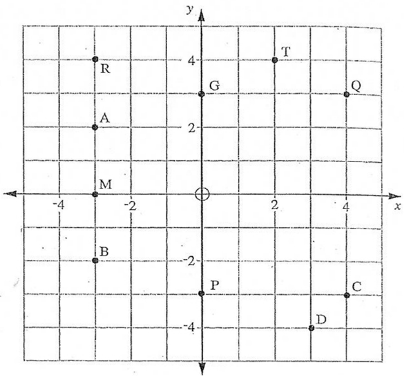
Number and algebra – Algebra and the Cartesian Plane

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) × 8 = -24
   b. (-7) × (-4) = 28
   c. $(-8)^2$ = 64
   d. 25 ÷ (-5) = -5
   e. (-16) ÷ (-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 answers to directed number sentences.

Calculates answers with correct usage of negatives.

Identifies coordinates of nominated points.

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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.

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

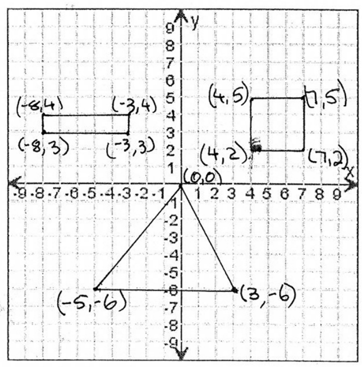
Shape: Square

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

Shape: Triangle - scalene

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

Shape: rectangle

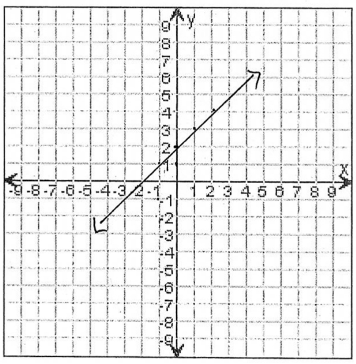


8. a. Complete the table of values using the rule given

$y = x + 2$

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 shapes with detail for the triangle.

Completes table of values.

Plots points on Cartesian plane and labels line with arrows.

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Number – Integers

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.

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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.

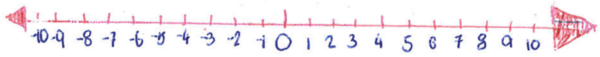
Number – Integers

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

-66, -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? when there is a + & a - in the middle of two numbers, then the minus over-rules, resulting in a negative number.

Annotations

Creates a number line with positive and negative integers that are evenly spaced.

Orders integers from lowest to highest.

Compares integers using mathematical symbols.

Demonstrates understanding of the effect of adding two negative integers.

Acknowledgement
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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? When there are two minus' in the center, then it becomes a +

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?

Annotations

Calculates addition equations involving positive and negative integers.

Describes the effect of subtracting a negative integer.

Calculates subtraction equations involving positive and negative integers.

Solves problems using addition of integers.

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Number – Integers

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

-7kg

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

-$300

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:		Name:	
HOLE	PAR	SHOTS	PAR SCORE	SHOTS	PAR SCORE
1	3	4	+1	1	-2
2	4	5	+1	1	-3
3	3	1	-2	3	0
4	5	2	-3	5	0
5	2	3	+1	3	+1
TOTAL	17	15	-2	13	-4

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.

The difference between the Total of Par and my total number of shots is -2. My total number of shots is not the same as my par score, infact there is a difference of +17.

Annotations

Solves problems involving subtraction of integers in context.

Uses negative symbol to represent the decrease of value.

Calculates the addition of multiple integers.

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Statistics – Statistics and probability

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.

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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.

Statistics – Statistics and probability

Statistics and Probability Assessment Task Year 7

Part A

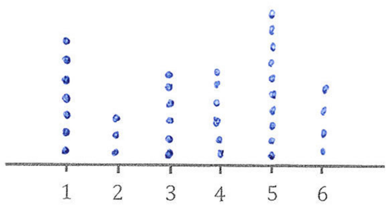
1. If you were to roll a standard six-sided die 36 times, how many sixes (6's) would you expect to get?

6

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

Number	Tally	Total
1	卌 II	7
2	III	3
3	卌 I	6
4	卌 I	6
5	卌 卌	10
6	IIII	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 probability of outcome in a simple experiment.

Constructs a dot-plot based on data gathered.

Identifies mode in data sets.

Compares and reasons observed events with the probability of outcomes.

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)= $\frac{7}{36}$

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)= $\frac{4}{36}$ / $\frac{2}{18}$

Annotations

Calculates experimental probability for outcomes.

Part B

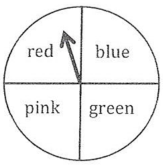
A single coin is tossed.

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}

Identifies sample space for simple experiments.

2. What is the probability of spinning red?

$\frac{1}{4}$

Identifies probability in experiments with equally likely outcomes.

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.

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

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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, 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	1,3,8,5,6,8
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 ~~mode & median~~ Mean is the one that best represents the results of the class because it is the average of All the Scores together

Annotations

Constructs a stem-and-leaf plot accurately.

Calculates the range, mode, median and mean of data sets.

Describes how the mean best represents data.

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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.

Number and measurement – Eggs for sale

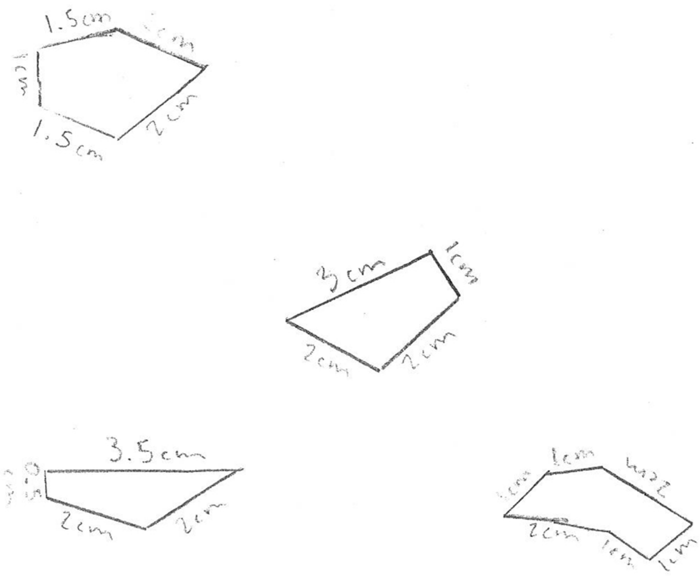
Year 7 Mathematics Assessment Task

EGGS 4 SALE - "Eggonomical"

PART A

Draw 4 different polygons with a total perimeter of 80 metres

Scale: 1cm : 1m



Annotations

Constructs polygons to scale.

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Number and measurement – Eggs for sale

PART B

To make some extra money to help pay bills, Jose and Kristina Fry decide to create a free-range chicken enclosure, and sell the eggs produced.

For eggs to be considered free-range, each chicken must have an area of $2.5m^2$.

Jose and Kristina have set aside a rectangular area of their property but need to fence the area. To build the enclosure, the Fry's plan to use recycled material that is on the property.

Jose and Kristina wish to enclose the largest possible area for their chickens with this amount of fencing. Investigate all the possible dimensions of a rectangular fence that can be made with an 80 metre length of fencing wire.

Use the table below to record the results of your investigation.

Length (m)	Breadth (m)	Perimeter (m)	Area (m^2)
20	20	80	400
30	10	80	300
35	5	80	202
25	15	80	375

Q1. From your investigation, which dimensions provide the greatest area for the chickens?

$20_m \times 20\,m = 400\,m^2$

Q2. How many chickens can the Frys fit in the maximum area created? (Remember: 1 chicken per $2.5m^2$ to be considered free-range).

160 chickens

Annotations

Records data in table.

Draws conclusions based on information.

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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)

4800 eggs

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

'Gillies' Eggs

Carton of 18 - $8.40

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

$5.50 per dozen – my price

illies' charges $5.60 per dozen

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.

largest area: 720m²

80+32=112

ngth (m)	Breath (m)	Perimeter (m)	Area (m²)
50	6	112	300
14	14	112	196
40	16	112	640
36	20	112	720

Annotations

Uses information gathered in table to find a solution.

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.

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.

Statistics and probability – Seatbelt sampling

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.

Smallest no of cars required would be 100. However, you need quite a large sample to get a precision of 93%. In reality you would need to take close to 1000 to get more accurate results

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%?

22 cars. $\frac{22}{25\text{people}} \times 100\% = 88\%$

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.*

The minimum sample would be 100 if you are working with whole numbers. If you were looking at decimal numbers not whole numbers the sample size could be less.

Annotations

Demonstrates insightful approach to the answer of the question.

Calculates minimum number to be surveyed.

Demonstrates understanding of the required answer but offers further reasoning of what else the answer could be.

Acknowledgement
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Measurement – Measurement investigation

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 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 lengths of 1 cm.
2. 

   This set of cubes is arranged to from 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 2 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 the 24 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. 4cm x 2cm x 3cm = 24cm³

V = 24cm³

SA

(Front) 3cm x 4cm = 12cm²
12cm² x 2 = 24cm²

(Top) 2cm x 4cm = 8cm²
8cm² x 2 = 16cm²

(End) 2cm x 3cm = 6cm²
6cm² x 2 = 12cm²

24
+16
+12
52

SA = 52cm²

Prism 1

2cm x 6cm x 2cm = 24cm³

V = 24cm³

Prism 2

2cm x 12cm x 1cm = 24cm³

V = 24cm³

Prism 1 SA

(Front) 2cm x 2cm = 4cm²
4cm² x 2 = 8cm²

(Top) 2cm x 6cm = 12cm²
12cm² x 2 = 24cm²

(End) 2cm x 6cm = 12cm²
12cm² x 2 = 24cm²

8
+24
+24
56

SA = 56cm²

Prism 2 SA

(Front) 2cm x 1cm = 2cm²
2cm² x 2 = 4cm²

(Top) 2cm x 12cm = 24cm²
24cm² x 2 = 48cm²

(End) 1cm x 12cm = 12cm²
12cm² x 2 = 24cm²

4
+48
+24
76

SA = 76cm²

Q D Largest possible surface area.

To find the largest surface area you would have to brake it down to one long colum 1cm by 1cm by 24cm because there is the most surface area exposed possible for each cube.

Prisms	Dimensions	Volume	S. Area
Original	4x2x3	24cm³	52cm²
Prism 1	2x6x2	24cm³	56cm²
Prism 2	2x12x1	24cm³	76cm²
Largest SA	1x1x24	24cm³	96cm²

Conclusion

Each rectangular prisms volume was 24cm³ but every Surface Area was different and I found that the less colums and longer colums let more area exposed.

Annotations

Uses the formula of volume.

Calculates the volume of a prism using appropriate units.

Calculates the surface area of a prism using appropriate units.

Identifies the prism that can have the largest possible surface area.

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

Draws conclusions on surface area from investigation.

Acknowledgement
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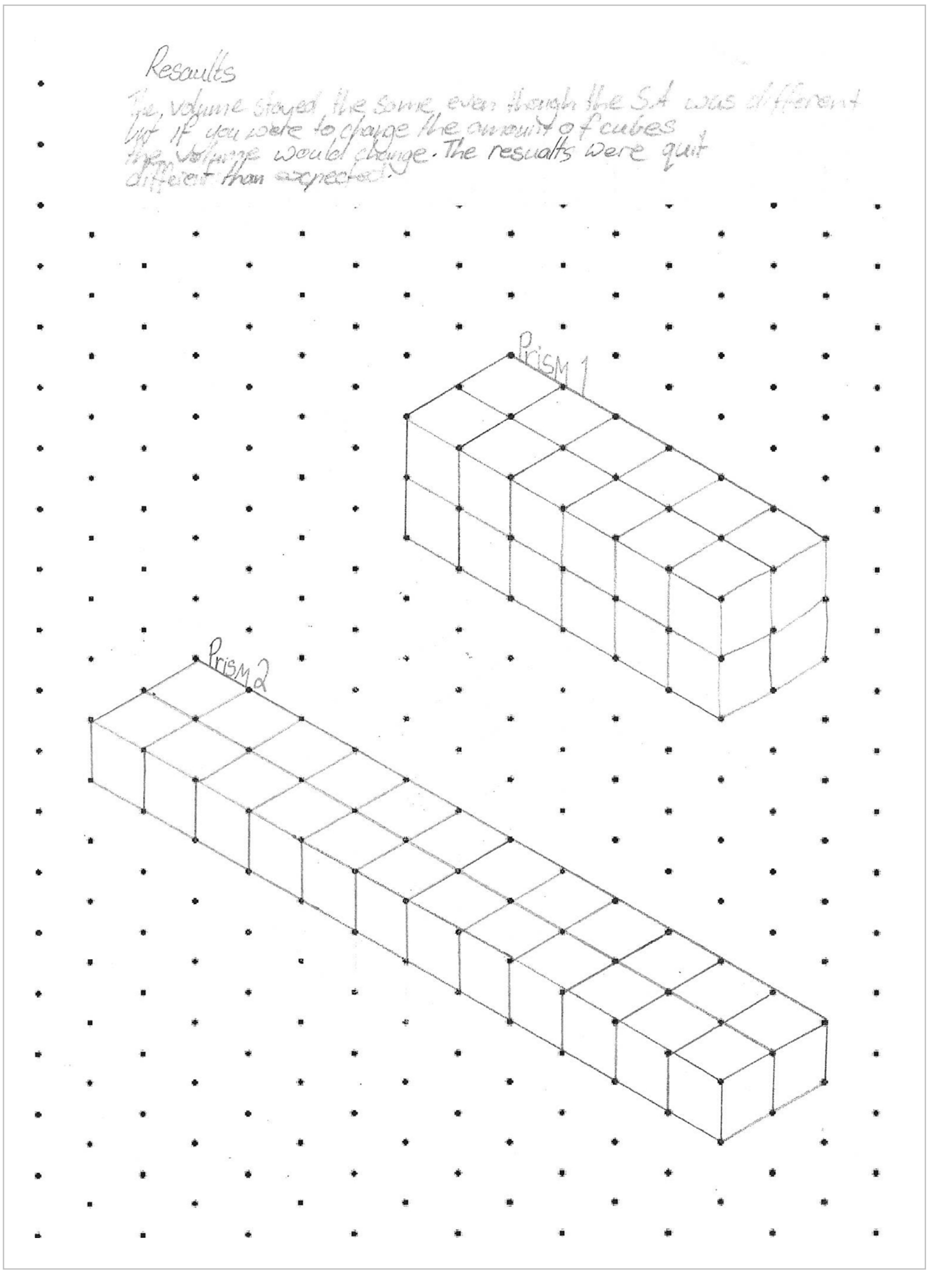
Measurement – Measurement investigation



Annotations

Draws prisms on isometric paper.

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.