

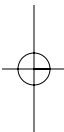
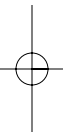
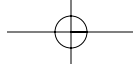
WASL—Washington Assessment of Student Learning

A Component of the Washington State Assessment Program

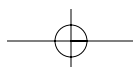
Using Results to Improve Student Learning

**Mathematics
Grade 7**
2001 Released Items





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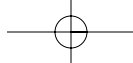
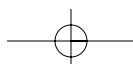
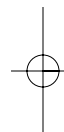
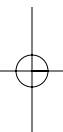


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October 10, 2001

Dear Washington State Educators:

It is with great pleasure that the Office of the Superintendent of Public Instruction (OSPI) offers this new publication containing released test items from the 2001 Washington Assessment of Student Learning (WASL). This publication is designed to assist teachers and administrators in the analysis of the results of specific test items in order to identify patterns, trends, weaknesses and strengths of student performance on the Essential Academic Learning Requirements (EALRs).

In this packet, you will find actual test items that were used on the Spring 2001 WASL test in reading and mathematics. The writing prompts are not included because you will be receiving the 2001 writing prompts separately along with annotated student work.

As a teacher, or as a district or building administrator, you will be able to analyze the actual test items and the data that accompanies them to learn more about students in your school and district. You will be able to compare the performance of your school to your district or the state. By analyzing the differences in the data and the relationship that each question has with the EALRs, you will be able to identify where performance is strong and weak in your school and district. We encourage you to provide opportunities for students, teachers, and parents to work with the item-specific scoring guides in reading and mathematics and the annotated student responses that illustrate each score point.

OSPI hopes that you will use the information to begin a thoughtful, impassioned dialogue about what we expect our students to know and be able to do and how well they need to do it. We expect that this material will initiate conversations among administrators, faculty, students, and parents to how this information can impact our teaching, our learning, and our communication. Plans to improve student learning should not be made based on these results alone. It is important to also include the results from other assessments used by the teacher, school, and/or district.

In October, OSPI will conduct regional training on the effective use of these materials.

Congratulations on our work to improve student learning in Washington. Let's continue our fine work as we move forward toward our goal of increasing all student achievement and to create thoughtful, competent citizens for the 21st Century. I encourage you to search our website for further resources (www.k12.wa.us).

Sincerely,



Dr. Terry Bergeson
State Superintendent of
Public Instruction

How to Use this Released Item Booklet and the Item Analysis Report

Introduction:

You should have two documents: one, this Released Item Booklet and two, the Item Analysis Report. These two documents should be used together to help administrators and teachers understand released WASL items that reflect content-specific learning strands and targets which are derived Essential Academic Learning Requirements.

This **Released Item Booklet** includes the following information:

- WASL passages (for reading) and items from the 2001 Operational Test
- A table for each item where you can transfer the school-level, district-level, and state-level data information
- Information to indicate the learning target and strand information for each item
- Item-specific scoring guides, student work at representative score points, and annotated explanations for scores

The **Item Analysis Report** includes the following information:

- A list of all released items referenced to learning strands and learning targets
- Multiple choice items include the percent of students who responded to each possible answer. Correct answers have asterisks. Information is presented by the percent of students responding to each possible answer by school, by district, and by state.
- For constructed-response items, including short answers and extended response, information is presented by the percent of students who scored at each score point by school, by district, and by state.

How to Understand Your Data:

- First, transfer your data from the Item Analysis Report to the Released Item Booklet. Transfer all the information for each item into each table. By transferring the data, you will have all the information in one place.
- Second, examine the item types that represent the school's or the district's strengths or weaknesses. Does the school or district perform well on multiple choice items? Constructed-response items? What percent of students in a school or a district left constructed-response items blank or earned a zero?
- Third, examine the learning strands and targets represented by each item. Group together targets that represent strengths or weaknesses for a school or a district. Do the targets all fit underneath one particular strand or do they belong to several strands?
- Fourth, look for trends. Does a school perform markedly lower on a particular item in comparison to the district or the state? Does a school or a district perform markedly higher on a particular item in comparison to the state?

Introduction to Released Mathematics Items

Welcome to the Released Item Booklet for the WASL 2001 mathematics items. In this booklet you will find between 12-16 items that were part of the spring 2001 WASL test for mathematics.

There are four types of test items:

- multiple choice items where students earn one point by selecting the right answer from a few options;
- extended multiple choice items where students can earn up to two points by first selecting the right answer from options and then explaining something about their choice
- short answer items where students earn up to two points by writing an answer, explaining their thinking, drawing a picture or diagram, or showing steps used to solve a problem
- extended response items where students can earn up to four points by constructing a response that asks for more details (graphs, tables, written summaries) or more thinking.

Please note that in releasing 12-16 items from the 2001 WASL test for mathematics, OSPI is releasing approximately 36% of the mathematics WASL. The items that were not released this year will be used on future WASLs. However, these released items also provide invaluable opportunities for teachers and administrators to become familiar with the types of mathematics items derived from the mathematics EALRs while also becoming experienced with the item-specific scoring guides and annotated samples of student responses.

You may want to become familiar with the WASL test and item specifications (located on our website-www.k12.wa.us) as you study the items, your school or district's data, and the annotated student responses contained in this Released Item Booklet. Each item in this booklet represents a "learning target" which is a mathematics skill derived from the EALRs that can be captured in a paper and pencil assessment. These targets are subsets of the nine content and process mathematics strands.

As you begin to analyze your data, think about what would account for the performance of students on particular items. Although many of the items can represent strength and weaknesses across schools, districts, and the state, attempt to maintain the whole picture in your analysis. Staff at OSPI recommends that you examine the items themselves closely and ask yourselves, "What do we expect our students to know and be able to do in order to be successful on this item?" Along with classroom performance information, results from other tests, and these test items informed curriculum decisions can be made.

In order to assist you in your efforts in understanding and using the Released Item Test Booklet, please do not hesitate to search our website for further resources or call our offices in Olympia for further information.

Mathematics

1 Which expression is equivalent to $8 \times 2 \div 4 + 5$?

- A. $8 + 4 \div 2 + 5$
- B. $2 \div 4 + 5 \times 8$
- C. $4 \div 8 \times 2 + 5$
- D. $5 + 8 \times 2 \div 4$

Item Information:

Correct Answer: D

Strand: Number Sense

Learning Target: Demonstrate an understanding of operations on non-negative, rational numbers.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C
			D*
			NR

Mathematics

2 What is the correct value of the expression below?

$$4^2 \times 8 \div \frac{1}{2}$$

- A. 32
- B. 48
- C. 128
- D. 256

Item Information:

Correct Answer: D

Strand: Number Sense

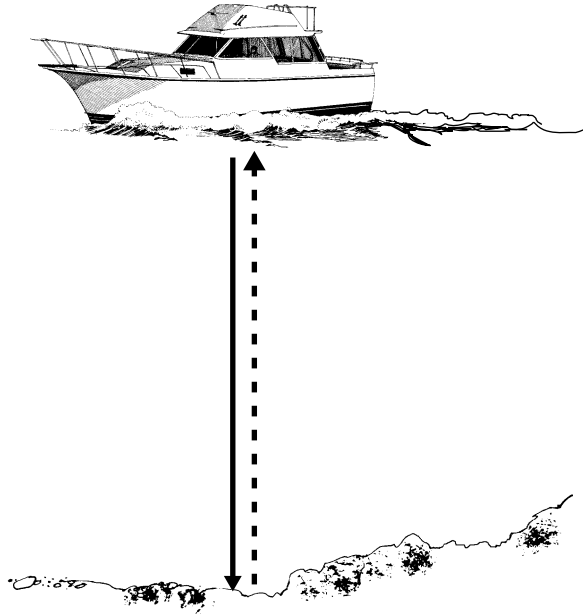
Learning Target: Add, subtract, multiply, and divide non-negative whole numbers, fractions, and decimals using rules for order of operations.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C
			D*
			NR

Mathematics

- 3 Sound travels in sea water at the rate of 4,900 feet per second. Scientists can figure out the depth of the ocean floor by using a method called *sonar*.



Sonar measures the time it takes for sound waves to travel from a ship to the ocean floor **and back**.

Suppose a ship has a sonar sounding of 6 seconds. What would be the approximate depth of the ocean floor below the ship?

- A. 1,630 feet
- B. 4,900 feet
- C. 9,800 feet
- D. 14,700 feet

Mathematics**3** (continued)Item Information:

Correct Answer: D

Strand: Measurement

Learning Target: Use estimation and knows when to estimate to obtain reasonable approximations; demonstrate an understanding of how precision is affected by the unit of measurement

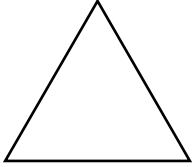
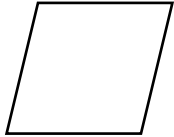

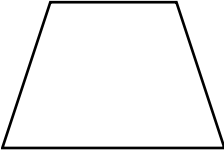
Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C
			D*
			NR

Mathematics

4 A **regular polygon** is a figure in which all of its sides are equal in length and all of its angles are equal in measure.

Which of the following is a regular polygon?

- A.** 
- B.** 
- C.** 
- D.** 

Item Information:

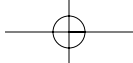
Correct Answer: A

Strand: Geometric Sense

Learning Target: Identify and use geometric properties and relationships to draw and describe shapes, figures, and simple scale drawings

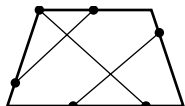
Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A*
			B
			C
			D
			NR



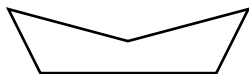
Mathematics

- 5 In a **convex polygon**, any two points can be connected by a line segment that remains entirely within the polygon. The figure below is an example of a convex polygon.

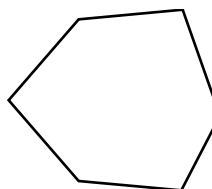


Which of the figures below is another example of a convex polygon?

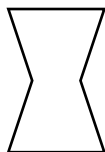
A.



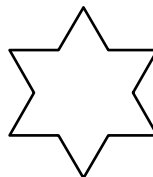
C.



B.



D.



Item Information:

Correct Answer: C

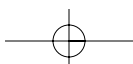
Strand: Geometric Sense

Learning Target: Identify and use geometric properties and relationships to draw and describe shapes, figures, and simple scale drawings

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

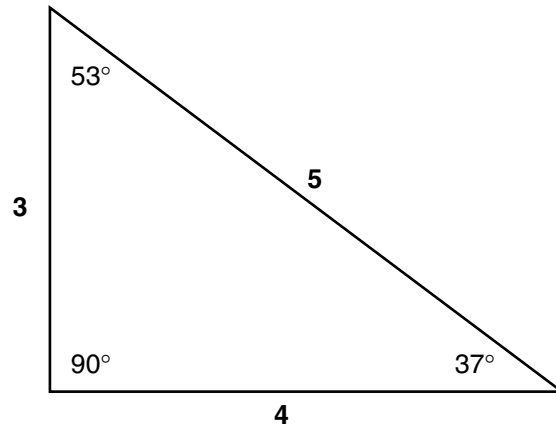
10

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C*
			D
			NR

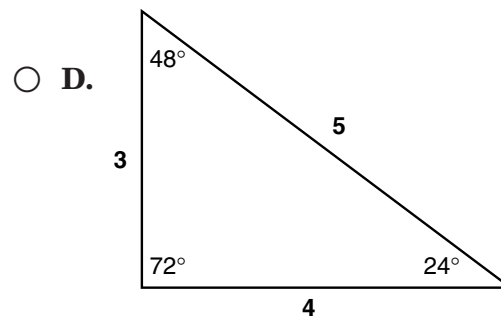
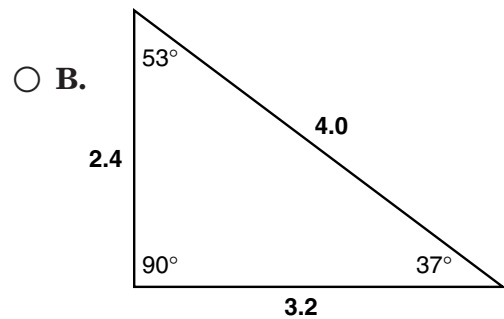
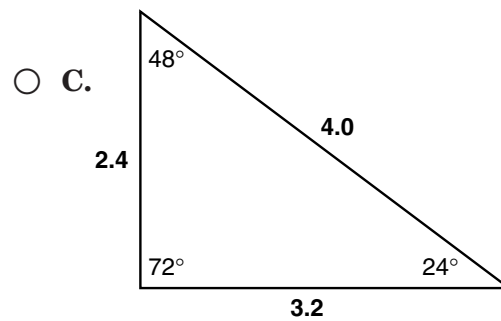
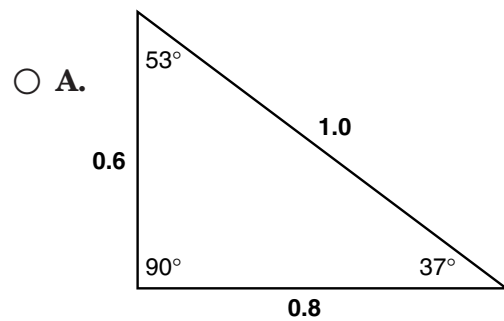


Mathematics

- 6 Photocopy machines can be used to make an image larger or smaller on paper.



Suppose the above triangle were reduced on a photocopy machine to 80% of its original size. Which of the following gives the correct **measures** of its sides and angles after it was reduced?



Mathematics**6** (continued)Item Information:

Correct Answer: B

Strand: Geometric Sense

Learning Target: Demonstrate an understanding of symmetry, congruence, and similarity; draw symmetric, congruent, or similar figures.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B*
			C
			D
			NR

Mathematics

- 7** You have 3 pairs of socks in the dryer. The socks are **not** paired together and each pair is a different color. Suppose you take socks out of the dryer, one at a time, without looking. What is the **least** number of socks you need to take out of the dryer to guarantee that you have one matched pair?
- A.** 3
- B.** 4
- C.** 5
- D.** 6

Item Information:

Correct Answer: B

Strand: Probability and Statistics

Learning Target: Demonstrate an understanding of chance, and use counting procedures and calculations to determine the probability of a simple event; compare results of experiments and simulations with mathematical expectations.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B*
			C
			D
			NR

Mathematics

- 8** Sara is working on a project for math class. She is going to conduct a survey to determine which hot lunch at her school is the favorite among students. Which question below should she use in her survey to get the information she wants?
- A.** What is your favorite food at our school cafeteria?
 - B.** What do you like best for lunch at our school cafeteria?
 - C.** What hot lunch do you like best at our school cafeteria?
 - D.** What do you usually eat for lunch at our school cafeteria?

Item Information:

Correct Answer: C

Strand: Probability and Statistics

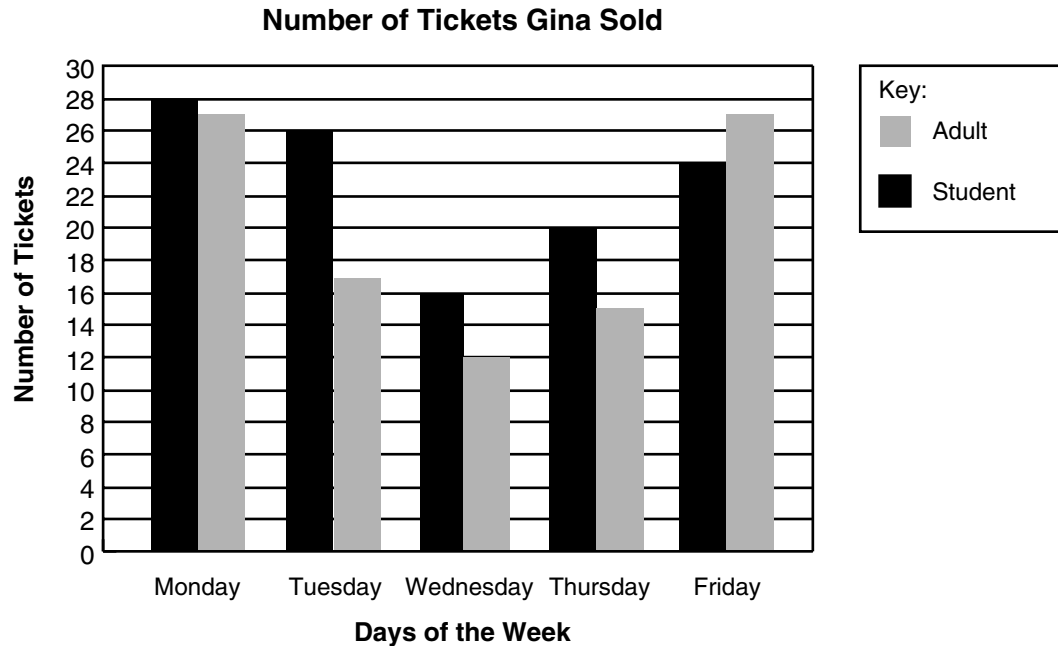
Learning Target: Demonstrate an understanding of how to collect a random sample of data to represent a population.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C*
			D
			NR

Mathematics

- 9 Gina sold tickets to the talent show. The graph below shows how many tickets Gina sold each day during the week of the show.



Gina wants to change the appearance of her bar graph. Without changing her data, how could she change the graph to make all the bars appear longer?

- A. Increase the length of the horizontal axis and make the bars wider.
- B. Double the length of the vertical axis and increase the scale to 60.
- C. Keep the scale at 0–30, double the length of the vertical axis and use units of 1 on the scale instead of units of 2.
- D. Keep the length of the vertical axis the same, start the scale at 10, and increase the space between the numbers on this scale.

Mathematics**9** (continued)Item Information:

Correct Answer: C

Strand: Probability and Statistics

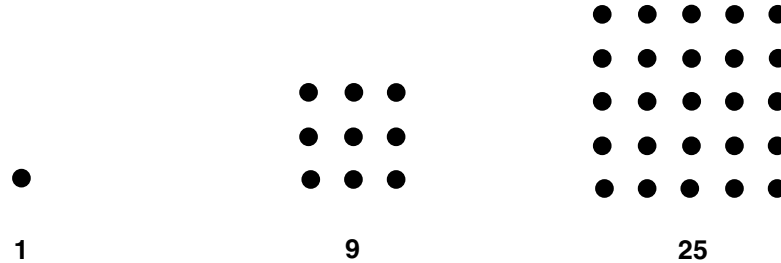
Learning Target: Organize and display data in appropriate forms; calculate and appropriately use range and measures of central tendency to describe data; identify how statistics can be used to support different points of view.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C*
			D
			NR

Mathematics

- 10** The ancient Greeks discovered that certain numbers form definite shapes when arranged in dot patterns. For example, **square numbers** have the same number of columns and rows.



Which 3 numbers would come next in **this pattern** of square numbers?

- A. 36, 49, 64
- B. 49, 64, 81
- C. 36, 64, 100
- D. 49, 81, 121

Item Information:

Correct Answer: D

Strand: Algebraic Sense

Learning Target: Recognize, extend, and create patterns and sequences; represent number patterns with tables, graphs, and rules.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C
			D*
			NR

Mathematics

- 11** Chip Silicon is writing a computer program for basketball data. To find the points scored in a game, he must include each free throw, which is 1 point, each regular shot, which is 2 points, and each long shot, which is 3 points. Chip uses the following symbols in his program:

* stands for multiplication in a computer.

F stands for the number of free throws made.

R stands for the number of regular shots made.

L stands for the number of long shots made.

T stands for the total score a team has in a game.

Which of these shows how to find a team's total score in a game?

- A.** $T = F + (R * 2) + (L * 3)$
- B.** $T = F * (R + 2) * (L + 3)$
- C.** $T = (F + R + L) * (1 + 2 + 3)$
- D.** $T = (1 + F) * (2 + R) * (3 + L)$

Item Information:

Correct Answer: A

Strand: Algebraic Sense

Learning Target: Evaluate expressions and formulas; solve single-variable equations in context.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A*
			B
			C
			D
			NR

Mathematics

- 12** All of Ms. Hansen's students are reading poetry by Wordsworth. Nam is in Ms. Hansen's class. Jeff is not in Ms. Hansen's class. Lisa is reading poetry by Wordsworth.

If all the statements above are true, which conclusion below is definitely true?

- A.** Lisa and Nam are in the same class.
- B.** Jeff and Lisa are **not** in the same class.
- C.** Jeff is **not** reading poetry by Wordsworth.
- D.** Nam and Lisa are reading poetry by Wordsworth.

Item Information:

Correct Answer: D

Strand: Solves Problems and Reasons Logically

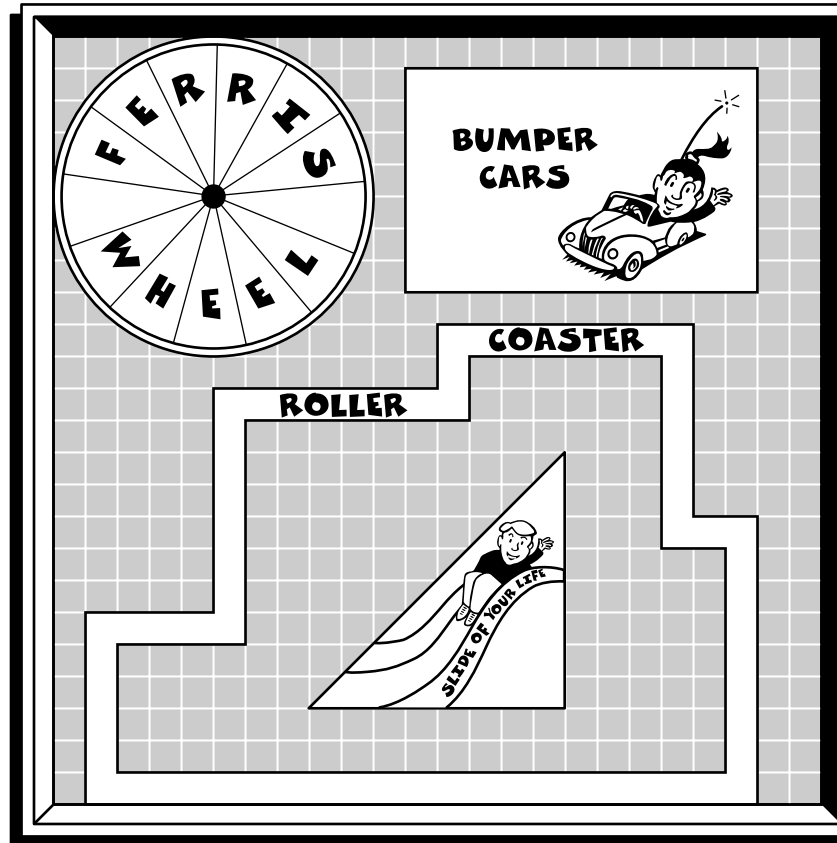
Learning Target: Compare, contrast, and interpret information from a variety of sources.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B
			C
			D*
			NR

Mathematics

Use the information from the picture to answer question 13.



- 13** At a carnival, people will get a chance to win free tickets for the rides. A player will be blindfolded and will then throw a dart at the dartboard shown below. If the dart lands in one of the pictures, that player will receive a free ticket for that ride. (Note: A player will be allowed to rethrow the dart until it hits the board.)

What are the chances of a person winning a free ticket to ride the Ferris wheel?

- A. 55%
- B. 14%
- C. 5%
- D. 3%

Mathematics**13** (continued)Item Information:

Correct Answer: B

Strand: Makes Connections

Learning Target: Evaluate expressions and formulas; solve single-variable equations in context. Relate and use conceptual and procedural understandings among a variety of mathematical content strands; relate and use equivalent mathematical models and representations.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Responses (* = correct response)
			A
			B*
			C
			D
			NR

Mathematics**14** (continued)Item Information:

Score points: 2 (see pages 28-31 for examples of each score point)

Strand: Communicates Understanding

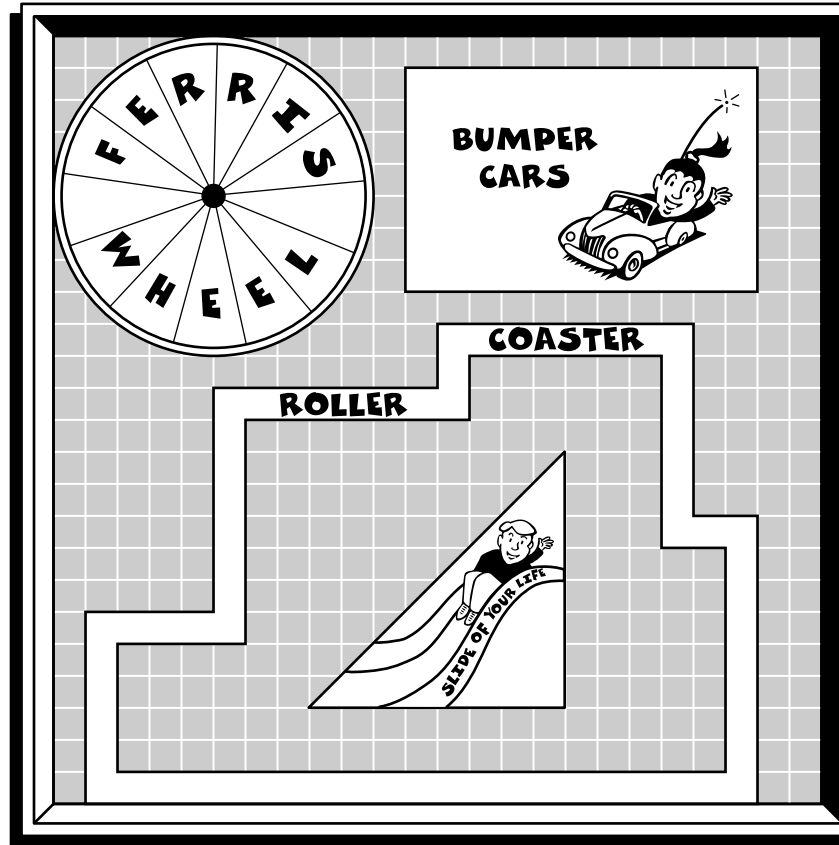
Learning Target: Develop and describe a plan to gather information;
extract mathematical information from multiple sources

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Points
			0
			1
			2
			NR
			Mean

Mathematics

Use the information from the picture to answer question 15.



- 15** Since the slide has been so popular, the owner of the carnival wants to decrease the chances of winning a free ticket for this ride. On the dartboard, the triangle shape has two sides that are each 8 units long. He wants to decrease the length of each of these sides to 4 units.

Compare the chances of winning a free ticket for the slide on the old dartboard versus the new dartboard. Use words, numbers, and/or pictures to explain your answer.

Mathematics**15** (continued)Item Information:

Score points: 2 (see pages 32-35 for examples of each score point)

Strand: Making Connections

Learning Target: Relate and use conceptual and procedural understandings among a variety of mathematical content strands; relate and use equivalent mathematical models and representations.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Points
			0
			1
			2
			NR
			Mean

Mathematics

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.



Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Mathematics**16** (continued)Item Information:

Score points: 4 (see pages 36–42 for examples of each score point)

Strand: Communicates Understanding

Learning Target: Clearly organize, represent, and express mathematical informations, understandings, and ideas in ways appropriate for the given audience and purpose.

Performance Data (Use this space to fill in student performance information for your school, district, and the state.):

Percent Distribution			
School	District	State	Points
			0
			1
			2
			3
			4
			NR
			Mean

Mathematics

Item Specific Scoring Guides and Annotated Examples of Score Points

Scoring Guide for question number 14:

A **2-point** response lists at least one clear question or statement that would determine which of the three listed students are most afraid of, and gives an acceptable method for selecting a random sample. Surveys (methods) should be limited to students at school, but not the whole school.

For example:

Rank these in order according to what you are most to least afraid of:

Public Speaking

High Places

Snakes

I would find a random sample by surveying every third person in the cafeteria at lunch.

NOTE: Additional question(s)/statement(s) are acceptable if they do not compromise the quality of the survey (e.g., ones that would compromise anonymity). In fact, the student may indicate that they would enhance the quality by confirming randomness (e.g., by requesting age).

A **1-point** response does one of the following:

- States a clear question (or statement), but does not give an acceptable method for selecting a random sample.
- Gives an acceptable method for selecting a random sample, but the questions, if any, could not be used to clearly determine which of the three things students are most afraid of (e.g., an open-ended question like, “What are you most afraid of?”).

A **0-point** response shows little or no mathematical understanding of the task.

Mathematics**Annotated Example of a 2-point response for question number 14:**

14 For a class project, you are asked to conduct a survey of students at your school. You decide to find out which of the following things students at your school are **most afraid** of:

- Public speaking
- High places
- Snakes

Describe how you would go about conducting your survey. Be sure to include the following things in your survey:

- A list of the question(s) you would need
- How you would go about selecting a random sample

The question I would use are "What are You most afraid of...public speaking, high places, or snakes?" I would also ask for their age and gender. I would take 50 people from each grade and have 25 females and males out of the 50.

Annotations:

The response includes a correct question and an acceptable method to select a random survey. The question includes the three categories. The method describes the number of students that will be surveyed and realizes that the survey must include all grades, both boys and girls. This response is correct and complete earning two points.

Mathematics

Annotated Example of a 1-point response for question number 14:

14 For a class project, you are asked to conduct a survey of students at your school. You decide to find out which of the following things students at your school are **most afraid** of:

- Public speaking
- High places
- Snakes

Describe how you would go about conducting your survey. Be sure to include the following things in your survey:

- A list of the question(s) you would need
- How you would go about selecting a random sample

I would use the question, What are You most afraid of? To select a random sample I would choose an equal number of boys and girls and I would pick an equal number of students per grade level. Then I would walk around asking people what they thought and not let anyone else see my results so they could not be persuade in any way.

Annotations:

The response includes an incomplete question. The categories are not listed as the options to choose from. The question is left totally open-ended which is unacceptable. The method “*walk around asking people what they thought*” did not interfere with their survey. Therefore this response earns one point.

Mathematics**Annotated Example of a 0-point response for question number 14:**

14 For a class project, you are asked to conduct a survey of students at your school. You decide to find out which of the following things students at your school are **most afraid** of:

- Public speaking
- High places
- Snakes

Describe how you would go about conducting your survey. Be sure to include the following things in your survey:

- A list of the question(s) you would need
- How you would go about selecting a random sample

I would select a random sample by asking someone I didn't know really well. If I had to ask questions to collect my data I would ask questions about what scares them and why does it scare them. I would also want to know the background of how they have this phobia.

Annotations:

The response has a question and method that are unacceptable since the method of "asking someone" is limited to surveying only one person. This response shows little understanding of the task and earns no points.

Mathematics

Scoring Guide for question number 15:

A **2-point** response makes clear connections between conceptual areas by doing the following:

- Indicates that the chance of winning a free ticket with the old dartboard was 4 times greater than winning a free ticket with the new dartboard (or equivalent, such as; the chance of winning with the new dartboard is 75% less than the old dartboard).
- Explains how the comparison was acquired.

For example:

The area of the picture on the old dartboard = $1/2 \times 8 \times 8 = 32$ square units, and the area of the picture on the new dartboard = $1/2 \times 4 \times 4 = 8$ square units. 32 square units is 4 times greater than 8 square units, therefore a person's chance of winning with the old dartboard was 4 times greater than with the new dartboard.

A **1-point** response makes a partially accurate connection by stating that there was a better chance with the old dartboard. The explanation is unclear, incorrect, or missing.

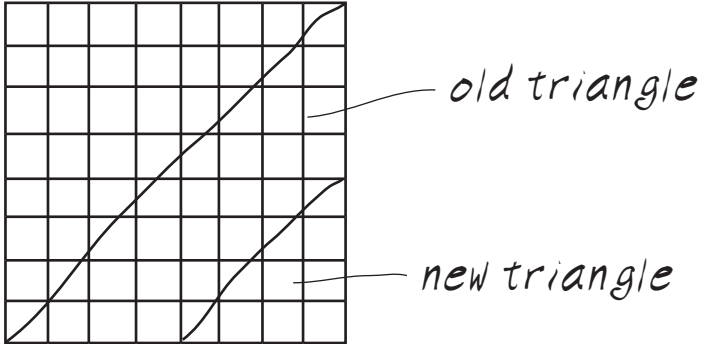
A **0-point** response shows no connection within or between conceptual areas.

Mathematics

Annotated Example of a 2-point response for question number 15:

- 15** Since the slide has been so popular, the owner of the carnival wants to decrease the chances of winning a free ticket for this ride. On the dartboard, the triangle shape has two sides that are each 8 units long. He wants to decrease the length of each of these sides to 4 units.

Compare the chances of winning a free ticket for the slide on the old dartboard versus the new dartboard. Use words, numbers, and/or pictures to explain your answer.



The total number of squares on the dart board is 576. The old triangle took up 32 squares equaling $\frac{32}{576} = \frac{1}{18}$. The new triangle is 8 squares equaling $\frac{8}{576} = \frac{1}{72}$. Now the chances of winning a free ticket on the slide have gone down.

Annotations:

The response makes an accurate connection between area and chances by stating “the chances of winning a free ticket on the slide have gone down” and indicates that the chance for the old board is 4 times greater, “old triangle took up to 32 squares...= $1/18$...new triangle is 8 squares... = $1/72$ ”. This response is complete and correct, earning two points.

Mathematics

Annotated Example of a 1-point response for question number 15:

- 15** Since the slide has been so popular, the owner of the carnival wants to decrease the chances of winning a free ticket for this ride. On the dartboard, the triangle shape has two sides that are each 8 units long. He wants to decrease the length of each of these sides to 4 units.

Compare the chances of winning a free ticket for the slide on the old dartboard versus the new dartboard. Use words, numbers, and/or pictures to explain your answer.

<i>Small one is 8 units²</i>	
<i>Big one is 32 units²</i>	
<i>Smaller one has a 1% chance</i>	
<i>Big one has a 6% chance</i>	
$\begin{array}{r} \approx .013 \\ 576 \overline{)8} \end{array}$	$\begin{array}{r} \approx .055 \\ 576 \overline{)32} \end{array}$

Annotations:

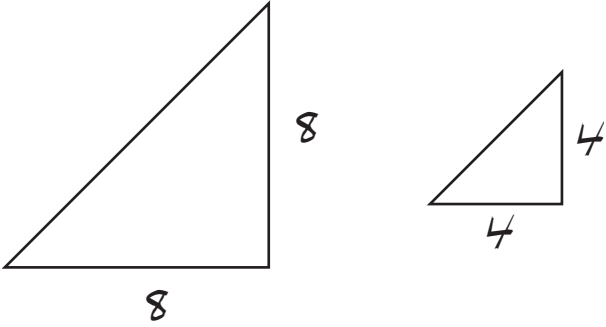
The response indicates that the chance of the old board is 4 times greater, “8...32”, but does not state that there is a better chance of winning a free ticket with the old dartboard. Since no comparison is given, the response earns one point.

Mathematics

Annotated Example of a 0-point response for question number 15:

- 15** Since the slide has been so popular, the owner of the carnival wants to decrease the chances of winning a free ticket for this ride. On the dartboard, the triangle shape has two sides that are each 8 units long. He wants to decrease the length of each of these sides to 4 units.

Compare the chances of winning a free ticket for the slide on the old dartboard versus the new dartboard. Use words, numbers, and/or pictures to explain your answer.


<p><i>The chances of winning in the smaller triangle are cut in half because it is half as big.</i></p>

Annotation:

The response incorrectly compares the chances of winning on the old versus the new dartboard “*the chances...are cut in half because it is half as big*” (a common incorrect answer). One point is deducted for an incorrect number comparison. The response shows no understanding of connections between conceptual areas, earning no points.

Mathematics

Scoring Guide for question number 16:

A **4-point** response uses all the information in the chart to create an appropriate and accurate graph (line, bar graph or scatter plot) that includes the following graphing elements:

- Appropriate scales (Mean intervals should be less than or equal to 0.5, and the scales chosen allow the viewer to see a downward trend in the data. The x and y axes must indicate ascending values left to right and bottom to top.)
- Consistent vertical scale (Intervals are consistent in number and spacing.) A line graph also requires a consistent horizontal scale. NOTE: Beginning scale of the mean axis can range from 0 to 1.2 inclusive and scale drawn is accurate based on the selected starting point.
- An appropriate title (e.g., “Mean Number of People in Each Moving Passenger Car for a 25-year Period.”)
- Appropriate labels on both the horizontal and vertical axes, e.g., “Number of People” on the vertical axis; “Year” on the horizontal axis. (NOTE: The axes may be switched.)
- All six means are correctly graphed.

NOTE: Allow for responses that show points plotted correctly without lines connecting them or bars shown. However, a graph that shows only tops of bars loses 1 point, and line graphs that extrapolate from (1970,3.5) to (0,0) lose 1 point. Incorrectly placing a zero on the time line does not cause the loss of a point if it does not affect the correct trend between given data points.

A **3-point** response uses information in the chart to create an appropriate and accurate graph with at least five means graphed correctly that includes 2 out of the 3 following graphing elements:

- appropriate scale(s)
- consistent scale(s)
- three appropriately labeled elements (title, vertical axis, horizontal axis)

A **2-point** response uses information in the chart to create a graph with at least three means graphed correctly and 2 of the following 3 graphing elements:

- appropriate scale(s)
- consistent scale(s)
- two out of three labeling elements (title, vertical axis, horizontal axis)

A **1-point** response shows some understanding of graphing, e.g., shows a correctly plotted mean. The graph may be disorganized, difficult to understand, or does not resemble a traditional, standard type of graph.

A **0-point** response shows no understanding of an appropriate graph. (A pie chart would be scored a 0.)

Mathematics

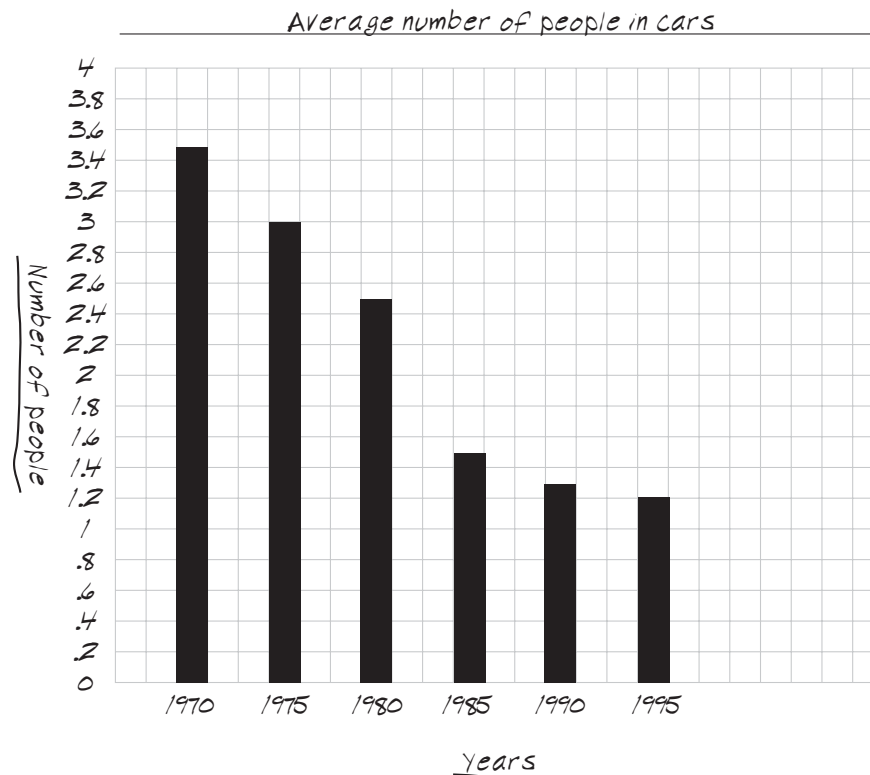
Annotated Example of a 4-point response for question number 16:

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.

Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Annotations:

This response uses all the information in the chart to create an appropriate and accurate bar graph by including a consistent vertical scale (c) every .2, and appropriate scale (A) starting at zero, an appropriate title with appropriately labeled horizontal and vertical axes (L3), and all six means correctly graphed (M6). This response is complete and correct, earning four points.

Mathematics

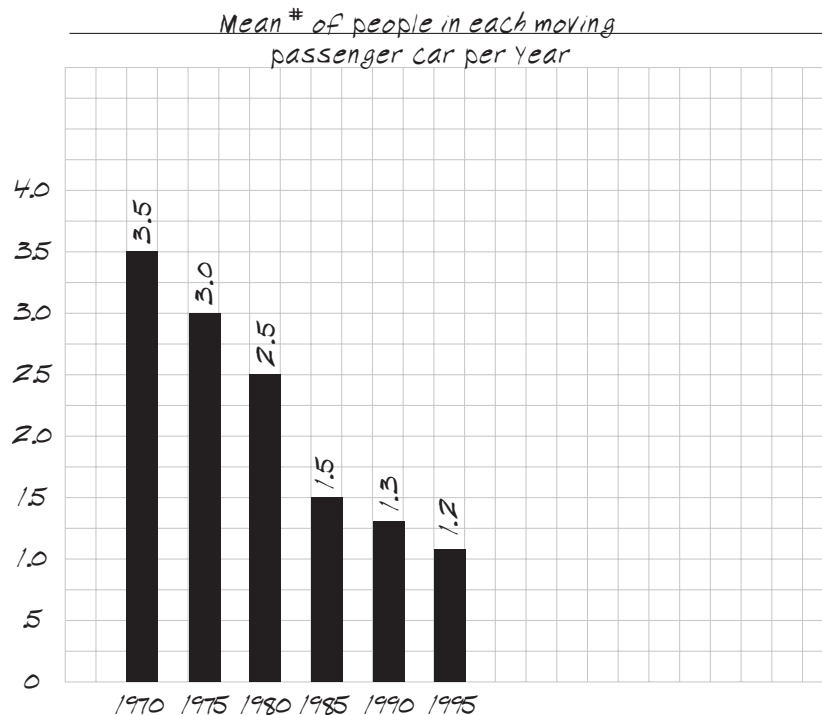
Annotated Example of a 3-point response for question number 16:

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.

Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Annotations:

The response uses all the information in the chart to create a bar graph by including a consistent vertical scale (c) every .25, and appropriate scale (A) starting at zero, and an appropriate title with no labels on the axes (L1). Five of the six means are graphed correctly (M5). Due to this response having a misplotted mean and two missing labels it earns three points.

Mathematics

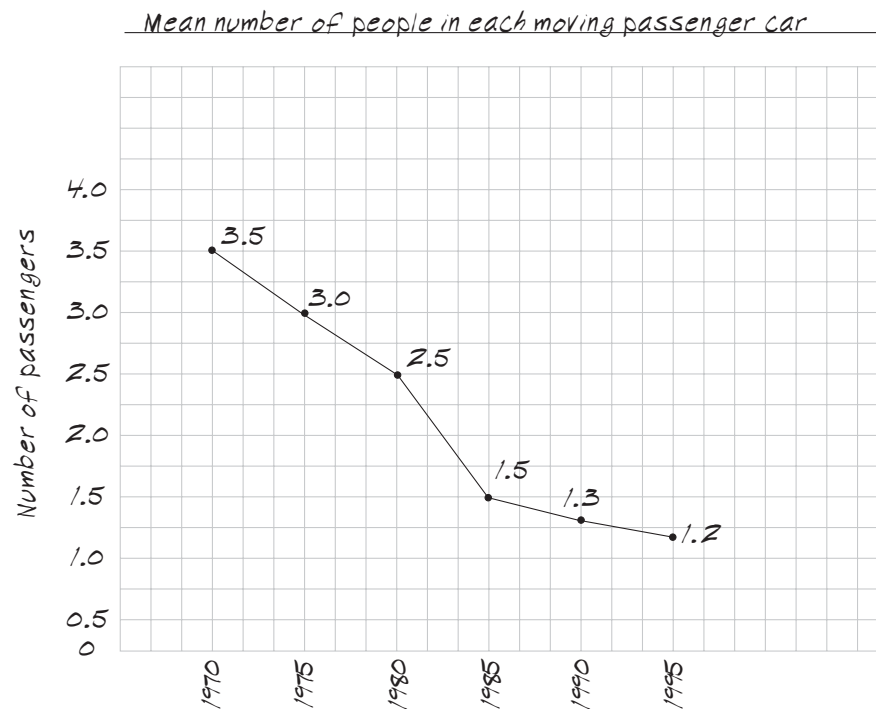
Annotated Example of a 2-point response for question number 16:

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.

Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Annotations:

The response uses all the information in the chart to create a broken line graph by including an appropriate scale (A) starting at zero, an appropriate title with only the vertical axis labeled (L2), and five of the six means plotted correctly (M5). 1990 is at 1.25, not 1.3. The interval choice of .25 is appropriate but inconsistent between zero and .5. Due to this response having an inconsistent scale and misplotted mean the response earns two points.

Mathematics

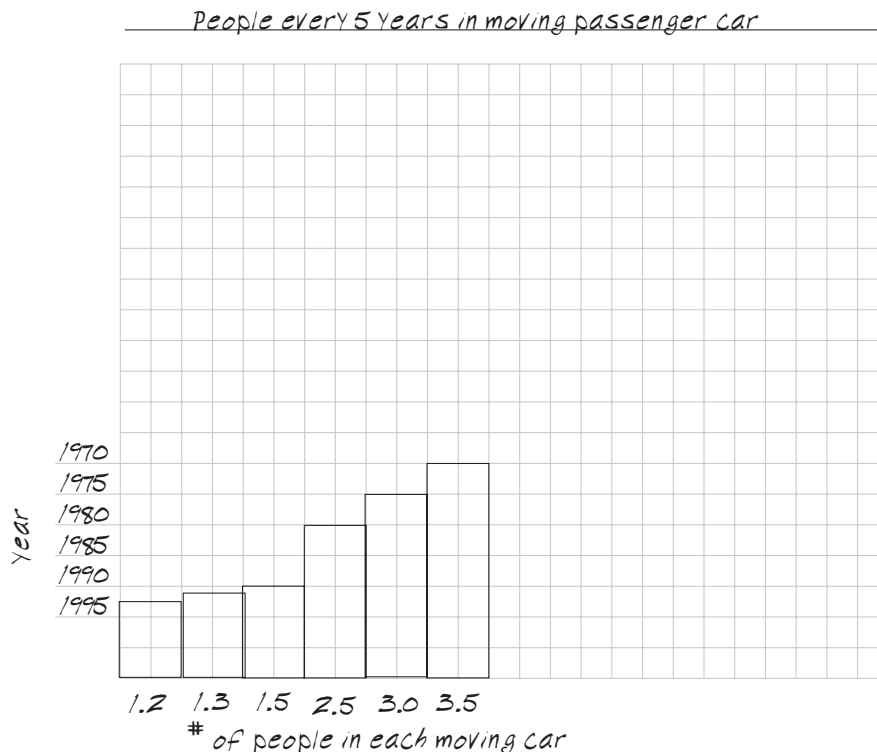
Annotated Example of a 1-point response for question number 16:

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.

Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Annotations:

- 40** The response has a bar graph with an appropriate title and labeled axes (L3). Data values, not equal intervals, are used for the horizontal scale. The bars represent an incorrect upward trend because the bars are drawn from the wrong axis. This six means appear to be connected to their appropriate years as slanted lines point to appropriate grid lines. The response shows some understanding of graphing and earns one point.

Mathematics

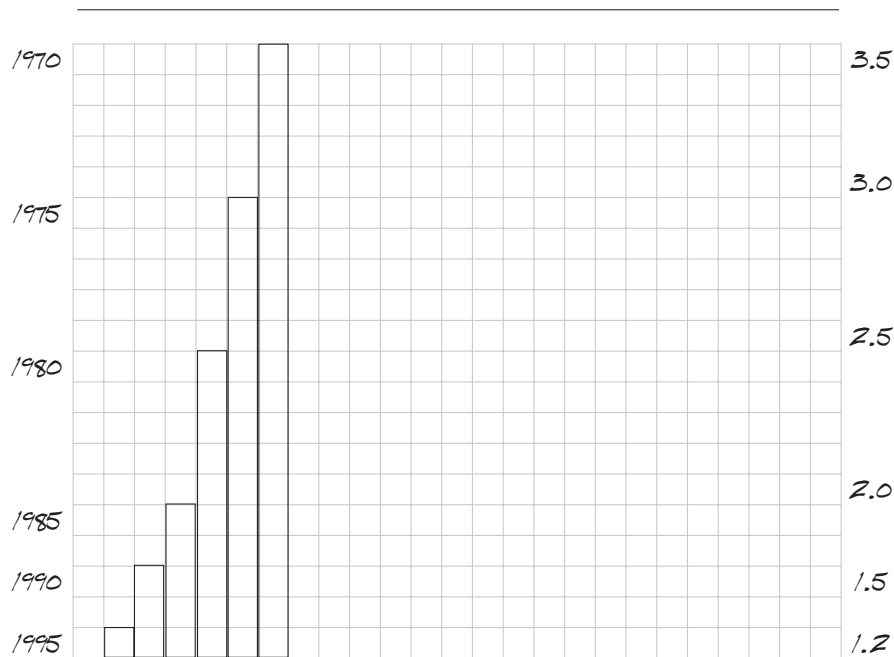
Annotated Example of a 0-point response for question number 16:

- 16** The data in the table below show the average (mean) number of people riding in passenger cars, including the driver, for different years.

Year	Mean Number of People in Each Moving Passenger Car
1970	3.5
1975	3.0
1980	2.5
1985	1.5
1990	1.3
1995	1.2

Nicholas wants to present this information to the class in the form of a graph. Graph the data from the table on the grid below.

- Give it an informative title.
- Label the scales and axes.



Annotations:

This response has data exhibited in such a way that a scorer cannot verify any correct means for the graph. The years are on the wrong axis. There are no labels or title. The scale is inconsistent and shows an incorrect upward trend. The response shows no understanding of an appropriate graph, earning no points.

