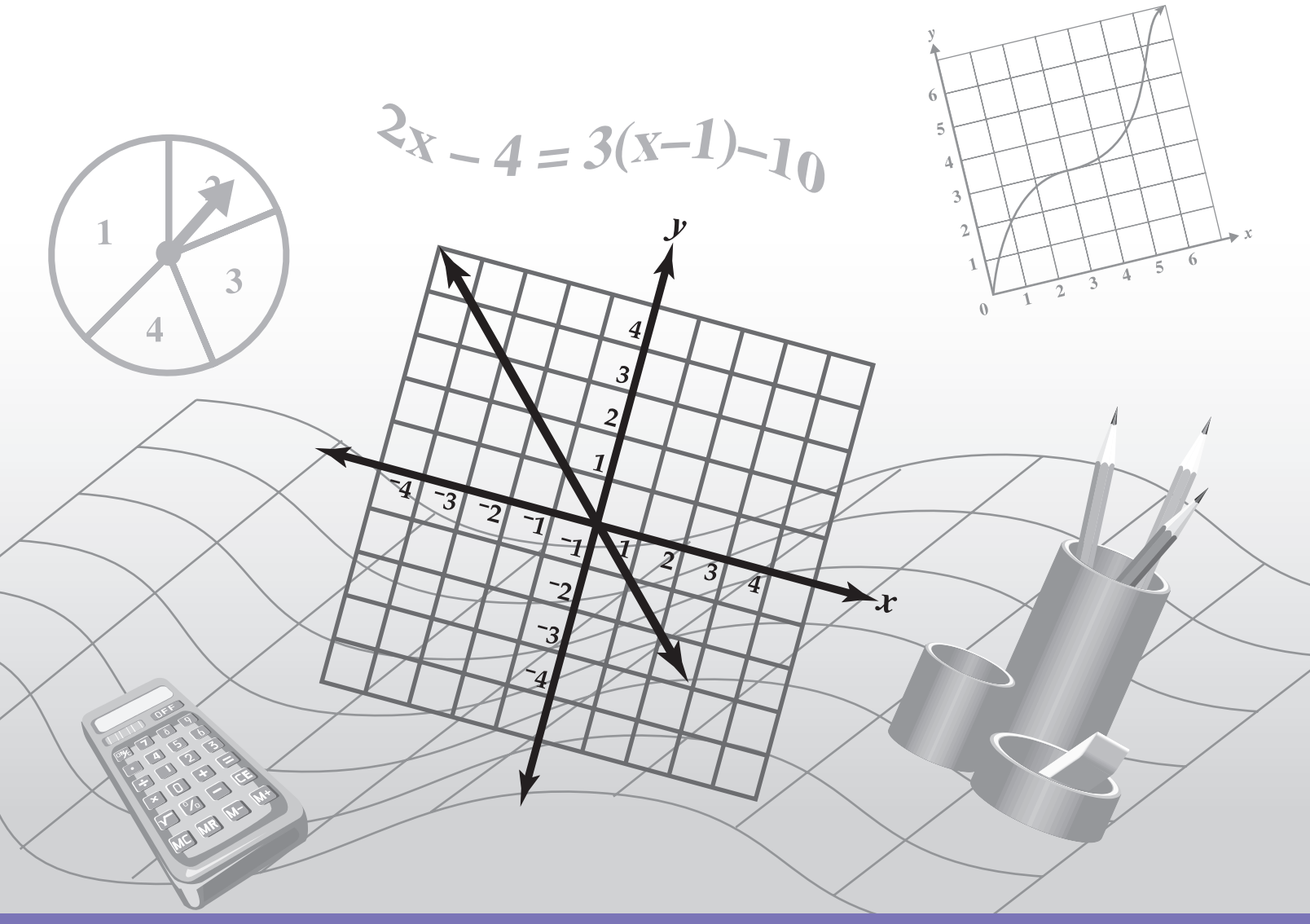
HSA

Maryland High School Assessment

Maryland State Department of Education

Achievement Matters Most



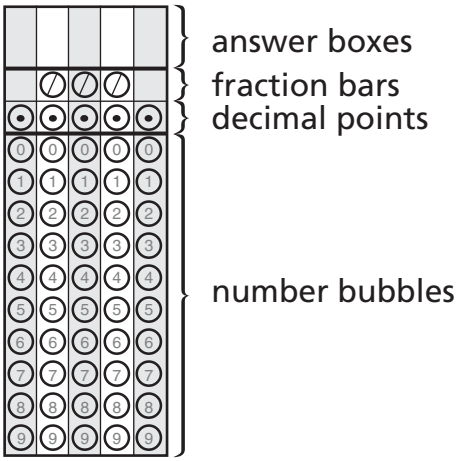
ALGEBRA/ DATA ANALYSIS

Public Release, Fall 2004

Session 1

Response Grid Questions

Several questions in this test require you to enter your answer on a special grid like the one shown below.



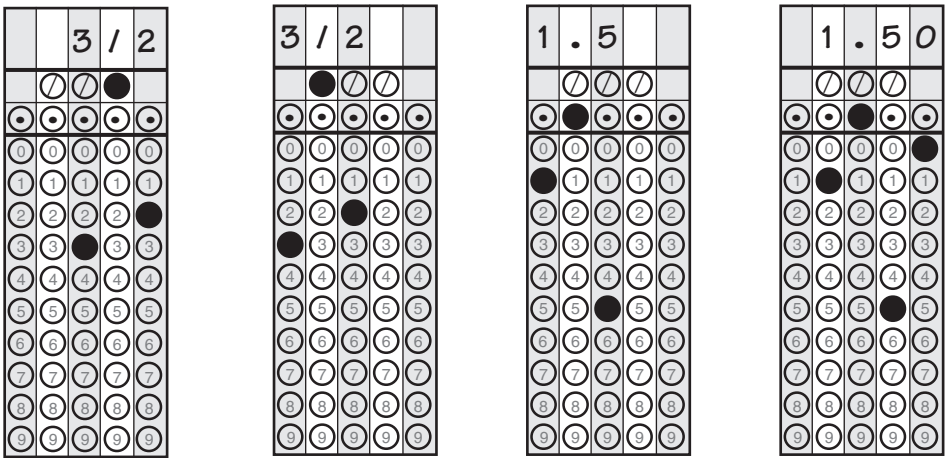
Directions for Completing the Response Grids

1. Find the answer to the problem.
2. Write your answer in the boxes at the top of the grid.
   - You may start your answer at either end of the answer box. Print your answer with the first digit (or symbol) in the left answer box, or with the last digit in the right answer box.
   - Print no more than one digit or symbol in each answer box. Do **not** leave a blank answer box in the middle of an answer.
   - Be sure to write a decimal point or fraction bar in the answer box if it is part of the answer.
3. Fill in the appropriate bubble under each box in which you wrote your answer.
   - Fill in only one bubble for each answer box used in your answer. Do **not** fill in a bubble under an unused answer box.
   - You must fill in the bubbles accurately to receive credit for your answer.

GO ON

Examples of Valid Responses

The Response Grids below show valid ways to enter an answer of $\frac{3}{2}$.



Special Directions for Mixed Numbers, Decimals, Negative Numbers, and Percents

- Mixed numbers must be entered as decimals or improper fractions. For example, an answer of $1\frac{1}{2}$ should be entered as 1.5 or $\frac{3}{2}$.
- Decimal answers should be entered as accurately as possible unless otherwise indicated in the problem. Some answers may need to be rounded in order to fit in the Response Grid space.
- No Response Grid questions have negative answers.
- Percents must be entered as decimals or fractions. For example, an answer of 50% should be entered as .5 or $\frac{1}{2}$.

Directions

Use the Response Grid in the Answer Book to complete Sample A.

Sample A

Diana earned the scores below on her science tests.

79, 98, 85, 91

What is the mean of these scores?

Sample B

Look at the pattern below.

0, 2, 4, 6, 8, . . .

If the pattern continues, what will be the next term?

A 2

B 8

C 10

D 14

Sample C

The sum of the angles of a triangle is 180 degrees. The measures of two angles of a triangle are x and $3x$. Which of these expressions represents the measure of the third angle?

F $180 + x + 3x$

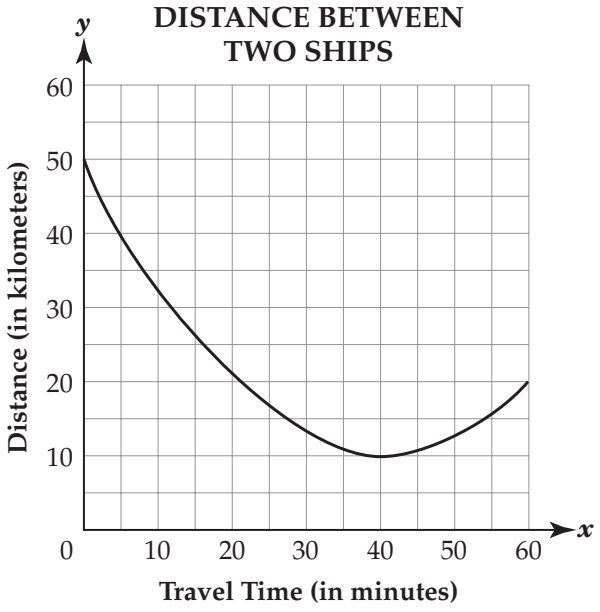
G $180 - x + 3x$

H $180 - x - 3x$

J $180 + x - 3x$

STOP

1 **Two ships travel in the Chesapeake Bay. The graph below shows the distance between the two ships during the time the ships travel.**



How many minutes have the ships traveled when the distance between them is the shortest?

A 10 minutes

B 20 minutes

C 40 minutes

D 60 minutes

2 **A park ranger spent $208 to buy 12 trees. Redwood trees cost $24 each and spruce trees cost $16 each. How many of each tree did the park ranger buy?**

F 10 redwoods and 2 spruce

G 9 redwoods and 3 spruce

H 3 redwoods and 9 spruce

J 2 redwoods and 10 spruce

3 **Paul earned scores of 76, 78, and 86 on his first three science tests. What score does he need on his fourth test to earn a mean score of 82?**

A 78

B 80

C 84

D 88

GO ON

4 **Two machines make three different products in three different sizes: small (S), medium (M), and large (L). The matrices below show the number of products each machine makes in one day.**

MACHINE 1

Product	S	M	L
1	4	8	0
2	6	16	10
3	3	20	6

MACHINE 2

Product	S	M	L
1	1	8	3
2	9	2	6
3	2	1	12

Which of these matrices represents the number of medium-sized products made by the two machines?

F

Product	M
1	16
2	18
3	21

H

Product	M
1	15
2	18
3	16

G

Product	M
1	64
2	32
3	20

J

Product	M
1	16
2	32
3	40

5 **BCR**

Matt caught 6 fish and recorded each of their weights as shown in the table below.

MATT'S FISH

Fish	Weight (in pounds)
1	2
2	3
3	2
4	4
5	32
6	5

Complete the following in the Answer Book:

- **Find the mean and the median of the data.**
- **Which measure of central tendency, mean or median, should Matt use to best represent the typical weight of the fish he caught? Use mathematics to justify your answer.**

GO ON

6 **A rectangular rug is $x+4$ feet wide and $2x+1$ feet long. Which expression represents the area of the rug?**

F $(x + 4) + (2x + 1)$

G $(x + 4) \times (2x + 1)$

H $2(x + 4) + 2(2x + 1)$

J $2(x + 4) \times (2x + 1)$

7 **The table below lists the names most frequently given to boys born in Hollister City during the year 2000.**

NAMES MOST FREQUENTLY GIVEN TO BOYS IN HOLLISTER CITY IN 2000

Rank	Name	Number
1	Michael	21
2	Jacob	19
3	Timothy	17
4	José	15
5	Calvin	13

Mary concludes that 20% of the boys born in Hollister City during 2000 were named Timothy. Why is Mary's conclusion incorrect?

A Mary did not consider the top five names for girls.

B Mary did not consider the entire population of the United States.

C Mary did not consider the names most frequently given to boys in other years.

D Mary did not consider that there were other names given to boys born in the year 2000.

8 **Bruce bought 4 candy bars and 3 decks of cards. The candy bars cost $1.35 each. Bruce spent no more than $12.00. Which of these inequalities best represents the cost (c) for one deck of cards?**

F $c \leq \$2.20$

G $c > \$2.20$

H $c \leq \$3.55$

J $c > \$3.55$

9 **Look at the pattern below.**

12, 36, 108, 324, . . .

If this pattern continues, what will be the next term?

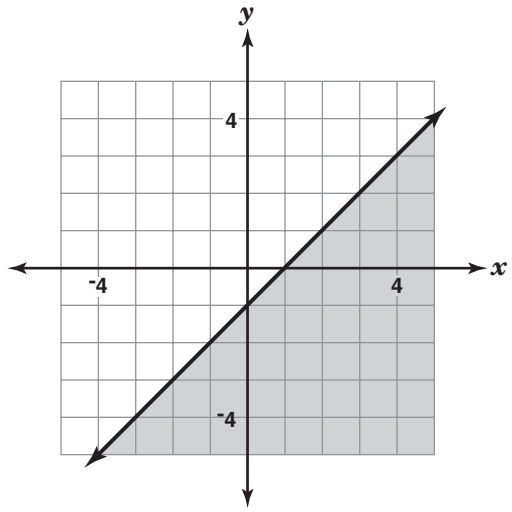
A 540

B 648

C 972

D 1,296

10 **Look at the graph below.**



Which of these inequalities best describes this graph?

F $y \geq x - 1$

G $y \leq x - 1$

H $y > x - 1$

J $y < x - 1$

GO ON

11 ECR **A city bus company requires exact change or a token to ride a bus. The company conducted a random survey of 100 passengers to determine how they paid their bus fare. The survey results are shown in the table below.**

BUS PAYMENT SURVEY

Number of People Who Use Exact Change	Number of People Who Use Tokens
63	37

Complete the following in the Answer Book.

- **Last week 2,000 passengers rode the bus. Based on this survey, how many of these passengers would be expected to use exact change to pay the bus fare? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.**
- **Mr. Blake, a bus driver for the city bus company, reported that 44 passengers who rode on his bus one morning paid using a token. Based on this survey, estimate how many passengers rode on his bus that morning. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.**
- **Should a different city use these survey results to predict the number of bus passengers that would be expected to use exact change to ride the bus in their city? Use mathematics to justify your answer.**

Directions

Use the Response Grids in the Answer Book to complete Numbers 12 through 15.

12 **The matrices below show what drinks high school and college students prefer during the winter and the summer.**

DRINK PREFERENCE

Winter

	High School	College
Milk	408	200
Soda	650	560
Coffee	200	700

Summer

	High School	College
Milk	405	200
Soda	808	708
Coffee	56	500

How many high school and college students prefer milk in winter and summer?

13 **A bag contains 5 red apples, 7 yellow apples, and 8 green apples. Brett picks an apple from the bag without looking. What is the probability that Brett will pick a green apple?**

14 **Martin and Anna buy books at a sale. Martin buys 3 hardcover books and 4 paperback books for $6.50. Anna buys 2 hardcover books and 6 paperback books for $6.00. What is the cost, in dollars, of <u>each</u> hardcover book?**

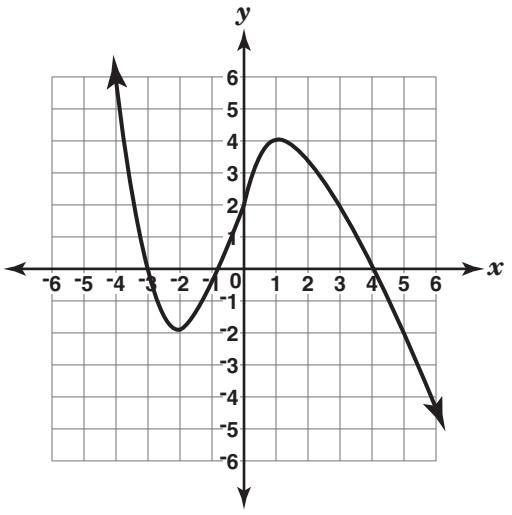
15 **The senior class sold school spirit items. The table below shows the number of items sold on the first day of a two-day sale.**

SCHOOL SPIRIT ITEMS
SOLD ON THE FIRST DAY

Item	Number Sold
T-shirt	15
Frisbee	14
Hat	22
Pen	23
Ribbon	16

Based on sales from the first day, what is the probability that the first person on the second day of the sale will buy a hat?

16 **Look at the function that is graphed below.**



Which of these represents the number of zeros of this function?

F 0

G 1

H 2

J 3

17 **The mayor of a town conducted an opinion survey of 90 randomly selected voters. The mayor wants to determine if a new shopping mall should be built in town. The survey results are shown in the table below.**

OPINION SURVEY RESULTS

Want a New Mall	60
Do Not Want a New Mall	20
No Opinion	10

There are 1,440 voters in the town. How many voters would be expected to want the new shopping mall built?

A 160

B 320

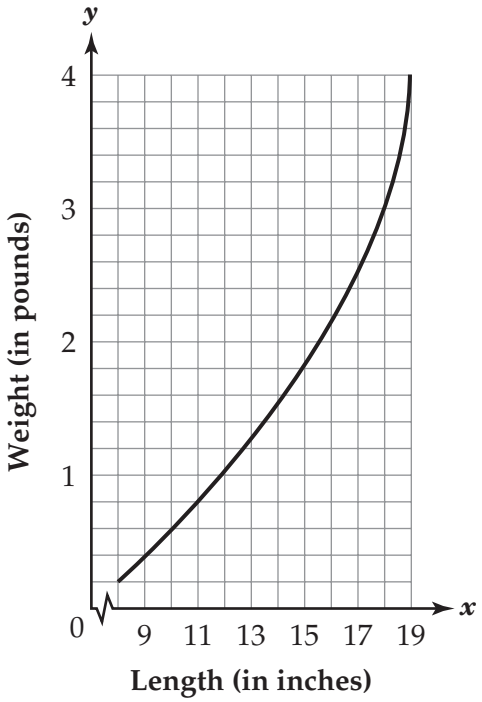
C 860

D 960

GO ON

18 **The graph below relates the length and weight of fish found in Lake Opinicon.**

FISH FROM LAKE OPINICON



Using the curve of best fit, what would be the expected weight of a fish that is 14.5 inches long?

F 1.5 pounds

G 1.7 pounds

H 1.8 pounds

J 1.9 pounds

19 **ECR**

Elizabeth joins a CD buyer's club. She receives 10 free CDs when she joins this club. She must buy 3 CDs each month.

Complete the following in the Answer Book:

- **Write an equation that represents the number of CDs (y) Elizabeth will receive from the CD buyer's club after x months.**
- **What is the y-intercept of your equation? What does the y-intercept mean in the context of this problem?**
- **Elizabeth wants to receive no more than 55 CDs from this club. What is the maximum number of months Elizabeth will remain in the CD buyer's club? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.**

STOP

Session 2

20 **One hundred randomly selected students from Western High School were surveyed to determine whether they would like school to start one hour later. Of the students surveyed, 58 favored the change. Western High School has 1,200 students. According to the survey results, which of these is a reasonable prediction of the total number of students who would favor this change?**

F 42

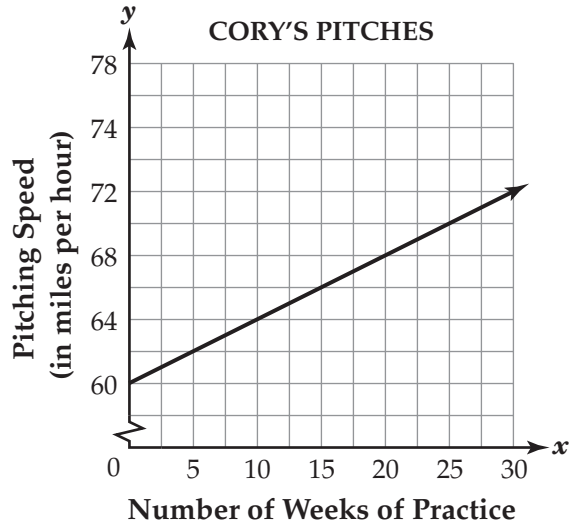
G 58

H 504

J 696

21 **Cory is a baseball pitcher. Cory's pitching speed increases by 2 miles per hour every 5 weeks of practice. Which of these graphs shows the relationship between the number of weeks of practice and Cory's pitching speed?**

A



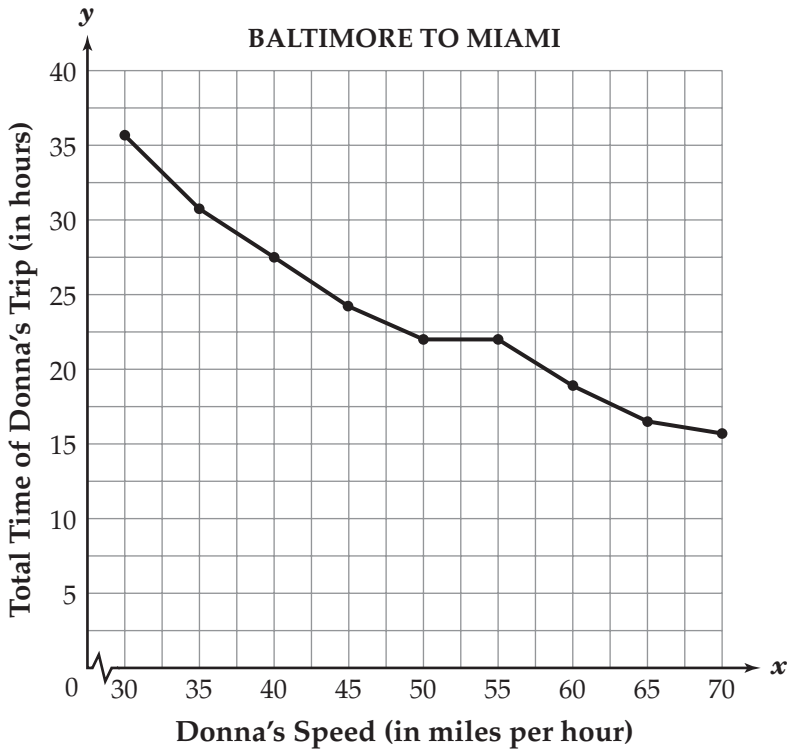
C

B

D

GO ON

22 **Donna drives from Baltimore to Miami. The total time, in hours, of Donna's trip depends on her speed, in miles per hour. This relationship is shown in the graph below.**



Approximately, how much longer does the trip take if Donna drives 55 miles per hour than if she drives 70 miles per hour?

F 2 hours

G 6 hours

H 15 hours

J 21 hours

GO ON

23 **Customers at Harvey's Store can win appliances at the grand opening. The table below shows the type and the number of appliances.**

APPLIANCES CUSTOMERS CAN WIN

Type	Number
Blender	6
Iron	5
Toaster	4
TV	1

Toby is the first customer to win an appliance. What is the probability that Toby will win an iron or a toaster?

A $\frac{4}{16}$

B $\frac{5}{16}$

C $\frac{9}{16}$

D $\frac{11}{16}$

24 **The rental rates at Snappy Car Rental are $30 per day plus $0.25 per mile for each mile driven. Joe rented a car for one day and drove 300 miles. What is the total amount Joe paid to rent the car?**

F $30

G $75

H $105

J $300

GO ON

25 **A company bought equipment for $x^2 + 5x$ dollars. One year later the value of the equipment was $x^2 + 2$ dollars. Which expression represents the amount that the equipment value decreased?**

A $(x^2 + 5x) - (x^2 + 2)$

B $(x^2 + 2) - (x^2 - 5x)$

C $(x^2 + 5x) \div (x^2 + 2)$

D $(x^2 + 2) \times (x^2 + 5x)$

26 **A credit card company investigates any purchase that is larger than the third quartile of a customer's last 12 purchases. Mike's last 12 purchases are shown below.**

$6.98	**$15.92**	**$31.84**	**$39.55**
$7.56	**$19.47**	**$36.64**	**$40.03**
$14.95	**$26.34**	**$38.25**	**$42.47**

What is the largest purchase Mike could make next <u>without</u> having his purchase investigated?

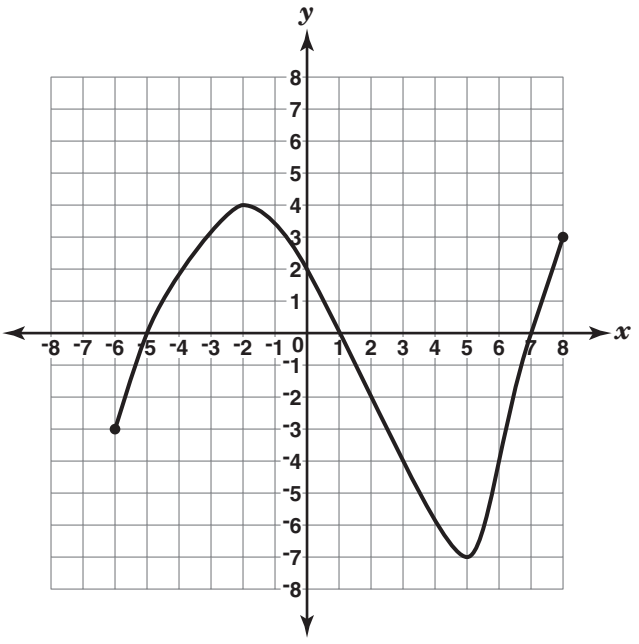
F $26.25

G $28.84

H $38.75

J $43.25

27 **Look at the function that is graphed below.**



What is the range of this function?

A $^{-}7 \leq y \leq 4$

B $^{-}6 \leq y \leq 8$

C $^{-}5 \leq y \leq 7$

D $^{-}2 \leq y \leq 5$

28
BCR

Students in a nutrition class decide to sell orange juice at their school's next sports event. To determine the price, the students record prices of orange juice from various stores in their city. The table below shows the price of different-sized bottles of juice.

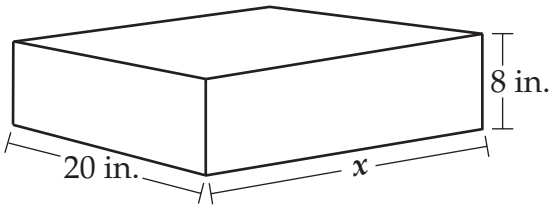
PRICE OF ORANGE JUICE

Bottle Size (in ounces)	Price (in dollars)
16	2.19
24	2.99
30	3.59
32	3.79
48	5.29
64	6.99

Complete the following in the Answer Book:

- **Write an equation for a line of best fit. (If you choose to draw a graph, use the grid provided in the Answer Book.)**
- **What is the slope of your equation? What does the slope mean in the context of this problem?**
- **The students are selling 8-ounce bottles of orange juice. According to your line of best fit, what is the price of an 8-ounce bottle of juice? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.**

29 **The rectangular solid below has a volume of 5,600 cubic inches, a width of 20 inches, and a height of 8 inches.**



Note: The figure is not drawn to scale.

What is the length (x) of the rectangular solid?

A 20 inches

B 35 inches

C 200 inches

D 280 inches

30 **Which of these equations represents a line with an x-intercept of -3 and a y-intercept of 4?**

F $y = -\frac{3}{4}x - 3$

G $y = \frac{3}{4}x - 3$

H $y = -\frac{4}{3}x + 4$

J $y = \frac{4}{3}x + 4$

GO ON

31 **Look at the pattern below.**

0, 3, 8, 15, 24, . . .

If the pattern continues, what will be the 8th term?

A 35

B 48

C 63

D 80

32 **The table below shows a relationship between x and y.**

x	y
1	5
2	7
3	9
4	11

Which of these equations represents this relationship?

F $y = {}^{-}2x + 7$

G $y = 2x + 3$

H $y = 3x + 2$

J $y = 7x - 2$

33 **Sam needs to rent a van for a school field trip. Van Company A charges a one-time fee of $250 plus $10 for each mile driven. Van Company B charges a one-time fee of $150 plus $12 for each mile driven. Let x represent the number of miles driven. Let y represent the total cost, in dollars, to rent the van. Which system of equations models this situation?**

A $y = 250 - 10x$
$y = 150 - 12x$

B $y = 10x - 250$
$y = 12x - 150$

C $y = 250x + 10$
$y = 150x + 12$

D $y = 10x + 250$
$y = 12x + 150$

34 ECR **Toy blocks are used to build a tower. The surface area and volume of the tower built with these blocks is shown in the table below.**

MODEL TOWER VALUES

Number of Blocks	Surface Area (in square centimeters)	Volume (in cubic centimeters)
1	18	4
2	30	8
3	42	12
4	54	16
5	?	?
6	?	?

Complete the following in the Answer Book:

- **Complete the table in the Answer Book to determine the surface area and the volume for 5 and 6 blocks.**
- **Write an algebraic expression to represent the relationship between the number of blocks and the surface area of the tower. Use mathematics to justify your answer.**
- **If 10 blocks are used, what is the surface area and the volume of the tower? Use mathematics to explain how you determined your answers. Use words, symbols, or both in your explanation.**

Directions

Use the Response Grids in the Answer Book to complete Numbers 35 and 36.

35 **Dominic rents a car for a trip. He pays $300 plus $0.20 per mile. Dominic has $750 to spend on the car rental. What is the maximum number of miles Dominic can drive?**

36 **The depth of a lake is 26 meters. Melting snow causes the lake to rise 0.05 meters each day. At the end of 8 days, what will be the depth, in meters, of the lake?**

STOP

ALGEBRA/DATA ANALYSIS

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