

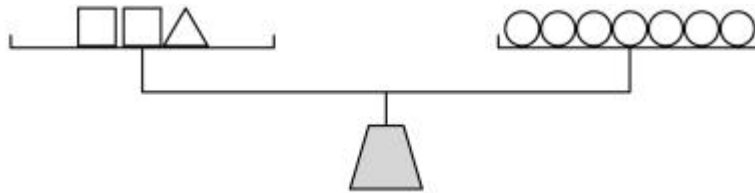
Sample Questions and Answers from NAEP

1. **Grade: 4** **Year: 2003** **Difficulty Level: Hard** **Item Number: 13 (M6)**

Question Categorization:

NAEP : Algebra and Functions and Conceptual Understanding

GPS: M3A1c. Use a symbol, such as \square and \triangle , to represent an unknown and find the value of the unknown in a number sentence.

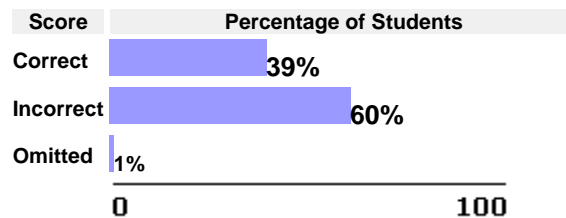


The objects on the scale above make it balance exactly. According to this scale, if \triangle balances $\bigcirc\bigcirc\bigcirc$, then \square balances which of the following?

- A) \bigcirc
- B) $\bigcirc\bigcirc$
- C) $\bigcirc\bigcirc\bigcirc$
- D) $\bigcirc\bigcirc\bigcirc\bigcirc$

Answer: B

2003 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	Omitted/Missing
Students	3	39	15	42	1

2. **Grade: 4** **Year: 2003** **Difficulty Level: Hard** **Item Number: 20 (M7)**

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: M4A1a. Understand and apply patterns and rules to describe relationships and solve problems.

The table below shows how the chirping of a cricket is related to the temperature outside. For example, a cricket chirps 144 times each minute when the temperature is 76°.

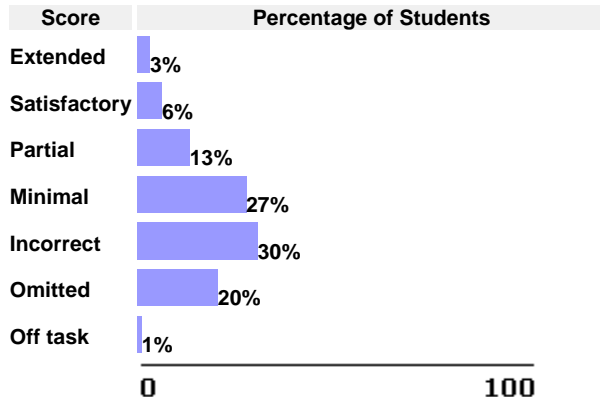
Number Of Chirps Per Minute	Temperature
144	76°
152	78°
160	80°
168	82°
176	84°

What would be the number of chirps per minute when the temperature outside is 90° if this pattern stays the same?

Answer: _____
Explain how you figured out your answer.

Answer: 200 For every 2° that the temperature increases, the number of chirps increases by 8.

2003 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Score & Extended Description

Extended

Answers 200 with explanation that indicates number of chirps increases by 8 for every temperature increase of 2°.

Satisfactory

Gives explanation that describes ratio, but does not carry process far enough (e.g., gives correct answer for 86° (184) or 88° (192) or carries process too far (answers 208)).

OR

Answers 200 and shows 184 86°, 192 88°, 200 90° but gives no explanation.

OR

Answers 200 with explanation that is not stated well but conveys the correct ratio.

OR

Gives clear description of ratio and clearly has minor computational error (e.g., adds incorrectly).

Partial

Answers between 176 and 208, inclusive, with explanation that says chirps increase as temperature increases.

OR

Answers between 176 and 208, inclusive, with explanation that they counted by 8 (or by 2).

OR

Uses a correct pattern or process (includes adding a number 3 times or showing 184 and 86 in chart) or demonstrates correct ratio.

OR

Has half the chart with 200 on the answer line.

OR

"I added 24" (with 200 on answer line).

Minimal

Answers between 176 and 208, inclusive, with no explanation or irrelevant or incomplete explanation.

OR

Has explanation that number of chirps increases as temperature increases but number is not in range.

OR

Has number out of range but indicates part of the process (e.g., I counted by 8's)

OR

Explanation—as temperature increases the chirps increase but number is out of range.

Incorrect

Incorrect response.

This question required students first to recognize a pattern and then extend the pattern for three more values. In addition, students were asked to explain how they arrived at the answer. The pattern was linear in two variables—number of chirps and temperature. Both algebraic and numerical reasoning were used to obtain the answer to this question. Students were permitted to use a calculator.

Student Responses:

Extended:

Answer: 200 chirps

Explain how you figured out your answer.

Well each 2° it goes 8 more chirps
86° it would be 184 chirps 88° it would
be 192 chirps 90° it would be 200 chirps.

Satisfactory:

Answer: 200

Explain how you figured out your answer.

If you need more room for your work, use the space below.

I got my answer by continue-
ing the graph until I got
to 90°F Then I did the same
on the other side

80
88
90

180
192
200

Partial:

Answer: 194

Explain how you figured out your answer.

I went up 8 chirps each 2°

Minimal:

Answer: 180

Explain how you figured out your answer.

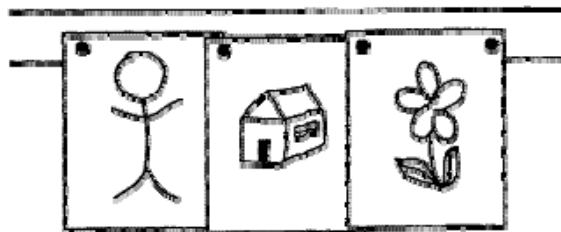
you just figure the
numbers out it will work
you just add them together

3. Grade: 4/8 Year: 1992 Difficulty Level: Hard Item Number: 8 (M7)/20(M7)

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

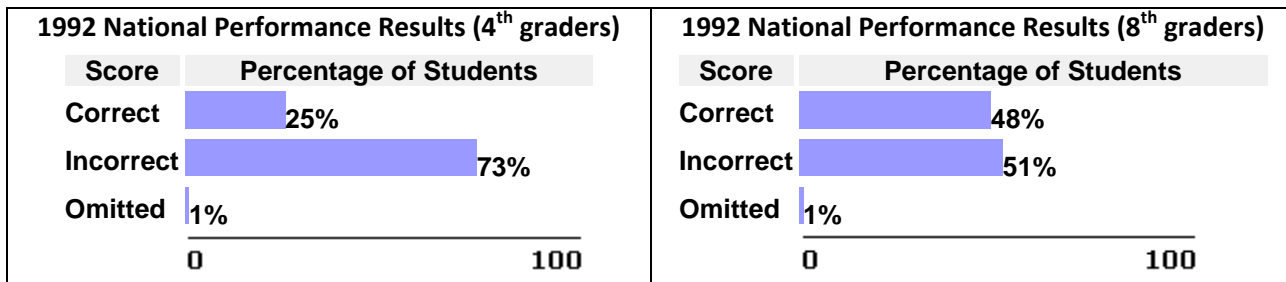
GPS: M4A1a. Understand and apply patterns and rules to describe relationships and solve problems.



Children's pictures are to be hung in a line as shown in the figure above. Pictures that are hung next to each other share a tack. How many tacks are needed to hang 28 pictures in this way?

- A) 27
- B) 28
- C) 29
- D) 56

Answer: C



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	Omitted/Missing
Students	28	27	25	19	1

4. **Grade: 8** **Year: 2003** **Difficulty Level: Hard** **Item Number: 19 (M7)**

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: M8A5b. Solve systems of equations graphically and algebraically, using technology as appropriate.

While she was on vacation, Tara sent 14 friends either a letter or a postcard. She spent \$3.84 on postage. If it costs \$0.20 to mail a postcard and \$0.33 to mail a letter, how many letters did Tara send?

Show what you did to get your answer.

Answer: 8 letters

Students may use a variety of strategies to solve this, including guess and check, formal algebra, or others. For example,

# postcards	# letters	total cost
1	13	4.49
2	12	4.36
3	11	4.23
4	10	4.10
5	9	3.97
6	8	3.84
7	7	3.71
8	6	3.58

OR

$$x + y = 14$$

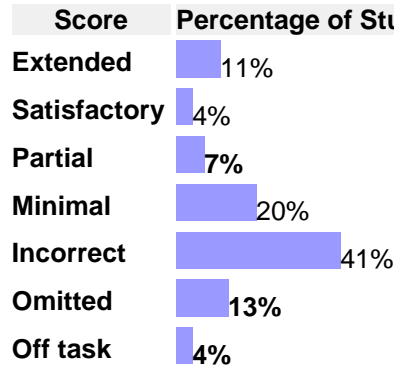
$$.20x + .33y = 3.84$$

therefore,

$$.20x + .33(14 - x) = 3.84$$

$$\text{so } x = 6 \text{ and } y = 8$$

2003 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Score & Description
<p>Extended Correct response</p>
<p>Satisfactory Correct, complete process is indicated, but answer is not 8 and only has a minor computational error OR Shows correct, complete process but does not indicate answer</p>
<p>Partial Correct, complete process is indicated, but answer is not 8 and there are several computational errors (Process must clearly illustrate a correct strategy, such as a table or equations.) OR Correct response of 8 but shows no work or incomplete work</p>
<p>Minimal Process is incorrect because it ignores one or more pieces of given information OR Process is correct but incomplete (process may be guess and check or another process which may lead to correct answer i.e., chart but no equation, but goal is not clearly defined) and answer is not 8</p>
<p>Incorrect Incorrect response</p>

This question was a word problem that asked the student to consider two values—the number of letters and the number of postcards—even though the student was only asked for the number of letters. This question could be solved in several ways. A student could reason numerically to find the number of letters and the number of postcards, possibly by using a guess-and-check strategy or by creating a table. Another possibility was to set up and solve a system of two linear equations in two unknowns. To earn full credit, students needed to show how they obtained the answer. Students were permitted to use a calculator.

Student Responses:

<p>Extended:</p> $\begin{array}{r} .33 \\ \times 4 \\ \hline 1.32 \\ + 1.00 \\ \hline 2.32 \\ + .33 \\ \hline 2.95 \\ + .33 \\ \hline 3.28 \\ + .33 \\ \hline 3.61 \\ + .21 \\ \hline 3.84 \end{array}$ $\begin{array}{r} .33 \\ \times 9 \\ \hline 2.97 \\ + 1.00 \\ \hline 3.97 \\ + .40 \\ \hline 4.37 \\ + .40 \\ \hline 4.77 \\ + .40 \\ \hline 5.17 \\ + .40 \\ \hline 5.57 \\ + .40 \\ \hline 5.97 \end{array}$ $\begin{array}{r} .33 \\ \times 6 \\ \hline 1.98 \\ + 1.00 \\ \hline 2.98 \\ + .40 \\ \hline 3.38 \\ + .40 \\ \hline 3.78 \\ + .40 \\ \hline 4.18 \end{array}$ $\begin{array}{r} .33 \\ \times 7 \\ \hline 2.31 \\ + 1.00 \\ \hline 3.31 \\ + .40 \\ \hline 3.71 \\ + .40 \\ \hline 4.11 \\ + .40 \\ \hline 4.51 \end{array}$ $\begin{array}{r} .33 \\ \times 8 \\ \hline 2.64 \\ + 1.00 \\ \hline 3.64 \\ + .20 \\ \hline 3.84 \end{array}$ <p>6 postcards</p> <p>8 letters</p>	<p>Satisfactory:</p> $\begin{cases} 0.20x + 0.33y = 3.84 \\ x + y = 14 \end{cases}$ $y = 14 - x$ $0.20x + 0.33(14 - x) = 3.84$ $0.20x + 4.62 - 0.33x = 3.84$ $0.20x - 0.33x = -0.78$ $\frac{-0.13x = -0.78}{-0.13 \quad -0.13}$ $x = 6$ $y = 14 - 6$ $y = 8$
<p>Partial:</p> <p>She sent 8 letters. Add the money together</p>	<p>Incorrect</p> $\frac{3.44}{20 + 38} = 7.245283$ <p>8</p> <p>≈ 7 letters</p>
<p>Minimal :</p> $\begin{array}{r} .33 \\ \times 11 \text{ letters} \\ \hline 3.63 \end{array}$ $\begin{array}{r} 3.84 \\ - 3.63 \\ \hline .21 \\ - .20 \text{ postcard} \\ \hline .01 \end{array}$ <p>11 letters and 1 postcard</p>	

Question Categorization:

NAEP : Algebra and Functions and Conceptual Understanding

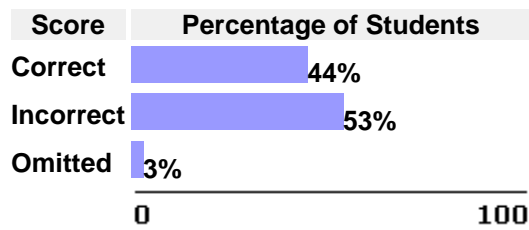
GPS: M8A4. Students will graph and analyze graphs of linear equations and inequalities.

In a coordinate plane, the points (2,4) and (3,-1) are on a line. Which of the following must be true?

- A) The line crosses the x-axis.
- B) The line passes through (0,0).
- C) The line stays above the x-axis at all times.
- D) The line rises from the lower left to the upper right.
- E) The line is parallel to the y-axis.

Answer: A

2003 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	44	13	13	15	12	3

6. **Grade: 8** **Year: 1992** **Difficulty Level: Hard** **Item Number: 9**

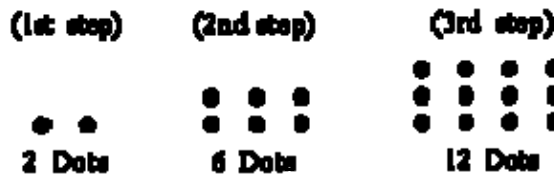
Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: M6A2a. Analyze and describe patterns arising from mathematical rules, tables, and graphs.

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all your work.

A pattern of dots is shown below. At each step, more dots are added to the pattern. The number of dots added at each step is more than the number added in the previous step. The pattern continues infinitely.

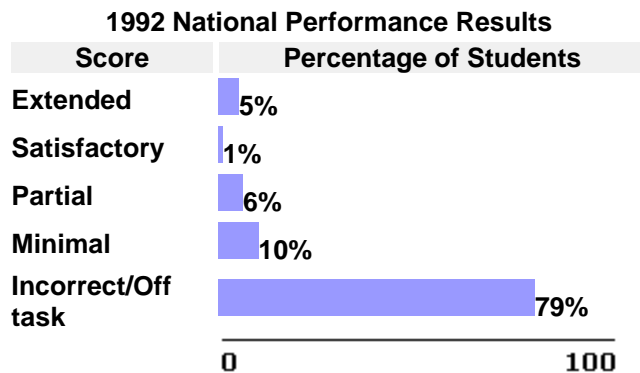


Marcy has to determine the number of dots in the 20th step, but she does not want to draw all 20 pictures and then count the dots. Explain or show how she could do this and give the answer that Marcy should get for the number of dots.

Answer: Explanation should include one of the following ideas with no false statements.

a. For each successive step, the number of rows and the number of columns is increasing by 1, forming a pattern. For example, the first step forms 1 by 2 rows and columns, the next step 2 by 3, the third step 3 x 4, and so on. Continuing this pattern would mean that the 20th step has 20 x 21 or 420 dots.

b. Look at successive differences between consecutive steps. The differences 4, 6, 8, 10, . . . form a pattern. There are 19 differences forming the pattern 4, 6, 8, 10, . . . , 38, 40 and this sum is $(9 \times 44) + 22$ or 418. However, 2 must be added for the 1st step, yielding a response of 420.



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Score & Description
<p>Extended</p> <p>Correct answer. (Must state 420; must tie step 20 back to beginning of pattern in some specific form of generalization.)</p>
<p>Satisfactory</p> <p>Correct explanation of pattern but does not include or omits the correct number of dots (420).</p>
<p>Partial</p> <p>A partial (incomplete) correct explanation, i.e., does not tie together well.</p>
<p>Minimal</p> <p>An attempt to generalize OR to draw all 20 pictures in the pattern (with a clear understanding of the pattern).</p>
<p>Incorrect/Off Task</p> <p>The work is completely incorrect, irrelevant, or off task.</p>

Student Responses:

Extended:

(1st step) (2nd step) (3rd step)

•• ••• ••••

2 Dots 6 Dots 12 Dots

Marcy has to determine the number of dots in the 20th step, but she does not want to draw all 20 pictures and then count the dots.

Explain or show how she could do this and give the answer that Marcy should get for the number of dots.

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$

$\frac{20}{x}$

$\frac{20}{20 \cdot 21}$

$\frac{20}{420}$ step #20

Step #20 has 420 dots.

Another Student's Response:

You can see that every step adds one zero and up
 2 on the 20th step it would have

$$\begin{array}{r} 20 \\ \times 21 \\ \hline 420 \end{array}$$

Satisfactory:

Each time the number of rows is 1 more and the number of columns is 1 more. So 4th step is 4 rows and 5 columns for 4×5 because you multiply rows times columns

Minimal:

she would have to times 20 by 19 because she wants the 20th step and there would be 19 lines.

Another Student's Response:

400 dots
if you 20 EACH STEP
WITH 20 YOU ADD 1 DOT
400 TO EACH SIDE. SO
AFTER 20 ADDIT.ONS
YOU HAVE A SQUARE
20 DOTS \times 20 DOTS.

Partial:

She could use a calculator and calculate 20 times (\times) 21 and get 420.

Incorrect:

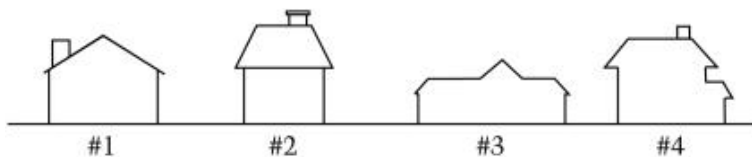
638
I added the multiples of 2 up to 40 on a calculator.

7. **Grade: 8 Year: 2003 Difficulty Level: Medium Item Number: 18 (M10)**

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: M4A1a. Understand and apply patterns and rules to describe relationships and solve problems.



Allen, Bridgitte, Chaz, and Diann each live in a different house on the same side of a street. The houses and their numbers are shown above.

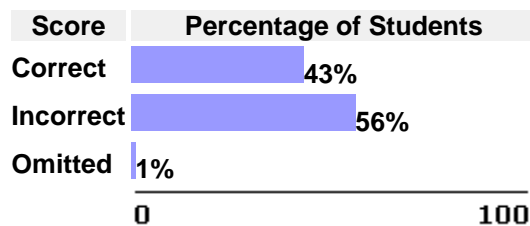
- Only one of the other three people lives next to Bridgitte.
- Chaz lives next to Bridgitte and next to Diann.

Which person could live in house number 2?

- A) Allen only
- B) Chaz only
- C) Diann only
- D) Chaz or Diann
- E) Any of these four people could live in house number 2.

Answer: D

2003 National Performance Results



Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	9	21	10	43	16	1

8. **Grade: 8** **Year: 1996** **Difficulty Level: Medium** **Item Number: 17 (M7)**

Question Categorization:

NAEP : Algebra and Functions and Procedural Knowledge

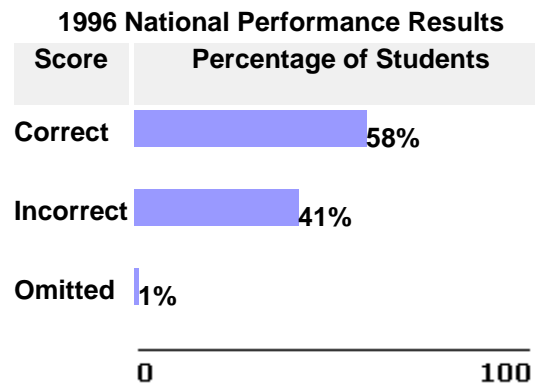
GPS: M7A1a. Translate verbal phrases to algebraic expressions.

M7D1c. Analyze data using measures of central tendency...

Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?

- A) $x + y + z$
- B) xyz
- C) $3(x + y + z)$
- D) $3(xyz)$
- E) $(x + y + z)/3$

Answer: E



Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	23	4	10	3	58	1

9. **Grade: 8** **Year: 1990** **Difficulty Level: Medium** **Item Number: 8 (M9)**

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: M4A1a. Understand and apply patterns and rules to describe relationships and solve problems.

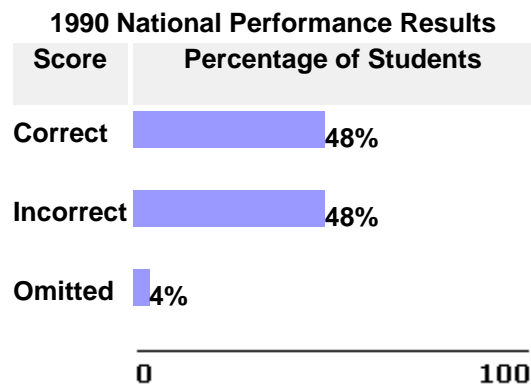
M4G3a. Understand and apply ordered pairs in the first quadrant of the coordinate system.

(2, 5), (4, 9), (6, 13)

Which of the following describes what to do to the first number in each ordered pair shown above to obtain the corresponding second number?

- A) Add 3
- B) Subtract 3
- C) Multiply by 2
- D) Multiply by 2 and subtract 1
- E) Multiply by 2 and add 1

Answer: E



Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	11	3	17	17	48	4

10. **Grade: 12*** **Year: 1996** **Difficulty Level: Hard** **Item Number: 9 (M13)**

*The 12th grade test is cumulative.

Question Categorization:

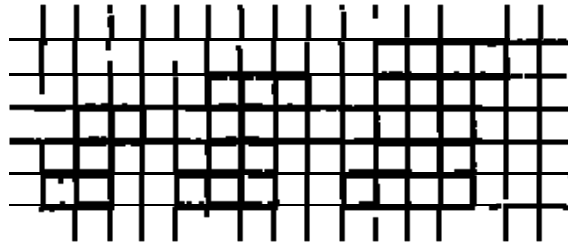
NAEP : Algebra and Functions and Problem Solving

GPS: M8A1. Students will use algebra to represent, analyze, and solve problems.

M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all your work.

The first 3 figures in a pattern of tiles are shown below. The pattern of tiles contains 50 figures.



Describe the 20th figure in this pattern, including the total number of tiles it contains and how they are arranged. Then explain the reasoning that you used to determine this information. Write a description that could be used to define any figure in the pattern.

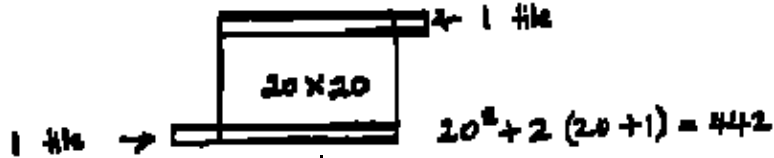
Answer:

The explanation should indicate there are 442 tiles in the 20th figure.

Descriptions will vary

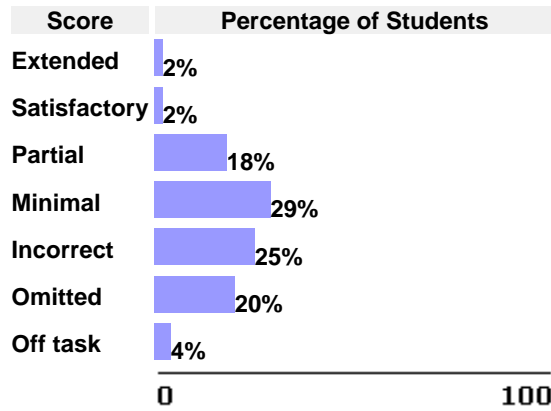
A correct one should suggest a row of 21 tiles across the top, a row of 21 across the bottom, and a 20 x 20 square between these rows. The top row extends one tile to the right of the square and the bottom row one tile to the left.

A diagram such as this might illustrate the student's counting methods



Counting methods are supported by generalizations (verbal or symbolic) that are based on the students' observations about the pattern.

1996 National Performance Results



Scoring Guide:

In this question, a student had to use reasoning skills as well as problem solving skills to describe the number of tiles that would be in the 20th figure. A student needed to recognize the pattern that was given and be able to generalize it in some correct way. In addition, the student had to write a description that could be used to describe any figure in the pattern. Different levels of partial credit (satisfactory, partial, and minimal) were earned by a student depending on his or her reasoning skills and the description of the 20th figure.

Score & Description
<p>Extended</p> <p>The 20th figure is described correctly, including the fact that there are 442 tiles with a clear, accurate explanation.</p>
<p>Satisfactory</p> <p>The 20th figure is described and the number of tiles is given. Some evidence of reasoning must be present. Reasoning is sound but there may be a computation error.</p>
<p>Partial</p> <p>Illustrates or describes at least one additional figure in the pattern correctly or states there are 442 tiles in the 20th figure</p>
<p>Minimal</p> <p>Attempts to draw or describe the given pattern or an additional figure in the pattern</p>
<p>Incorrect</p> <p>Incorrect response</p>

Student Responses:

Extended:

Each figure increases 1 layer in height and 1 middle layer in width for every successive relation to the first. For example, for the n th section, the figure will be $n+1$ units across the base, n units wide, $n+1$ units across the top, and $n+2$ units high. This is the pattern.

The 20th figure will be 21 units across on the bottom length, 20 units wide in the middle, 22 units high, and 21 units at the top. The increase is linear.

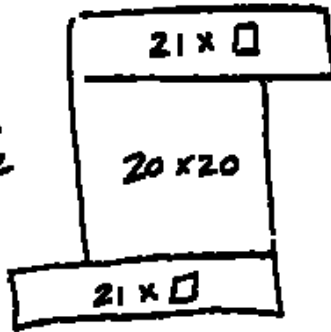
Total number of tiles it contains:

$$21 + (20 \times 20) + 21 = 442$$

The inner square is always $(n \times n)$ units

Satisfactory:

20th figure will have 442 tiles.
Starting with the first pattern there is 2 greater



Another Student's Response:

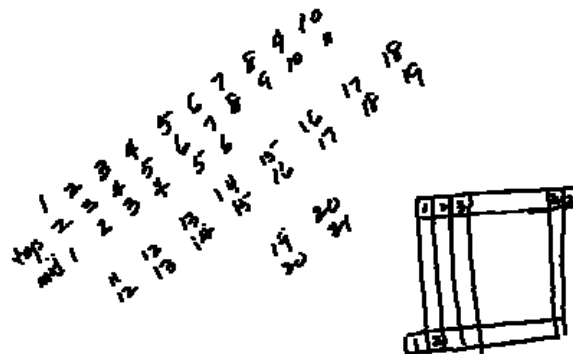
It will have 21 ~~rows~~ lines
20 the top and bottom... it
will contain 20 middle rows with
20 tiles each. It will have
442 total tiles.

Partial:

1 = 3 1 = 2
2 = 4 2 = 3 Find the
3 = 5 height and
 length.
20 = 20 20 = 21

It will be 22 tiles tall with
21 tiles on the top and bottom row
with 20 tiles in the middle 20 rows

Minimal:



Another Student's Response:

$$\begin{array}{r} 37 \\ 75 \\ \hline 85 \\ 12 \\ \hline 97 \end{array}$$
 5 tiles are added to the pattern
 each time so figure 20 will
 have 97 tiles.
 the figures are in \sqcap form
 with the vertical line widening
 by a row each time.

The middle rows have the number
 of tiles that that diagram is
 in the pattern. Top and bottom
 rows have one more tile each.
 Each diagram has six more
 tiles than the last.

11. **Grade: 12*** **Year: 1990** **Difficulty Level: Hard** **Item Number: 19**

*The 12th grade test is cumulative.

Question Categorization:

NAEP : Algebra and Functions and Problem Solving

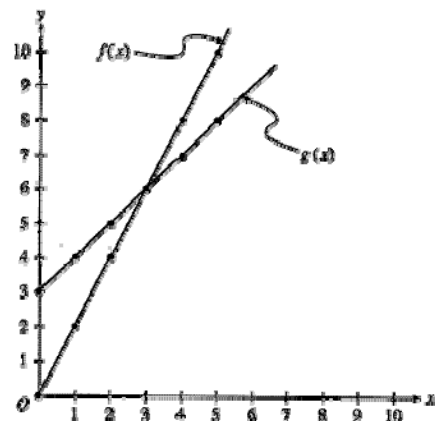
GPS: MM1A1a. Represent functions using function notation.

The following question refers to the graph shown below.

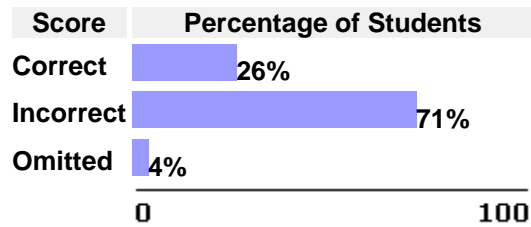
What is the value of $f(g(1))$?

- A) 2
- B) 4
- C) 5
- D) 6
- E) 8

Solution: E



1990 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	15	20	15	21	26	4

12. **Grade: 12*** **Year: 1990** **Difficulty Level: Easy** **Item Number: 7**

*The 12th grade test is cumulative.

Question Categorization:

NAEP : Algebra and Functions and Procedural Knowledge

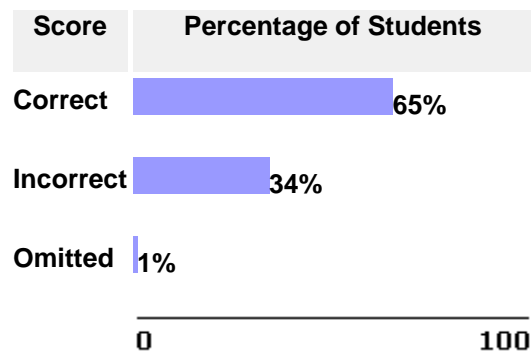
GPS: M8A2b. Use the properties of inequality to solve inequalities.

What is the least whole number x for which $2x > 11$?

- A) 5
- B) 6
- C) 9
- D) 22
- E) 23

Solution: B

1990 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
% Students	20	65	6	8	0	1

13. **Grade: 12*** **Year: 1990** **Difficulty Level: Medium** **Item Number: 12**

*The 12th grade test is cumulative.

Question Categorization:

NAEP : Algebra and Functions and Procedural Knowledge

GPS: M8A1c. Solve algebraic equations in one variable, including equations involving absolute values.

If $d = 110$ and $a = 20$ in the formula $d = \frac{1}{2}(2t - 1)$, then $t =$

A) $\frac{15}{22}$

B) $\frac{15}{8}$

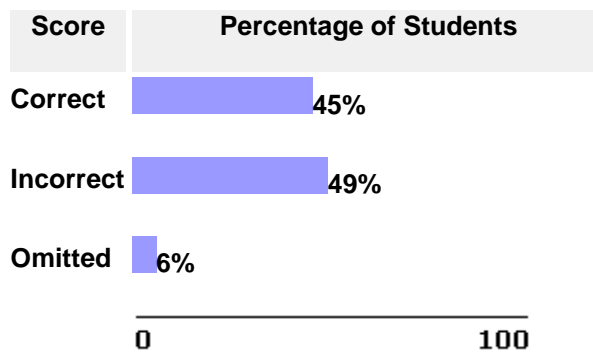
C) 5

D) $\frac{111}{20}$

E) 6

Solution: E

1990 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Answer choices made by all students:

	A	B	C	D	E	Omitted/Missing
Students	4	12	21	14	45	6

14. **Grade: 12*** **Year: 1992** **Difficulty Level: Hard** **Item Number: 11 (M15)**

*The 12th grade test is cumulative.

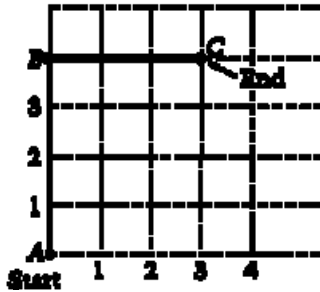
Question Categorization:

NAEP : Algebra and Functions and Problem Solving

GPS: MM1A1e. Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.

MM1G1a. Determine the distance between two points.

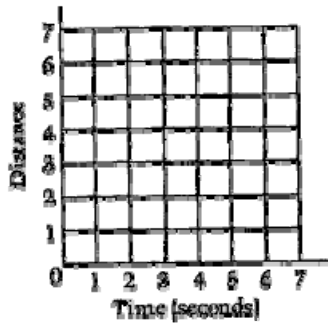
This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all your work.



The darkened segments in the figure above show the path of an object that starts at point A and moves to point C at a constant rate of 1 unit per second. The object's distance from point A (or from point C) is the shortest distance between the object and the point.

In the space below, complete the following steps.

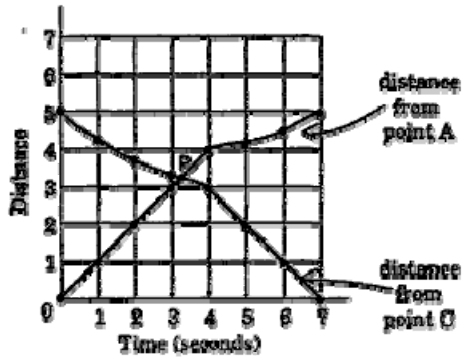
- Sketch the graph of the distance of the object from point A over the 7-second period.
- Then sketch the graph of the distance of the object from point C over the same period.



- On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.
- Between which two consecutive seconds is the object equidistant from points A and C?

Answers:

a) and b)



c)

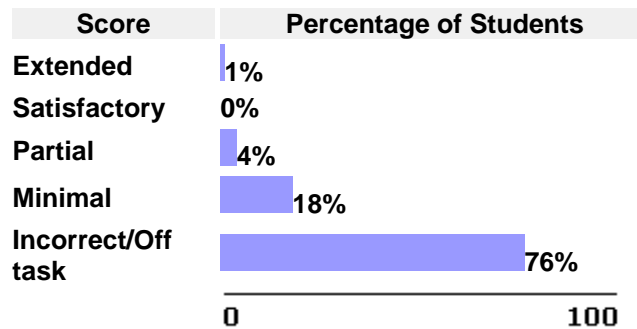
$$P = \left(3\frac{1}{2}, 3\frac{1}{2}\right)$$

Seconds	Distance from Point A	Distance from Point C
0	0	5
1	1	$\sqrt{18} = 4.2$
2	2	$\sqrt{13} = 3.6$
3	3	$\sqrt{10} = 3.2$
4	4	3
5	$\sqrt{17} = 4.1$	2
6	$\sqrt{20} = 4.5$	1
7	5	0

d)

Between 3 and 4 seconds.

1992 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

Score & Description

Extended

Complete, correct answer, (must show change in slope exactly at (4,4) and (4,3)).

Satisfactory

Both graphs are correct, (Change in slope need not occur exactly as (4,4) and (4,3)). P is located correctly or the time of equidistance is correct.

Partial

At least one graph is correct (must show change in slope, but curve is not required). P is not located or is located incorrectly and the time of equidistance is incorrect or missing
OR
One or both graphs incorrect, but P is located correctly for their graph.

Minimal

At least 2 points are plotted correctly on at least one graph that is not just a reiteration of the position graph; i.e., a plot of distance versus time.

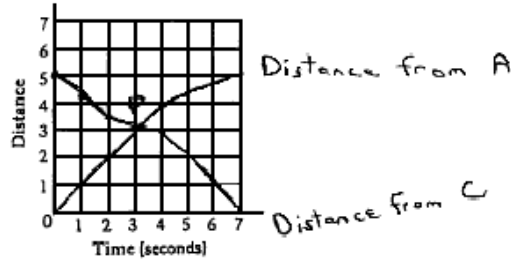
Incorrect/Off Task

The work is completely incorrect, irrelevant, or off task.

Student Responses:

Extended:

b) Then sketch the graph of the distance of the object from point C over the same period.



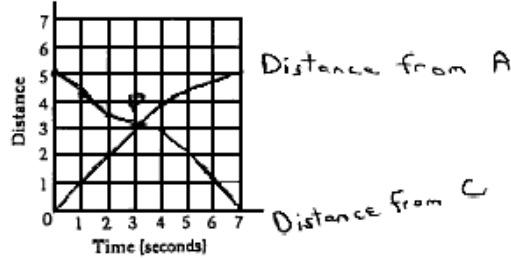
c) On your graph, label point *P* at the point where the distance of the object from point A is equal to the distance of the object from point C.

d) Between which two consecutive seconds is the object equidistant from points A and C?

3 and 4

Another Student Response:

b) Then sketch the graph of the distance of the object from point C over the same period.



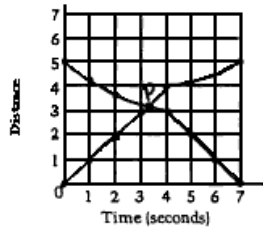
c) On your graph, label point *P* at the point where the distance of the object from point A is equal to the distance of the object from point C.

d) Between which two consecutive seconds is the object equidistant from points A and C?

3 and 4

Satisfactory:

b) Then sketch the graph of the distance of the object from point C over the same period.



c) On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.

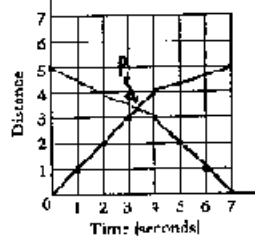
d) Between which two consecutive seconds is the object equidistant from points A and C?

?

Another Student's Response:

a) Sketch the graph of the distance of the object from point A over the 7-second period.

b) Then sketch the graph of the distance of the object from point C over the same period.



c) On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.

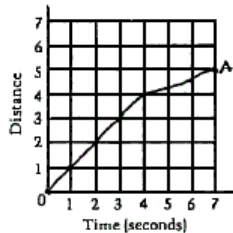
d) Between which two consecutive seconds is the object equidistant from points A and C?

3 + 4

Partial:

a) Sketch the graph of the distance of the object from point A over the 7-second period.

b) Then sketch the graph of the distance of the object from point C over the same period.

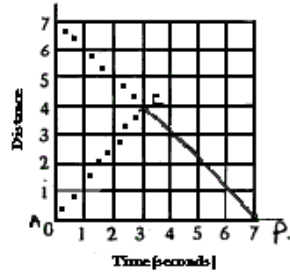


c) On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.

d) Between which two consecutive seconds is the object equidistant from points A and C?

Minimal:

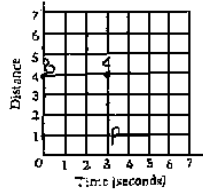
- a) Sketch the graph of the distance of the object from point A over the 7-second period.
- b) Then sketch the graph of the distance of the object from point C over the same period.



- c) On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.
- d) Between which two consecutive seconds is the object equidistant from points A and C? *point c + p*

Incorrect

- a) Sketch the graph of the distance of the object from point A over the 7-second period.
- b) Then sketch the graph of the distance of the object from point C over the same period.



- c) On your graph, label point P at the point where the distance of the object from point A is equal to the distance of the object from point C.
- d) Between which two consecutive seconds is the object equidistant from points A and C?

Point P because it is half way between point A and point C