Name _____

Minnesota Comprehensive Assessments-Series II

Mathematics Item Sampler
Grade 8

Minnesota
Department
of **Education**

Mathematics Test — Segment 1

Use the number line below to answer question 1.
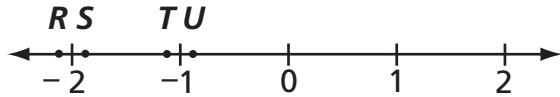
1. Which point on the number line represents the location of −1.96?

- **A.** R
- **B.** S
- **C.** T
- **D.** U

2. Anna said, "Any number that ends in a 7 is a prime number." Which of the following proves Anna's statement false?

- **A.** 7
- **B.** 17
- **C.** 27
- **D.** 37

3. The space shuttle weighs approximately 4.5 million pounds before take-off. After $8\frac{1}{2}$ minutes into its flight, the shuttle has used approximately 3.5 million pounds of its propellant fuel. Which is the space shuttle's weight in scientific notation after $8\frac{1}{2}$ minutes into its flight?

- **A.** 1.0×10^{-6}
- **B.** 1.0×10^{-5}
- **C.** 1.0×10^{5}
- **D.** 1.0×10^{6}

Go on to the next page.

Use the figure below to answer question 4.
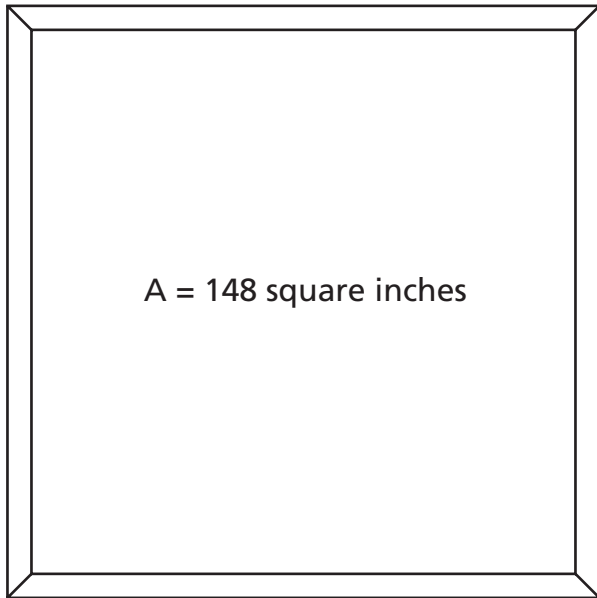
A = 148 square inches

4. The area of a square mirror is 148 square inches. Which integer is closest to the length of the pane of glass in inches?

A. 12
B. 13
C. 37
D. 74

5. Which of the following is equivalent to $\dfrac{4^5}{4^3}$?

A. 1^2

B. 1^8

C. 4^2

D. 4^8

6. Millie was told that 16 is a perfect square of a number. Which of these could Millie use to find what number squared equals 16?

A. 16^2

B. $16 \div 2$

C. $\sqrt{16}$

D. $16 \cdot 2$

Use the expression below to answer question 7.

$$9 + (12 - 7) \div 2 \cdot 4$$

7. What is the value of the expression above?

A. 2
B. 7
C. 19
D. 28

9

Use the information below to answer question 8.

$$1 \quad 7 \quad 13 \quad 19 \ldots$$

8. Mr. Davis wrote the above arithmetic progression on the board. What are the next two numbers in this progression?

    A. 21 27
    B. 23 29
    C. 25 31
    D. 27 33

Use the expression below to answer question 9.

$$(8n^4)(16n^2)$$

9. Which of these is equivalent to the expression?

    A. $2n^6$
    B. $2n^8$
    C. $128n^6$
    D. $128n^8$

Use the expression below to answer question 10.

$$\frac{(x+2)(x-3)}{x}$$

10. What is the value of the expression when $x = 7$?

    A. $\dfrac{18}{7}$

    B. $\dfrac{36}{7}$

    C. $\dfrac{60}{7}$

    D. $\dfrac{90}{7}$

11. The probability of 2 people in any given group of 13 people having the same birthday is about 15%. Based on this information, what is the probability of 2 people in any given group of 13 **not** having the same birthday?

    A. 2%
    B. 13%
    C. 50%
    D. 85%

12. Tisha used a 5-quart container to put 8 gallons of water in a fish tank. What is the minimum number of times she filled the 5-quart container?

- **A.** 4
- **B.** 6
- **C.** 7
- **D.** 8

Please fill in the grid with your answer to question 13 on page 2 of your answer book.

13. The odds of picking a green marble from a bag that contains only blue, white, and green marbles are 4 to 9. What is the probability of picking a green marble from the bag?

Go on to the next page.

14. Which list contains only rational numbers?

A. $-4,\ 0,\ \dfrac{1}{4},\ \sqrt{\dfrac{9}{4}}$

B. $0,\ \dfrac{1}{2},\ 1.5,\ \sqrt{8}$

C. $-2,\ 1,\ 2.\overline{6},\ \sqrt{\dfrac{3}{2}}$

D. $0,\ 0.\overline{36},\ 4,\ \sqrt{24}$

16. Mrs. Stanley has 24 yards of ribbon. She wants to cut the ribbon into pieces $\dfrac{3}{4}$ yard long. What is the maximum number of $\dfrac{3}{4}$-yard pieces of ribbon in 24 yards?

A. 12

B. 18

C. 30

D. 32

15. What type of number is $\sqrt{26}$?

A. Whole number

B. Integer

C. Rational number

D. Irrational number

17. There are 360 tickets available for the 8th-grade dance. The class sold 95% of the tickets in advance. How many tickets were **not** sold in advance?

A. 18

B. 34

C. 180

D. 342

2

Go on to the next page.

18. **Part A**   Determine a decimal that is between $\frac{7}{9}$ and $\frac{4}{5}$. Show or explain your work.

   Part B   Determine a fraction that is between $0.\overline{63}$ and $\frac{2}{3}$. Show or explain your work.

   Part C   Order the numbers in the number set below from least to greatest. Show or explain your work.

Number Set				
$\frac{4}{5}$	$\frac{2}{3}$	$0.\overline{63}$	71%	$\frac{7}{9}$

Be sure to show all your work in your answer book.

2

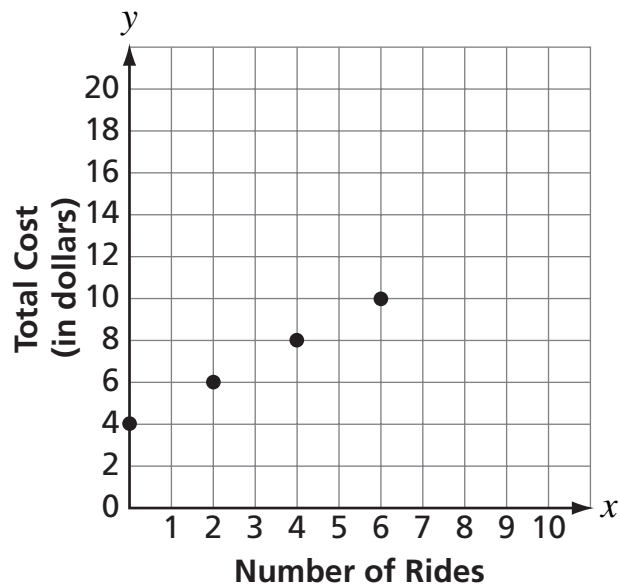Use the table below to answer question 19.

Marilyn's Points

Game	1	2	3	4
Number of Points	25	50	100	200

19. The table shows the number of points Marilyn won in each of 4 games. The pattern for the first four games continues. How many points will Marilyn win in game 5?

A. 225

B. 300

C. 400

D. 800

Use the graph below to answer question 20.

Amusement Park

20. The graph shows four different amounts spent at an amusement park for the cost of admission and rides. If each ride costs the same, what is the total cost for 1 admission and 10 rides?
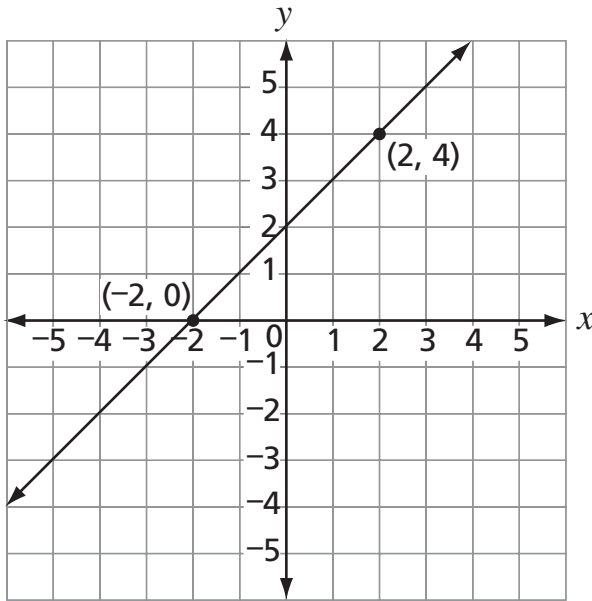
A. $6

B. $10

C. $12
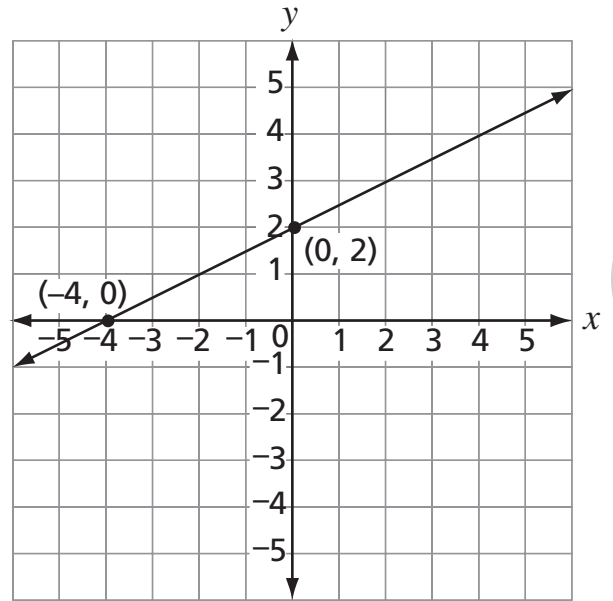
D. $14

2

Use the equation below to answer question 21.

$$y = \frac{1}{2}x + 2$$
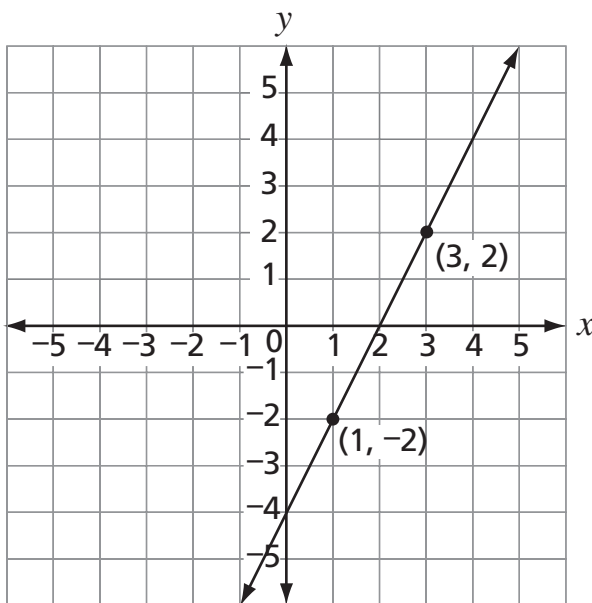
21. Which graph represents the equation above?

A.

(2, 4)

(−2, 0)

B.

(0, 2)

(−4, 0)

C.

(3, 2)
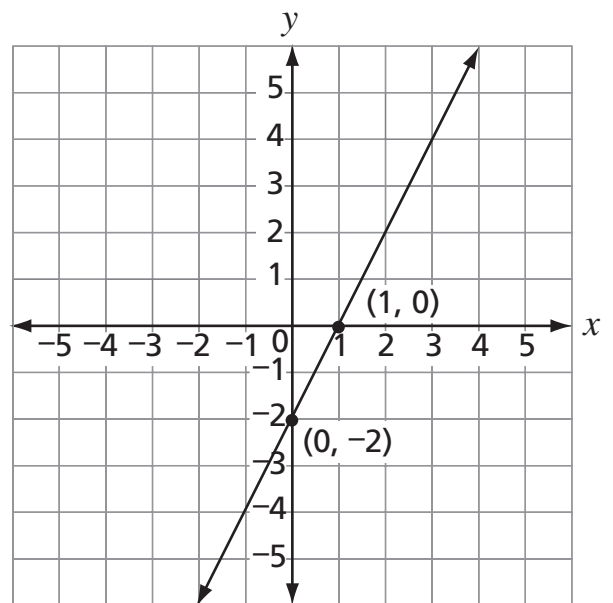
(1, −2)

D.

(1, 0)

(0, −2)

Go on to the next page.

Use the equation below to answer question 22.

$$C = 6.25x + 50$$

22. A caterer charges a $50 fee plus an additional $6.25 per person. She determines the total cost, C, for x people by using the equation shown above. How much will a party cost for 75 people?

    A. $125.00

    B. $469.25

    C. $518.75

    D. $718.25

Use the equation below to answer question 23.

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

23. What is 180° Celsius in degrees Fahrenheit?

    A. 82°F

   **B.** 212°F

    C. 324°F

    D. 356°F

24. The length of a standard piece of paper is 11 inches. About how many centimeters is 11 inches? (Use 2.54 centimeters for 1 inch.)

    A. 4.3

    B. 8.5

    C. 13.5

    D. 27.9

25. Conrad went to the mall to buy a CD for his brother. The original price of the CD was $15.95, but the store was offering a 15% discount. What was the cost of the CD after the discount?

    A. $13.56

    B. $14.45

    C. $15.80

    D. $18.34

2

Go on to the next page.

Use the graph below to answer question 26.
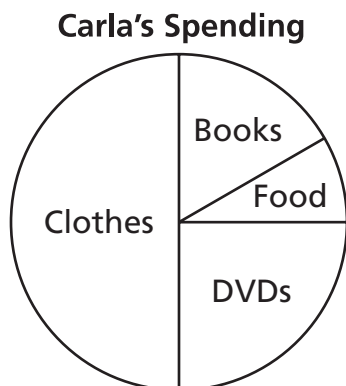
Carla's Spending

26. This circle graph represents how Carla spent some of the money she earned. Which list could show how Carla spent her money?

A.

Carla's Spending

Clothes	Books	Food	DVDs	Total
$120	$40	$20	$100	$280

B.

Carla's Spending

Clothes	Books	Food	DVDs	Total
$90	$15	$30	$45	$180

C.

Carla's Spending

Clothes	Books	Food	DVDs	Total
$150	$50	$25	$75	$300

D.

Carla's Spending

Clothes	Books	Food	DVDs	Total
$60	$30	$15	$30	$135

Use the information below to answer question 27.
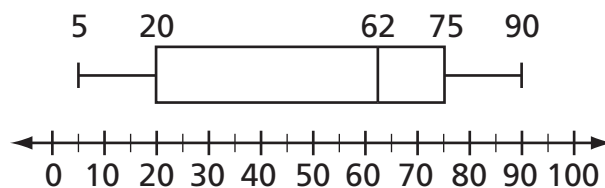
27. Which of the following can be determined from the box-and-whisker plot?

A. The interquartile range of the data set is 62.

B. The mean of the data is 62.

C. The mode of the data is 62.

D. The median of the data is 62.

2

Use the table below to answer question 28.

**April Precipitation in
Duluth, MN**

Year	Precipitation (inches)
1985	2.4
1986	4.1
1987	0.2
1988	0.4
1989	2.1
1990	3.8
1991	3.9
1992	2.9
1993	2.4
1994	4.1
1995	2.2
1996	1.5
1997	1.1
1998	1.4
1999	3.0

28. Which stem-and-leaf plot of these 15 numbers is correct?

A.
```
0 | 2 4
1 | 1 4 5
2 | 1 2 4 4 9
3 | 0 8 9
4 | 1 1
```

B.
```
2 | 1 2 4 4 9
4 | 1 1
0 | 2 4
3 | 0 8 9
1 | 1 4 5
```

C.
```
0 | 2 4
1 | 5 1 4
2 | 4 1 9 4 2
3 | 8 9 0
4 | 1 1
```

D.
```
0 | 2 4
1 | 1 4 5
2 | 1 2 4 9
3 | 0 8 9
4 | 1
```

Go on to the next page.

2

Use the information below to answer question 29.

19 36 24 40 17 43 30 31 37 28 45 32 16

29. What are the first quartile, median, and third quartile of this data set?

A. 21.5, 31, 37
B. 21.5, 31, 38.5
C. 24, 31, 38.5
D. 24, 31, 37

3

Go on to the next page.

Use the table below to answer question 30.

Depths of Minnesota Lakes

| Name of Lake	Depth (feet)
Lake Saganaga	240
Ten Mile	209
Lower LaSalle	204
Loon Lake	202
Rainy Lake	161
Leech Lake	150
Cass Lake	120
Otter Tail	120
Minnetonka	113
Vermillion	76
Winnibigoshish	70
Mille Lacs	42
Upper Red Lake	18

30. The depths of 13 Minnesota lakes are shown above. What is the first quartile of the data given above?

A.   18
B.   73
C.   120
D.   203

31. Matthew had exactly 20 pennies in his pocket. Five were Canadian pennies and the rest were U.S. pennies. If he took 1 penny out of his pocket at random, what are the odds that the penny would be Canadian?

A.   1 to 3
B.   1 to 4
C.   1 to 5
D.   1 to 20

3

Go on to the next page.

Use the spinner below to answer question 32.
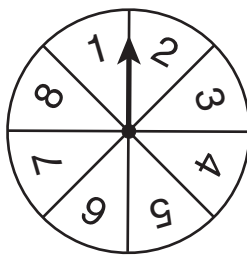
32. The spinner above is divided into 8 equal sections. The arrow of the spinner was spun 1,000 times. Which student's results are closest to the theoretical probability of the spinner?

A.   **Student A**

Outcome	Percent
1	12.5%
2	17.5%
3	10%
4	12.5%
5	7.5%
6	17.5%
7	12.5%
8	10%

B.   **Student B**

Outcome	Percent
1	11.6%
2	12.8%
3	13.2%
4	12%
5	11.2%
6	13.6%
7	12%
8	13.6%

C.   **Student C**

Outcome	Percent
1	5%
2	15%
3	10%
4	20%
5	15%
6	5%
7	5%
8	25%

D.   **Student D**

Outcome	Percent
1	27%
2	3%
3	0%
4	17%
5	19%
6	17%
7	11%
8	15%

3

Go on to the next page.
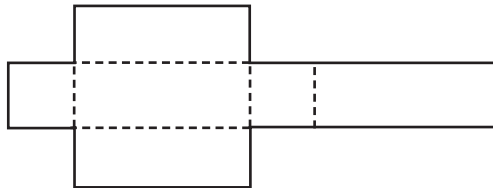
Use the figure below to answer
question 33.

33. Which of these nets could be folded
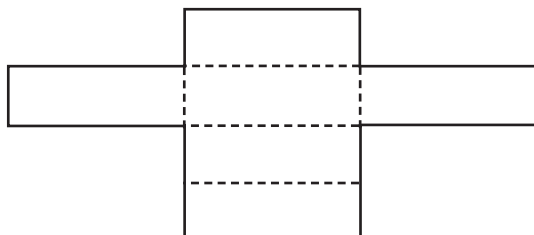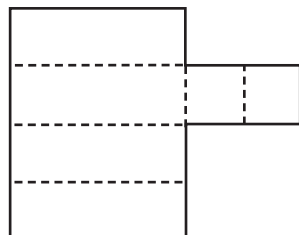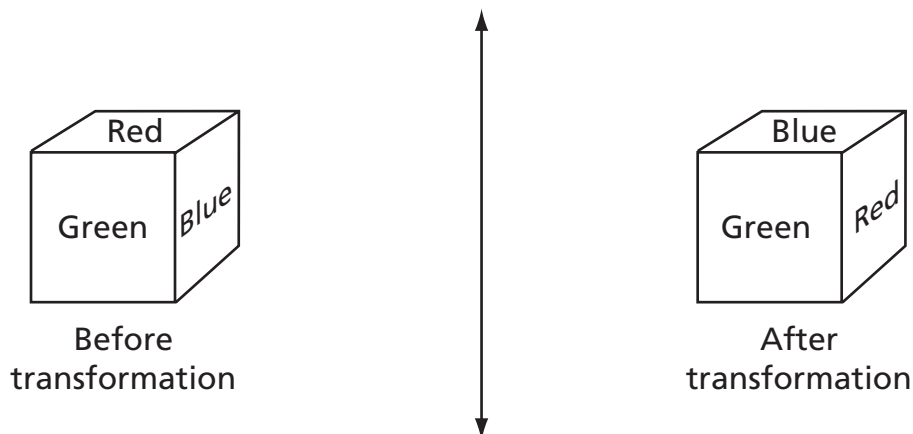to make the three-dimensional shape
above?

A.

B.

C.

D.

3
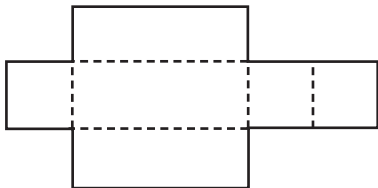
Use the figures below to answer question 34.

Before transformation

After transformation

34. The colors on the opposite sides of the cube are the same. A single transformation of the cube is shown. Which of the following describes the transformation?

A. Translation

B. Clockwise rotation

C. Reflection

D. Dilation

3

35. Jamie bought 2 rectangular rugs. The smaller rug has an area of 48 square feet and the larger rug has an area of 96 square feet. If both rugs have the same width, how does the length of the larger rug compare to the length of the smaller rug?

A. It is 2 feet shorter.

B. It is half as long.
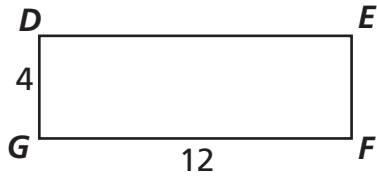
C. It is 2 feet longer.

D. It is twice as long.

Go on to the next page.
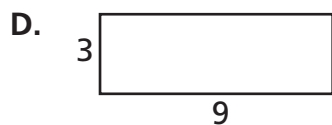
Use the diagrams below to answer question 36.
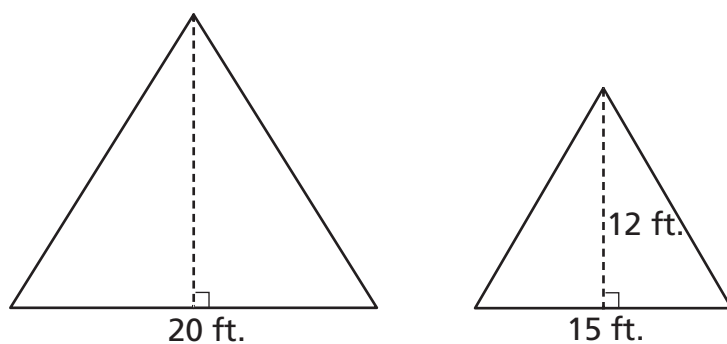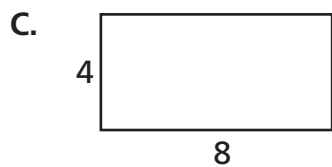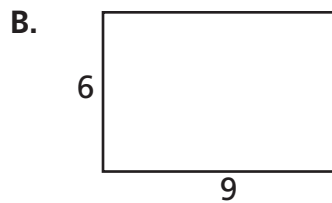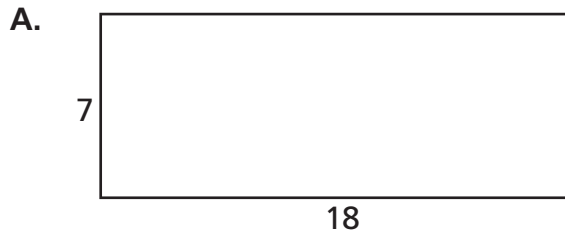

36. The sails of 2 boats are shaped like similar triangles. Based on the diagrams, what is the height of the larger sail?

- **A.** 16 ft.
- **B.** 17 ft.
- **C.** 23 ft.
- **D.** 25 ft.

3

Use the diagram below to answer question 37.

D _____ E
4 |
G |_____| F
       12

37. Which of the following rectangles is similar to rectangle $DEFG$?

A.

7 | (rectangle)
       18

B.

6 | (rectangle)
     9

C.

4 | (rectangle)
     8

D.

3 | (rectangle)
     9

Use the figure below to answer question 38.

25 feet

50 feet
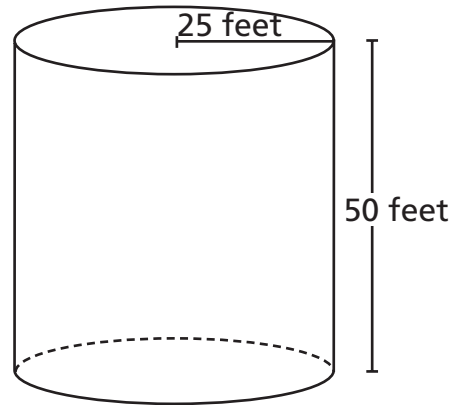
38. The dimensions of a cylindrical water tank are shown. Which is closest to the volume of the water tank? (Use 3.14 for π.)

A. 3,925 ft.^{3}

B. 7,850 ft.^{3}

C. 98,125 ft.^{3}

D. 308,113 ft.^{3}

3

Use the equation to answer question 39.

$$V = l \cdot w \cdot h$$

**39.** The volume V of a rectangular prism is given by the formula above, where l and w represent the length and width of the base, and h represents the height of the box. Garrett has a box in the shape of a rectangular prism that is 1.5 feet in height and 1 foot in length. The total volume of the box is 1.2 cubic feet. What is the width of Garrett's box?

A. 0.3

B. 0.8

C. 1.25

D. 1.8

Use the figure below to answer question 40.

2 feet
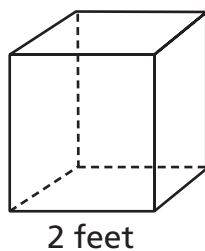
40. The figure above is a cube. What is the total surface area of the cube?

A. 6 square feet

B. 8 square feet

C. 20 square feet

D. 24 square feet

Use the figure below to answer question 41.
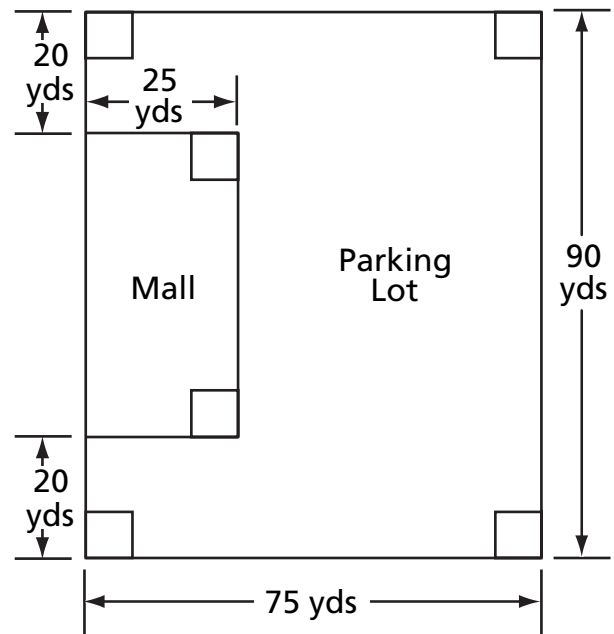
41. The parking lot at a mall extends around 3 sides of the mall as shown above. What is the total area of the parking lot?

A. 380 square yds

B. 1,250 square yds

C. 5,500 square yds

D. 6,750 square yds

Use the figure below to answer question 42.
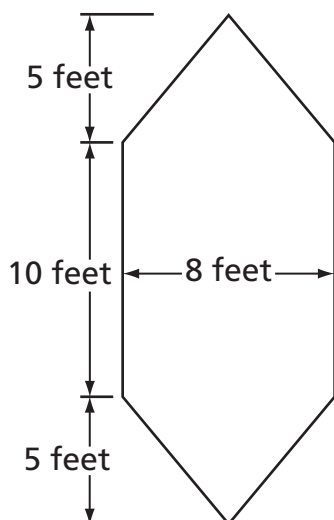
42. The pep club designed a banner shaped like the figure above. What is the area of the banner?

A. 100 square feet
B. 105 square feet
C. 120 square feet
D. 160 square feet

3

43. The inside of a school bus is 8 feet wide. A school bus manufacturer wants to put the widest benches possible in each row. The aisle between the two benches must be 1 foot 3 inches wide. What is the width of each of the two benches?

A. 3 feet 3.0 inches
B. 3 feet 4.5 inches
C. 3 feet 5.0 inches
D. 3 feet 6.0 inches

Please fill in the grid with your answer to question 44 on page 5 of your answer book.

Use the figure below to answer question 44.
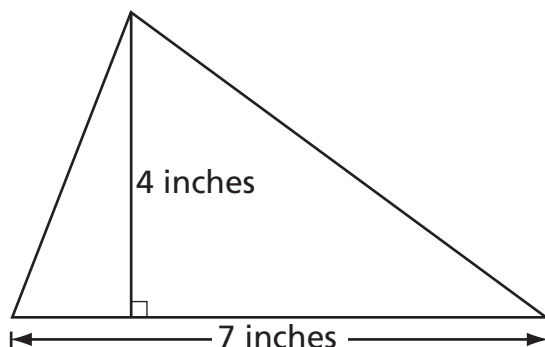
44. The base of the triangle above is increased to 11 inches and the height remains the same. What will be the increase in square inches of the area of the triangle?

45. The Eaton family rented a car for a weekend trip. The rate to rent the car was $30 per day plus $0.25 for each mile driven.

Part A   What is the cost of renting a car for 4 days and driving a total of 200 miles? Show or explain how you got your answer.

Part B   Write an expression to show the cost of renting a car for d days and driving m miles.

Part C   Show 2 different solutions that allow the Eatons to rent the car and not spend more than $150. For both solutions, explain the number of days they rent the car and the number of miles they drive.

Be sure to show all your work in your answer book.

3

Go on to the next page.

Grade 8 Teacher's Guide
MCA-II Item Sampler Answer Key
Grade 8 Math

Item #	Correct Answer	Item Type	Calculator Designation	Strand	Sub-Strand	Benchmark	Cognitive Level
1	B	MC	NC	II	A	1	A
2	C	MC	NC	II	A	2	A
3	D	MC	NC	II	A	3	A
4	A	MC	NC	II	B	2	B
				I	A	1	
5	C	MC	NC	II	B	3	A
6	C	MC	NC	II	B	4	A
7	C	MC	NC	II	B	5	B
8	C	MC	NC	III	A	1	A
9	C	MC	NC	III	B	1	B
10	B	MC	NC	III	B	4	B
11	D	MC	NC	IV	B	1	A
12	C	MC	NC	V	C	1	B
13	4/13	GR	NC	IV	B	2	B
14	A	MC	CL	II	A	4	A
15	D	MC	CL	II	A	4	A
16	D	MC	CL	II	B	1	B
17	A	MC	CL	II	B	1	B
18	See Annotation	CR	CL	II	B	1	B
				I	A	4	
19	C	MC	CL	III	A	1	B
20	D	MC	CL	III	A	2	B
21	B	MC	CL	III	A	3	B
22	C	MC	CL	III	B	2	B
23	D	MC	CL	III	B	2	B
24	D	MC	CL	III	B	3	B
25	A	MC	CL	III	B	3	B
26	C	MC	CL	IV	A	1	B
				I	A	1	
27	D	MC	CL	IV	A	1	B
				I	A	3	
28	A	MC	CL	IV	A	1	B
				I	A	3	
29	B	MC	CL	IV	A	2	B
30	B	MC	CL	IV	A	2	A
31	A	MC	CL	IV	B	2	B
32	B	MC	CL	IV	B	3	B
33	B	MC	CL	V	A	1	A
34	B	MC	CL	V	A	2	A
35	D	MC	CL	V	B	1	B
				I	A	6	
36	A	MC	CL	V	B	2	B
37	D	MC	CL	V	B	2	B
38	C	MC	CL	V	B	3	B
39	B	MC	CL	V	B	3	B
40	D	MC	CL	V	B	4	B
41	C	MC	CL	V	C	1	B
42	C	MC	CL	V	B	5	B
43	B	MC	CL	V	C	2	B
44	8	GR	CL	V	B	1	B
				I	A	3	
45	See Annotation	CR	CL	III	B	2	C
				I	A	2	