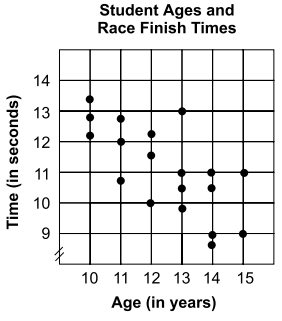
Session 1, Multiple-Choice Questions

Use the scatter plot to answer question 1.



1. In the scatter plot, each dot represents one student who participated in the 50-meter race. Ben is 15 years old. Based on the information in the scatter plot, what was Ben's time in the race?

   A. 9 seconds

   B. 10 seconds

   C. 11 seconds

✔ D. It cannot be determined.

Reporting Category/Substrand for Item 1: ***Statistics and Probability*/Statistics (p. 145)**

2. Which of the following is **closest** to 0.816 × 0.211?

✔ A. 0.16

   B. 16

   C. 1.6

   D. 160

Reporting Category/Substrand for Item 2: ***Number Sense*/Computation and Estimation (p. 142)**

3. A chemical solution is 0.5% iodine. How many milliliters of iodine are in 1,000 mL of solution?

   A. 0.5 mL

✔ B. 5 mL

   C. 50 mL

   D. 500 mL

Reporting Category/Substrand for Item 3: ***Number Sense*/Computation and Estimation (p. 142)**

Use the balance scales below to answer question 4.

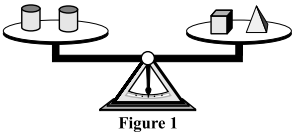


Figure 1

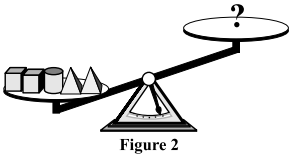


Figure 2

4. How many cylinders must be placed on the empty side of the second scale to make that scale balance?

✔ A. 5

B. 2

C. 3

D. 4

Reporting Category/Substrand for Item 4: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

5. What number comes next in this sequence?

5, 6, 9, 14, 21, _____

A. 26

B. 27

✔ C. 30

D. 32

Reporting Category/Substrand for Item 5: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

Session 1, Short-Answer Questions

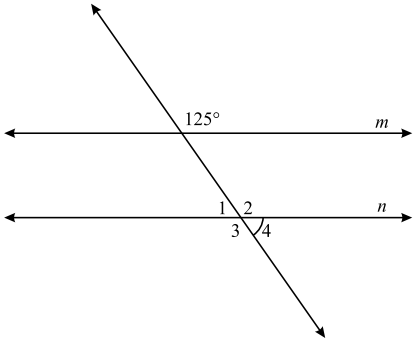
6. Compute:

$$35.2 - 5.74 =$$

Correct Answer: 29.46

Reporting Category/Substrand for Item 6: ***Number Sense*/Computation and Estimation (p. 142)**

Use the figure below to answer question 7.



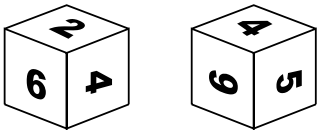
7. Lines *m* and *n* are parallel. What is the measure of ∠4?

Correct Answer: 55°

Reporting Category/Substrand for Item 7: ***Geometry and Measurement*/Geometry (p. 144)**

Session 1, Open-Response Question

8. John is playing a board game that uses a pair of number cubes with sides numbered 1 to 6.



To find how many spaces he can move on the board, he adds the two numbers he rolls. The possible sums are

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

a. Are all the sums John can roll equally likely? Explain your reasoning in detail.

b. John needs to roll a sum of exactly 11 in order to get another turn. What is the probability that he will roll a sum of exactly 11? Explain your reasoning in detail.

Reporting Category/Substrand for Item 8: ***Statistics and Probability*/Probability (p. 145)**

Session 1, Short-Answer Questions

9. Compute:

$$43.68 \times 2.5 =$$

Correct Answer: 109.2

Reporting Category/Substrand for Item 9: ***Number Sense*/Computation and Estimation (p. 142)**

10. Write the rule for the table shown below.

Input (x)	Output (y)
3	5
6	11
2	3
8	15

Correct Answers:
$2x - 1$ *or* $x + (x - 1)$

Reporting Category/Substrand for Item 10: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

11. What does y equal in the equation below?

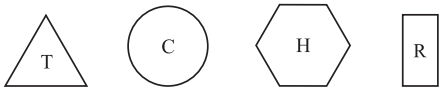
$$6 - 2y = -8$$

Correct Answer: 7

Reporting Category/Substrand for Item 11: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

Session 1, Open-Response Question

12. Erin is writing a science fiction story. She has invented a money system for her planet that uses four coins that she drew and named like this:



She has challenged her classmates to determine the relationships among the values of the coins from the following clues.

CLUE 1:
3 Cs are worth the same as 1 T and 1 C.

CLUE 2:
Kay bought a game costing H R R.
She gave the clerk 2 Hs. Her change was 1 R.

CLUE 3:
Kay and Max have the same amount of money.
Kay has 1 R, 4 Cs, and 1 H.
Max has 3 Rs and 6 Ts.

a. Use Clue 1 above to find how many C s equal 1 T . Use words or pictures to explain your reasoning.

b. Use Clue 2 to find how many R s equal 1 H . Use words or pictures to explain your reasoning.

c. Use Clue 3 and your answers to parts a and b to find how many T s equal 1 R. Use words or pictures to explain your reasoning.

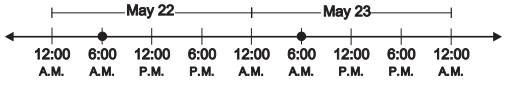
d. Erin told her classmates that 1 C is worth 25¢ in U.S. money. What is the value in U.S. money of **each** of the following?

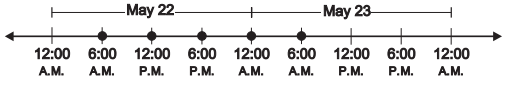
- 1 T
- 1 R
- 1 H

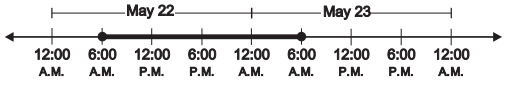
Reporting Category/Substrand for Item 12: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

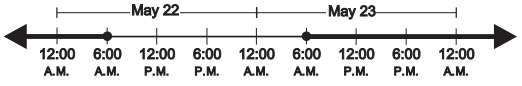
Session 2, Multiple-Choice Questions

13. NASA says conditions will be right for launching the space shuttle from 6:00 A.M. on May 22 to 6:00 A.M. on May 23. Which graph shows when the shuttle can be launched?

A.


B.


✔ C.


D.


Reporting Category/Substrand for Item 13: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

14. Which expression tells how much money a shopper has left if x represents the amount the shopper started with and s represents the amount spent?

A. $s - x$

B. $s + x$

C. $x \div s$

✔ D. $x - s$

Reporting Category/Substrand for Item 14: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

15. The following shows the first five rows of Pascal's triangle.

Row 1: 1
Row 2: 1 1
Row 3: 1 2 1
Row 4: 1 3 3 1
Row 5: 1 4 6 4 1

Which of the following represents the **8th row**?

✔ A. 1 7 21 35 35 21 7 1

B. 1 7 21 35 21 7 1

C. 1 5 5 10 10 5 5 1

D. 1 5 10 10 5 1

Reporting Category/Substrand for Item 15: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

16. A bag contains 2 blue, 6 black, and 4 white socks. Paula is going to draw out a sock without looking in the bag. What is the probability that she will draw **either** a blue **or** a black sock?

A. $\frac{1}{6}$

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

C. $\frac{1}{2}$

✔ D. $\frac{2}{3}$

Reporting Category/Substrand for Item 16: ***Statistics and Probability*/Probability (p. 145)**

17. The formula for the surface area *(SA)* of a cube is

$$SA = 6e^2, \text{ where } e \text{ is the length of an edge of the cube.}$$

An edge of a red cube is twice as long as an edge of a blue cube. How many times greater is the surface area of the red cube than that of the blue cube?

A. 2 times greater

✔ B. 4 times greater

C. 6 times greater

D. 12 times greater

Reporting Category/Substrand for Item 17: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

18. Which of the following measurements would **most likely** be given with a **negative** exponent in scientific notation?

✔ A. the diameter of a blood cell in centimeters

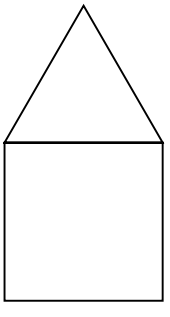
B. the distance to the Sun in kilometers

C. the weight of a pencil in grams

D. the mass of a rocket in kilograms

Reporting Category/Substrand for Item 18: ***Number Sense*/Number and Number Relationships (p. 141)**

19. In the figure on the right, the perimeter of the equilateral triangle is 24 inches.
What is the **area** of the square?



A. 32 sq. in.

✔ B. 64 sq. in.

C. 476 sq. in.

D. 12 sq. in.

Reporting Category/Substrand for Item 19: ***Geometry and Measurement*/Measurement (p. 144)**

20. The Massachusetts Department of Employment and Training predicted that there will be 21% more jobs for computer programmers in Massachusetts in 2005 than there were in 1994. There were 15,970 programming jobs in 1994. Based on the prediction, about how many **new** jobs will be available by 2005?

    A. 350

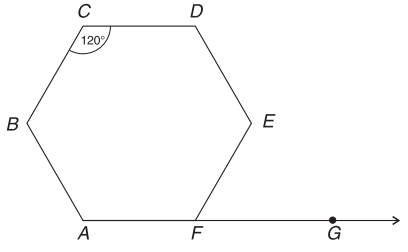
    B. 750

    C. 2,750

✔ D. 3,350

Reporting Category/Substrand for Item 20: ***Number Sense*/Computation and Estimation (p. 142)**

Use the regular hexagon below to answer question 21.



21. How many degrees are in $\angle EFG$?

    A. 80°

    B. 240°

✔ C. 60°

    D. 120°

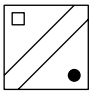
Reporting Category/Substrand for Item 21: ***Geometry and Measurement*/Geometry (p. 144)**

22. The following figure is to be rotated 90° clockwise.

What will the figure look like after the rotation?

A. 

B. 

C. 

✔ D. 

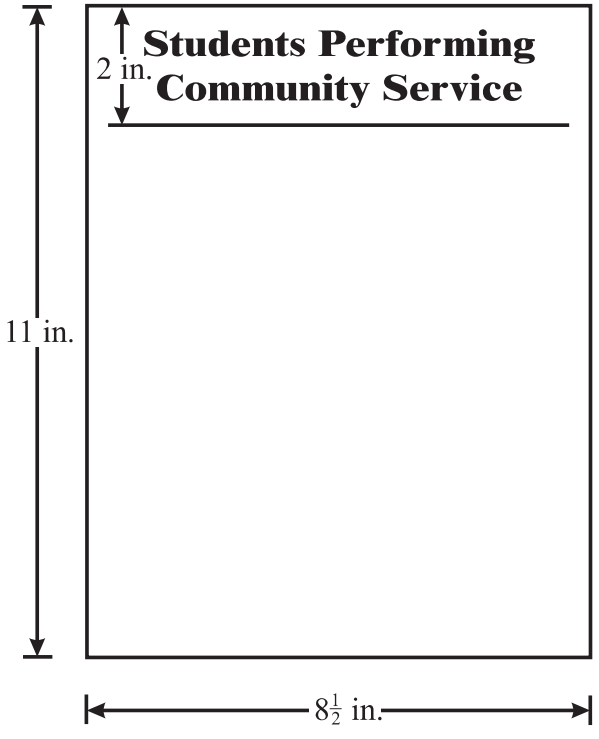
Reporting Category/Substrand for Item 22: ***Geometry and Measurement*/Geometry (p. 144)**

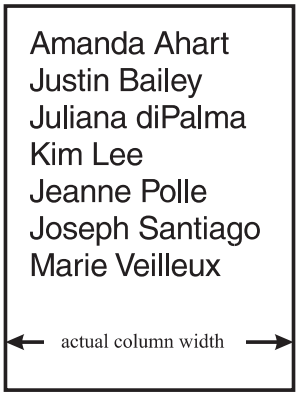
Session 2, Open-Response Question

Use your ruler to answer this open-response question.

23. Jarrod is the editor of the school newspaper. In the next issue, a page will be devoted to a list of the students who perform community service. Jarrod is planning how to arrange the names.

The first figure below tells the size of the page and the headline. The second figure shows the actual size of type that will be used for the students' names and the actual width of each column.





Actual size of type and column width, including margins.

There are 175 students who performed community service. Jarrod wants to plan the page so that

- the page has the greatest number of columns possible, and
- the columns are as close to the same length as possible.

a. What is the greatest number of columns that Jarrod can put on the page? Show or describe how you found your answer.

b. How many names should he put in each column so that the columns are of equal length or as close to equal length as possible? Assume each name will fit on one line in a column.

c. How long will each column of names be? Show or describe how you found your answer.

Reporting Category/Substrand for Item 23: ***Geometry and Measurement*/Measurement (p. 144)**

Session 3, Multiple-Choice Questions

24. Jasmine needs to reduce the height of a picture from 3 inches to 2 inches so it will fit in the school yearbook. The new height is what percent of the original height?

✔ A. $66\frac{2}{3}\%$

B. $33\frac{1}{3}\%$

C. 50%

D. 75%

Reporting Category/Substrand for Item 24: ***Number Sense*/Computation and Estimation (p. 142)**

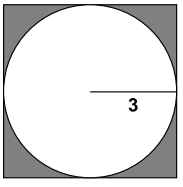
25. What is the area of the **shaded** region in the figure below? (Use 3.14 for π.)

A. 5.15 sq. units

B. 17.16 sq. units

✔ C. 7.74 sq. units

D. 21.72 sq. units



Reporting Category/Substrand for Item 25: ***Geometry and Measurement*/Geometry (p. 144)**

Use the following table to answer question 26.

Lowest Recorded Temperatures

Boston	–12°F
Hartford	–26°F
Mobile	3°F

26. Which lists the cities in order from the one with the lowest recorded temperature to the one with the highest?

A. Boston, Hartford, Mobile

✔ B. Hartford, Boston, Mobile

C. Mobile, Boston, Hartford

D. Mobile, Hartford, Boston

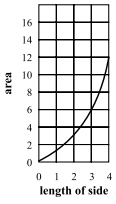
Reporting Category/Substrand for Item 26: ***Number Sense*/Number Systems and Number Theory (p. 142)**

27. The formula for the area, A, of a square is:

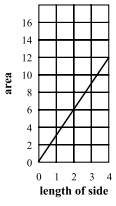
$A = s^2$, where s is the length of the side of the square.

Which graph shows the relationship between the length of one side of a square and its area?

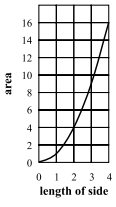
A.



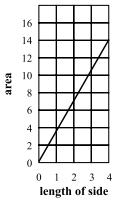
B.



✔ C.



D.



Reporting Category/Substrand for Item 27: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

28. The diagonal of a square is 25 units long. Which is the approximate length of a side of the square?

✔ A. 18 units

B. 15 units

C. 5 units

D. 13 units

Reporting Category/Substrand for Item 28: ***Geometry and Measurement*/Measurement (p. 144)**

29. Chris selected 50 students at random and asked them who they want for class president. The results are shown in the table below.

Candidate	Frequency
Jessica	30
Jeremy	4
Monique	16

Which statement is true regarding the probability that at least 5 of the next 10 students interviewed will want Jeremy for president?

A. It is impossible.

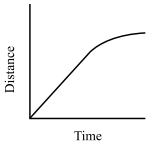
✔ B. It is unlikely.

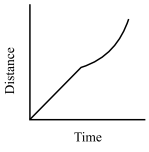
C. It is likely.

D. It is certain.

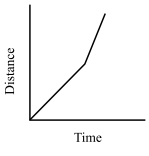
Reporting Category/Substrand for Item 29: ***Statistics and Probability*/Probability (p. 145)**

30. Kathy rode her bicycle from her house to the top of a nearby hill. First, she traveled very fast on a level road. Then, she traveled more and more slowly as she went up the hill. Which graph best shows the distance she traveled over time?

✔ A. 

B. 

C. 

D. 

Reporting Category/Substrand for Item 30: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

31. Suppose that for a **positive** number n,

$$n \div 7 = a \quad \text{and} \quad n \div 8 = b.$$

How do a and b compare?

A. $a < b$

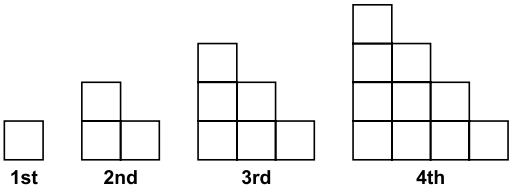
B. $a = b$

✔ C. $a > b$

D. It depends on the value of n.

Reporting Category/Substrand for Item 31: ***Number Sense*/Number Systems and Number Theory (p. 142)**

32. Each arrangement in the pattern below is made up of square tiles.



Which expression tells how many tiles are in the nth arrangement of this pattern?

A. $n(n + 1)$

B. $n(n - 1)$

C. $2n - 1$

✔ D. $\frac{n}{2}(n + 1)$

Reporting Category/Substrand for Item 32: ***Patterns, Relations, and Functions*/Algebra (p. 143)**

33. How does 80% of a number greater than 0 compare with that number?

A. It is greater than that number.

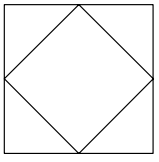
✔ B. It is less than that number.

C. It is equal to that number.

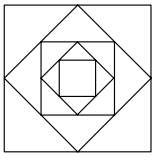
D. It depends on the number.

Reporting Category/Substrand for Item 33: ***Number Sense*/Number and Number Relationships (p. 141)**

34. Myra drew a square. She drew another square inside the first square as shown below.



Then she drew a square inside her second square, a square inside her third square, and so on. After she had drawn five squares, her figure looked like this:



Which expression tells the number of right angles in Myra's figure after she drew exactly n squares?

A. $2n$

✔ B. $4n$

C. n^2

D. $2n^2$

Reporting Category/Substrand for Item 34: ***Patterns, Relations, and Functions*/Patterns and Functions (p. 143)**

35. The Massachusetts Highway Department is responsible for more than 66.5 million feet of roadway in Massachusetts. **About** how many miles is 66.5 million feet?

A. 4,200 miles

B. 35,100 miles

✔ C. 12,600 miles

D. 11,700 miles

Reporting Category/Substrand for Item 35: ***Geometry and Measurement*/Measurement (p. 144)**

36. Which of the following terms best completes this sentence?

Triangle is to equilateral triangle as quadrilateral is to _____.

A. rectangle

B. trapezoid

C. parallelogram

✔ D. square

Reporting Category/Substrand for Item 36: ***Geometry and Measurement*/Geometry (p. 144)**

37. When Matt's and Damien's broad jumps were measured **accurately to the nearest foot,** each measurement was 21 feet. Which statement best describes the greatest possible difference in the lengths of Matt's jump and Damien's jump?

A. One jump could be up to $\frac{1}{4}$ foot longer than the other.

B. One jump could be up to $\frac{1}{2}$ foot longer than the other.

✔ C. One jump could be up to 1 foot longer than the other.

D. One jump could be up to 2 feet longer than the other.

Reporting Category/Substrand for Item 37: ***Geometry and Measurement*/Measurement (p. 144)**

Session 3, Open-Response Questions

38. The planning committee at Lane Middle School is planning a pizza party for its 127 eighth-grade students. They got this menu from The Pizza Palace.

The planning committee took a survey of a random sample of 26 eighth-grade students by asking, "What kind of pizza do you want?" This is what they found.

Favorite Kind of Pizza				
Kind of pizza	Cheese	Sausage	Pepperoni	Vegetarian
Number of students	7	3	9	7

The committee has a budget of $300 for the pizza. What kinds and sizes of pizzas could the committee order so that each of the 127 students can have his or her favorite kind of pizza?

a. Explain how you used the results of the survey to decide which pizzas to order.

b. Show or describe the calculations needed to be sure that there will be enough pizza for the 127 students.

c. Show or describe the calculations needed to be sure that the cost of the pizzas totals $300 or less.

You do **not** need to find the cheapest way to buy enough pizza. You only need to make sure that the total cost is $300 or less.

Reporting Category/Substrand for Item 38: ***Number Sense*/Computation and Estimation (p. 142)**

39. For Tiffany and Miguel's science fair project, they dropped the same ball from a height of 200 centimeters 20 times. Each time they dropped the ball, they measured how high it bounced on its first four bounces. The table below gives the average of their measurements.

Average Height of Ball Bounces (drop height = 200 cm)	
Height of 1st bounce	153 cm
Height of 2nd bounce	110 cm
Height of 3rd bounce	86 cm
Height of 4th bounce	63 cm

a. Using the grid in your answer booklet, draw a graph showing the data in the table. Be sure to label the axes.

b. Predict the height of the 5th bounce.

c. Describe the pattern that can be used to predict the height of the bounces.

*Reporting Category/*Substrand for Item 39: ***Statistics and Probability/*Statistics (p. 145)**