MARS Tasks | Grade 8

Page	Name of MARS Task	Year	Math Strand	Notes
*	Pete's Numbers	2003	AF	Mean, median, range in context
*	Squares and Rectangles	2003	GM	Analyze gym costs to solve problems
*	Sports Injuries	2003	DA, NO	Find area, perimeter of letters on a grid
*	Dots and Squares	2003	AF	Identify, evaluate likelihood of spins
*	Number Pairs	2003	AF	Find material cost, fractions in context
*	Merritt Bakery	2004	AF, GM	Diameter, circum., write a formula
*	Odd Numbers	2004	NO	Explain addition of odd numbers
*	Party	2004	AF	Find/use alg. Formula, cost of party
*	Hexagons	2004	GM	Identify diff. triangles in the hexagon
2	Pen Pal	2005	AF	Use formula changing degrees C to F
5	Picking Apples	2005	AF	Find cost from given rules
9	Fractions of a Square	2005	GM, NO	Calculate areas and fractional regions
13	Sports	2005	NO, DA	Percentages, use circle graph
17	T-shirt Sale	2005	NO	Calc. total cost and savings
20	**Overview of 2006 Tasks**			
21	Aaron's Designs	2006	GM	Draw reflections, rotations
24	Squares and Circles	2006	AF	Perimeter, circumference, line graphs
27	Temperatures	2006	DA	Scatter plot, box plot
30	25% Sale	2006	NO	Percentage increase and decrease
33	Going to Town	2006	NO	Dist. /time graph, fractions of mile/hour
36	**Overview of 2007 Tasks**			
37	Triangle	2007	GM	Use clues to find lengths of sides
39	Rugs	2007	GM	Find perimeter, use Pythagorean Rule
42	Number Calculations	2007	NO, AF	Order of operations
45	Shelves	2007	AF	Spatial problem solving, four point graphs
48	Take Off	2007	NO	Speed, time, distance
50	**Overview of 2008 Tasks**			
51	At the Jewelry Store	2008	NO	Percents of discounts and tax
53	Multiples of 10	2008	NP, NO	Explain why statement-not always true
55	Patterns in Prague	2008	GM	Calculate area/perimeter, Pythagorean Rule
57	Cog Railway	2008	AF	Calculate compare avg speed, distance/time
60	Flora, Freddy & the Future	2008	PS	Likely/unlikely events, numerical prob.
63	**Overview of 2009 Tasks**			
64	Averages	2009	DA	Weighted averages (mean), and percents
66	Square Patterns (no rubric)	2009	GM, NO	Extend geometric patterns, calculate percent
68	Marble Game	2009	PS	Compare exper/theor probability
71	Vincent's Graph	2009	AF	Interpret slope/intercept, draw graph
74	Photos	2009	GM	Equivalent ratios, find size of photos/page

NP=Number Properties
NO=Number Operations
PFA=Patterns Functions Algebra
GM=Geometry & Measurement
DA=Data Analysis

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8th grade Task 1 Pen Pal

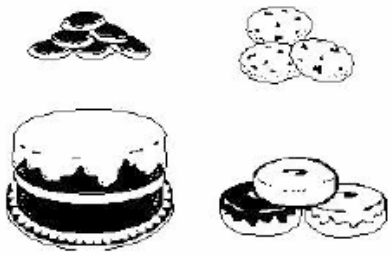
Student Task	Convert cake baking temperatures between Celsius and Fahrenheit.
Core Idea 3 Algebra and Functions	**Understand relations and functions, analyze mathematical situations, and use models to solve problems involving quantity and change.** • Express mathematical relationships using expressions and equations • Use symbolic algebra to represent situations to solve problems • Recognize and generate equivalent forms of simple algebraic expressions and solve linear equations
Core Idea 2 Mathematical Reasoning	**Employ forms of mathematical reasoning and justification appropriately to the solution of a problem.** • Invoke problem-solving strategies • Use mathematical language to make complex situations easier to understand

Grade 8 – 2005

Pen Pal

This problem gives you the chance to:
• use a formula

Darla's European pen pal has sent her a recipe for a cake.



The recipe says to bake the cake at 170° Celsius but Darla's oven is in degrees Fahrenheit.

Darla finds a formula in her science book for changing degrees Celsius to degrees Fahrenheit:

$$F = {}^{9}/_{5}\, C + 32$$

1. At what temperature, in degrees Fahrenheit, should Darla bake her cake? _____
   Show your calculations.

2. Her recipe says that she should bake her cake at 350° F.
   What is this in degrees Celsius?

   _____

   Show your calculations.

3. Darla wants to send a recipe to her pen pal.
   She decides to convert the temperature from degrees Fahrenheit to degrees Celsius.

   Darla rearranges the formula so that she can easily convert °F to °C.
   Write the formula so that it begins with

   C = _____

Grade 8 – 2005

Pen Pal	Rubric	
The core elements of performance required by this task are: • use a formula Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **338** Shows correct work such as: 9/5 x 170 + 32 =	1 1	2
2. Gives correct answer: **176.6** (Accept 176 to 177) Shows correct work such as: 350 – 32 = $^{9}/_{5}$C and 318 x 5 ÷ 9	1 1	2
3. Gives correct answer: **C = $^{5}/_{9}$ (F - 32)** or equivalent *Partial credit* C = $^{5}/_{9}$ F - 32	2 (1)	2
Total Points		**6**

8th grade Task 2 Picking Apples

Student Task	Determine the cost of apples from the rates given. Solve to find the number of pounds of apples that could be purchased for $30. Compare the two pricing structures for apples.
Core Idea 3 Algebra and Functions	**Understand relations and functions, analyze mathematical situations, and use models to solve problems involving quantity and change.** • Model and solve contextualized problems involving inequalities • Use graphs to analyze the nature of changes on quantities in linear relationships
Core Idea 2 Mathematical Reasoning	**Employ forms of mathematical reasoning and justification appropriately to the solution of a problem.** • Invoke problem-solving strategies • Use mathematical language to make complex situations easier to understand

Grade 8 – 2005

Picking Apples

This problem gives you the chance to:
- work out costs from given rules

Anna goes to pick apples.
She sees two orchards next to each other; David's orchard and Pam's orchard.
The signs below are at the entrance to the orchards.

DAVID'S APPLE ORCHARD Pick your own apples!	PAM'S ORCHARD DELICIOUS APPLES
First 10 pounds $2 per pound	$10 entry fee
Each additional pound $1 per pound	First 10 pounds $1.50 per pound
	Each additional pound $0.75

Anna wants to pick 40 pounds of apples.

1. a. How much does this cost at David's orchard? _____

   Show your calculations.

   b. How much does it cost at Pam's orchard? _____

   Show your calculations.

Grade 8 – 2005

Chris has $30 to spend.

2. a. How many pounds of apples will he get if he goes to David's orchard? _____
Explain how you figured it out.

_____

_____

_____

b. If Chris goes to Pam's orchard, how many pounds of apples will he get? _____
Explain how you figured it out.

_____

_____

_____

3. How many pounds of apples must Chris pick before Pam's orchard is cheaper than David's?
Show your work. _____

10

Picking Apples	Rubric	
The core elements of performance required by this task are: • work out costs from given rules Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. a. Gives correct answer: $**50** Shows correct work such as: 10 x $2 + 30 x $1 b. Gives correct answer: $**47.50** Shows correct work such as: $10 + 10 x $1.50 + 30 x $0.75	1 1 1 1	4
2. a. Gives correct answer: **20** pounds Gives a correct explanation such as: The first 10 pounds of apples cost $20. The remaining $10 buys 10 pounds. Altogether 10 + 10 = 20 pounds. b. Gives correct answer: **$16^{2}/_{3}$** pounds (accept 16) Gives a correct explanation such as: The entry fee is $10. The first 10 pounds of apples cost $15. The remaining $5 buys 6.6 (accept 6) pounds. Altogether 10 + 6.6 = 16.6 pounds (accept 16)	1 1 1 1	4
3. Gives correct answer: **more than 30** pounds (Accept 31) Shows work such as: David's: 10 x $2 + 20 x $1 = $40 Pam's: $10 + 10 x $1.50 + 20 x $0.75 = $40 **or** Draws a correct graph	1 1 or 1	2
Total Points		**10**

Grade 8 – 2005

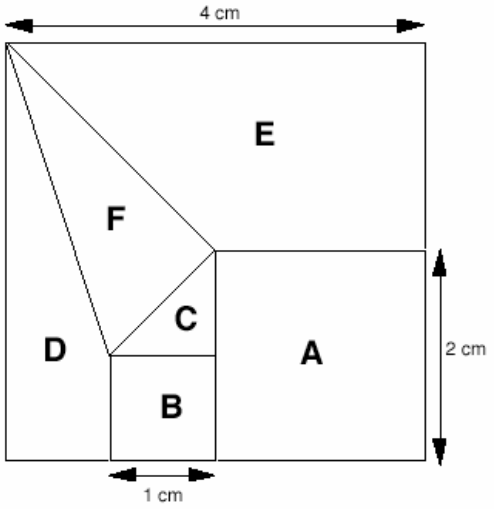
8th grade Task 3 Fractions of a Square

Student Task	Calculate the areas and name the fractional pieces of 6 regions of a square.
Core Idea 4 Geometry and Measurement	**Analyze characteristics and properties of two-dimensional geometric shapes, develop mathematical arguments about geometric relationships, and apply appropriate techniques, tools, and formulas to determine measurements.** • Develop strategies to determine area • Create and critique arguments concerning geometric ideas and relationships • Understand relationships among the angels, side lengths, perimeters and area of shapes
Core Idea 1 Number and Operation	**Understand number systems, the meanings of operations, and ways of representing numbers, relationships, and number systems.** • Understand and use the inverse relationships of squaring and finding square roots to simplify computations and solve problems
Core Idea 2 Mathematical Reasoning	**Employ forms of mathematical reasoning and justification appropriately to the solution of a problem.** • Extract pertinent information from situations and determine what additional information is needed • Invoke problem-solving strategies • Verify and interpret results of a problem • Use mathematical language to make complex situations easier to understand

Fractions of a Square

This problem gives you the chance to:
• calculate areas and fractional regions of a square

The large square shown below is cut into pieces along the lines shown in the diagram.



(diagram not drawn to scale)

The large square is 4 cm long and 4 cm wide.
Square A is 2 cm long and 2 cm wide.
Square B is 1 cm long and 1 cm wide.

What **fraction** of the large square are the other pieces?

Show your work.

Piece A _____

Piece C _____

Piece D _____

Piece E _____

Piece F _____

10

Grade 8 – 2005

Fractions of a Square	Rubric	
The core elements of performance required by this task are: • calculate areas and fractional regions of a square Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: Piece A = **1/4** accept equivalent fractions	1	1
2. Gives correct answer: Piece B = **1/16** accept equivalent fractions	1	1
3. Gives correct answer: Piece C = **1/32** accept equivalent fractions Shows correct work such as: The area of Piece C is **1/2** cm^2 or $^{1/2}$ /16	1 1	2
4. Gives correct answer: Piece D = **5/32** accept equivalent fractions Shows correct work such as: The area of Piece D is **2 1/2** cm^2 or $^{2\,1/2}$/16	1 1	2
5. Gives correct answer: Piece E = **6/16** or **3/8** accept equivalent fractions Shows correct work such as: The area of Piece E is **6** cm^2 or 6/16	1 1	2
6. Gives correct answer: Piece F = **1/8** accept equivalent fractions Shows correct work such as: Adds all their values A through E, then subtracts them from 1. $^1/_4 + {}^1/_{16} + {}^1/_{32} + {}^5/_{32} + {}^3/_8 = {}^{28}/_{32} = {}^7/_8$	1 1	2
Total Points		**10**

Grade 8 – 2005

8th grade Task 4 Sports

Student Task	Work with percentages to create and interpret favorite sports information in circle graphs. Communicate mathematical understanding of percentages.
Core Idea 1 Number and Operation	**Understand number systems, the meanings of operations, and ways of representing numbers, relationships, and number systems.** • Work flexibly with fractions, decimals, and percents to solve problems
Core Idea 5 Data Analysis	**Students deepen their understanding of statistical methods used to display, analyze, compare and interpret data sets.** • Represent and analyze data in the form of graphs including circle graphs • Discuss and understand the correspondence between data sets and their graphical representations
Core Idea 2 Mathematical Reasoning	**Employ forms of mathematical reasoning and justification appropriately to the solution of a problem.** • Extract pertinent information from situations and determine what additional information is needed • Invoke problem-solving strategies • Verify and interpret results of a problem • Use mathematical language to make complex situations easier to understand

Sports

This problem gives you the chance to:
- work with percentages
- use circle graphs

In a survey in Lake City, girls in the 8th grade were asked their favorite sport.

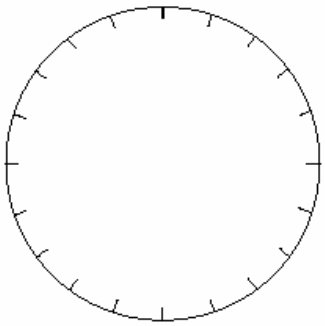
The results are shown in this table.

SPORT	GIRLS	PERCENTAGE
Soccer	78	
Basketball	117	
Tennis	65	

1. Find the percentage of girls who preferred each of the sports.
   Write your answers in the table.

   Show your calculations.

2. Use the percentages in the table to complete this circle graph.
   Do not forget to label each sector.

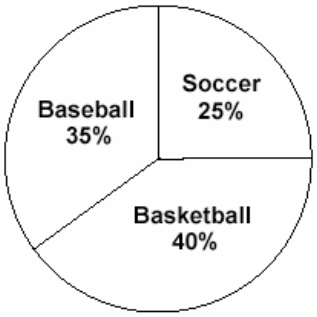


Grade 8 – 2005

In Lake City, boys in the 8th grade were also surveyed.
The results of this survey are shown in the circle graph below.

3. Seventy boys liked basketball best.
   How many boys were there in the 8th grade survey? _____

   Show your calculations.



The 8th grade baseball teams from Lake City and Appleton plan to play a game.

Luis has seen a survey of Appleton's 8th grade boys' favorite sports. The survey shows that 45% of them like baseball best.

Luis says that this will not be fair because more boys in Appleton like baseball best, so there will be more boys to choose from for the team.

Kyle says he thinks Luis is wrong.

4. Explain why Luis might be wrong in thinking that more boys prefer baseball in Appleton than in Lake City.

_____

_____

_____

8

Sports	Rubric	
The core elements of performance required by this task are: • work with percentages • use circle graphs Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives three correct percentages: **30, 45, 25** **Partial credit** 1 value correct and total 100% or 2 values correct Shows a correct method for at least one calculation such as: 78/260 x 100	2 (1) (1) 1	3
2. Draws and labels one sector correctly. Draws and labels the other two sectors correctly.	1ft 1ft	2
3. Gives a correct answer: **180** Shows correct work such as: 72/40 x 100	1 1	2
4. Gives a correct explanation such as: We only know about the percentages, not the actual numbers. **or** There might be fewer 8th grade boys in Appleton than in Lake City.	1	1
Total Points		**8**

Grade 8 – 2005

8th grade Task 5 T-shirt Sale

Student Task	Calculate the total costs and savings when purchasing T-shirts on sale.
Core Idea 1 Number and Operation	**Understand number systems, the meanings of operations, and ways of representing numbers, relationships, and number systems.** • Work flexibly with fractions, decimals, and percents to solve problems • Understand the meaning and effects of operations with fractions and decimals • Select appropriate methods and tools for computing with fractions and decimals from among mental computations, estimation, calculators, and paper and pencil depending on the situation, and apply selected methods.

Grade 8 – 2005

T-shirt Sale

This problem gives you the chance to:
- calculate total costs
- calculate percentage savings

1. Tom bought these three T-shirts at the sale price of $14.50.
   How much money did he save compared to the original total price of the T-shirts?
   Show your calculations.

   $ _____

2. What percentage of the original total price did Tom save? _____%
   Show your work.

3. Harry also paid $14.50 for three T-shirts at the sale. The sale price saved Harry 30% of the original price of the three T-shirts.
   What is the original total price of his three T-shirts? $ _____
   Show your calculations.

6

T-shirt Sale	Rubric	
The core elements of performance required by this task are: • calculate total costs • calculate percentage savings Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: $**2.47** Shows correct work such as: 3.99 + 6.99 + 5.99 = 16.97 16.97 – 14.50	1 1	2
2. Gives correct answer: **14.56**% (accept 14% - 15%) Shows correct work such as: 2.47/16.97	1 1	2
3. Gives correct answer: $**20.71** Shows correct work such as: 14.50 ÷ 0.7	1 1	2
Total Points		**6**

Grade 8 – 2005

Overview of Exam

Core Idea	Task	Score
Geometry and Measurement	**Aaron's Designs**	
This task asks students to draw reflections and rotations of a given figure on a grid. Students describe transformations needed to make a given pattern. Successful students could draw and describe reflections, flips, and slides. Students working at a high level could draw rotations and quantify the transformations.		
Algebra and Functions	**Squares and Circles**	
This task asks students to work with perimeter and circumference of squares and circles. Students use and interpret line graphs and their equations. Successful students could reason about perimeter of squares and plot points on a graph. They could identify the equation for perimeters and explain why the graph was a straight line. Students working at a high level could compare and contrast the graphs of two functions.		
Data Analysis	**Temperatures**	
This task asks students to understand and interpret statistical graphs and diagrams showing real data. Students compare and contrast data sets. Successful students compare and contrast line graphs and match the line graphs to box and whisker diagrams by noting key features of the data. Students working at a high level understood the upper and lower quartiles on a box and whisker diagram.		
Number and Operation	**25% Sale**	
This task asks students to work with percentage increase and decrease in the context of a sale and develop mathematical arguments on the effects of decreasing a price by 25% four times. Successful students could calculate the cost of a 25% reduction and reason why reducing something by 25% four times does not result in zero cost. Students working at a high level could calculate the percent reduction given the amount of reduction and original cost.		
Mathematical Reasoning	**Going to Town**	
This task asks students to interpret and complete a distance/time graph for a described situation and work with rates in the context of slope. Successful students could calculate rates from a graph, relate the meaning of slope to the problem context, and use information about the situation to continue the graph.		

Aaron's Designs

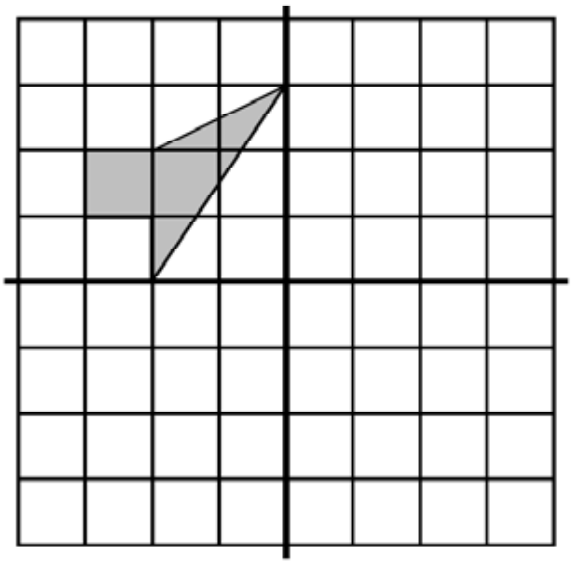
This problem gives you the chance to:
- draw reflections and rotations of a given figure on a grid
- describe transformations needed to make a given pattern

Aaron is drawing some designs for greetings cards.
He divides a grid into 4 quadrants and starts by drawing a shape in one quadrant.
He then reflects, rotates or translates the shape into the other three quadrants.

1. Finish Aaron's first design by reflecting the gray shape over the vertical line.

   Then reflect both of the shapes over the horizontal line.

   This will make a design in all four quadrants.

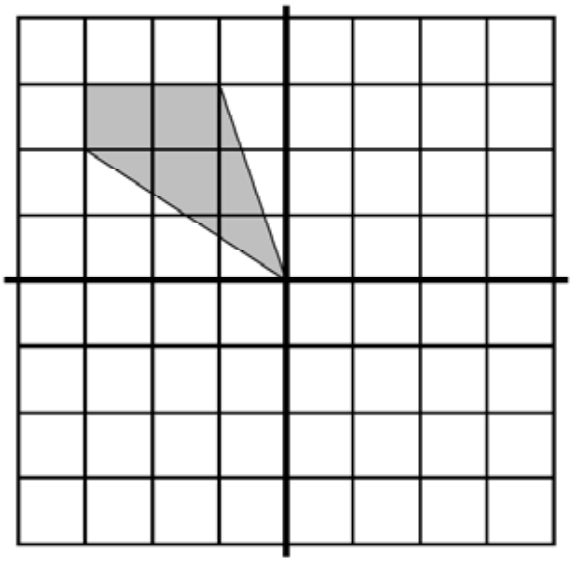


2. To finish drawing Aaron's second design, rotate the gray shape 1/4 of a turn in a clockwise direction about the origin. Then draw the second shape.

   Rotate the second shape 1/4 of a turn in a clockwise direction about the origin. Then draw the third shape.

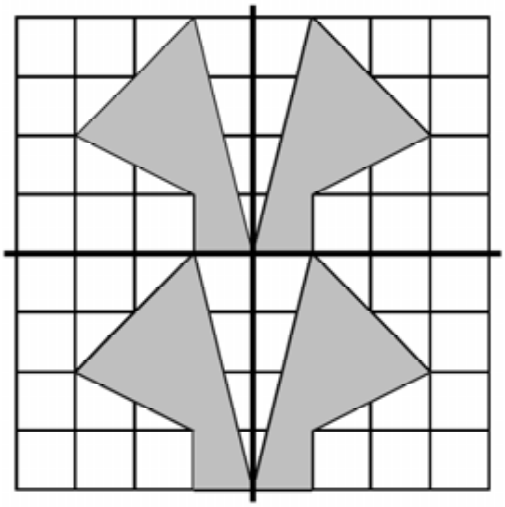
   Rotate the third shape 1/4 of a turn in a clockwise direction about the origin. Then draw the fourth shape.

   This will make a design in all four quadrants.

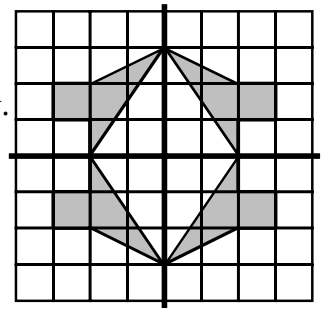
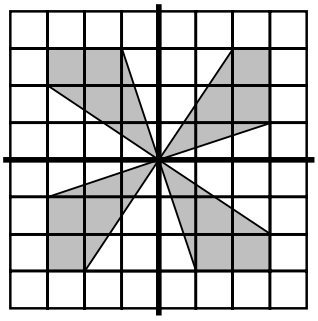


3. This is Aaron's third design.

He started with one gray shape in the top left hand quadrant of the grid and transformed it to make the design.



Describe the transformations that Aaron may have used to draw this design.

Aaron's Designs	Rubric	
The core elements of performance required by this task are: • draw reflections and rotations of a given figure on a grid • describe transformations needed to make a given pattern Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Draws all 3 shapes correctly. *Partial credit* Draws shape 2 and one other correctly. Draws shape 2 or shape 4 correctly. Shape 4 →  Shape 2 ←	3 (2) (1)	3
2. Draws all 3 rotations correctly. *Partial credit* Draws shape 2 correctly.  Shape 2 ←	2 (1)	2
3. Gives a correct description such as: **Reflects** the shape over the vertical line, then **translates/slides** the 2 shapes **down 4 squares**.	1 1 1	3
Total Points		**8**

Eighth Grade – 2006

Squares and Circles

This problem gives you the chance to:
- work with perimeter and circumference of squares and circles
- use and interpret line graphs and their equations

The points on this graph show the perimeters of squares of different sizes.

For example, a square with sides 2 inches long has a perimeter of 8 inches.

1. What is the perimeter of a square with sides 5 inches long?

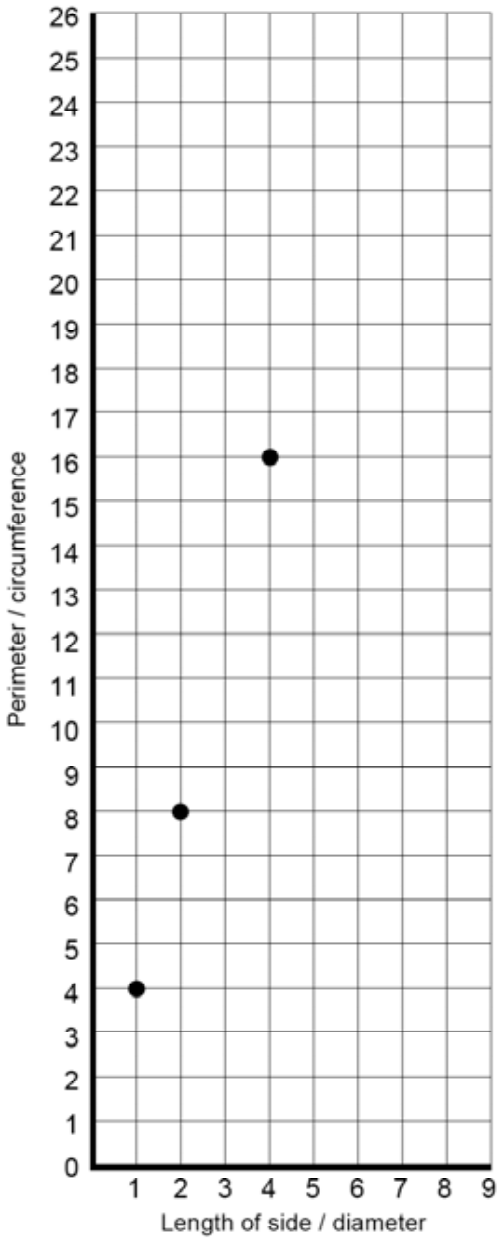
   _____

   Mark a point for this square on the graph.

2. How long are the sides of a square with perimeter 12 inches?

   _____

   Mark a point for this square on the graph.



3. Draw a line through the points on the graph.

   (a) Explain why the line passes through the point (0, 0).

   _____

   _____

   (b) Explain why the line is straight.

   _____

   _____

4. Draw a circle around the correct equation of the straight line on the graph.

$$x + y = 4 \qquad y = x + 4 \qquad y = 4x \qquad y = \frac{x}{4}$$

This table shows the circumferences of circles with different diameters.
The circumferences have been rounded to one decimal place.

Diameter of circle in inches	1	2	3	4	5	6
Circumference in inches	3.1	6.3	9.4	12.6	15.7	18.8

5. For each circle, mark an (X) on the graph to show its diameter and circumference.
   Join the Xs with a straight line.

6. Write down one thing that is the same and one thing that is different about the line for the squares and the line for the circles.

   Same:

   _____

   Different:

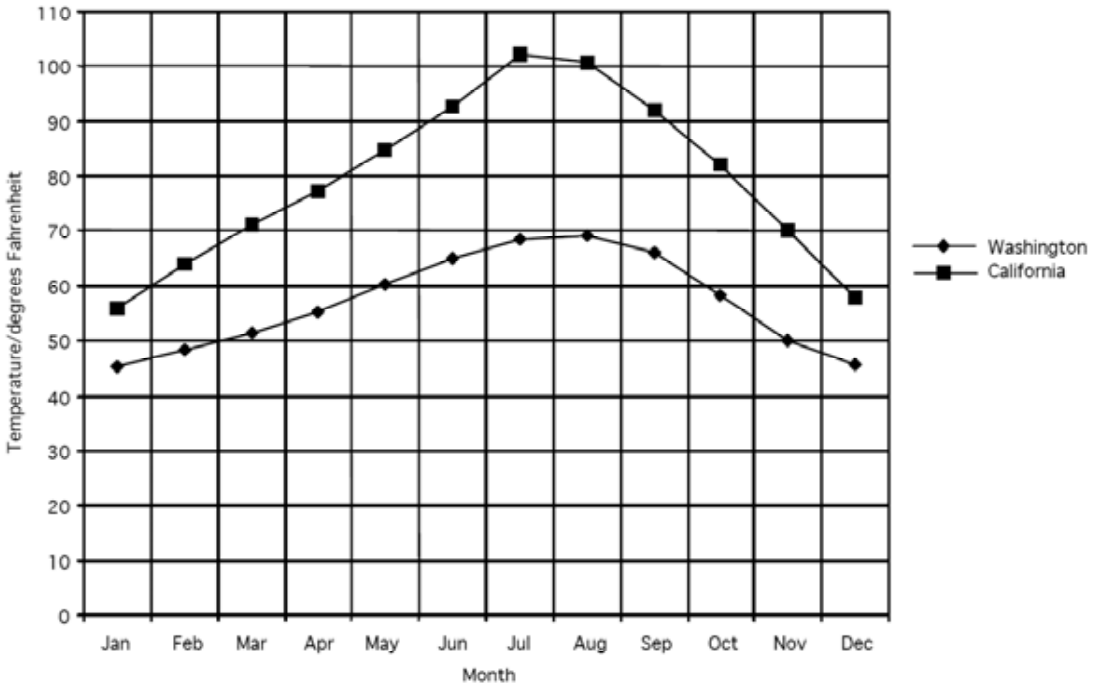
   _____

Squares and Circles	Rubric	
The core elements of performance required by this task are: • work with perimeter and circumference of squares and circles • use and interpret line graphs and their equations Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **20** (inches) and correct point marked on graph.	1	1
2. Gives correct answer: **3** (inches) and correct point marked on graph.	1	1
3. Correct line drawn. (a) Gives correct explanation such as: The perimeter is zero if the side length is zero. (b) Gives correct explanation such as: The perimeter is always four times side length. **or** The perimeter is proportional to side length.	1 1 1	3
4. Gives correct answer: $y = 4x$	1	1
5. Correct points marked and line drawn.	1	1
6. Writes correct statements such as: Both lines go through (0,0) The line for the squares is steeper than the line for the circles.	 1 1	2
Total Points		**9**

Temperatures

This problem gives you the chance to:
• understand and interpret statistical graphs and diagrams showing real data

This graph shows the highest average temperatures for each month of the year for one place in Washington and one place in California.



1. Write two statements about what is the same and what is different in the two sets of temperatures.

(i) _____

_____

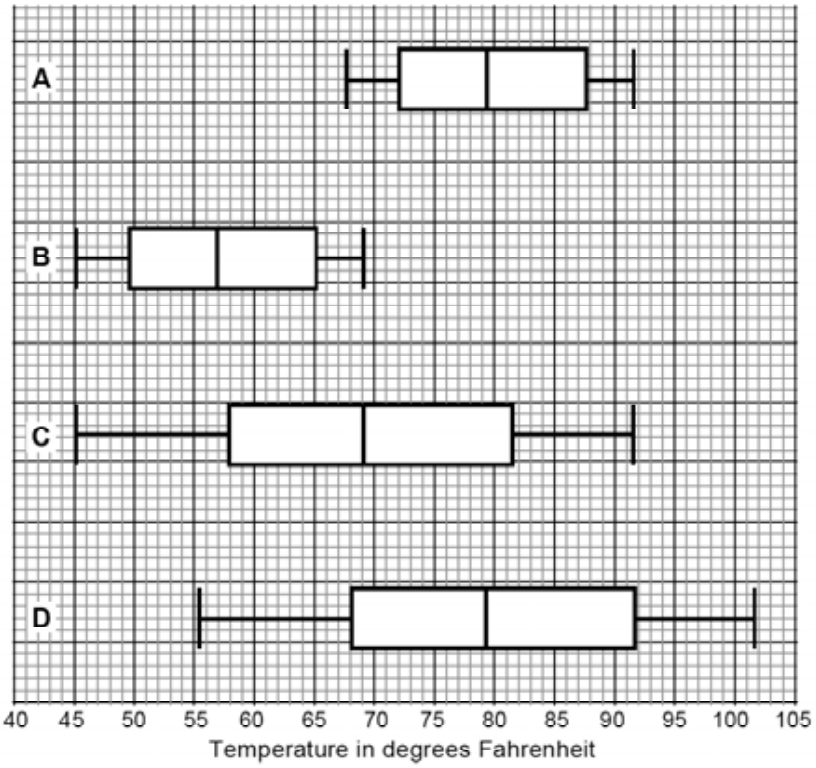
_____

(ii) _____

_____

_____

Box and whisker temperature diagrams



2. Which of the four box diagrams shows the Washington temperatures? _____

Explain how you decided.

_____

_____

3. Which of the four box diagrams shows the California temperatures? _____

For which months of the year is the maximum monthly temperature for California between the upper and the lower quartiles?

_____

_____

Explain how you figured it out.

_____

_____

7

Temperatures Test 8

Eighth Grade – 2006

Temperatures	Rubric	
The core elements of performance required by this task are: • understand and interpret statistical graphs and diagrams showing real data Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives two correct statements such as: Similarities: January has the lowest temperature in both states. June and July have the greatest temperatures. Temperatures increase from the beginning of the year to the middle of the year, then decrease again. Differences: California's temperatures are higher than Washington's for every month. The range of temperatures is greater for California than for Washington.	2x1	2
2. Gives correct answer: **B** Gives a correct explanation such as: Lowest temperature is 45º and highest is 69º. Numbers are not essential dependent on correct answer B.	1 1	2
3. Gives correct answer: **D** Gives correct answer: **March, April, May,** June, September**, October, November** Gives correct reason such as: The temperatures are between 68º and 92º. Numbers are not essential dependent on correct answer D.	1 1 1	3
Total Points		**7**

Eighth Grade – 2006

25% Sale

This problem gives you the chance to:
- work with percentage increase and decrease

In a sale, all the prices are reduced by 25%.

1. Julie sees a jacket that cost $32 before the sale.
   How much does it cost in the sale?

   $ _____

   Show your calculations.

In the second week of the sale, the prices are reduced by 25% of the previous week's price.
In the third week of the sale, the prices are again reduced by 25% of the previous week's price.
In the fourth week of the sale, the prices are again reduced by 25% of the previous week's price.

2. Julie thinks this will mean that the prices will be reduced to $0 after the four reductions because 4 x 25% = 100%.

   Explain why Julie is wrong.

3. If Julie is able to buy her jacket after the four reductions, how much will she have to pay?

$\$$_____

Show your calculations.

4. Julie buys her jacket after the four reductions.

What percentage of the original price does she save?

_____%

Show your calculations.

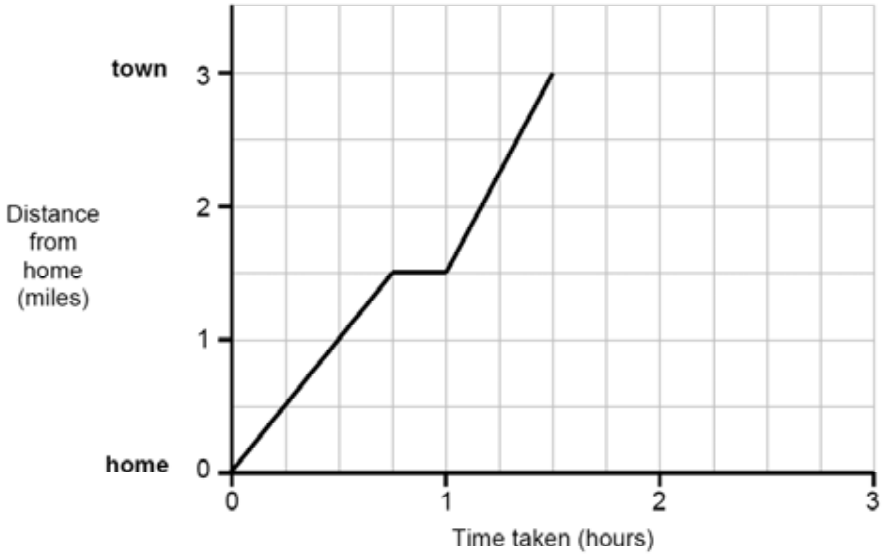
25% Sale	Rubric	
The core elements of performance required by this task are: • work with percentage increase and decrease Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: $**24** Shows correct work such as: 32 ÷ 4 = 8 and 32 - 8	1 1	 2
2. Gives a correct explanation such as: Each reduction is 25% of the previous week's price, and as the price goes down each week, the 25% will be a smaller amount each week.	 1	 1
3. Gives correct answer: $**10.12** or $**10.13** (accept $10.10) Shows correct work such as: 32 x 0.75^4 or 24 x 0.75^3 **or** 24 – (24 x 0.25) = 18 18 – (18 x 0.25) = 13.5 13.5 – (13.5 x 0.25) *Partial credit* Correct as far as/such as, 24 – (24 x 0.25) = 18; 18 – (18 x 0.25) = 13.5	1 2 (1)	 3
4. Gives correct answer: **68.3**% or **68.4**% (accept 68%) Shows correct work such as: 32 – 10.12(or 3) = 21.88(7) **and** 21.88(7) / 32 x 100 **or** 10.12(or 3) / 32 x 100 = 31.6(7) **and** 100 – 31.6(7) *Partial credit* Gives answer 31.6% or 31.7% with some correct work (accept 32%)	1 1ft (1)	 2
Total Points		**8**

Eighth Grade – 2006

Going to Town

This problem gives you the chance to:
- interpret and complete a distance/time graph for a described situation

Craig and James walk from home to town during the school holidays.
The distance/time graph below shows their journey into town.
They set off from home at 10:30 a.m.



1. At what speed did they walk for the first part of their journey?

   _____ miles per hour

   Show how you figured it out.

2. What do you think they do after they have travelled $1\frac{1}{2}$ miles?

3. After an hour the graph is steeper. What does this tell you about Craig and James's walking speed?

Craig and James stay in town for an hour and then catch a bus home.
The bus averages 12 miles per hour.

4. At what time did they get home? _____
   Show how you figured it out.

5. Continue the graph on the previous page to show the rest of this information.

Going to Town	Rubric	
The core elements of performance required by this task are: • interpret and complete a distance/time graph for a described situation Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives a correct answer: **2** mph Shows correct work such as: 1 1/2 miles in 3/4 hour equals 2 miles in an hour, or uses the line on the graph	1 1	2
2. Gives a correct answer such as: Stop for a rest.	1	1
3. Gives a correct answer such as: They walk faster.	1	1
4. Gives a correct answer: **1:15** p.m. or **13:15** Shows correct calculations such as: 3/12 = 1/4 3/4 + 1/4 + 1/2 + 1 + 1/4 = 2 3/4 10:30 plus 2 3/4 hours = 13:15	1 1	2
5. Draws correct graph: Horizontal line for 1 hour. Line down to axis taking 1/4 hour.	1 1	2
Total Points		**8**

Eighth Grade – 2006

Eighth Grade Mars 2007 Task Descriptions
Overview of Exam

Core Idea	Task	Score
Geometry	**Triangle**	
This task asks students to read and interpret clues about geometric attributes of a triangle to find the side lengths. Students needed to understand geometric terms, such as, perimeter, equilateral triangle, and isosceles triangle. Students also needed to understand number properties, such as prime number, single digit, and ratio. Successful students could find a solution that met all of the clues and that would make a closed triangle.		
Measurement	**Rugs**	
This task asks students to work with perimeter and circumference of squares, triangles, and circles. Students were given the formula for circumference to help them with the calculations. Students needed to make conversions from feet and inches to feet or inches. Students also needed to find the perimeter of a semi-circle and explain why it is not the same as half the circumference. Successful students could use Pythagorean theorem to find the side length of an isosceles triangle and use that length to find the perimeter.		
Algebra	**Number Calculations**	
This task asks students to explore the order of number operations by creating examples to fit a set of conditions and test those conditions by calculating the answers to their examples. Successful students could calculate accurately with negative numbers and understand division with decimal answers. Students were then given a set of algebraic representations for the relationships that they had investigated and asked to decide which were true.		
Functions	**Shelves**	
This task asks students to work with a pattern of growing shelves, made up of boards and bricks. Students needed to use spatial thinking to find the number of boards and bricks needed, determine the height, and find the cost of the bookcase. Successful students realized that the height would include the bricks and the thickness of the boards. Students were also asked to look at a graph of the four functions in the pattern (cost, number of bricks, height, and width) and match the points on the graph with descriptions and their equations. Successful students could match the verbal description to the equation.		
Number	**Take Off**	
This task asks students to work with speed, time, and distance in the context of an Indy car race and a rocket launch. Students needed to be able to convert units of measure and work with rates. Successful students could work with a rate in either kilometer per second or meters per second to find the distance traveled given an amount of time or to find the time given the distance.		

Triangle

This problem gives you the chance to:
• use clues to solve a problem

Use the six clues below to find the lengths of the sides of this triangle.

CLUE 1 The perimeter of the triangle is 35 centimeters.	**CLUE 4** The length of one side is a prime number.
CLUE 2 The triangle is not equilateral.	**CLUE 5** The triangle is not isosceles.
CLUE 3 The length of one side is a single-digit number.	**CLUE 6** The ratio of the shortest side to the middle side is 1:2.

Shortest side = _____cm. Middle side = _____cm. Longest side = _____cm.

Show how you figured it out.

8

Task 1: Triangle	Rubric	
The core elements of performance required by this task are: • use clues to solve a problem Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answers: **6, 12, 17**	6	
Partial credit Gives answers that satisfy all six clues but are not closed figures such as: 1, 2, 32; 2, 4, 29; 3, 6, 26; 4, 8, 23; 5, 10, 20	(4)	
or Gives answers that satisfy five clues and are closed figures such as: 8, 16, 11	(4)	
Gives answers that satisfy five clues but are not closed figures such as: 11, 22, 2; 6, 12, 23; 1, 11, 23	(3)	
or Gives answers that satisfy four clues and are closed figures such as: 7, 14, 14; 9, 18, 8	(3)	
Mentions and uses at least three of the given clues	2	
Partial credit Shows evidence of using at least two of the given clues.	(1)	8
Total Points		**8**

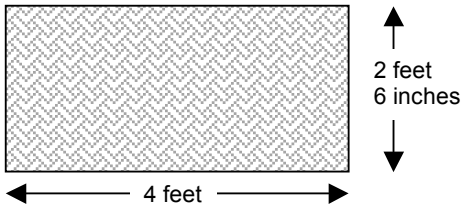
Rugs

This problem gives you the chance to:
• find perimeters of shapes
• use Pythagoras' Rule

Hank works at a factory that makes rugs.

The edge of each rug is bound with braid. Hank's job is to cut the correct length of braid for each rug.

1. The factory makes a rectangular rug that is 4 feet long and 2 feet 6 inches wide.

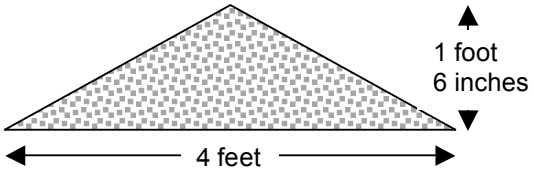


   How much braid will Hank need to cut to go all the way around this rug?

   _____ feet

   Show your work.

2. The factory makes a triangular rug. It is an isosceles triangle 4 feet wide with a perpendicular height of 1 foot 6 inches.

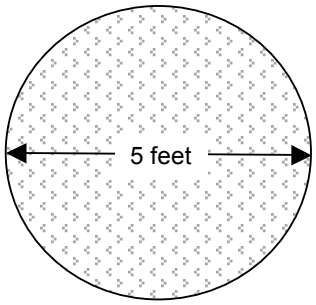


   How much braid will Hank need to cut to go all the way around this rug?

   _____ feet

   Show your work.

3. The factory also makes a circular rug that has a diameter of 5 feet.



How much braid will Hank need to go all the way around this circular rug? Give your answer in whole feet.

The circumference of a circle = $2\pi r$
The area of a circle = πr^2

_____feet

Show your work.

4. There are plans to make a semi-circular rug which also has a diameter of 5 feet. Hank thinks that this rug will need half as much braid as the circular rug.

Explain why Hank is not correct.

_____

_____

_____

_____

How much braid will this rug need? _____feet

Task 2: Rugs	Rubric	
The core elements of performance required by this task are: • find perimeters of shapes • use Pythagoras' Rule Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives a correct answer: **13** feet **and** shows correct work such as: 2 x (4 + 2.5)	1	1
2. Gives a correct answer: **9** feet Shows correct work such as: Attempts to use the Pythagorean Rule. $x^2 = 2^2 + 1.5^2 = 6.25$ $x = 2.5$ 2.5 + 2.5 + 4 Addition of sides.	1 1 1ft	3
3. Gives a correct answer: **16** feet or 5π feet Shows correct work such as: 5 x □	1 1	2
4. Gives a correct explanation such as: The curved part would be half the length of the circumference of the circle but you would need to add on 5 feet for the straight edge. Gives correct answer: 13 feet	1 1	2
Total Points		**8**

Number Calculations

This problem gives you the chance to:
• explore the order of number operations

1. When adding two numbers, it makes no difference to the answer if the order of the numbers is changed. Write an example that shows this.

2. When subtracting two numbers, it does make a difference to the answer if the order of the numbers is changed. Write an example that shows this.

   Describe what happens to the answer of a subtraction calculation when the order of the two numbers is changed.

3. When multiplying two numbers, does the order of the numbers matter?
   Use examples to explain your answer.

4. When dividing two numbers, does the order of the numbers matter?
   Use examples to explain your answer.

5. Complete the table below to show whether each statement about the numbers a and b is correct (✓) or incorrect (X).

Statement	*✓ or X*
$a + b = b + a$	
$a - b = b - a$	
$a - b = -(b - a)$	
$a \times b = b \times a$	
$a \div b = b \div a$	

8

Task 3: Number Calculations — Rubric

The core elements of performance required by this task are: • explore the order of number operations Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct example such as: 2 + 3 = 5 and 3 + 2 = 5	1	1
2. Gives correct example such as: 3 - 2 = 1 and 2 – 3 = -1 Makes statement such as: The answers are opposite	1 1	2
3. Gives correct examples to show that the order does not matter	1	1
4. Gives correct examples to show that the order does matter	1	1
5. See table. Five answers correct 3 points **Partial credit** Four answers correct 2 points Three answers correct 1 point	3 (2) (1)	3
Total Points		**8**

Statement	√ *or* x
$a + b = b + a$	√
$a - b = b - a$	x
$a - b = -(b - a)$	√
$a \times b = b \times a$	√
$a \div b = b \div a$	x

Shelves

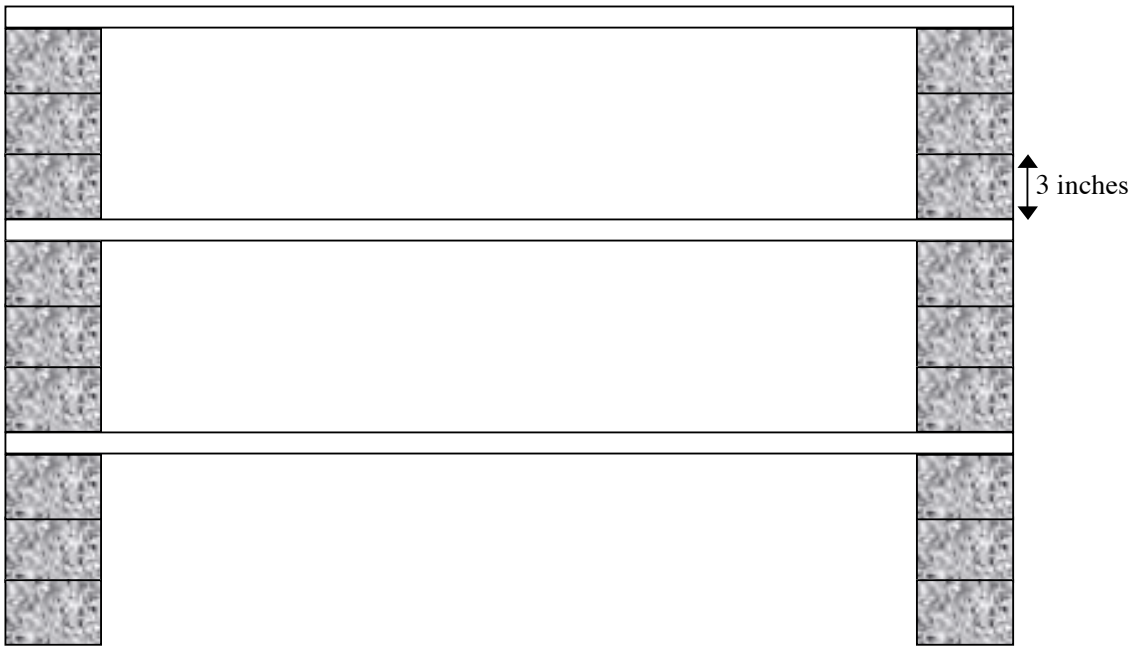
This problem gives you the chance to:
• solve problems in a spatial context
• identify and distinguish the four point graphs related to this situation

Pete is making a bookcase for his books and other stuff.

He already has plenty of bricks and can get planks of wood for $2.50 each.

Each plank of wood measures 1 inch by 9 inches by 48 inches. Each brick measures 3 inches by 4.5 inches by 9 inches.

For each shelf, Pete will put three bricks at each end then put a plank of wood on top. The diagram shows three shelves.



1. Pete wants five shelves in his bookcase.

   a. How many planks of wood does he need? _____

   b. How many bricks does he need? _____

   c. How high will the shelves be? _____

   d. How much will the bookcase cost? _____

The diagram below shows graphs with the following descriptions:

Description One: The cost of the bookcase against the number of shelves.

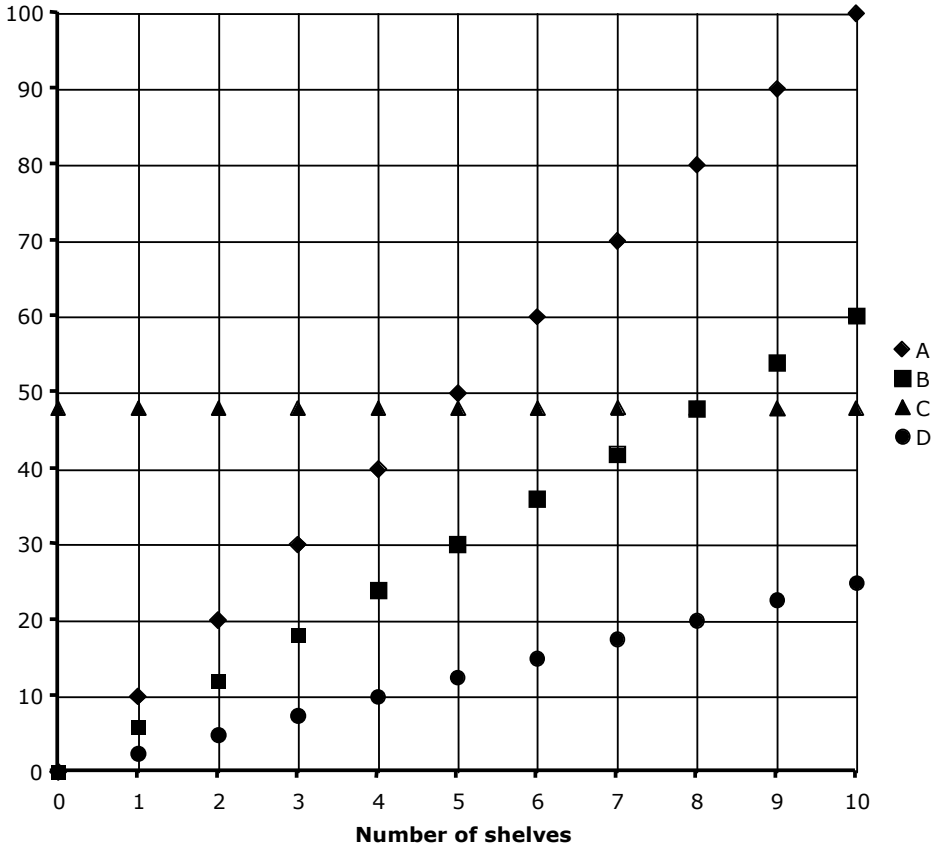
Description Two: The number of bricks against the number of shelves.

Description Three: The height of the bookcase against the number of shelves.

Description Four: The width of the bookcase against the number of shelves.

The equations of the graphs are

$y = 48$, $y = 10x$, $y = 6x$, $y = 2.5x$



2. Complete this table to match each graph with its description and its equation.

Graph letter	Description number	Equation
A		
B		
C		
D		

Task 4: Shelves — Rubric

The core elements of performance required by this task are: solve problems in a spatial context identify and distinguish the four point graphs related to this situation Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **5**	1	
Gives correct answer: **30**	1ft	
Gives correct answer: **50** inches	1ft	
Gives correct answer: $**12.50**	1ft	
		4
2. Four points for eight correct answers.	4	

Graph letter	Description number	Equation
A	3	$y = 10x$
B	2	$y = 6x$
C	4	$y = 48$
D	1	$y = 2.5x$

Partial credit		
7 or 6 correct 3 points	(3)	
5 or 4 correct 2 points	(2)	
3 or 2 correct 1 point	(1)	
		4
Total Points		**8**

Take Off

This problem gives you the chance to:
• work with speed, time, and distance

1. A space rocket needs to move at 11.2 kilometers per second to escape from the earth's gravitational pull. This is called escape velocity.

An Indy car races at up to 370 kilometers per hour.

How many times faster would an Indy car have to move to reach escape velocity?
Give your answer correct to the nearest whole number.

_____

Show your work

2. Sound travels at about 340 meters per second.
Light travels at almost 300,000,000 meters per second.

If you **watched** a space rocket take off from a distance of 3.5 kilometers how much later would it be before you **heard** it take off?
Give your answer correct to the nearest second. _____ seconds

Explain how you figured it out and show your calculations.

_____

_____

_____

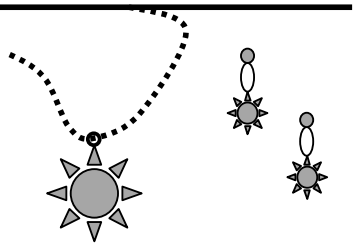
8

Task 5: Take Off	Rubric	
The core elements of performance required by this task are: • work with speed, time and distance Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives a correct answer: **109** (accept 112) Shows correct work such as: 11.2 x 60 x 60 = or 370 ÷ 60 ÷ 60 = 0.1027 40320 / 370 11.2 ÷ 0.1027 =	1 1 1ft	3
2. Gives a correct answer: **10** seconds *Partial credit* Gives answer 10.29 Gives a correct explanation such as: You would see the take off straight away. 3.5 kilometres = 3500 metres 3500 / 340	2 (1) 1 1 1	5
Total Points		**8**

Core Idea	Task	Score
Number Operations	**At the Jewelry Store**	
This task asks students to work with percents to calculate discounts, tax, and then find total cost. Successful students could calculate the original price given the sale price and percent of the discount.		
Number Properties	**Multiples of 10**	
This task asks students to work with multiples of 10 and explain their thinking. Successful students were able to make generalized arguments about items like why multiplying any two multiples of 10 would be multiples of 100.		
Geometry and Measurement	**Patterns in Prague**	
This task asks students to calculate the area and perimeter of a complex figure. Students needed to interpret the scale in the diagram when finding the dimensions. Successful students were able to use Pythagorean theorem to find the side dimensions for part of the shape.		
Functions and Rates	**Cog Railway**	
This task asks students to calculate and compare average speeds and work with a time distance graph. Successful students could use the distance formula to help them solve parts of the problem.		
Probability	**Flora, Freddy, and the Future**	
This task asks students to use terms likely and unlikely to describe probabilities for events and also give numerical probability for simple and compound events. Successful students could reason about the issue of "non-replacement" in the context of a sequence of events and use multiplication to find the total probability.		

At the Jewelry Store

This problem gives you the chance to:
- work with percents of discount and tax



Marcy and Dave are at the jewelry shop.

Marcy buys a necklace costing $45 and a pair of earrings costing $30.

An 8% sales tax needs to be added to the price she has to pay.

1. Calculate what Marcy has to pay. Show your work.

$ _____

Dave chooses a watch.
It is on sale and has 30% off the original price of $135.
An 8% sales tax will be added onto the price after the sales reduction has been calculated.

2. Calculate what Dave has to pay. Show your work.

$ _____

Marcy and Dave look at a ring.
It is on sale and the sale price is $188 after a 20% reduction.

3. How much was the ring before the sale reduction?
   Explain how you figured it out.

$ _____

_____

_____

_____

8

Grade 8 – 2008

At the Jewelry Store	Rubric	
• The core elements of performance required by this task are: • • work with percents of discount and tax • Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: $**81** Shows correct work such as: (45 + 30) x 1.08	1 1	2
2. Gives correct answer: $**102.06** Shows correct work such as: 135 x 0.7 = 94.5 94.5 x 1.08 *Partial credit* For a partially correct method	1 2 (1)	3
3. Gives correct answer: $**235** Gives a correct explanation such as: $188 is 80% of the original $188 / 0.8 will give you the original price.	1 2	3
Total Points		**8**

Multiples of 10

This problem gives you the chance to:
• work with multiples of 10 and explain your reasoning

This task is about multiples of 10 (10, 20, 30, ...).

1. Adam says, "If you add together two multiples of 10 you get a multiple of 20."

   a. Give an example to show that this can be true. _____

   b. Give an example to show that this is not always true. _____

2. Eli says, "If you multiply two multiples of 10 you get a multiple of 100."

   a. Give an example to show that this can be true. _____

   b. Explain why this is always true. _____

_____

_____

_____

3. Dona says, "If you multiply two multiples of 5 you get a multiple of 10."

   a. Give an example to show that this can be true. _____

   b. Give an example to show that this is not always true. _____

   c. What do you have to do to make sure the answer will be a multiple of 10?

_____

_____

4. Hannah says, "If you multiply a multiple of 2 by a multiple of 5 you get a multiple of 10."

   Use examples and explanation to show whether this statement is always true, sometimes true or never true.

_____

_____

_____

_____

_____

Grade 8 – 2008

Multiples of 10	Rubric	
• The core elements of performance required by this task are: • • work with multiples of 10 and explain your reasoning Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct examples such as: 50 + 70 = 120 Gives correct examples such as: 50 + 60 = 110	1 1	2
2.a. Gives correct examples such as: 30 x 20 = 600 b. Gives correct explanation such as: 30 x 20 = 3 x 10 x 2 x 10 = 6 x 100 which is a multiple of 100.	1 1	2
3.a. Gives correct examples such as: 20 x 30 = 600 **and** b. Gives correct examples such as: 25 x 25 = 625 c. Gives correct explanation such as: At least one of the multiples of 5 must have a factor of 2.	 1 1	2
4. Gives correct examples such as: 6 x 15 = 90 = 10 x 9 **and** States that the statement is always true Gives correct explanation such as: 6 x 15 = 2 x 3 x 5 x 3 = 10 x 9	1 1	2
Total Points		**8**

Grade 8 – 2008

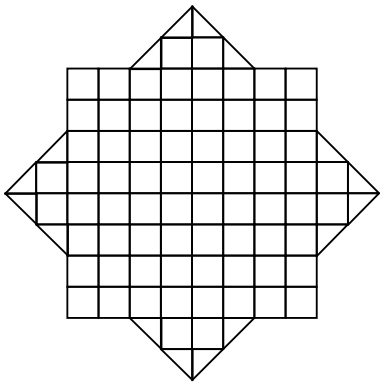
Patterns in Prague

This problem gives you the chance to:
- calculate the area of a complex shape
- calculate the perimeter of a shape using Pythagoras' Rule

Prague is an ancient city in the Czeck Republic.
In Prague some of the sidewalks are made from small square blocks, **5 cm by 5 cm**.

The blocks are in different shades to make patterns.

This is one of the patterns they make.
In this pattern some triangular blocks are made by cutting a square in half diagonally.



1. Find the area of this pattern.
   Show how you figured it out.

_____cm^2

2. Calculate the perimeter of the pattern.
   Show how you figured it out.

_____cm

8

Grade 8 -2008

Patterns in Prague	Rubric	
• The core elements of performance required by this task are: • • calculate the area of a complex shape • • calculate the perimeter of a shape using Pythagoras' Rule • Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **2000** cm^2	1	
Shows correct work such as: 8^2	1	
$+ 4 \times 4 = 80$ blocks	1	
80×5^2	1ft	4
2. Gives correct answer: 192 to 194 cm or $80 + 80\sqrt{2}$	1	
Shows correct work such as: $\sqrt{(10^2 + 10^2)} = \sqrt{200} = 14.14$ or $10\sqrt{2}$	2	
$14.14 \times 8 + 10 \times 8$	1	4
Total Points		**8**

The Cog Railway

This problem gives you the chance to:
- calculate and compare average speeds
- work with a time/distance graph

In 1869 a cog railway was built to take people to the top of Mount Washington, NH.

The track is 3 miles long and it takes between 1 hour and 1 hour 10 minutes for the train to climb to the top.

1. What is the average speed of the train:
   a. when the journey takes 1 hour?

_____miles per hour

   b. when the journey takes 1 hour 10 minutes?
   Show your work.

_____miles per hour

The train descends in about 40 minutes.

2. What is the average speed at which the train descends?
   Show your calculations.

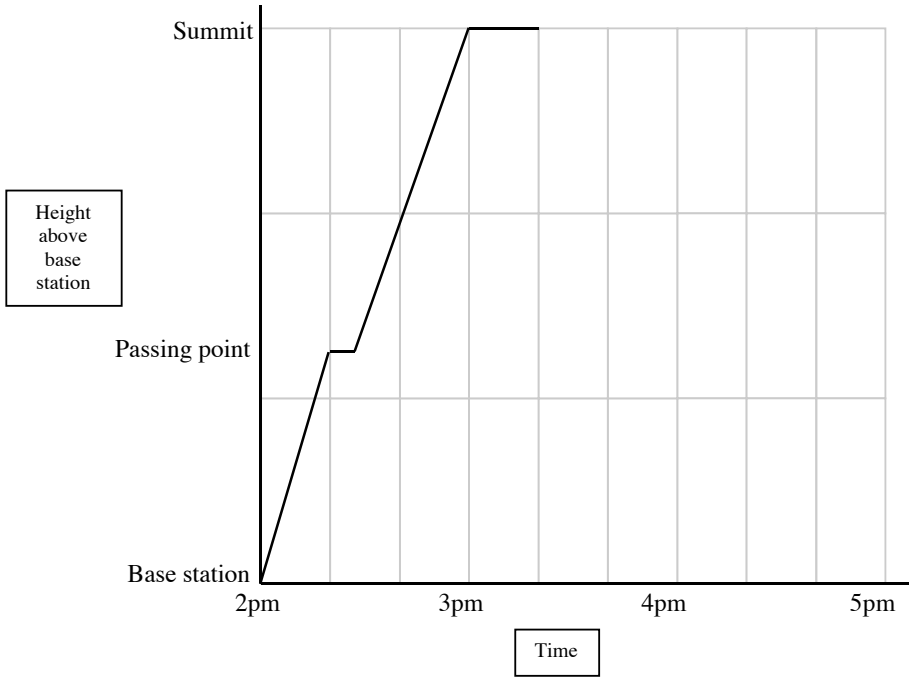
_____miles per hour

Until 1920 workers went down the track on a wooden plank called a 'slide board'.
A typical ride down took 10 minutes.

3. How many times faster is this than on the train?

_____

Grade 8 -2008



This is an approximate distance/time graph of the journey up Mount Washington.

4. What does the horizontal line at the 'passing point' tell you?

_____

_____

_____

5. For how long does the train stop at the summit?

_____minutes

6. On the distance/time graph draw a line to show the return journey that takes the train 40 minutes to descend from the summit to the base station without a stop.

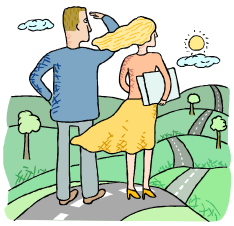
The Cog Railway	Rubric	
The core elements of performance required by this task are: • calculating and comparing average speeds • understanding a time/distance graph Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1.a. Gives correct answer: **3** miles per hour b. Gives correct answer: **2.57** miles per hour or $2^4/_7$ Shows correct work such as: $3 / 1^1/_6$	1 1 1	3
2. Gives correct answer: 4.5 miles per hour Shows correct work such as: $3 / (^{40}/_{60})$	1 1	2
3. Gives correct answer: 4 times	1	1
4. Gives correct answer: The train going up **stops** at the passing point.	1	1
5. Gives correct answer: **20** minutes	1	1
6. Draws a correct line from (3:20 pm, summit) to (4pm, base station)	1	1
Total Points		**9**

Grade 8 -2008

Flora, Freddy and the Future

This problem gives you the chance to:
- use terms likely and unlikely for events
- use numbers from 0 to 1 as measures of likelihood

Flora and Freddy often think about what is likely to happen in the future.
Here are some of their thoughts.
Choose the word you think fits their thoughts best on the likelihood line and draw a ring around it,



1. a. When Flora flips a coin it will land head up.

impossible unlikely equally likely likely certain

b. Freddy will be a millionaire by the time he is fourteen.

impossible unlikely equally likely likely certain

c. In the year 2010 more people than today will own a computer.

impossible unlikely equally likely likely certain

Grade 8 -2008

2. There are 12 socks in Flora's drawer, 9 are red, 2 are blue and 1 is green.
She takes out one sock without looking at the color.

a. What is the numerical probability of Flora picking out a blue sock.
Explain how you figured it out.

_____

_____

_____

b. What is the numerical probability of Flora picking out a red sock first time?

_____

c. Flora picks out a red sock. Freddie then picks out a second sock. Flora does not replace the first sock before Freddie picks the second sock.

What is the numerical probability that Flora and Freddie both pick out red socks?

_____

Show how you figured it out.

Flora, Freddy and the Future.	Rubric	
The core elements of performance required by this task are: • use terms likely and unlikely for events • use numbers from 0 to 1 as measures of likelihood Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **equally likely**. Gives correct answer: **unlikely** Gives correct answer: **likely** *Partial credit* 2 correct	2 (1)	2
2.a. Gives correct answer: **2/12** or equivalent b. Gives correct answer: **9/12** or equivalent c. Gives correct answer: **72/132** = 6/11 or equivalent Shows work such as: P(red first) = 9/12 P(red second) = 8/11 Multiplies 9/12 x 8/11	1 1 1 1 1	5
Total Points		**7**

Core Idea	Task
Data	**Averages**
This task asks students to work with weighted averages and percents. Successful students could find and correct an error in calculating the average test scores.	
Algebra and Functions	**Square Patterns**
This task asks students to work with extending geometric patterns and calculating percentages. Successful students could count the number of black and white tiles in a pattern and calculate the percentage of the pattern containing black tiles.	
Probability	**Marble Game**
This task asks students to calculate compound probability for pulling marbles from two bags, to compare experimental and theoretical probabilities, and find the probability for a simple spinner. Successful students were able to find probabilities in different situations, but often struggled with making comparisons between probabilities or applying probabilities to context.	
Algebra and Mathematical Reasoning	**Vincent's Graph**
This task asks students to read and interpret graphs in a context. Students needed to interpret the slope of graphs in terms of the action of the context. Successful students could interpret a graph about measures and time and make some correct work in drawing their own graph to match a given story.	
Geometry and Measurement	**Photos**
This task asks students to work with equivalent ratios and show understanding of spatial relationships by finding sizes of photos on a page. Successful students could identify equivalent rations, find the size of photos for a given number per page, and find the number of pages needed for making a given number of copies.	

Grade 8

Averages

This problem gives you the chance to:
- identify an error about means
- calculate means and solve a problem involving means

1. In a test, the 10 students in Group 1 get a mean score of 43%.
   The 15 students in Group 2 get a mean score of 57%.

   Hank says, "The mean score for all 25 students is 50%."

   a. What mistake has Hank made?

   _____

   _____

   b. What is the correct mean score for all 25 students? _____
   Show how you figured it out.

2. In a different test, the mean score of 50 students is 54%.
   The students are split into two groups, Group A and Group B.
   The mean score for Group A is 60% and the mean score for Group B is 50%.

   How many students are in Group A and how many are in Group B? Group A _____

   Group B _____

   Show how you figured it out.

Averages	Rubric	
The core elements of performance required by this task are: • identify an error about means • calculate means and solve a problem involving means Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1.a. Gives correct explanation such as: Hank has found the mean of 43% and 57%. He has not taken into account the sizes of the groups. b. Gives correct answers: 51.4 $\text{Mean} = \frac{10 \times 43 + 15 \times 57}{25} = \frac{1285}{25}$	2 2 1	5
2. Gives correct answers: **20** and **30** Shows work such as: If number in group A is X and number in Group B is Y, X + Y = 50 60X + 50Y = 50 x 54 Solution of the above to give 20 in group A and 30 in group B or Guess and check	2 2 or 2	4
Total Points		**9**

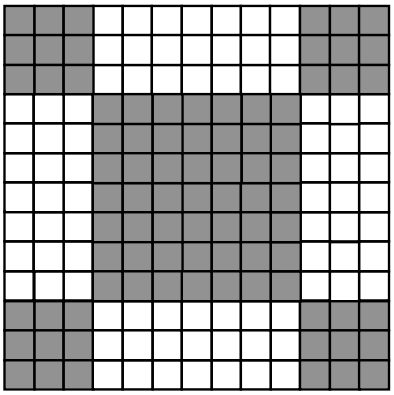
Square Patterns

This problem gives you the chance to:
- work out percentages

In Prague some sidewalks are made from small square tiles.

The blocks are made from black and white tiles.

This is one of the patterns.



1. How many black and white tiles are there in this pattern?

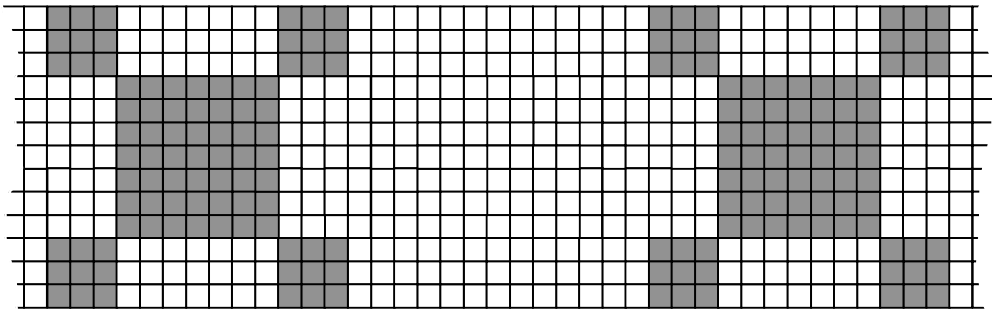
black _____

white _____

2. What percent of the tiles is black?
   Give your answer to one decimal place.

   Show how you figured it out.

_____ %



On the sidewalks the patterns are separated by areas of white tiles.

3. On one sidewalk there are 10 patterns separated by areas of 13 by 13 white tiles, with a 13 by 13 area of white tiles at each end.

   What percent of the tiles on the sidewalk is black? Explain how you figured it out.

_____ %

_____

_____

_____

_____

_____

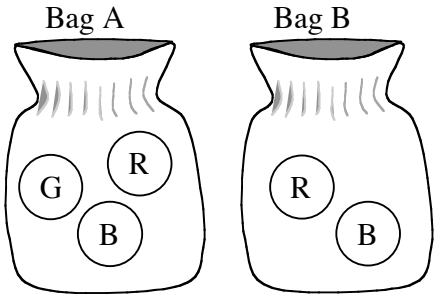
_____

7

Marble Game

This problem gives you the chance to:
- use probability in an everyday situation

Linda has designed a marble game.



1. Bag A contains 3 marbles –
   one red, one blue and one green.

   Bag B contains 2 marbles –
   one red and one blue.

To play this game, a player draws one marble from each bag without looking.
If the two marbles match (are the same color), the player wins a prize.

What is the theoretical probability of winning a prize at a single try? _____
Show your work.

2. Here are the results for the first 30 games.

Win (Match)	No Win (No Match)
𝍸 |||	𝍸 𝍸 𝍸 𝍸 |

How do the results in this table and the theoretical probability you found compare?

_____

Explain any differences.

_____

_____

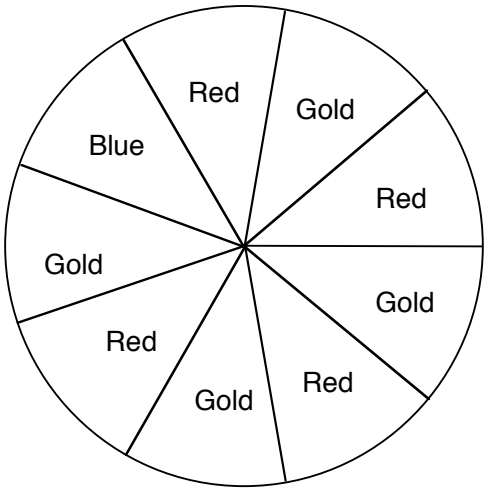
Grade 8 Marble Game

3. Linda has designed a second game.

The spinner has nine equal sections.

To play the game, a player spins the spinner.

If the spinner lands on a Gold section,
the player wins a prize.



Does the player have a better chance of winning with the bag game or the spinner game?

_____

Explain your reasoning.

_____

_____

_____

7

Grade 8 Marble Game

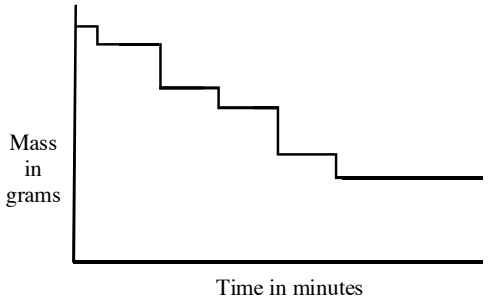
Marble Game	Rubric	
The core elements of performance required by this task are: • listed here Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: $\frac{2}{6} = \frac{1}{3}$ Lists all possibilities: RR, RB, BR, BB, GR, GB p(RR or BB) = 2/6 or 1/3 or Shows work such as: Probability $R \cap R = \frac{1}{3} \times \frac{1}{2}$ Probability $B \cap B = \frac{1}{3} \times \frac{1}{2}$ Probability both same color = $\frac{1}{6} + \frac{1}{6}$	1 1 1 or 1 1	3
2. **These results are quite close**; but the number of trials is not large enough to give an accurate estimate. **or** Explains that from these results the experimental probability $= \frac{9}{30} = \frac{3}{10} = 0.3$ The theoretical probability = 0.33 recurring	1 1 1	2
3. Gives correct answer: t**he spinner game** Shows work such as: the probability of winning on the spinner game is 4/9 = 0.44 recurring	1 1	2
Total Points		**7**

Vincent's Graphs

This problem gives you the chance to:
- interpret graphs
- draw a graph

Vincent is eating a packet of raisins.

This graph shows the changes in the mass of raisins in the packet as time passes.



1.a. What is Vincent doing when there is a vertical line on the graph?

_____

b. Why are the vertical lines of different lengths?

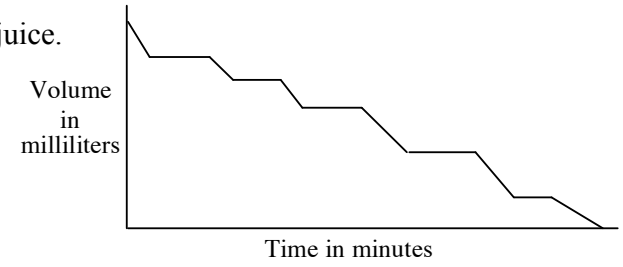
_____

c. Did Vincent eat all the raisins? _____
Explain how you know.

_____

2. Ellie is drinking with a straw from a box of fruit juice.

The graph shows the volume of juice in the box as time passes.



a. What is happening when the line on the graph is horizontal?

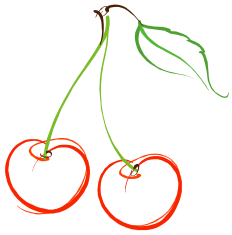
_____

b. Why do the lines going downwards on this graph go at an angle?

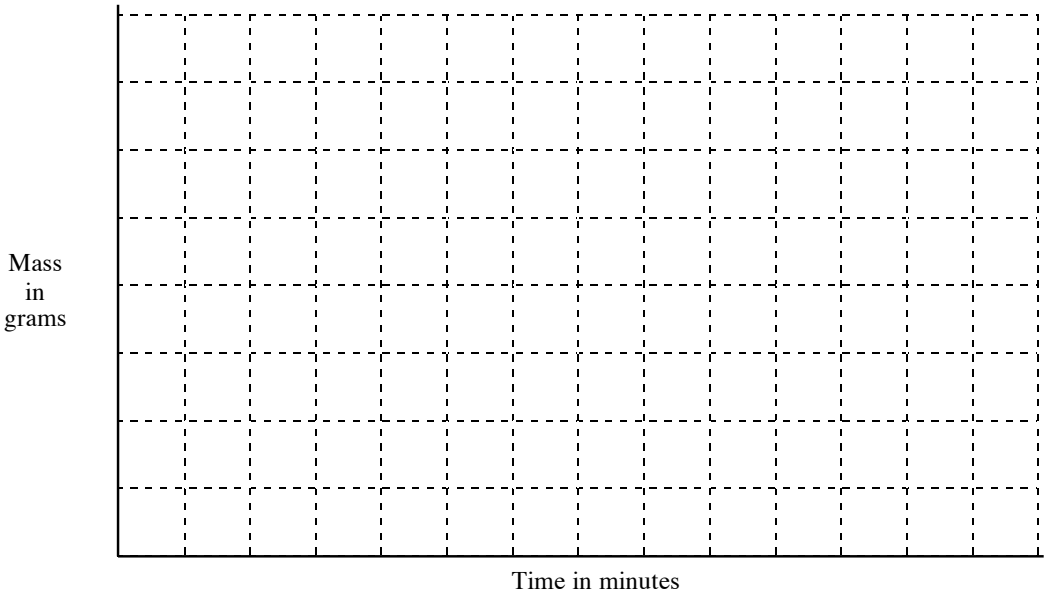
_____

3. Ralph is eating cherries from a bag.

After eating a cherry he puts the stone back into the bag before taking out the next cherry.



On the grid draw a graph to show the changes in the mass of the bag of cherries as time passes.



8

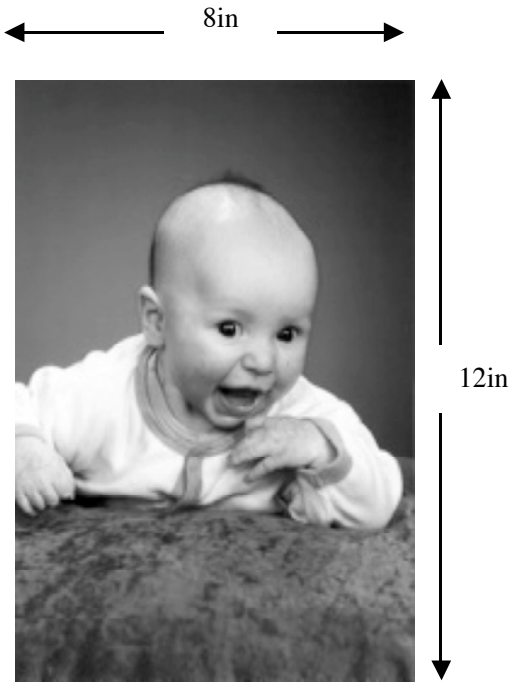
Vincent's Graphs	Rubric	
The core elements of performance required by this task are: • interpreting graphs • drawing graphs Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. a. Gives correct answer such as: he is taking raisins out of the packet.	1	
b. Gives correct answer such as: he takes different numbers of raisins from the packet.	1	
c. Gives correct answer: **No** **and** a correct explanation such as: the line does not reach the x axis.	1	
		3
2. a. Gives correct answer such as: Ellie is not drinking.	1	
b. Shows correct work such as: the volume decreases steadily as the juice is sucked out.	1	
		2
3. Draws a correct graph: First a short horizontal line	1	
Followed by a short line downwards.	1	
A short horizontal line followed by a short line upwards.	1	
The line upwards should be shorter than the first line downwards.		3
Total Points		**8**

Grade 8

Photos

This problem gives you the chance to:
• show understanding of spatial relationships

The 'aspect ratio' of a picture is the ratio of its width to its height.

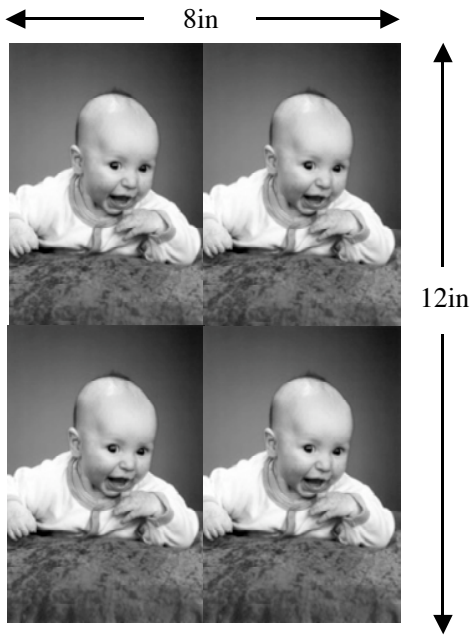


1. Which of the following are correct expressions for the aspect ratio for this 8 inch by 12 inch baby photo?

   Draw rings around all of the correct ratios.

   8:12 12: 8 4:6 2:3

   3:2 1:1.5 16:24 24:36



2. When the length and width of the photo are halved, four photos fit onto the 8 inch by 12 inch page. The aspect ratio is still the same.

   a. What are the new measurements of the photo?

   _____

   b. Jane wants 75 copies of this size of the photo for Christmas cards.
   How many 8 inch by 12 inch pages does she need?

   _____

   Show your work.

3. For use on key chains, the photo is reduced to a width of 1 inch, keeping the aspect ratio the same.

   a. What is the height of the photo? _____

   b. How many of the photos will fit onto one 8 inch by 12 inch page?
   _____

4. Explain how to calculate the number of photos that will fit on one page if you know the width of the photo.

_____

_____

_____

_____

Photos	Rubric	
The core elements of performance required by this task are: • show understanding of spatial relationships Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answers: **8:12 4:6 2:3 1:1.5 16:24 24:36** with no extras *Partial credit* 4 or 5 correct with no extras or 6 correct and 1 extra 3 or 2 correct with no extras or 4/5 correct and 1 extra	3 (2) (1)	3
2.a. Gives correct answer: **4** inches **by 6** inches b. Gives correct answer: **19**	1 1	2
3.a. Gives correct answer: **1.5** inches b. Gives correct answer: **64**	1 1	2
4. Gives correct explanation such as: Find how many times the width goes into 8 inches and square that number. Or Find how many times the width goes into 8 inches and multiply by how many times the height of the photo goes into 12.	2 or 2	2
Total Points		**9**

Grade 8