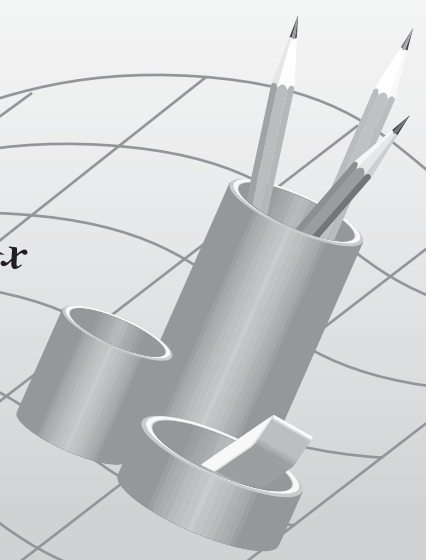
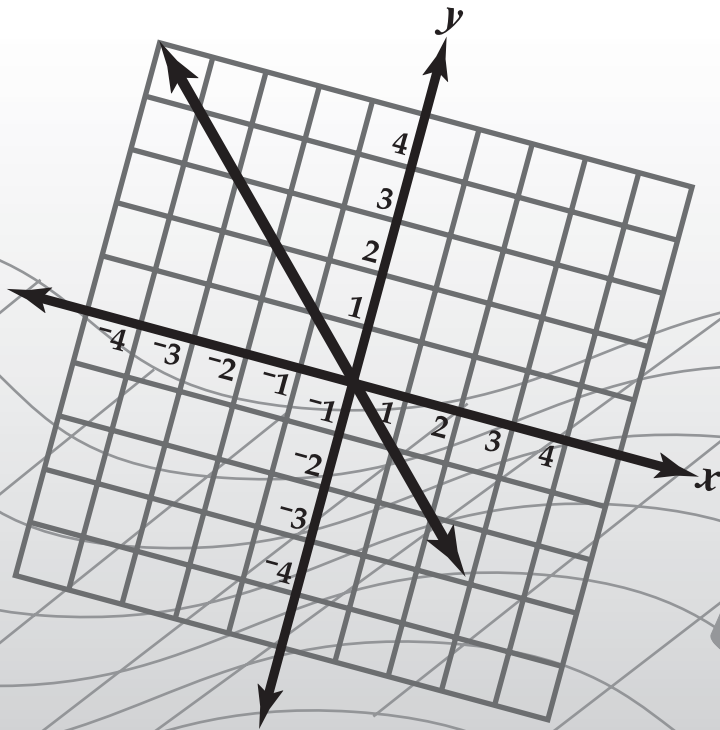
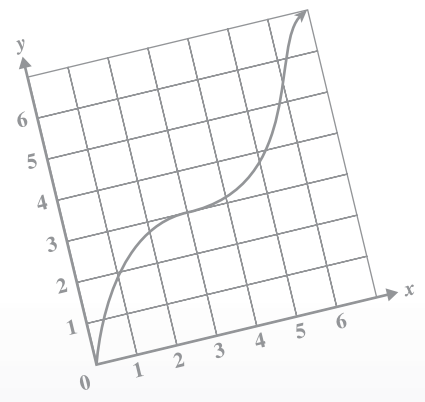


# HSA

Maryland High School  
Assessment



$$2x - 4 = 3(x - 1) - 10$$



# ALGEBRA/ DATA ANALYSIS

Public Release 2005

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# Session 1

## Response Grid Items

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

					} answer boxes
	/	/	/		
⊙	⊙	⊙	⊙	⊙	} number bubbles
0	0	0	0	0	
1	1	1	1	1	
2	2	2	2	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
7	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

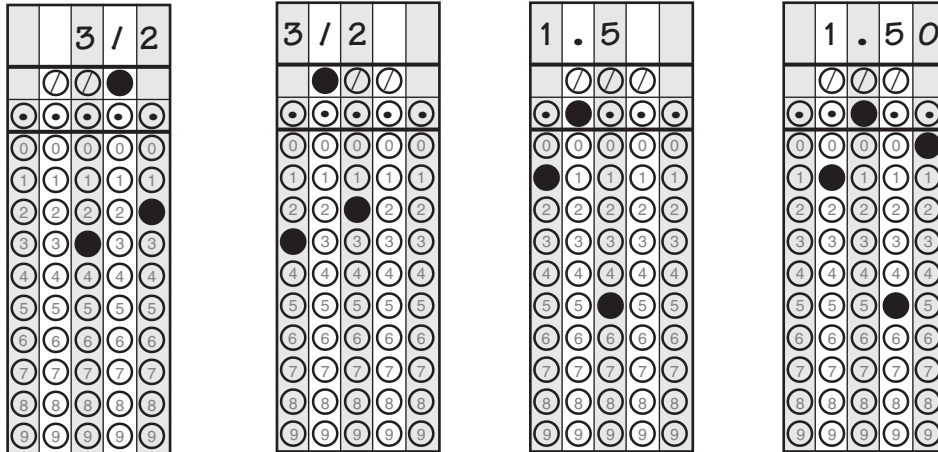
### Directions for Completing the Response Grids

- Find the answer to the problem.
- 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.
- 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.



**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 items 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  $180 + x - 3x$



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

$x$	0	1	2	3	4	?
$y$	-1	0	3	8	15	?

If the pattern continues, what are the next values for  $x$  and  $y$ ?

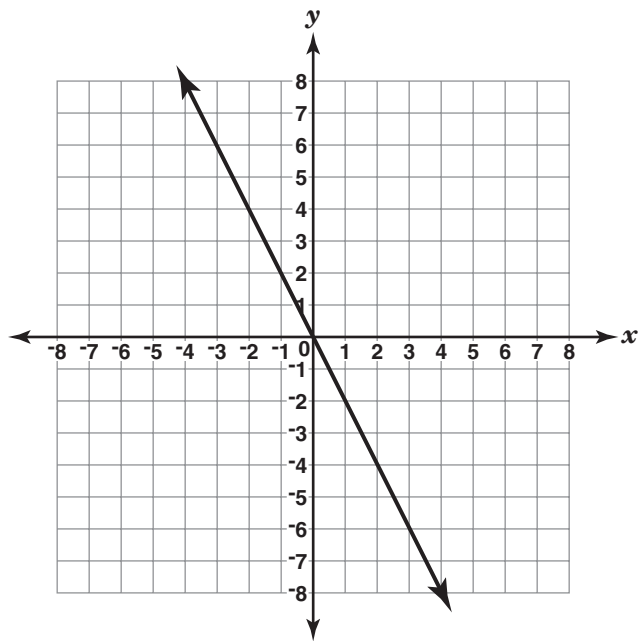
- A  $x = 5, y = 20$
- B  $x = 5, y = 22$
- C  $x = 5, y = 24$
- D  $x = 5, y = 35$

**2** Barbara has  $x$  dollars to spend. Joe has  $2x + 3$  dollars to spend. Which of these expressions represents the total amount of money Barbara and Joe have to spend?

- F  $(2x + 3) + x$
- G  $(2x + 3) - x$
- H  $x(2x + 3)$
- J  $(2x + 3) \div x, x \neq 0$



**3** Look at the graph below.



Which of these tables corresponds to the line that is graphed?

**A**

<i>x</i>	-3	-1	1	3
<i>y</i>	6	2	-2	-6

**C**

<i>x</i>	2	0	-2	-6
<i>y</i>	-4	0	-4	3

**B**

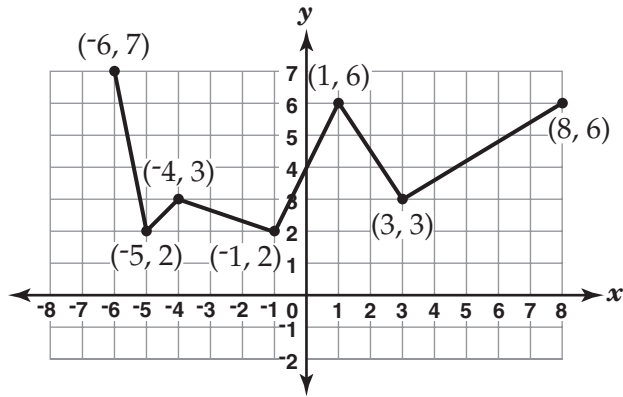
<i>x</i>	-3	-1	1	3
<i>y</i>	6	-2	2	-6

**D**

<i>x</i>	-2	0	2	6
<i>y</i>	-4	0	4	3



4 Look at the function that is graphed below.



What is the greatest rate of increase of this function?

- F  $\frac{3}{5}$
- G  $\frac{3}{2}$
- H 2
- J 5





**5** At the end of each day, Bob’s Balloon Shop counts how many balloons they have in the store. The results of their Monday and Tuesday counts are shown in the matrices below. The shop received no new balloons on either day.

	MONDAY’S COUNT				TUESDAY’S COUNT		
	Plain	Helium	Water		Plain	Helium	Water
Red	38	68	14	Red	24	61	11
Yellow	32	39	21	Yellow	30	28	16
Blue	41	47	16	Blue	29	32	14
White	31	39	23	White	21	29	21

How many helium balloons did they sell on Tuesday?

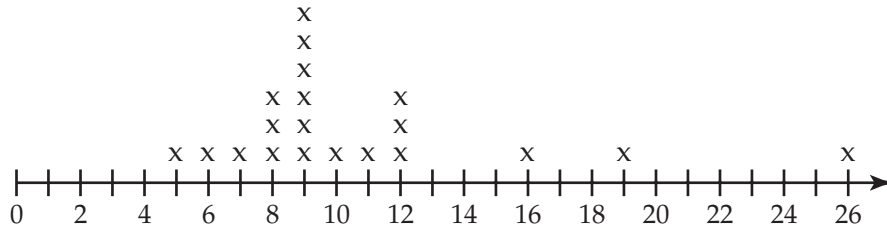
- A 7
- B 12
- C 38
- D 43



**6**  
**BCR**

A cereal company awards a prize to anyone who collects all 5 different game pieces. Each game piece has an equal chance of being placed in a box of cereal. Each box of cereal contains 1 game piece. A class of 20 students conducted a simulation to see how many boxes of cereal must be purchased to collect all 5 different game pieces. Their results are shown in the table below.

**SIMULATION RESULTS**



Number of Boxes Needed to Collect All 5 Pieces  
x = 1 Student

Complete the following in the Answer Book:

- What are the mean, median, and mode of the data?
- A box of cereal costs \$2.80. Based on the simulation results, how much money must a consumer spend to collect all 5 different game pieces? Use measures of central tendency to justify your answer.
- One student in the class suggested that the data point of 26 should be ignored. Will ignoring this data point have a greater influence on the mean or the median? Use mathematics to justify your answer.

**7**

Look at the system of equations below.

$$y = 3x - 2$$

$$2y = 6x - 4$$

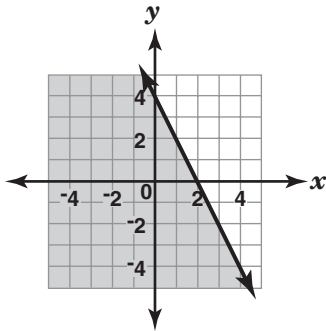
Which of these describes this system?

- A two parallel lines
- B two equations of the same line
- C two lines that intersect only at (1, 1)
- D two lines that intersect only at (-1, -1)

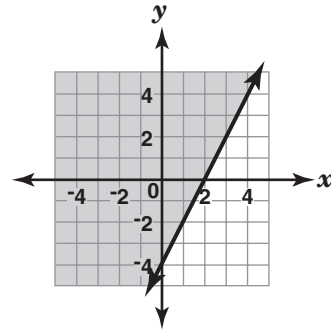


8 Which of these graphs represents the solution set of the inequality  $y \leq -2x + 4$ ?

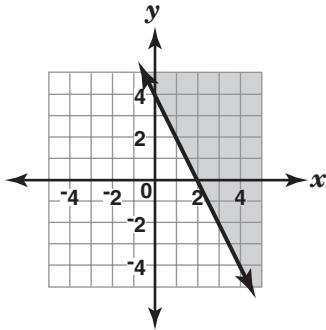
F



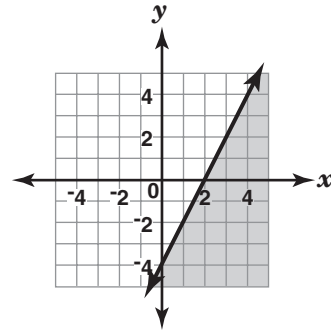
H



G



J



9 The table below shows the total number of people served in a cafeteria.

PEOPLE SERVED IN A CAFETERIA

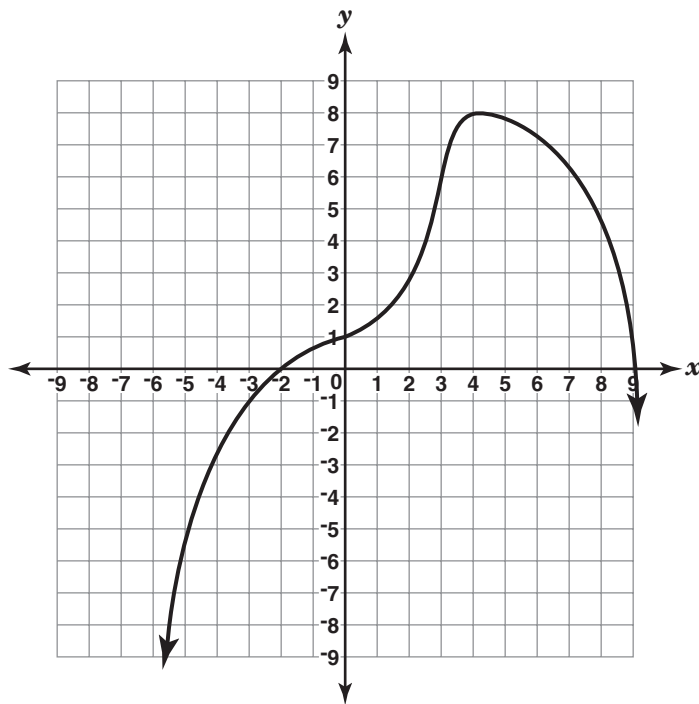
Time	Total Number of People Served
12:00	25
12:10	55
12:20	85
12:30	115

If the pattern continues, what will be the total number of people served by 1:00?

- A 145
- B 175
- C 205
- D 235



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



What is the maximum value of this function?

- F -2
- G 1
- H 8
- J 9



- 11** Karen spun a spinner 50 times and recorded her results in the table below. The spinner had five numbered sections.

RESULTS OF 50 SPINS

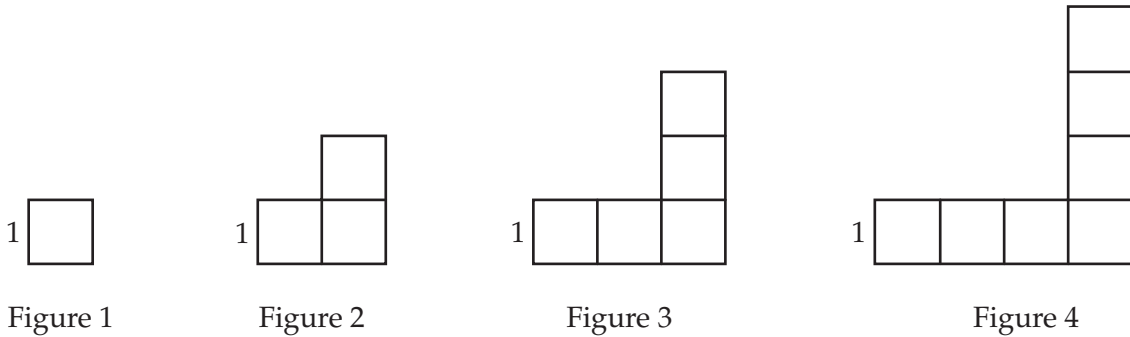
Section	Frequency
1	13
2	8
3	10
4	12
5	7

Based on the results in the table, how many times should Karen expect the spinner to land on section 3 or 4 if she spins the spinner 300 times?

- A 60
- B 72
- C 108
- D 132



**12** Aisha used squares to make the pattern of figures below.  
**ECR**



Complete the following in the Answer Book:

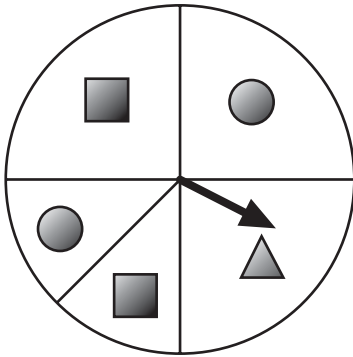
- Using the pattern, draw Figure 5 and Figure 6 in the Answer Book.
- Complete the table in the Answer Book to determine the perimeter of each figure.
- Write an expression that can be used to determine the perimeter of the  $n$ th figure in this pattern.
- If this pattern continues, which figure will have a perimeter of 140 centimeters? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.



**D**irections

Use the Response Grids in the Answer Book to complete Numbers 13 through 15.

- 13** The Game Land Company developed a new trivia game. The spinner below is used to determine what kind of question is asked. The spinner is divided into 4 equal sections. One of the sections is divided in half.



What is the probability that a circle question is asked?

- 14** Denise has 24 baseball cards in her collection. She collects 9 baseball cards per month. In how many months will she have a total of 150 baseball cards in her collection?





- 15** Judy asked 140 students at her high school their opinion of the school mascot. The survey results are shown below.

**SURVEY RESULTS**

	Male	Female
Likes Mascot	47	43
Does Not Like Mascot	8	15
No Opinion	15	12

If a female student is selected at random, what is the probability that she likes the mascot?



- 16** **BCR** A tire company wants to determine how quickly the tread on its tires wears down with average use. Let  $x$  represent the number of months the tire was used. Let  $y$  represent the thickness of the tire tread, in millimeters. An equation for a line of best fit is shown below.

$$y = -\frac{5}{9}x + 20$$

Complete the following in the Answer Book:

- What is the slope of this line of best fit? What does the slope mean in the context of this problem?
- What is the  $y$ -intercept of this line of best fit? What does the  $y$ -intercept mean in the context of this problem?
- Tina will need to replace her new tires when they have 5 millimeters of tire tread left. According to the line of best fit, for how many months can Tina drive before she needs to replace her tires? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

- 17** Wendy asked 40 students on the school football team if they have ever injured themselves playing sports. Fifteen football team members responded “Yes.” Wendy concluded that 375 of the 1,000 students in her school have injured themselves playing sports. Which of these explains why her conclusion is invalid?

- A computation is incorrect
- B sample size is too large
- C sample is biased
- D sample is random

**18** A fish tank empties at a constant rate. The table below shows the volume of water left in the fish tank after each minute.

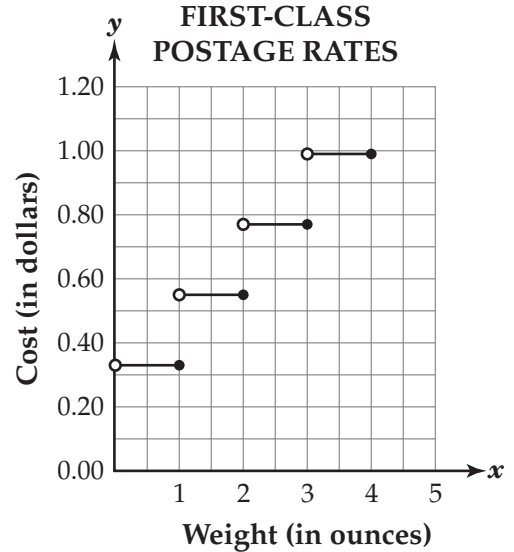
**FISH TANK VOLUME**

Minutes ( $t$ )	Volume ( $v$ )
0	630
1	622
2	614
3	606
4	598

Which of these equations describes the volume of water in the tank as a function of time?

- F**  $v = -8t + 622$
- G**  $v = -8t + 630$
- H**  $v = 8t + 622$
- J**  $v = 8t + 630$

**19** In 1999, first-class postage for items that weighed up to one ounce was \$0.33. Each additional ounce (or fraction of an ounce) cost \$0.22 as shown in the graph below.



What was the cost to mail a letter that weighed 2.8 ounces?

- A** \$0.33
- B** \$0.55
- C** \$0.77
- D** \$0.99



**No test material on this page**



*Session* **2**

**20** A company manufactures CD players. The quality control department checks 600 CD players and discovers that 12 of them are defective. What is the probability that a CD player is not defective?

- F 0.12
- G 0.50
- H 0.72
- J 0.98

**21** Sue has \$75 to spend on shirts and shorts. The shirts are on sale for \$10 each, including tax, and the shorts are on sale for \$15 each, including tax.

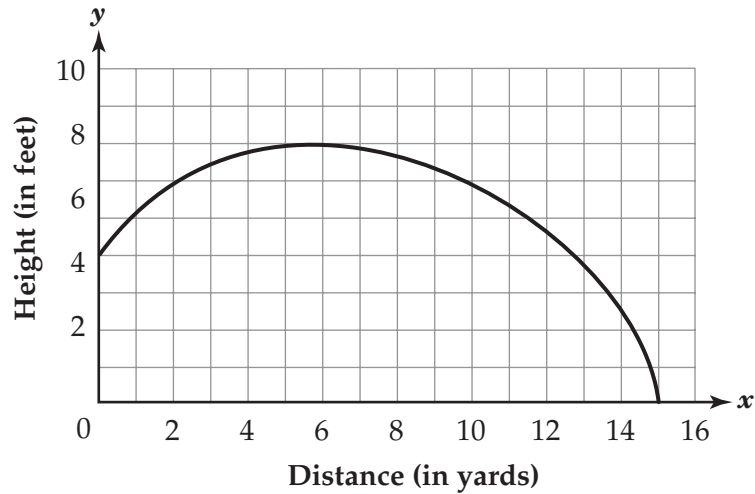
**ECR**

Complete the following in the Answer Book:

- Write an inequality that represents the situation above, where  $x$  represents the number of shirts and  $y$  represents the number of shorts.
- What is the maximum number of shorts Sue can buy if she buys 2 shirts? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation. (If you need to draw a graph for your solution, use the grid provided in the Answer Book.)
- List all the number combinations of shirts and shorts Sue can buy to spend exactly \$75. Use mathematics to justify your answer.

- 22** The path of a tennis ball follows the curve given in the graph below.

**PATH OF A TENNIS BALL**



How far does the ball travel horizontally before it hits the ground?

- F 4 yards
- G 5 yards
- H 8 yards
- J 15 yards

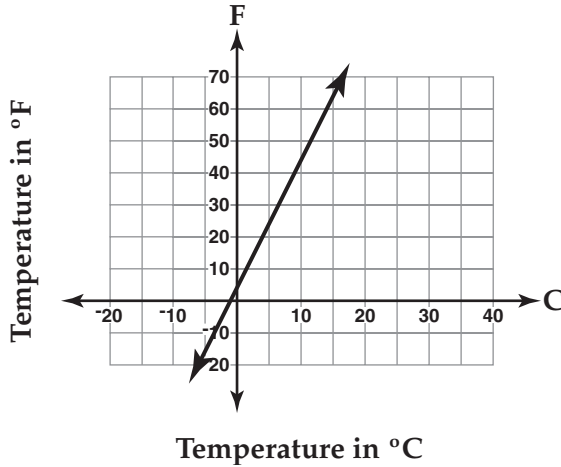


- 23** Carlos uses the formula below to change Celsius temperatures (C) into Fahrenheit temperatures (F).

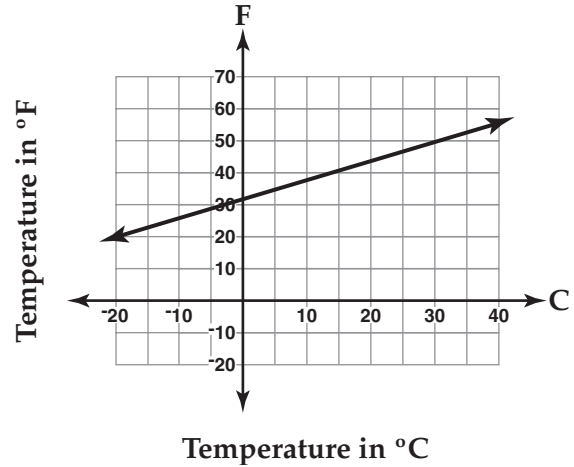
$$F = \frac{9}{5}C + 32$$

Which of these graphs represents this formula?

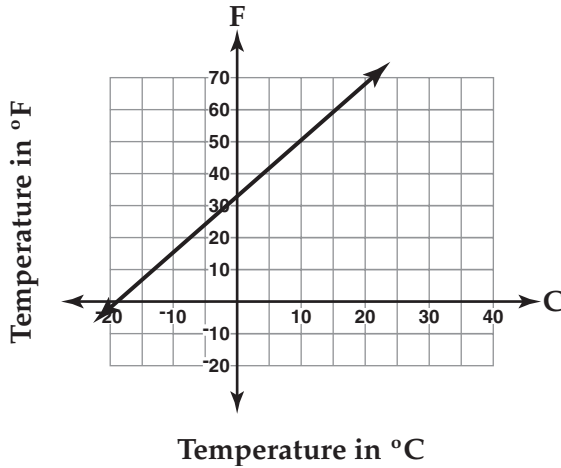
A



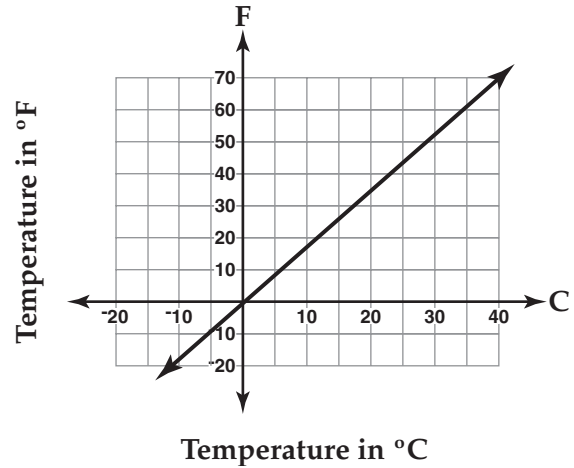
C



B



D





**24** At a movie theater, the child ticket price is  $x$  dollars and the adult price is \$3.50 more. One evening 41 child tickets were sold and 65 adults tickets were sold. Which of these expressions represents the total ticket sales, in dollars?

F  $41x + 65(x + 3.50)$

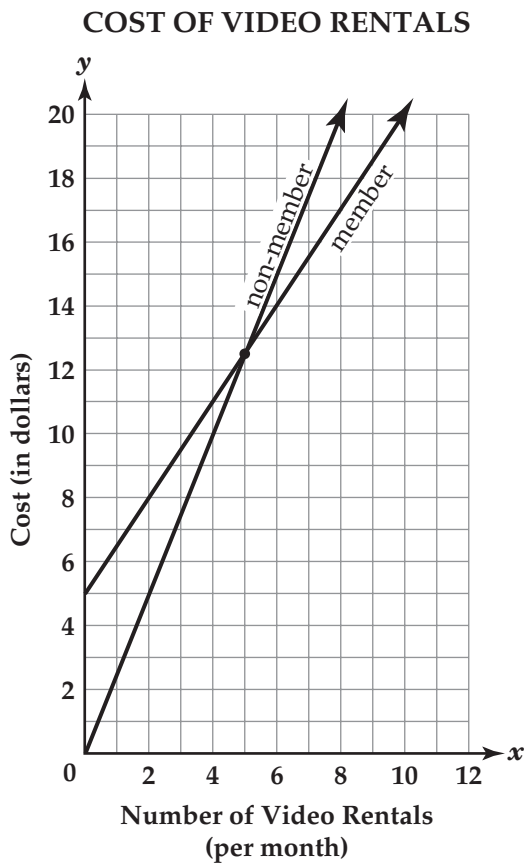
G  $41x + 65x + 3.50$

H  $41x + 65(3.50)$

J  $41 + x + 65 + 3.50$



- 25** The graph below shows the cost of video rentals for members and non-members of a video club.



According to the graph, which of these statements is true?

- A members pay less for 4 movies
- B non-members pay less for 5 movies
- C non-members pay less for 6 movies
- D members pay less for 8 movies

- 26** A school store sells pens for \$1.29 each and notebooks for \$2.25 each. Paul bought  $p$  pens and  $n$  notebooks. He spent less than \$10. Which of these inequalities represents this situation?

- F  $2.25p - 1.29n < 10$
- G  $1.29p - 2.25n < 10$
- H  $2.25p + 1.29n < 10$
- J  $1.29p + 2.25n < 10$



**27** Steve is a member of the baseball team. He averages 2 hits for every 5 times at bat. Steve might get a hit his next time at bat. Which of these methods could not be used to simulate this situation?

- A Flip a fair coin once. Let heads represent a hit and let tails represent not getting a hit.
- B Use a random number generator. Let 1 and 5 represent a hit and let 2, 3, and 4 represent not getting a hit.
- C Spin a spinner with 10 equally-sized sections. Let 4 sections represent getting a hit and let 6 sections represent not getting a hit.
- D Draw a marble from a bag that contains 8 red and 12 blue marbles. Let a red marble represent getting a hit and let a blue marble represent not getting a hit.



**28** The matrix below shows the annual salaries, in dollars, for 3 different jobs based on the employee's level of education.

	EDUCATION LEVEL	
	High School Diploma	College Degree
Secretary (Sec)	\$22,000	\$26,000
Customer Service Representative (CSR)	\$25,500	\$28,000
Manager (Mgr)	\$31,000	\$34,800

If each employee's salary increased by 5%, which of these matrices represents the new salaries?

**F**

	HS	College
Sec	\$1,100	\$1,300
CSR	\$1,275	\$1,400
Mgr	\$1,550	\$1,740

**H**

	HS	College
Sec	\$23,100	\$27,300
CSR	\$26,775	\$29,400
Mgr	\$32,550	\$36,540

**G**

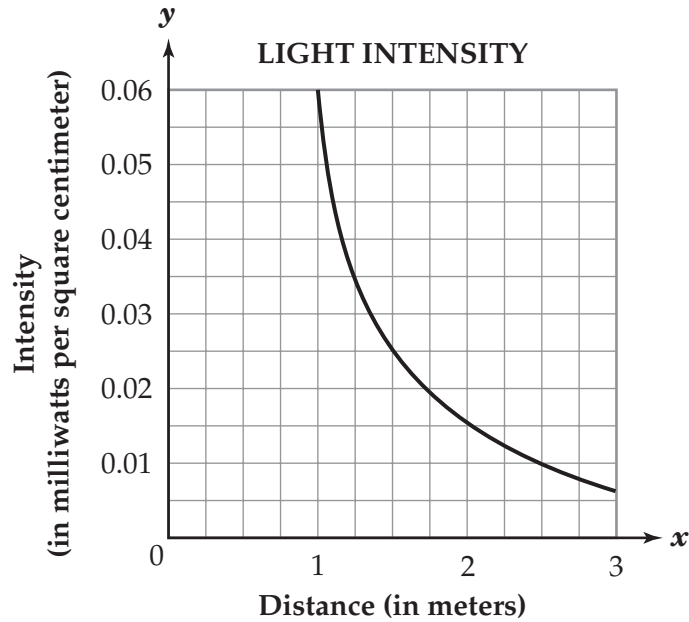
	HS	College
Sec	\$11,000	\$13,000
CSR	\$12,750	\$14,000
Mgr	\$15,500	\$17,400

**J**

	HS	College
Sec	\$33,000	\$39,000
CSR	\$38,250	\$42,000
Mgr	\$46,500	\$52,200



- 29** The graph below models the relationship between light intensity and the distance from a light source.



Which of these is the best estimate of the intensity, in milliwatts per square centimeter, of light 2 meters from the source?

- A 0.015
- B 0.181
- C 1.520
- D 1.720



- 30** Paul asked 50 randomly selected eleventh-grade students to choose their favorite candidate for class president. The survey results are shown in the table below.

**ECR**

**VOTING PREFERENCES**

Candidate	Number of Votes
Nick	14
Marie	12
Bertha	16
Darrin	8

Complete the following in the Answer Book:

- There are 300 eleventh-grade students at Paul’s school. Based on the survey results, how many votes will Marie expect to receive? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.
- Using the survey results, Paul claims that Bertha will receive 2 more votes than Nick in the election. Is Paul correct? Use mathematics to justify your answer.
- Loren asked the same question in another survey. She asked 50 randomly selected eleventh-grade chorus students to choose their favorite candidate for class president. Will you expect Loren’s survey or Paul’s survey to give more reliable results? Use mathematics to justify your answer.



**31** While studying a school's top 10 college entrance exam scores, a guidance counselor found the mean score to be 1,472. In looking at the calculations, the counselor realized he had made a mistake. One of the student's scores was 10 points greater than the counselor used in his calculations. What is the correct mean score?

- A 1,462
- B 1,472
- C 1,473
- D 1,482

**32** A student at West High School conducted a random survey of 200 tenth-grade students to determine their favorite season. The survey results are shown in the table below.

**TENTH-GRADE STUDENTS'  
FAVORITE SEASON**

Season	Number of Students
Winter	42
Spring	64
Summer	52
Fall	42

There are 500 tenth-grade students in the school. Based on the survey results, how many of these tenth-grade students would be expected to choose Spring as their favorite season?

- F 105
- G 125
- H 130
- J 160



- 33** The number of people ( $n$ ) who will attend a dance depends on the admission price ( $p$ ), in dollars. This relationship is represented by the equation shown below.

$$n = 800 - 50p$$

Which of these is a correct interpretation of the slope of this equation?

- A 50 people will attend if the admission price is free
- B 50 fewer people will attend for every dollar the admission price increases
- C 800 people will attend if the admission price is free
- D 800 fewer people will attend for every dollar the admission price increases

- 34** Four teachers gave a test to their classes. A summary of the test results is shown below.

TEST RESULTS

Teacher	Minimum Score	Q1	Median	Q3	Maximum Score
Mrs. Lee	52	73	83	89	95
Mr. Green	54	75	79	89	93
Mrs. Smith	73	78	84	93	96
Mr. Wang	42	83	91	96	100

Which teacher's class has the widest spread in the middle 50% of the test scores?

- F Mrs. Lee
- G Mr. Green
- H Mrs. Smith
- J Mr. Wang





**35****BCR**

A high school principal is meeting with the PTA to discuss the amount of time students spend doing homework each day. He asked a teacher to gather data for the parents. The teacher is going to survey 25 students from a student body of 1,000 students. Consider the methods of sampling shown below.

**Method 1:** randomly select 25 students from honors classes

**Method 2:** select 25 members of the girls' varsity softball team at random

**Method 3:** use a random number generator to generate 25 random numbers and use these to select 25 students from a numerical list of the students

**Method 4:** randomly select 25 classrooms and ask the teacher in each classroom to select a student

Complete the following in the Answer Book:

- Which of the above methods of sampling would give the most representative random sample of the student population? Use mathematics to justify your answer. Include in your justification why you chose that method and why you did not choose each of the other three methods.



**D**irections

Use the Response Grids in the Answer Book to complete Numbers 36 through 38.

- 36** Sue's doctor must decide how much medicine she needs for each dosage. The dosage ( $d$ ), in milligrams, depends on Sue's body mass ( $m$ ), in kilograms. The formula below is used to calculate the dosage of her medicine.

$$d = 0.1m^2 + 5m$$

What is the dosage needed, in milligrams, if Sue's body mass is 70 kilograms?

- 37** Monique bought 2 hot dogs and 1 large soda. She spent \$7. Scott bought 4 hot dogs and 1 large soda. He spent a total of \$12. What is the cost of each hot dog?

- 38** Look at the pattern below.

$$\frac{16}{4}, \frac{21}{4}, \frac{26}{4}, \frac{31}{4}, \frac{36}{4}, \frac{41}{4}, \dots$$

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





# **ALGEBRA/DATA ANALYSIS**

*Public Release 2005*