Mathematics

SESSION 1

You may use your reference sheet and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS
This session contains twelve multiple-choice questions, two short-answer questions, and three open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

1 Which of the following is equivalent to the expression below?

$$5^4$$

A. 54

B. 5×4

C. $5 \times 5 \times 5 \times 5$

D. $4 \times 4 \times 4 \times 4 \times 4$

2 Michael has exactly 204 stamps. He has 43 more stamps than Brian. What is the total number of stamps Brian has?
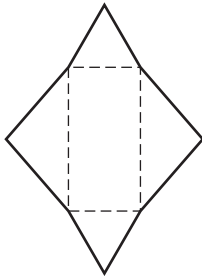
A. 161

B. 167

C. 247

D. 261

3 Nathan folded and taped a piece of cardboard to form the figure shown below.
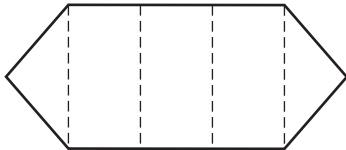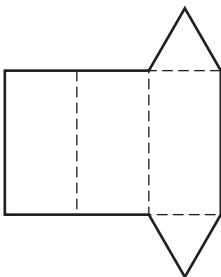

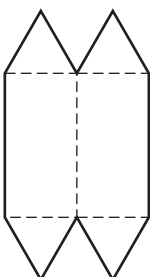Which of the following nets shows the unfolded figure?

A.

B.

C.

D.

4 The table below shows the number of points that each player on a basketball team scored in his last game.

Points Scored

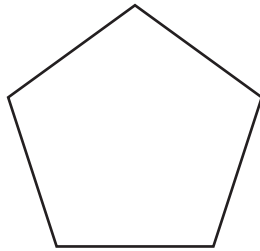| Player	Number of Points Scored
Alex	9
Doug	12
Nick	15
Keith	5
Sam	4

What percent of the total number of points did Alex score?

A. 9%

B. 20%

C. 25%

D. 45%

5 What is the value of the expression below when $\square = 3$?

$$2(\square) + 5$$

A. 6

B. 7

C. 10

D. 11

6 A drawing of a pentagon is shown below.

What is the sum of the measures of the interior angles of the pentagon?

A. 180°

B. 360°

C. 540°

D. 720°

7 Last year, Jenna's town recycled 9.85 tons of paper. This year, her town recycled 18.5 tons of paper.

How much more paper did the town recycle this year than last year?

A. 8.00 tons

B. 8.65 tons

C. 8.75 tons

D. 9.35 tons

8 Which of the following has the **greatest** value?

A. $(2 \times 100{,}000) + (6 \times 100)$

B. $(2 \times 100{,}000) + (5 \times 1{,}000)$

C. $(3 \times 10{,}000) + (6 \times 100) + (7 \times 10)$

D. $(3 \times 10{,}000) + (5 \times 1{,}000) + (7 \times 10)$

9 Each of the cards below is the same shape and size. The front of each card has a letter on it, and the back of each card is blank. Jack will put them all in a bag and then, without looking, take out one card.

| P | A | T | R | I | O | T | S |

What is the probability that Jack will take out a card with the letter T on it?

A. $\frac{1}{8}$

B. $\frac{1}{7}$

C. $\frac{1}{4}$

D. $\frac{1}{3}$

305

Question 10 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 10 in the space provided in your Student Answer Booklet.

10 Lucinda earns $20 each week. She spends $5 each week and saves the rest. The table below shows the total amount that she saved at the end of each week for 4 weeks.

Lucinda's Savings at the End of Each Week

| Week	1	2	3	4
Total Amount Saved	$15	$30	$45	$60

Lucinda continues to save at the same rate.

a. What will be Lucinda's total amount saved at the end of 7 weeks? Show or explain how you got your answer.

b. Use numbers, words, or symbols to write an expression that represents Lucinda's total amount saved at the end of n weeks.

c. How many weeks will it take for Lucinda to save $300? Show or explain how you got your answer.

Questions 11 and 12 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

11   Write 84 as a product of prime numbers.

12   Using the number line below, what is the distance between point *A* and point *B*?
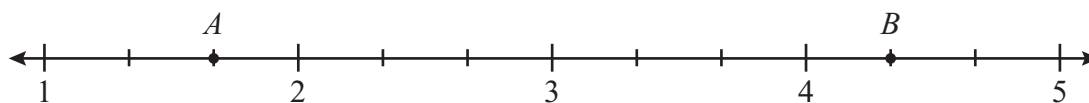
Question 13 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 13 in the space provided in your Student Answer Booklet.

13 Six geometric terms are given in the box below.

acute	equilateral	isosceles
obtuse	right	scalene

David drew the six triangles shown below.
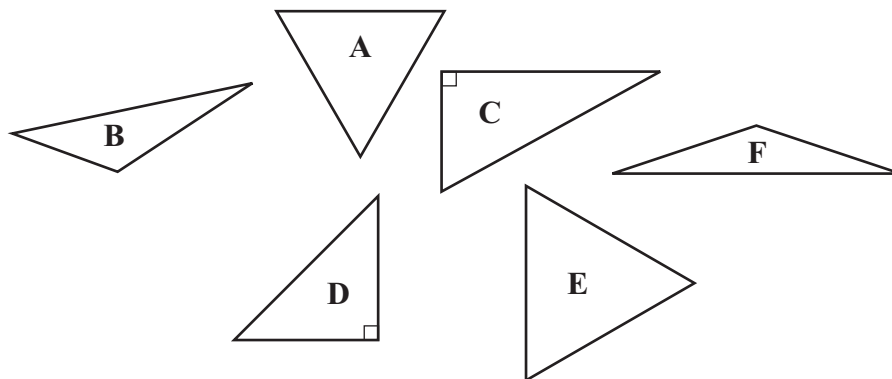
a. Identify one of the geometric terms listed in the box that can be used to describe triangle A. Explain your reasoning.

b. Which **two** of the geometric terms listed in the box can be used to describe triangle B? Explain your reasoning.

David grouped his triangles as shown below.

Group 1	Group 2	Group 3
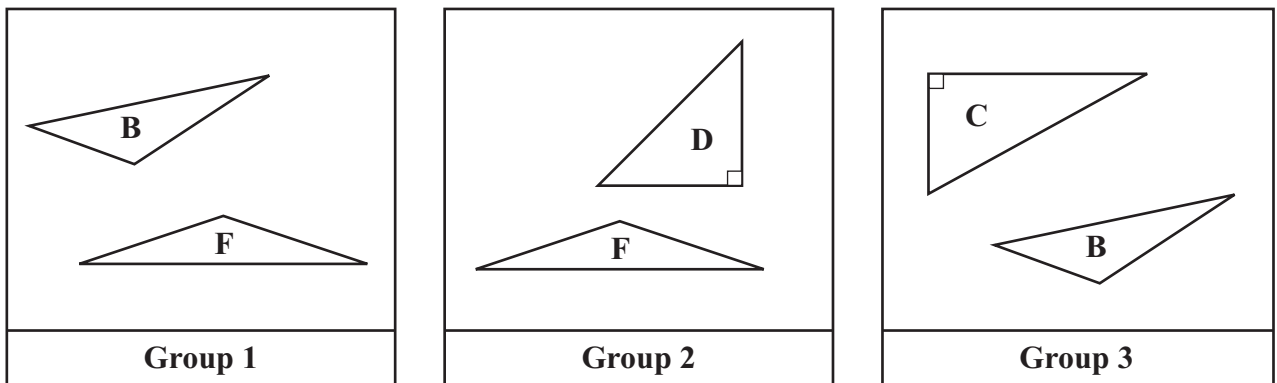
c. Using one or more of the geometric terms listed in the box, explain what the two triangles in each group have in common. Be sure to label your answers Group 1, Group 2, and Group 3.

Mark your answers to multiple-choice questions 14 through 16 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

14 Francisco, Leon, and Jack each had the same number of trading cards.

- Francisco put his cards into groups of 3 with none left over.
- Leon put his cards into groups of 4 with none left over.
- Jack put his cards into groups of 9 with none left over.

Which of the following could be the total number of trading cards each person had?

A. 72

B. 81

C. 84

D. 90

15 Ted used the amounts of spices listed below to make a pie.

- 2 teaspoons of cinnamon
- $\frac{3}{4}$ teaspoon of nutmeg
- $\frac{1}{2}$ teaspoon of cloves

What is the total number of teaspoons of spices that Ted used?

A. $2\frac{3}{8}$ teaspoons

B. $2\frac{4}{6}$ teaspoons

C. $3\frac{1}{4}$ teaspoons

D. $3\frac{1}{2}$ teaspoons

16   In which of the following tables do the data show a constant rate of change in the total
distance traveled during a four-hour trip?

A.   **Distance Traveled**

Time (hours)	Total Distance (miles)
1	50
2	80
3	140
4	230

C.   **Distance Traveled**

Time (hours)	Total Distance (miles)
1	60
2	120
3	150
4	165

B.   **Distance Traveled**

Time (hours)	Total Distance (miles)
1	30
2	60
3	120
4	240

D.   **Distance Traveled**

Time (hours)	Total Distance (miles)
1	50
2	100
3	150
4	200

Question 17 is an open-response question.
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 17 in the space provided in your Student Answer Booklet.

17 Emily works at a fitness center. She recorded the heart rates of some people immediately after they exercised. Her data are shown below.

Heart Rates (beats per minute)

120	128	144	136	130
150	138	140	132	130

a. Construct a stem-and-leaf plot to show Emily's data. Be sure to include a key.

b. Based on Emily's data, what is the **median** heart rate? Show or explain how you got your answer.

Emily measured the heart rates of two more people. When these heart rates were added to the data set, the **mode** decreased.

c. Explain what must be true of the two additional heart rates in order for the **mode** to decrease.

d. Explain how the two additional heart rates will affect the **median** heart rate that you found in part (b).

Mathematics

SESSION 2

You may use your reference sheet and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS

This session contains seventeen multiple-choice questions, three short-answer questions, and two open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

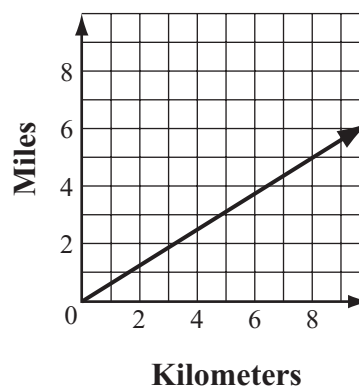**18** The measure of an angle is 100°. What kind of angle is this?

A. right

B. acute

C. obtuse

D. straight

19 Megan bought a box of 30 cookies. She ate $\frac{1}{3}$ of them. What is the total number of cookies that Megan ate?

A. 27

B. 10

C. 9

D. 3

20 The graph below shows the relationship between distance measured in kilometers and distance measured in miles.

Measures of Distance

Which of the following is closest to the number of miles that is equivalent to 4 kilometers?

A. 1.5 miles

B. 2.5 miles

C. 5.8 miles

D. 6.2 miles

21 What is the value of *n* that makes the equation below true?

$$\frac{n}{3} = 12$$

A. 4

B. 9

C. 15

D. 36

22 At one time, the world population was 6,034,627,105. What digit is in the millions place of 6,034,627,105?

A. 0

B. 3

C. 4

D. 6

23 Jon and his friends painted a mural in art class. The shaded part of the figure below represents the part of the mural that Jon painted.

Which of the following best represents the percent of the mural that Jon painted?

A. 20%

B. 25%

C. 33%

D. 40%

**24** The cost for labor at a car repair center is shown in the table below.

Car Repair Costs

Hours	Total Cost
1	$ 60
2	$120
3	$180
4	$240

Based on the data in the table, which of the following expressions represents the total cost, in dollars, of a repair that requires h hours of labor?

A. $h + 60$

B. $h - 60$

C. $h \times 60$

D. $h \div 60$

25 The line plot below shows the number of books individual customers bought at a bookstore one day.

Number of Books Bought
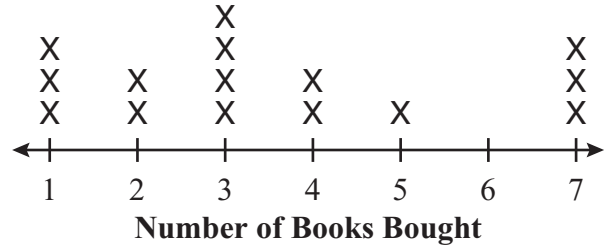
What was the total number of customers who bought **more than** 3 books?

A. 4

B. 6

C. 7

D. 10

26   The table below shows the lowest recorded temperature for each of four cities.

Lowest Recorded Temperatures

City	Temperature (in degrees Fahrenheit)
Detroit, Michigan	−21
San Juan, Puerto Rico	60
Fairbanks, Alaska	−62
Seattle, Washington	9

Which of the following shows these numbers in order from least to greatest?

A. −62, −21, 9, 60

B. 9, −21, 60, −62

C. −62, 60, −21, 9

D. −21, −62, 9, 60

Question 27 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 27 in the space provided in your Student Answer Booklet.

Use your MCAS ruler to answer question 27.

27   Part of a map is shown below. Each point is labeled to indicate the town that it represents. The map has a scale in which 1 inch represents 20 miles.
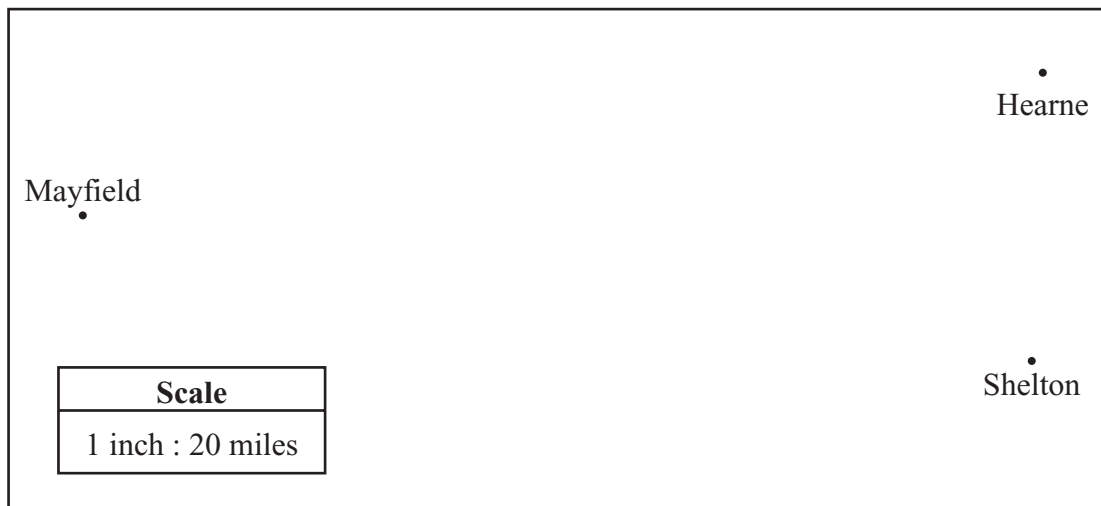

a. Using your MCAS ruler, what is the distance, in inches, between Mayfield and Shelton on the map?

b. What is the actual distance, in miles, between the towns of Mayfield and Shelton? Show or explain how you used the scale to get your answer.

c. What is the actual distance, in miles, between the towns of Hearne and Shelton? Show or explain how you used the scale to get your answer.

d. The town of Sawyer is located 50 miles from Mayfield. On the full map, what should be the distance, in inches, between Sawyer and Mayfield? Show or explain how you got your answer.

Questions 28 and 29 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

28   What number best represents the location of point *A* on the number line below?

A

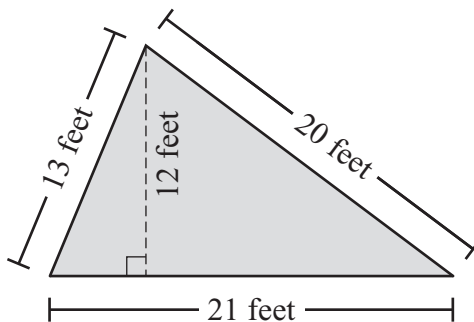−3   −2   −1   0   1   2   3
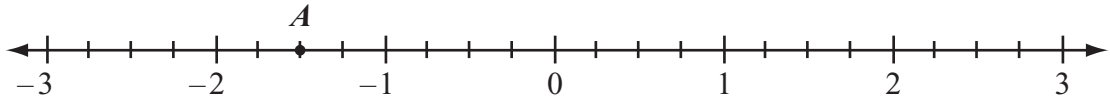
29   A hexagonal prism is shown below.
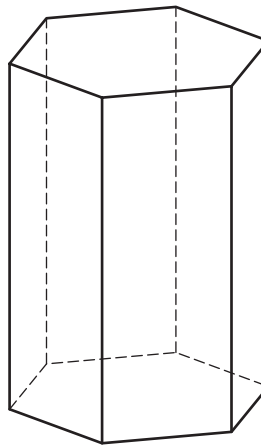
What is the total number of edges in a hexagonal prism?

Question 30 is a short-answer question. Write your answer to this question in the box provided in your Student Answer Booklet. Do not write your answer in this test booklet. You may do your figuring in the test booklet.

30   The shaded figure below represents Peggy's garden.

Based on the dimensions in the figure, what is the perimeter, in feet, of Peggy's garden?

Question 31 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 31 in the space provided in your Student Answer Booklet.

31 Carla made the table below to show the populations of five different states.

State Populations

State	Population (in millions)
Massachusetts	6.35
New Hampshire	1.24
New York	18.98
Pennsylvania	12.28
Vermont	0.61

a. Based on the data in the table, write the states in order from the **greatest** population to the **least** population.

b. Based on the data in the table, estimate how many more people live in Pennsylvania than in Vermont. Show or explain your strategy.

c. Based on the data in the table, estimate the total number of people who live in all five states. Show or explain your strategy.

d. Based on your answer to part (c), estimate the percent of the total population of the five states that is from Massachusetts. Show or explain how you got your answer.

Mark your answers to multiple-choice questions 32 through 39 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

32 Each night, Stephanie reads 3 more pages of her book than Michael reads of his book. Which of the following graphs correctly represents the relationship between the number of pages Stephanie reads each night and the number of pages Michael reads each night?
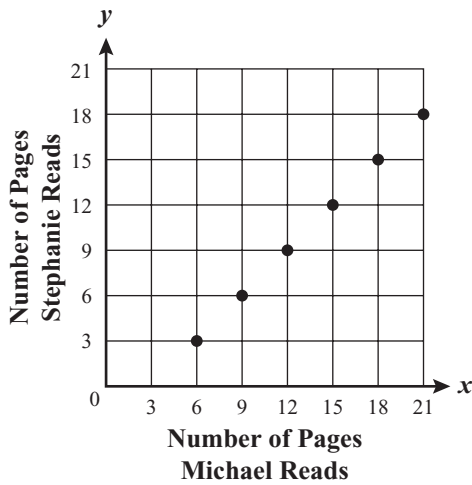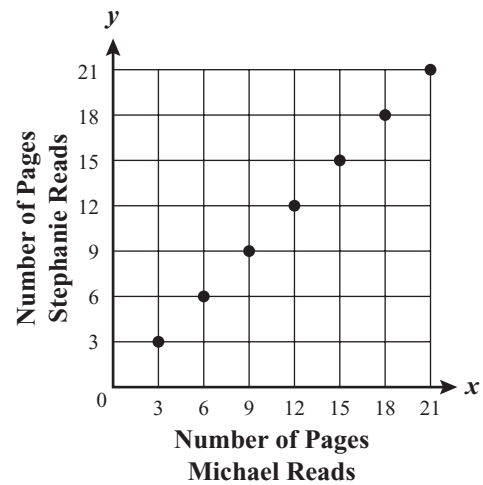
A. **Pages Read Each Night**
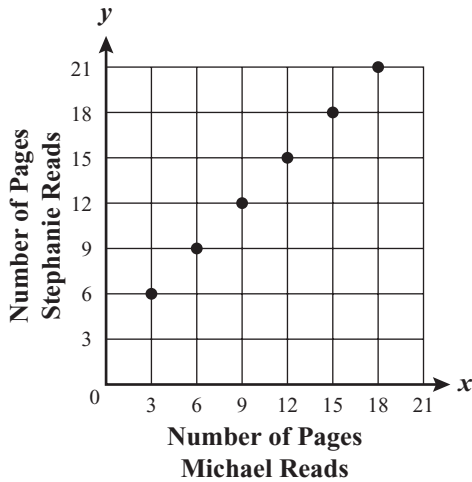
C. **Pages Read Each Night**
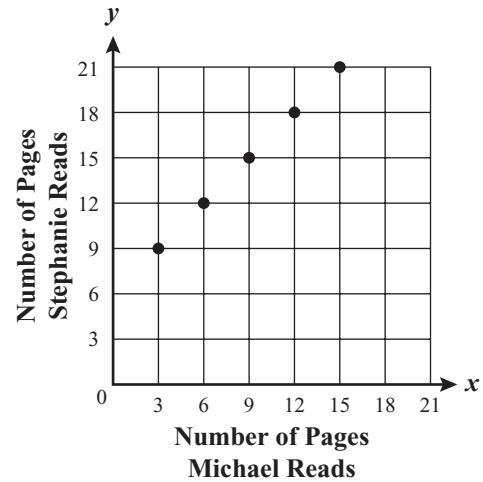
B. **Pages Read Each Night**

D. **Pages Read Each Night**

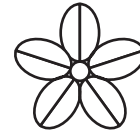**33** What is the value of the expression shown below?

$$3 + (2 + 5) \times 3$$

A. 13

B. 20

C. 24

D. 30

34 A comet passed by Earth in the year 1835. It passes by Earth every 60 years.

Based on this information, in which of the following years can the comet be expected to pass by Earth?

A. 2035

B. 2060

C. 2075
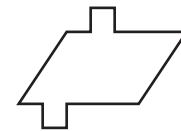
D. 2080

35 Which of the following figures appears to have both line symmetry and rotational symmetry?

A.

B.

C.

D.

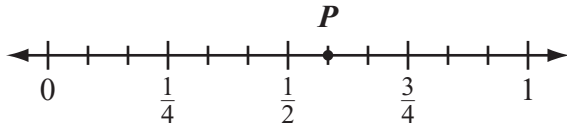**36** Which of the following could be the rule used to create the number pattern shown below?

$$250, \quad 130, \quad 70, \quad 40, \quad 25$$

A. Subtract 120.

B. Subtract 10; then divide the result by 2.

C. Divide by 2.

D. Divide by 2; then add 5 to the result.

37 Which of the following numbers best represents the location of point P on the number line below?

$$P$$

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{7}{9}$

D. $\frac{7}{12}$

38 Karen purchased a new camera for $60. She also purchased 5 rolls of film. The total cost of the camera and the rolls of film was $90. Karen's purchase is represented by the equation below. In the equation, f stands for the cost of each roll of film.

$$5f + 60 = 90$$

What was the cost of each roll of film that Karen purchased?

A. $6

B. $12

C. $18

D. $30

39 Alex practiced playing the piano each day last week. The number of minutes he practiced each day is shown in the table below.

Piano Practice Time per Day

Day	Time (minutes)
Sunday	55
Monday	20
Tuesday	25
Wednesday	45
Thursday	50
Friday	20
Saturday	30

What is the median number of minutes per day that Alex practiced last week?

A. 20 minutes

B. 30 minutes

C. 35 minutes

D. 45 minutes

Grade 6 Mathematics
Spring 2007 Released Items:
Reporting Categories, Standards, and Correct Answers

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	303	*Number Sense and Operations*	6.N.1	C
2	303	*Number Sense and Operations*	6.N.12	A
3	304	*Geometry*	6.G.9	C
4	304	*Number Sense and Operations*	6.N.9	B
5	304	*Patterns, Relations, and Algebra*	6.P.2	D
6	305	*Measurement*	6.M.7	C
7	305	*Number Sense and Operations*	6.N.13	B
8	305	*Number Sense and Operations*	6.N.3	B
9	305	*Data Analysis, Statistics, and Probability*	6.D.4	C
10	306	*Patterns, Relations, and Algebra*	6.P.4	
11	307	*Number Sense and Operations*	6.N.8	$2 \times 2 \times 3 \times 7$
12	307	*Geometry*	6.G.5	$2\frac{2}{3}$ or equivalent
13	308	*Geometry*	6.G.1	
14	309	*Number Sense and Operations*	6.N.8	A
15	309	*Number Sense and Operations*	6.N.14	C
16	310	*Patterns, Relations, and Algebra*	6.P.7	D
17	311	*Data Analysis, Statistics, and Probability*	6.D.1	
18	312	*Measurement*	6.M.2	C
19	312	*Number Sense and Operations*	6.N.4	B
20	312	*Patterns, Relations, and Algebra*	6.P.6	B
21	313	*Patterns, Relations, and Algebra*	6.P.3	D
22	313	*Number Sense and Operations*	6.N.2	C
23	313	*Number Sense and Operations*	6.N.5	D
24	314	*Patterns, Relations, and Algebra*	6.P.4	C
25	314	*Data Analysis, Statistics, and Probability*	6.D.2	B
26	315	*Number Sense and Operations*	6.N.7	A
27	316	*Measurement*	6.M.3	
28	317	*Number Sense and Operations*	6.N.6	$-1\frac{1}{2}$ or equivalent
29	317	*Geometry*	6.G.2	18
30	318	*Measurement*	6.M.1	54 feet
31	319	*Number Sense and Operations*	6.N.16	
32	320	*Patterns, Relations, and Algebra*	6.P.6	A
33	321	*Number Sense and Operations*	6.N.11	C
34	321	*Patterns, Relations, and Algebra*	6.P.1	C
35	321	*Geometry*	6.G.7	A
36	321	*Patterns, Relations, and Algebra*	6.P.1	D
37	322	*Number Sense and Operations*	6.N.6	D
38	322	*Patterns, Relations, and Algebra*	6.P.5	A
39	323	*Data Analysis, Statistics, and Probability*	6.D.1	B

* Answers are provided here for multiple-choice items and short-answer items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's Web site later this year.