## MARS Tasks | Grade 6

| Page | Name of MARS Task | Year | Math Strand | Notes |
| :---: | :---: | :---: | :---: | :---: |
| * | Baseball Players | 2003 | PS | Mean, median, range in context |
| * | Gym | 2003 | PFA, NO | Analyze gym costs to solve problems |
| * | Square Elk | 2003 | GM | Find area, perimeter of letters on a grid |
| * | Spinners | 2003 | PS | Identify, evaluate likelihood of spins |
| * | Rabbit Costumes | 2003 | NO | Find material cost, fractions in context |
|  |  |  |  |  |
| * | Candy Bars | 2004 | NO, PFA | Compare 3 ways to buy, find best buy |
| * | Biggest | 2004 | NO, PFA | Great largest possible answer in fractions |
| * | Meals | 2004 | PS, PFA | Correctly label parts of circle graph |
| * | Parallelograms | 2004 | GM | Geometric shapes and their properties |
| * | School Days | 2004 | PS | Analyze board game outcomes |
|  |  |  |  |  |
| 2 | Crystal Earrings | 2005 | PFA | Describe, extend pattern, generalize |
| 5 | Money | 2005 | DA | Analyze, interpret bar charts |
| 9 | Winning Spinners | 2005 | PS | Find probability of winning prize |
| 12 | In The Playground | 2005 | GM | Find area of sandbox, design bigger one |
| 15 | How Much Money? | 2005 | NO | Determine fractions of \$ amounts |


| $\mathbf{1 8}$ | Overview of 2006 Tasks |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| 19 | Smallest and Largest | 2006 | NP, NO | Place numbers in +-X/ sentences=lg/sm |
| 22 | Nuts | 2006 | PS | Circle graph, fractions, \% to find amount |
| 25 | Sorting Shapes | 2006 | GM | Draw shape that meet given attributes |
| 26 | Tetra | 2006 | PS | Work out probabilities, change rules-fair |
| 31 | Bike Ride | 2006 | PFA | Distance/time graph, interpret slopes |


| 34 | Overview of 2007 Tasks |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| 35 | Division | 2007 | NP, NO | Analyze quotient in variety of contexts |
| 37 | Card Game | 2007 | PS | Probability in context, changing sample sp |
| 40 | Factors | 2007 | NP | Describe patterns in \# w/diff factor char. |
| 43 | Household Statistics | 2007 | DA | Interpret bar graph info, calculate \% |
| 46 | Being Building Blocks | 2007 | GM | Calculate volume and surface area |


| 48 | Overview of 2008 Tasks |  |  |  |
| ---: | :--- | :--- | :--- | :--- |
| 49 | Snail's Pace | 2008 | NO | Distance, time, rate, inches/min |
| 51 | Black and White | 2008 | PS | Probabilities, meaning of fractions |
| 53 | A Number Pattern | 2008 | PFA | Describe, extend a number pattern |
| 55 | Percent Cards | 2008 | NP | Fractions, decimals, \% on numb. line |
| 58 | Area and Perimeter | 2008 | GM | Calculate area \& perimeter, create rect. |


| $\mathbf{6 0}$ | Overview of 2009 Tasks |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| 61 | Sewing | 2009 | NO | Work with rule, find cost, calculate \% tax |
| 63 | Truffles | 2009 | PFA | Extend recipe, make a rule |
| 66 | Boxes | 2009 | PFA, GM | Weigh 9 boxes, using scale 2 times |
| 69 | Skateboarding Tricks | 2009 | GM | Angles, degree of rotation in context |
| 72 | A Board Game | 2009 | PS | Probability of win, determine if fair |

$\mathrm{NP}=$ Number Properties
$\mathrm{NO}=$ Number Operations
PFA=Patterns Functions Algebra
GM=Geometry \& Measurement
DA=Data Analysis

* Tasks from 2003 and 2004 are not included in this packet due to copyright restrictions. However, if you click on the name of the task, you can access the tasks via the Noyce Foundation website. Tasks from 2005 to 2009 are available here with permission from the Mathematics Assessment Resource Service (MARS).

| Student <br> Task | Describe and extend a pattern of crystal earrings that is increasing in size. <br> Make generalizations around this pattern. |
| :--- | :--- |
| Core Idea | Understand relations and functions, analyze mathematical situations, <br> and use models to solve problems involving quantity and change. <br> - <br> Represent, analyze, and generalize a variety of relations and <br> functions with tables, graphs, and words |
| Functions | Model and solve contextualized problems using various |
| representations such as graphs, tables, and equations |  |

Grade 6-2005

## Crystal Earrings

This problem gives you the chance to:

- describe, extend, and make generalizations about a number pattern

Rahul is a talented jeweler. He makes fantastic crystal earrings.
He always makes them using this pattern.



3 crystals
\#2


6 crystals
\#3
\#4

1. Draw earring Pattern \#4 next to Pattern \#3.
2. How many crystals will there be in earring Pattern \#5? $\qquad$
Show how you figured this out.

This table shows how many crystals are needed for each pair of earrings.

| Pattern \# | 1 | 2 | 3 | 4 | 5 |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of crystals | 2 | 6 | 12 |  |  |  |

3. Complete the table for pairs of earrings of Pattern \#4 and Pattern \#5.
4. Each crystal costs $\$ 1$. Rahul says the crystals for a pair of earrings of Pattern \#7 will cost $\$ 50$. Show how you know he is wrong.

How much will the crystals for a pair of earrings of Pattern \#7 cost?
$\$$ $\qquad$

| Crystal Earrings Grade 6 | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - to describe, extend, and make generalizations about a number pattern <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Draws Pattern \#4 correctly: | 1 | 1 |
| 2. Gives correct answer: $\mathbf{1 5}$ <br> Shows work such as: $1+2=3,3+3=6,6+4=10,10+5=15$ | $1$ | 2 |
| 3. Completes table to show: <br> Pattern \#4 has 20 crystals. <br> Pattern \#5 has $\mathbf{3 0}$ crystals. | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | 2 |
| 4. Shows work such as: <br> Pattern \#7 will be $1+2+3+4+5+6+7=28$ and $28 \times 2=56$, not 50 <br> or <br> (accept $7 \times 8$ ) <br> Gives correct answer: | $\begin{gathered} 1 \\ 1 \\ \text { or } \\ 2 \\ \\ 1 \\ \hline \end{gathered}$ | 3 |
| Total Points |  | 8 |

Grade 6 - 2005

| Student <br> Task | Analyze and interpret bar chart information to determine how much <br> money was spent by four children. Write a description to fit a fifth child's <br> bar chart. |
| :--- | :--- |
| Core Idea | Select and use appropriate statistical methods to display, analyze, <br> compare and interpret different data sets. <br> - Interpret data to answer questions about a situation <br> - |
| Statistics | understand what each indicates about the data sets |
|  | - Communicate mathematical thinking clearly and coherently <br> - Use representations to interpret physical, social, and mathematical <br> phenomena |

## Money

This problem gives you the chance to:

- interpret bar charts

These bar charts show how much money four children, Ali, Ben, Chris and Danny, spent each week for five weeks.


1. This is what the four children said about what they had spent. Write the correct name next to each statement.
"I spent less and less money each week."
"I spent more in the last three weeks than in the first two."
"I spent about the same amount each week except one week when I bought an expensive present for my sister."
"I spent about the same amount each week."
2. a. Which child spent the most money in the first week?
b. Which child spent the most money altogether?

Name $\qquad$

Name: $\qquad$

Name $\qquad$

Name: $\qquad$

Name: $\qquad$

Name: $\qquad$

Show how you know.
3. This bar chart shows how much Ernest spent during the five weeks. Write a description to fit Ernest's bar chart.
$\qquad$
$\qquad$
$\qquad$
$\qquad$


Grade 6 - 2005

| Money Grade 6 | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - interpret bar charts <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answers: <br> Danny <br> Chris <br> Ben <br> Ali <br> All four answers correct <br> Partial credit <br> Three correct answers <br> Two correct answers | 3 <br> (2) <br> (1) | 3 |
| 2. a. Danny <br> b. Ali <br> Compares values on at least two graphs to show that the sum of Ali's bars is larger than the other bars <br> Partial credit <br> Makes a sensible verbal comment about the total amounts spent | 1 <br> 2 <br> (1) | 4 |
| 3. Gives a reasonable description such as: "I spent more and more each week" or similar | 1 | 1 |
| Total Points |  | 8 |

Grade Six - 2005

| Student Task | Work with two spinners to find the probability of winning a prize. Design two new spinners that will increase the likelihood of winning. |
| :---: | :---: |
| $\begin{array}{\|l\|} \hline \text { Core Idea } \\ 2 \\ \text { Probability } \\ \hline \end{array}$ | Demonstrate understanding and the use of probability in problem situations. <br> - Determine theoretical probabilities and use these to make predictions about events <br> - Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1 <br> - Represent probabilities as ratios, proportions, decimals or percents <br> - Represent the sample space for a given event in an organized way (e.g. table, diagram, organized list) <br> - Use representation to model and interpret mathematical phenomena |

## Winning Spinners

This problem gives you the chance to:

- work with probability

Bill is playing a game of chance at the School Fair.
He must spin each of these two spinners.
If the sum of the numbers is an even number, he wins a prize.



Spinner B

1. Fill in the empty boxes in the addition chart below to show the possible totals.

2. What is the probability of Bill winning a prize? $\qquad$
3. Using two new spinners, rearrange the same eight numbers to increase Bill's chances of winning.


What is the probability of Bill winning using his new spinners? $\qquad$
Show how you figured it out.

Grade 6-2005


Grade Six - 2005

| $\mathbf{6}^{\text {th }}$ grade | Task 4 $\quad$ In The Playground |
| :--- | :--- |
| Student <br> Task | Find the area of a playground sandbox and make a new design that <br> will measure twice the area of the first sandbox. |
| Core Idea <br> 4 <br> Geometry and <br> Measurement | Analyze characteristics and properties of two-dimensional <br> geometric shapes and apply the appropriate techniques, tools, and <br> formulas to determine measurements. <br> - |
| Develop, understand and use formulas to determine the area of <br> quadrilaterals |  |
| - Select and apply techniques and tools to accurately find length |  |
| and area measures to appropriate levels of precision |  |$|$

## In the Playground

This problem gives you the chance to:

- work with areas

The playground committee decides to make a sandbox area for toddlers.
For safety reasons, the sandbox must be surrounded by a strip of rubber matting that is 2 feet wide.
Here is a scale drawing of the sandbox.


SCALE:


1. Find the area of the sandbox and the area of the rubber matting.

Sandbox area: $\qquad$ square feet Rubber matting area: $\qquad$ square feet

More children are using the playground, so the committee decides to double the area of the sandbox.
2. Design a new rectangular sandbox that has double the area of the original sandbox.

On the grid below, make a scale drawing of the new sandbox and the surrounding rubber matting.

SCALE:

3. How many square feet of rubber matting will they need? $\qquad$ square feet
4. What is the length and width of the new sandbox?
length $\qquad$ feet
width $\qquad$ feet

| In the Playground Grade 6 | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with areas <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answers: $\mathbf{2 4}$ square feet (Accept 80 square feet) 56 square feet | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | 2 |
| 2. Draws a correct diagram: <br> Rectangular area of sand, 48 square feet ( 12 squares) <br> Surrounded by a row of squares of "rubber matting" | $1$ | 3 |
| 3. Gives correct answer: their number of squares $\mathbf{x} 4$ (dependent on their diagram and following the one row rule) $\mathbf{8 0}$ or $\mathbf{7 2}$ (accept 120) | 1ft | 1 |
| 4. Gives a correct answer dependent on their diagram for question 2 : <br> 12 and 4 <br> or $\mathbf{8}$ and $\mathbf{6}$ <br> or 2 and 24 | 2x1ft | 2 |
| Total Points |  | 8 |

Grade Six - 2005

| Student <br> Task | Work with simple fractions to solve two money problems and use <br> representations to organize and record the thinking. |
| :--- | :--- |
| Core Idea <br> $\mathbf{1}$ | Understand number systems, the meanings of operations, and ways <br> of representing numbers, relationships. And number systems. <br> - <br> Operation |
| -Understand fractions as parts of unit wholes |  |
|  | from among mental computations, estimation, calculators and <br> - paper and pencil and apply selected methods |
| -Develop and analyze algorithms for operations on fractions and <br> develop fluency in their use |  |
| -Create and use representations to organize, record, and <br> communicate mathematical thinking |  |

Grade 6 - 2005

## How Much Money?

This problem gives you the chance to:

- work with simple fractions
- figure out a money problem

Chuck has $\$ 6$ and he spends $1 / 5$ of his money on candy.

1. How much money does Chuck have left?
$\qquad$ dollars and $\qquad$ cents
Show your work.

Rachelle buys a drink. She spends the same amount of money on her drink as Chuck spent on his candy. Rachelle now has only $1 / 3$ of the amount of money that she had before she bought the drink.
2. How much money did Rachelle have before she bought the drink?
$\qquad$ dollars and $\qquad$ cents
Show how you figured it out.

| How Much Money? Grade 6 | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with simple fractions <br> - figure out a money problem <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: $\mathbf{4}$ dollars and $\mathbf{8 0}$ cents <br> Finds ${ }^{1} / 5 \times \$ 6.00=\$ 1.20$ <br> Shows work such as: $\$ 6.00-\$ 1.20$ <br> or $4 / 5 \times \$ 6.00$ | 1 <br> 1 <br> 2 | 3 |
| 2. $\mathbf{1}$ dollar and $\mathbf{8 0}$ cents <br> or <br> one and a half times the incorrect answer that replaced $\$ 1.20$ <br> Shows correct work such as: <br> Works out that $\$ 1.20$ represents $(1-1 / 3)$ or $2 / 3$ what Rachelle started with <br> Works out that Rachelle must have $\$ 0.60=1 / 2$ of $\$ 1.20$ left (adding the $\$ 1.20+.60=\$ 1.80$ is credited in the answer) | or <br> 1 ft <br> 1 <br> 1 | 3 |
| Total Points |  | 6 |

Grade 6 - 2005

| Core Idea | Task |  |
| :--- | :--- | :---: |
| Number Properties and <br> Operations | Smallest and Largest |  |
| This task asks students to analyze properties of numbers and operations to select numbers <br> from a list to fit in equations to make the largest and smallest values. Successful students <br> use logic to pick numbers from a set to make the largest answer using addition, subtraction, <br> multiplication and division. They could also use number properties to pick numbers from a <br> set to make the smallest answer using addition and multiplication. |  |  |
| Statistics | Nuts |  |
| This task asks students to use clues to match quantities to a circle graph and use <br> calculations with fractions and percents to find amount of nuts. Successful students could <br> use relational clues about most, least, twice as much, and fractional parts to identify and <br> label data on a graph. Students could find one fourth of a quantity and use pictorial or <br> numerical reasoning to talk about 80\% of a circle graph. |  |  |
| Geometry and <br> Measurement | Sorting Shapes |  |
| This task asks students to recognize and name shapes and their properties and draw a shape <br> to meet given attributes. Successful students could sort shapes by attributes such as <br> symmetry and parallel sides. They could design shapes to meet more than one constraint. |  |  |
| Tetra |  |  |
| This task asks students to complete scores in a table and work out probabilities from a table <br> of possible scores. Students analyze probabilities and make a change in game rules to <br> make a game fair. Successful students could find the total possibilities for a game using <br> two dice and write probabilities in terms of that total. |  |  |
| Algebra and Functions | Bike Ride |  |
| This task asks students to interpret a distance/time graph about a bike ride and use a graph <br> to calculate and compare speeds. Successful students could read a time/distance graph and <br> determine speeds and interpret slopes on the graph. |  |  |

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## Smallest and Largest

This problem gives you the chance to:

- choose numbers and operations to give largest and smallest results

1. In this question, make up calculations with answers that are as large as possible.

For each calculation, choose two different numbers from this list.

$$
\begin{array}{llllll}
\frac{1}{2} & 1 & 2 & 10 & 20 & 50
\end{array}
$$



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2. Now make the answers to your calculations as small as possible.

For each calculation, choose two different numbers from this list.

3. Explain how to choose numbers to make the answer to a division question as small as possible.
$\qquad$
$\qquad$
$\qquad$
$\qquad$

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| Smallest and Largest | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - choose numbers and operations to give largest and smallest results <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: $\mathbf{5 0 + 2 0}=\mathbf{7 0}$ <br> Gives correct answer: 50-1/2 $=\mathbf{4 9} \frac{1}{2}$ accept 49.5 <br> Gives correct answer: $\mathbf{5 0} \times \mathbf{2 0}=\mathbf{1 0 0 0}$ <br> Gives correct answer: $\mathbf{5 0} \div \frac{1}{2}=\mathbf{1 0 0}$ | $\begin{aligned} & 1 \\ & 1 \\ & 1 \\ & 1 \end{aligned}$ | 4 |
| 2. Gives correct answer: $\mathbf{1} / \mathbf{+ 1}=\mathbf{1} / \mathbf{2}$ accept1.5 <br> Gives correct answer: $1 / \mathbf{2} \mathbf{- 5 0}=\mathbf{- 4 9} \frac{1}{2}$ accept -49.5 <br> Gives correct answer: $\frac{1}{\mathbf{2}} \times \mathbf{1}=\frac{1}{\mathbf{2}}$ accept 0.5 <br> Gives correct answer: $\mathbf{1} \mathbf{1} \div \mathbf{5 0}=\mathbf{1} / \mathbf{1 0 0}$ accept 0.01 |  | 4 |
| 3. Gives correct explanation such as: <br> The first number must be the smallest of the list, and the second must be the largest of the list. <br> Partial credit <br> Choose a small number and divide by a large number. | 2 <br> (1) | 2 |
| Total Points |  | 10 |

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## Nuts

This problem gives you the chance to:

- work with interpretations of a circle graph

This circle graph shows the amounts of five different kinds of nuts grown in the U.S each year.


Here are some facts about the nuts grown.

- Most of the nuts are Almonds
- A quarter of the nuts are Walnuts
- The least grown nuts are Macadamias
- There are about twice as many Pistachios as Macadamias grown
- The fifth type of nuts is Hazelnuts
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1. Write the correct kind of nut on each label.
2. The total amount of all nuts grown is 956 thousand tons. What amount of walnuts is grown? $\qquad$ thousand tons Show your calculations.
3. Iris says that $80 \%$ of all the nuts grown in the U.S. are almonds.

Explain why Iris is wrong.
$\qquad$
$\qquad$
$\qquad$

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| Nuts | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with interpretations of a circle graph <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answers, clockwise from top: <br> Hazelnuts <br> Macadamias <br> Pistachios <br> Walnuts <br> Almonds |  | 5 |
| W Gives correct answer: 239 thousand tons ork Shows work such as: the $956 \div 4$ 2. | $1$ | 2 |
| 3. Gives a correct and complete explanation, such as: <br> Walnuts are 25\% <br> So that only leaves 75\% <br> or <br> The graph shows that a bit more than $50 \%$ (or a half) are almonds. <br> Partial credit <br> Incomplete quantitative explanation eg walnuts are 25\% It doesn't look like it on the graph. | 3 <br> or <br> 3 <br> (2) <br> (1) | 3 |
| Total Points |  | 10 |

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## Sorting Shapes

This problem gives you the chance to:

- recognize and name shapes and their properties
- draw a shape to meet given conditions

Here are some two dimensional shapes drawn on square grid paper.


1. What is the mathematical name of shape $F$ ? $\qquad$
2. How many lines of symmetry does shape D have? $\qquad$
3. Write the letter of each shape in the correct region of the diagram on the next page.

The first one has been done for you.

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4. Draw another shape that could go into the shaded region.

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| Sorting Shapes | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - recognize and name shapes and their properties <br> - draw a shape to meet given conditions <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: hexagon | 1 | 1 |
| 2. Gives correct answer: $\mathbf{8}$ | 1 | 1 |
| 3. Completes the diagram. <br> 7 letters correct with no extras <br> Partial credit <br> 6 or 5 letters correct <br> 4 or 3 letters correct | 3 <br> (2) <br> (1) | 3 |
| 4. 1 point for a shape with line(s) of symmetry, and 1 point for a shape with no parallel sides. | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | 2 |
| Total Points |  | 7 |

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## Tetra

This problem gives you the chance to:

- complete scores in a table of results
- work out probabilities from a table of possible scores

Anna and Bill play the game Tetra.
In this game two four-sided dice numbered 1 to 4 are tossed.
The numbers on the base of each dice are then multiplied together to get a score.
When the score is even Anna gets a point.
When the score is odd Bill gets a point.

1. Complete this table of score results.

|  | $\mathbf{4}$ | 4 | 8 |  | 16 |
| :--- | :--- | :---: | :---: | :---: | :---: |
| Number <br> on base of <br> red dice | $\mathbf{3}$ | 3 | 6 |  |  |
|  | $\mathbf{2}$ | 2 |  | 6 |  |
|  | $\mathbf{1}$ | 1 |  | 3 | 4 |
|  | X | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ |



Number on base of blue dice
2. Explain why the probability of getting a score of 4 is $\frac{3}{16}$.
3. Find the probability that Anna gets a point.

Explain your work.
$\qquad$
$\qquad$
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4. This game is not fair.

Suggest a change to the way that Anna and Bill get points that would make the game fair.
$\qquad$
$\qquad$
$\qquad$
$\qquad$

| Tetra |  |  |  |  |  | Rubric |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - complete scores in a table of results <br> - work out probabilities from a table of possible scores <br> Based on these, credit for specific aspects of performance should be assigned as follows |  |  |  |  |  | points | section points |
| 1. Com 6 cor <br> Parti <br> 5, 4, | resulth corr 4 4 3 2 1 1 | $\begin{gathered} \text { ble. } \\ \text { resu } \\ \hline 8 \\ \hline 6 \\ \hline \mathbf{4} \\ \hline \mathbf{2} \\ \hline \mathbf{2} \end{gathered}$ |  <br> 12 <br> 9 <br> 6 <br> 3 <br> 3 | $\begin{gathered} \\ \hline 12 \\ \hline \mathbf{1 2} \\ \hline 4 \\ \hline 4 \end{gathered}$ |  | 2 <br> (1) | 2 |
| 2. Gives a correct explanation, such as: <br> There are 3 ways of getting a score of 4 , and there are 16 possible outcomes. |  |  |  |  |  | 1 | 1 |
| 3. Gives correct answer: $\mathbf{1 2} / \mathbf{1 6}$ or $\mathbf{3 / 4}$ (accept equivalent answers) <br> Gives a correct explanation such as: 12 of the results are even, and there are 16 possible outcomes. |  |  |  |  |  | 1ft <br> 1ft | 2 |
| 4. Suggests a change such as: <br> When the score is less than 5 Anna gets a point. <br> When the score is more than 5 Bill gets a point. |  |  |  |  |  | 1 | 1 |
| Total Points |  |  |  |  |  |  | 6 |

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## Bike Ride

This problem gives you the chance to:

- interpret a distance/time graph

Selina and Jack went for a bike ride today.
They made this graph of their bike ride.



1. How many miles did they travel in all? $\qquad$ miles
2. How long did their bike ride take? $\qquad$ hours
3. When were they cycling the fastest? $\qquad$
Explain your answer.
$\qquad$
$\qquad$
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4. What does the graph show that they did between 11:30 a.m. and 12 noon?

## Explain your answer.

5. What was their speed between 12 noon and 1 p.m.?
$\qquad$ miles an hour

| Bike Ride | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - interpret a distance/time graph <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: 25 | 1 | 1 |
| 2. Gives correct answer: 3 | 1 | 1 |
| 3. Gives correct answer: from $\mathbf{1 0}$ a.m. to 10:30 a.m. <br> Gives correct comparative statement such as: <br> The graph shows that they were cycling at 20 mph . Later they cycled at 10 mph and 5 mph . <br> or <br> It is the steepest line | 1 | 2 |
| 4. Gives correct answer such as: They may have rested. <br> Gives correct explanation such as: For half an hour, their distance did not increase. |  | 2 |
| 5. Gives correct answer: 5 | 1 | 1 |
| Total Points |  | 7 |

Sixth Grade - 2006
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| Core Idea | Task | Score |
| :--- | :--- | :--- |
| Rational Numbers | Division |  |
| This task asks students to analyze the answer to a division problem in a variety of <br> contexts. Students need to think about how to interpret the decimal and round it <br> appropriately to answer the question for each situation. Students were also asked to <br> write a word problem that would fit a given calculation and pick the appropriate <br> answer to fit their own problem. Successful students could determine how to write the <br> correct interpretation of the answer to each of the contexts from the same numerical <br> answer and understood how to round money. |  |  |
| Probability | Card Game |  |
| This task asks students to use probability in the context of picking cards, numbered 1 <br> to 10. Students needed to think about a changing sample space. Some cards were no <br> longer available after they had been drawn. Successful students could give a <br> numerical value for each probability. |  |  |
| Number Properties | Factors |  |
| This task asks students to list factors of numbers and think about types of numbers <br> with an odd number of factors or an equal amount of even and odd factors. <br> Successful students used the factor list given to help them find and describe patterns <br> in the numbers with different factor characteristics. |  |  |
| Data Analysis | Household Statistics |  |
| This task asks students to use a bar graph about number of households and number of <br> children per household and record the information in a table. Students were also <br> asked to interpret information from the graph and calculate percentages. Successful <br> students could think about total number of households, total number of children, or <br> mean (or average) and match it to the correct computation. |  |  |
| Geometry and <br> Measurement | Building Blocks |  |
| This task asks students to calculate volume of rectangular prisms, given a picture of <br> the object and its dimensions. Successful students could also calculate the surface <br> area. |  |  |

[^0]
## Division

This problem gives you the chance to:

- relate a given division calculation to appropriate practical situations

When you calculate $100 \div 6$ using a calculator, the result is 16.6666667 .
This result can be used to give a sensible answer to all the following questions except one.

1. Write down the sensible answers and find the question that cannot be answered using this result.
a. How much does each person pay when 6 people share the cost of a meal costing $\$ 100$ ?
b. 100 children each need a pencil. Pencils are sold in packs of 6 . How many packs are needed?
c. What is the cost per gram of shampoo costing $\$ 6$ for 100 grams?
d. How many CDs costing $\$ 6$ each can be bought for $\$ 100$ ?
e. What is the average distance per day, to the nearest mile, travelled by a hiker on the Appalachian Trail, who covers 100 miles in 6 days?
2. Write another question, together with its sensible answer, that can be answered using $100 \div$ 6.

| Task 1: Division | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - relate a given division calculation to appropriate practical situations <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1a. Gives correct answer: \$16.67 Accept \$16.70, S $16.75, \$ 17.00$ <br> 1b. Gives correct answer: $\mathbf{1 7}$ <br> 1c. Gives correct answer such as: 'cannot be done using this result' <br> 1d. Gives correct answer: 16 <br> 1e. Gives correct answer: $\mathbf{1 7}$ | 1 <br> 1 | 5 |
| 2 Writes an appropriate question. Writes a sensible answer. | $1$ | 2 |
| Total Points |  | 7 |

## Card Game

This problem gives you the chance to:

- figure out and explain probabilities

Mrs Jakeman is teaching her class about probability.
She has ten cards, numbered 1 to 10 .
She mixes them up and stands them on a shelf so that the numbers do not show.


Mrs. Jakeman turns the cards around one at a time.
Students have to guess whether the next card will have a higher or a lower number than the one just turned.

The first card turned is the number 3.


1. Would you expect the next number to be higher than 3 or lower? $\qquad$
Explain why you made this decision.
$\qquad$
$\qquad$
$\qquad$

The second card is number 10 .

2. What is the probability that the next card will be a higher number than 10 ?

Explain how you know.
$\qquad$
$\qquad$
$\qquad$

The third card is number 4.

3. What is the probability that the next number is higher than 4 ?

Show your work.

The fourth card is number 7 .

4. What is the probability that the next number is lower than 7 ?

Show your work.

The fifth card is the number 1.


When the sixth card is turned the probability that the next card is higher is the same as the probability that it is lower.
5. What must the sixth card be?

Explain how you figured it out.
$\qquad$
$\qquad$
$\qquad$

| Task 2: Card Game | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - figure out and explain probabilities <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives a correct answer: higher <br> and gives a correct explanation such as: There are more cards higher that 3 than lower than 3 . | 1 | 1 |
| 2. Gives a correct answer: $\mathbf{0}$ or impossible <br> Gives a correct explanation such as: <br> All the cards are lower than 10 so it is impossible for the next card to be higher. | 1 | 2 |
| 3 Gives a correct answer: $\mathbf{5 / 7}$ or equivalent ( $\mathbf{7 1 \%}$ ) <br> Shows correct work such as: <br> $5,6,7,8,9$ There are five higher numbers | $1$ <br> 1 | 2 |
| 4. Gives a correct answer: 4/6 or equivalent ( $\mathbf{6 6 . 6 \%}$ ) <br> Shows correct work such as: <br> $1,2,5,6$ There are four lower numbers |  | 2 |
| 5. Gives a correct answer: 6 <br> Gives a correct explanation such as: <br> The cards left are $2,5,6,8$ and 9 <br> The middle one of these is the 6 leaving two higher and two lower. | 1 | 2 |
| Total Points |  | 9 |

## Factors

This problem gives you the chance to:

- work with factors of numbers up to 30

A factor of a number divides into the number exactly.
This table shows all the factors of most of the numbers up to 30 .

| Number | Factors | Number <br> of factors |
| :---: | :--- | :---: |
| $\mathbf{1}$ | 1 | 1 |
| $\mathbf{2}$ | 1,2 | 2 |
| $\mathbf{3}$ | 1,3 | 2 |
| $\mathbf{4}$ | $1,2,4$ | 3 |
| $\mathbf{5}$ | 1,5 | 2 |
| $\mathbf{6}$ | $1,2,3,6$ | 4 |
| $\mathbf{7}$ | 1,7 | 2 |
| $\mathbf{8}$ | $1,2,4,8$ | 4 |
| $\mathbf{9}$ | $1,3,9$ | 4 |
| $\mathbf{1 0}$ | $1,2,5,10$ | 2 |
| $\mathbf{1 1}$ | 1,11 | 6 |
| $\mathbf{1 2}$ | $1,2,3,4,6,12$ | 4 |
| $\mathbf{1 3}$ | 1,13 | $1,2,7,14$ |
| $\mathbf{1 4}$ | $1,3,5,15$ | 4 |
| $\mathbf{1 5}$ |  |  |


| Number | Factors | Number of factors |
| :---: | :---: | :---: |
| 16 | 1, 2, 4, 8, 16 | 5 |
| 17 | 1,17 | 2 |
| 18 | 1, 2, 3, 6, 9, 18 | 6 |
| 19 | 1,19 | 2 |
| 20 | 1, 2, 4, 5, 10, 20 | 6 |
| 21 | 1, 3, 7, 21 | 4 |
| 22 | 1,2, 11, 22 | 4 |
| 23 | 1,23 | 2 |
| 24 | $1,2,3,4,6,8,12,24$ | 8 |
| 25 | 1, 5, 25 | 3 |
| 26 | 1,2, 13, 26 | 4 |
| 27 | - - - - | 4 |
| 28 | - - - - - | 6 |
| 29 | - - | 2 |
| 30 | $1,2,3,5,6,10,15,30$ | 8 |

1. Write the factors of the numbers 27,28 , and 29 in the table.
2. The numbers 1 and 4 have an odd number of factors.
a. Write down all the numbers up to 30 that have an odd number of factors.

1, 4, $\qquad$ , $\qquad$
$\qquad$
b. Complete this sentence:

All the $\qquad$ numbers up to 30 have an odd number of factors.
3. The number 10 has two odd factors (1 and 5).

It also has two even factors (2 and 10).
The number 18 has three odd factors (1,3 and 9).
It also has three even factors ( 2,6 and 10).
a. Write down all the numbers up to 30 that have an equal number of odd and even factors.
$\qquad$
b. Describe two patterns you can see in the above sequence of numbers.
$\qquad$
$\qquad$
$\qquad$
$\qquad$

| Task 3: Factors | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with factors of numbers up to 30 <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1 Gives correct answers: $27: \mathbf{1 , 3}, \mathbf{9 , 2 7}$ <br> 28: 1, 2, 4, 7, 14, 28 <br> 29: 1, 29 |  | 3 |
| 2 a Gives three correct answers with no extras: $9,16,25$ <br> Partial credit <br> Gives two correct answers. | $2$ |  |
| Gives correct answer: square | 1 | 3 |
| 3.a Gives correct answers: $14,22,26,30$ | 1 |  |
| b Describes two correct patterns such as: <br> They are all even numbers. <br> The sequence increases in fours. <br> They are all twice an odd number | $2 \times 1$ | 3 |
| Total Points |  | 9 |

## Household Statistics

This problem gives you the chance to:

- interpret a block graph and statistics in a real life context

This graph shows the number of children per household in a survey of 20 families.


1. Use the graph to complete this table.

| Number of children per household | 0 | 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Number of households |  |  |  |  |  |  |

2. a. How many households have three or more children?
b. What percentage of households has two children?

Show your calculation.
3. For each of these descriptions, choose the calculation below that matches it.

Write the letter of the calculation you choose in the table.

| Description | Letter |
| :--- | :--- |
| Total number of households |  |
| Total number of children |  |
| Mean number of children per household |  |

## Calculations

A $0+1+2+3+4+5$
B $\frac{0+1+2+3+4+5}{6}$
C $\quad 0 \times 1+1 \times 5+2 \times 8+3 \times 4+4 \times 1+5 \times 1$

D $\quad 1+5+8+4+1+1$
E $\quad \frac{1+5+8+4+1+1}{20}$
F $\quad \frac{0 \times 1+1 \times 5+2 \times 8+3 \times 4+4 \times 1+5 \times 1}{20}$


## Being Building Blocks

This problem gives you the chance to:

- work with area and volume

Barbara's baby brother, Billy, has a set of building blocks.
Each block is 2 inches long, 2 inches wide, and 2 inches high.

1. How many faces does the block have?

2. What is the volume of the block? $\qquad$ cubic inches

Show how you figured this out.
3. Billy has built this shape from his $2 \times 2 \times 2$ blocks.
a. What is the surface area of the shape?
$\qquad$ square inches
Show how you figured this out.

b. What is the volume of the shape? $\qquad$ cubic inches

Explain how you figured this out.
$\qquad$
$\qquad$

| Task 5: Building Blocks | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with area and volume <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: 6 | 1 | 1 |
| 2. Gives correct answer: $\mathbf{8}$ cubic inches Shows work such as: $2 \times 2 \times 2=$ <br> or length x breadth x height | $1$ <br> 1 | 2 |
| 3 a. Gives correct answer: 64 square inches <br> Shows work such as: $2((4 \times 4)+(4 \times 2)+(4 \times 2))$ <br> b. Gives correct answer: $\mathbf{3 2}$ cubic inches <br> Gives explanation such as: <br> There are 4 cubes and each is 8 cubic inches. So 4 times 8 makes 32 or $4 \times 4 \times 2=$ | 1 <br> 1 <br> 1 | 4 |
| Total Points |  | 7 |

Balanced Assessment Test -Sixth Grade 2008

| Core Idea | Task | Score |
| :--- | :--- | :--- |
| Number Operations | Snail's Pace |  |
| This task asks students to work with distances, time and speeds in inches per minutes <br> in the context of snails. Students are asked to find equivalent rates. Successful <br> students were able to find a common unit to make a comparison of the rates for all <br> four snails. |  |  |
| Probability | Black and White |  |
| This task asks students to use probability in the context of picking balls from a bag. <br> Students needed to think about probabilities and the meaning of fractions for a variety <br> of contexts. Successful students understood the probability of "not" getting <br> something. |  |  |
| Algebra | A Number Pattern |  |
| This task asks students to describe and extend a number pattern. Successful students <br> recognized a pattern growing by an increasing amount each time. |  |  |
| Rational Numbers | Percent Cards |  |
| This task asks students to relate fractions, decimals, and percents and locate them on a <br> number line. Successful students could work with decimals in the thousandths place <br> and locate 3/8 on a number line. |  |  |
| Geometry and <br> Measurement | Area and Perimeter |  |
| This task asks students to calculate area and perimeter for rectangles. Successful <br> students could keep a given area and create new rectangles with larger and smaller <br> perimeters. |  |  |

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## Snail Pace

This problem gives you the chance to:

- work with distances, time and speeds in inches and minutes

These snails move very slowly. Here are their speeds.

Snail A
5 inches in 10 minutes
Snail B
3 inches in 20 minutes
Snail C
1 inch in 15 minutes
Snail D
6 inches in 30 minutes


1. How far can snail D travel in 1 hour? $\qquad$ inches
2. How far can snail C travel in half an hour? $\qquad$ inches
3. How far can snail B travel in 2 hours? $\qquad$ inches
Show how you figured this out.
4. Which snail moves more quickly than the others? $\qquad$
Explain how you figured this out.
$\qquad$
$\qquad$
$\qquad$
$\qquad$

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| Snail Pace | Rubric |  |
| :---: | :---: | :---: |
| - The core elements of performance required by this task are: <br> - - work with distances, time and speeds in inches and minutes <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: $\mathbf{1 2}$ inches or $\mathbf{1}$ foot | 1 | 1 |
| 2. Gives correct answer: $\mathbf{2}$ inches | 1 | 1 |
| 3. Gives correct answer: $\mathbf{1 8}$ inches or $\mathbf{1}$ foot $\mathbf{6}$ inches or $\mathbf{1} \mathbf{1 / 2}$ feet <br> Shows correct work such as: 60 divided by $20=3$ <br> $3 \times 3=9$ inches in 1 hour <br> $9 \times 2=18$ inches | 1 <br> 2 | 3 |
| 4. Gives correct answer: Snail A Accept 5 <br> Gives correct explanation such as: In 1 hour Snail A travels 30 inches. In 1 hour Snail B travels 9 inches. In 1 hour Snail C travels 4 inches. In 1 hour Snail D travels 12 inches. Partial credit <br> For 1 error | 1 <br> 2 <br> (1) | 3 |
| Total Points |  | 8 |

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## Black and White

This problem gives you the chance to:

- show your understanding of fractions and probability

There are 4 black balls and 7 white balls in a bag. Jasper picks a ball without looking.

He says,
The probability of getting a black ball is $\frac{4}{7}$
Jasper is wrong!

1. What is the probability of getting a black ball?


Explain why Jasper is wrong.
$\qquad$
$\qquad$
$\qquad$
2. The fractions $\frac{4}{7}, \frac{7}{4}, \frac{7}{11}, \frac{4}{11}$ are answers to the questions below.

Put each fraction in a correct place.
a. What is the probability of getting a white ball? $\qquad$
b. What is the probability of not getting a black ball? $\qquad$
c. What is the fraction of black balls in the bag? $\qquad$
d. What is the number of black balls as a fraction of the number of white balls?
$\qquad$
e. What is the number of white balls as a fraction of the number of black balls?

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| Black and White | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - show understanding of fractions and probability <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: 4/11 <br> Gives correct explanation such as: The probability of getting a black ball is the number of black balls divided by the total number of balls. | 1 | 2 |
| 2. Gives correct answer: 7/11 <br> Gives correct answer: 7/11 <br> Gives correct answer: 4/11 <br> Gives correct answer: 4/7 <br> Gives correct answer: 7/4 | $\begin{aligned} & 1 \\ & 1 \\ & 1 \\ & 1 \\ & 1 \end{aligned}$ | 5 |
| Total Points |  | 7 |

## A Number Pattern

This problem gives you the chance to:

- describe and extend a numeric pattern

This is a number pattern. It can go on and on.
Sum of numbers in row


1

2
$\qquad$
$\qquad$
$\qquad$
$\qquad$

1. Which numbers appear just once in the part of the pattern that is shown above?
2. In this pattern, each row begins and ends with the number 1.

The other numbers are the sum of the two numbers above it.
For example, $10=6+4$.
Continue the pattern, by writing numbers in the row of empty squares.
3. a. Find the sum of the numbers in each of the rows. The first two have been done for you.

Write your answers on the diagram above.
b. What do you notice about the sequence of numbers in the Totals column?
4. Look at the numbers that have been shaded.

What do you notice about the sequence of numbers that have been shaded?

| A Number Pattern | Rubric |  |
| :---: | :---: | :---: |
| - The core elements of performance required by this task are: <br> - - describe and extend a numeric pattern <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: 2 Accept 6 and 20 | 1 | 1 |
| 2. Gives correct answers: $\mathbf{1}, \mathbf{6}, \mathbf{1 5}, \mathbf{2 0}, \mathbf{1 5}, \mathbf{6}, \mathbf{1}$ <br> Partial credit <br> One error | $2$ <br> (1) | 2 |
| 3.a. Gives correct answer: $1,2,4,8,16,32,64$ <br> Partial credit <br> One error <br> b. Gives correct answer such as: The numbers double each time. or Powers of 2 | 2 <br> (1) <br> 1 | 3 |
| 4. Gives correct answer such as: <br> The difference between consecutive numbers $(2,3,4,5)$ increases by one each time. <br> Partial credit <br> For one error or an incomplete statement. | 2 <br> (1) | 2 |
| Total Points |  | 8 |

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## Percent Cards

This problem gives you the chance to:

- relate fractions, decimals and percents

Mrs. Lopez makes sets of cards for her math class.
All the cards in a set have the same value.


1. Complete these sets of cards.


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2. Show $\frac{2}{5}, 65 \%$ and $\frac{3}{8}$ on the number line below.


\begin{tabular}{|c|c|c|}
\hline Percent Cards \& \multicolumn{2}{|l|}{Rubric} \\
\hline \begin{tabular}{l}
The core elements of performance required by this task are: \\
- relate fractions, decimals and percents \\
Based on these, credit for specific aspects of performance should be assigned as follows
\end{tabular} \& points \& section points \\
\hline \begin{tabular}{l}
1. Gives correct answers: Set B \(\mathbf{0 . 4 0}\) \\
Set C 13/20, 65/100 \\
Set D 0.375, 37.5/100 (accept 375/1000), 37.5\% \\
Partial credit \\
One error
\end{tabular} \& \[
\begin{gathered}
1 \\
2 \times 1 \\
2 \\
(1)
\end{gathered}
\] \& 5 \\
\hline \begin{tabular}{l}
2. Values correctly indicated on number line. \\
Partial credit \\
One error
\end{tabular} \& 2

(1) \& 2 <br>
\hline Total Points \& \& 7 <br>
\hline
\end{tabular}

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## Area and Perimeter

This problem gives you the chance to:

- work with area and perimeter of rectangles

1. The perimeter of this rectangle is $2(5+2)=14$ inches.

The area of this rectangle is $2 \times 5=10$ square inches.


5 inches
a. Draw a diagram of a rectangle with the same perimeter, but a larger area. Write down the area of your rectangle.
b. Draw a diagram of a rectangle with the same perimeter, but a smaller area. Write down the area of your rectangle.
2. The perimeter of this rectangle is 22 inches. The area of this rectangle is 24 square inches
a. Is it possible to draw a rectangle with the same area as the one on the right, but a larger perimeter? Explain your reasoning.

b. Is it possible to draw a rectangle with the same area, but a smaller perimeter?

Explain your reasoning.
$\qquad$
$\qquad$
$\qquad$

| Area and Perimeter | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: - work with area and perimeter of rectangles <br> Based on these, credit for specific aspects of performance should be assigned as follows | $\underset{\mathrm{s}}{\mathrm{point}}$ | $\begin{gathered} \text { sectio } \\ n \\ \text { point } \end{gathered}$ |
| 1.a Draws a rectangle with sides such as: 3 inches $x 4$ inches area $=12$ square inches <br> Draws a rectangle with sides such as: 1 inch x 6 inches area $=6$ square inches <br> b. | $\begin{aligned} & 1 \\ & 1 \\ & 1 \\ & 1 \end{aligned}$ | 4 |
| 2.a Gives correct answer: Yes and <br> Gives correct explanation such as: <br> Area $2 \times 12=24$, Perimeter $2(2+12)=28$ inches or <br> Area $1 \times 24=24$, Perimeter $2(1+24)=50$ inches <br> Partial credit <br> Allow partial credit for a partially correct answer. <br> Gives correct answer: Yes and <br> Gives correct explanation such as: <br> b. Area $4 \times 6=24$, Perimeter $2(4+6)=20$ inches <br> Partial credit <br> Allow partial credit for a partially correct answer. | 3 or 3 <br> (2) <br> 3 <br> (2) | 6 |
| Total Points |  | 10 |


| Core Idea | Task | Score |
| :--- | :--- | :---: |
| Number and Operations | Sewing |  |
| This task asks students to think about buying fabric and supplies. Students needed to |  |  |
| work with a rule to find the amount of fabric, find the cost, and calculate an $8 \%$ tax. |  |  |
| Successful students could round the amount of fabric to the nearest quarter yard and |  |  |
| round the tax to the nearest cent. |  |  |

Algebra $\quad$ Truffles

This task asks students to work with equivalent ratios to extend the amount of ingredients in a recipe. Students are asked to read a graph to help them reason about extending the recipe. Successful students could make a rule to help them find the amount of chocolate needed given any amount of cream.

| Algebra and <br> Measurement | Boxes |
| :--- | :--- |
| This |  |

This task asks students to reason about weighing boxes to find the heaviest box. The challenge was how to weigh 9 boxes by only using the scale two times. Successful students could use the information about weights from pictures to make conclusions and find the second step in weighing the objects.
Geometry $\quad$ Skateboarding

This task asks students to reason about angles and degree of rotation in the context of skateboarding tricks. Successful students could also reason about the angles in a ramp given one of the angles and a right angle.

## Probability $\quad$ A Board Game

This task asks students to reason about probabilities in the context of rolling a number cube in a board game. Successful students could find the probability of a student winning in a given situation and determine if the game was fair.

## Sewing

This problem gives you the chance to:

- use mathematics in a real life situation

Amy is sewing some pants for herself.
This is the rule for how much fabric she needs to buy.

- Measure from your waist to the finished length of the pants
- Double this measurement
- Add 8 inches

1. Amy's measurement from her waist to the finished length of the pants is 35 inches.

How many inches of fabric does she need?
2. Fabric is actually sold not in inches, but in yards. Each yard is 36 inches.

The smallest amount you can buy is a quarter of a yard. So, if you want one yard and 25 inches you have to buy one and three quarter yards.

How much fabric must Amy buy for the pants? $\qquad$
3. Chris is also making some pants for herself.

She buys fabric, thread, buttons and a zipper.
Complete Chris's bill

|  | \$ |
| :---: | :---: |
| $21 / 4$ yards of fabric at \$5 a yard |  |
| 2 spools thread at 35¢ a spool |  |
| 3 buttons at 25¢ each |  |
| Zipper 60¢ |  |
| Total before sales tax |  |
| Sales tax at $8 \%$ <br> (round this to nearest cent) |  |
| Total |  |

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| Sewing | Rubric |  |
| :--- | :---: | :---: |
| The core elements of performance required by this task are: <br> - use mathematics in a real situation <br> Based on these, credit for specific aspects of performance should be assigned as follows |  |  |
| 1. | Gives correct answer: $\mathbf{7 8}$ inches | 1 |
| section |  |  |
| points |  |  |$|$

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## Truffles

This problem gives you the chance to:

- do calculations in a real situation

Linda makes chocolate truffles.
The recipe for 20 dark chocolate truffles is
1 cup cream
2 cups dark chocolate

1. Complete the recipe for 40 dark truffles

$\qquad$ cups cream
$\qquad$ cups dark chocolate
2. One day, Linda has 8 cups of dark chocolate and plenty of cream.

How many truffles can she make?
Explain how you figured it out.
3. The recipe for Super Truffles is different. The graph on the next page shows how much cream and
chocolate to use.
How much chocolate does Linda need for two cups of cream?
4. How much cream does she need for 15 cups of chocolate?

[^1]Number of cups of chocolate


Number of cups of cream
5. Write a rule that Linda can use to figure out how many cups of chocolate she needs for any number of cups of cream when making Super Truffles.
$\qquad$
$\qquad$

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| Truffles | Rubric |  |
| :---: | :---: | :---: |
| - The core elements of performance required by this task are: <br> - - do calculations in a real situation <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answers: 2 $4$ | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | 2 |
| 2. Gives correct answer: $\mathbf{8 0}$ <br> Gives correct explanation such as: <br> She can make four times as many as the recipe. | $2$ | 3 |
| 3 Gives correct answer: 5 cups | 1 | 1 |
| 4. Gives correct answer: 6 cups | 1 | 1 |
| 5. Gives correct rule such as: <br> Multiply the number of cups of cream by two and a half. <br> Partial credit <br> Shows a 2.5: 1 ratio or equivalent. | 2 <br> (1) | 2 |
| Total Points |  | 9 |

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## Boxes

This problem gives you the chance to:

- show understanding of a mathematical situation
- explain your reasoning

There are nine small boxes.
They all look exactly the same but one is a bit heavier than the others.


This is what Jake does first.


1. Explain what Jake now knows about the heavy box.
$\qquad$
$\qquad$
$\qquad$

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Then Jake dr

2. Which is the heavy box?
3. Explain how you know.
$\qquad$
$\qquad$
$\qquad$
4. Suppose the scales showed this the first time instead.


What should Jake do now to find the heavy box?
$\qquad$
$\qquad$
$\qquad$
$\qquad$

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| Boxes | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - show understanding of a mathematical situation <br> - explain your reasoning <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: It is $\mathbf{4}, \mathbf{5}$, or $\mathbf{6}$ Accept RHS or lower scale pan. | 2 | 2 |
| 2. Gives correct answer: 6 | 1 | 1 |
| 3. Gives correct answer: $\mathbf{4}$ and $\mathbf{5}$ weigh the same so $\mathbf{6}$ is the heavy one. <br> Partial credit <br> 4 and 5 are the same weight. | 2 <br> (1) | 2 |
| 4. Gives correct answer such as: Weigh 7 and 8 and leave 9 out. If 7 and 8 weigh the same, 9 is the heavy one. If the scales do not balance, the heavy parcel is in the lower scale pan. <br> Incomplete explanation. <br> Weighs 7 and 8 and nothing else. | 3 <br> (2) <br> (1) | 3 |
| Total Points |  | 8 |

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## Skateboarding Tricks

This problem gives you the chance to:

- use geometry in everyday life

Tom loves skateboarding. He can do lots of tricks.
1.When he begins his first trick, the skateboard is in this position.


He spins clockwise.
When he has completed the trick, the skateboard is in this position.
Through how many degrees has the skateboard turned? $\qquad$ $\circ$
2. Tom can do a second trick. The skateboard does a complete turn. Through how many degrees does his skateboard turn? $\qquad$。
3. In his third trick the skateboard makes a $180^{\circ}$ turn.

Draw the end position of Tom's skateboard.


Start position End position
4. Tom's fourth trick shows that he can skateboard around a square fish pond.
When he starts at point A , this is the position of his skateboard.


He skateboards in a straight line until he reaches point $B$. He spins clockwise until he faces point C.
He skateboards in a straight line until he reaches point C .
He spins clockwise until he faces point D.
He skateboards in a straight line until he reaches point D. He spins clockwise until he faces point A.


He skateboards in a straight line until he reaches point A.
Through how many degrees has his skateboard turned in all?
5. Tom's newest trick uses a ramp. The ramp looks like this.

What are the other two angles of Tom's ramp?
$\qquad$
Explain how you figured this out.

$\qquad$

| Skateboarding Tricks | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - use geometry in everyday life. <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answers such as: $\mathbf{9 0} \% / 450 \%$ a quarter turn. | 1 | 1 |
| 2. Gives correct answer: $\mathbf{3 6 0}$ degrees. | 1 | 1 |
| 3. Draws correct end position of the skateboard. | 1 | 1 |
| 4. Gives correct answer: $\mathbf{2 7 0}$ degrees | 1 | 1 |
| 5. Gives correct answer: $\mathbf{9 0}^{\circ}$ and $\mathbf{2 5}^{\circ}$ <br> Gives correct explanation such as: <br> I know that there are 180 degrees in a triangle. 90 plus 65 is 155 . I took 155 from 180. | 1 1 | 2 |
| Total Points |  | 6 |

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## A Board Game

This problem gives you the chance to:

- work with probabilities

Jake and Annia are playing a board game using an ordinary cube numbered 1 to 6 .
Players take turns to throw the cube, but only the player with the higher score moves. The player with the higher score moves the number of places shown on their cube. If the scores are equal neither player moves.

1. On his first throw Jake got a 3. Annia was the one to move.


What numbers could she have thrown?
List all the possible numbers.
2. On his second throw Jake got a 4.

What is the probability that Annia was the one to move?
3. On another throw, after Jake has thrown, the probability that Annia moves is $2 / 3$.

What number did Jake throw?
4. Towards the end of the game Annia needs to move two places to win. She must throw exactly 2.

What would Jake need to throw for Annia to have a chance of winning?
Explain how you decided. $\qquad$
$\qquad$
$\qquad$
5. Annia thinks it unfair for Jake to go first each time. She thinks it gives him an advantage.

Is she correct?
Explain how you decided.
$\qquad$
$\qquad$
$\qquad$

| A Board Game | Rubric |  |
| :---: | :---: | :---: |
| The core elements of performance required by this task are: <br> - work with probabilities <br> Based on these, credit for specific aspects of performance should be assigned as follows | points | section points |
| 1. Gives correct answer: 4, 5 and 6 | 1 | 1 |
| 2. Gives correct answer: $\mathbf{2 / 6}$ or equivalent | 1 | 1 |
| 3. Gives correct answer: 2 | 1 | 1 |
| 4. Gives correct answer: $\mathbf{1}$ <br> Gives a correct explanation such as: To be able to move she has to score more than Jake and she needs to score 2 to move 2 so he must get only 1 . | 1 | 2 |
| 5. Gives correct answer: No <br> Gives a correct explanation such as: They each throw before they decide who moves and what one person throws does not effect the other throw/ the order does not matter. | $1$ | 2 |
| Total Points |  | 7 |

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