Session 1, Multiple-Choice Questions

1 The value of $\frac{51.92 \times 202}{4.93}$ is closest to

A. 20.

B. 200.

✔ C. 2,000.

D. 20,000.

Reporting Category for Item 1: ***Number Sense and Operations*** **(p.315)**

2 If $4 + 2(3x - 4) = 8$, then $3x - 4$ equals

A. 4.

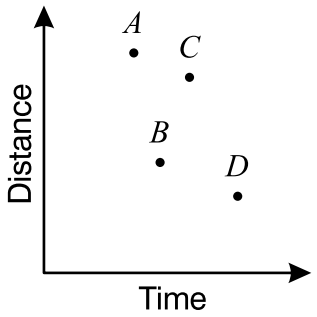
✔ B. 2.

C. 8.

D. 6.

Reporting Category for Item 2: ***Number Sense and Operations*** **(p.315)**

3 The scatter plot below gives information about four different car trips.



Which point represents the trip with the fastest average speed?

✔ A. point *A*

B. point *B*

C. point *C*

D. point *D*

Reporting Category for Item 3: ***Data Analysis, Statistics, and Probability*** **(p. 318)**

4 $2^4 \cdot 3^4$ is the same as

A. 5^4.

B. 5^8.

✔ C. 6^4.

D. 6^8.

Reporting Category for Item 4: ***Number Sense and Operations*** **(p.315)**

5 Let a, x, and y represent real numbers with $a > 0$ and $x > y$. Which of the following statements is **not** true?

A. $ax > ay$

✔ B. $ay > ax$

C. $x + a > y + a$

D. $x - a > y - a$

Reporting Category for Item 5: ***Number Sense and Operations*** **(p.315)**

6 $2\sqrt{5}$ is between

A. 2 and 3.

✔ B. 4 and 6.

C. 6 and 9.

D. 9 and 12.

Reporting Category for Item 6: ***Number Sense and Operations*** **(p.315)**

7 The sophomore class plans to sell T-shirts with the school's name on them. The cost of each T-shirt alone is $3.50, and the printing cost of each is $0.75. If the class plans on selling each printed T-shirt for $11, what expression can you use to calculate the class profit for selling n printed T-shirts?

A. $11.00 - (3.50 + 0.75)n$

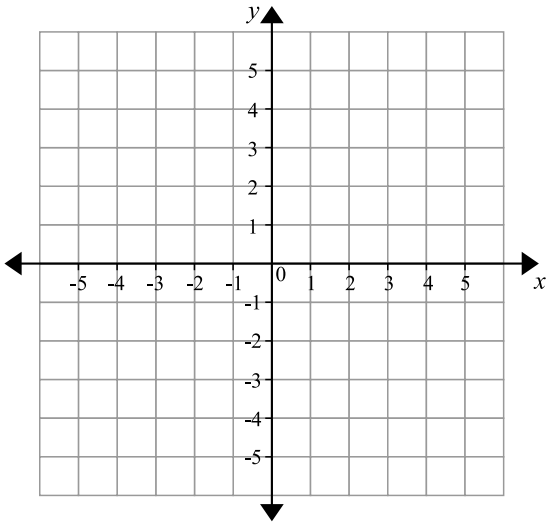
B. $11.00n - (3.50 + 0.75)$

C. $11.00 - 3.50 - 0.75n$

✔ D. $(11.00 - 3.50 - 0.75)n$

Reporting Category for Item 7: ***Patterns, Relations, and Algebra*** **(p.316)**

You may want to use the following coordinate plane to help you answer question 8.



8 As the result of a transformation, the image of the point $(-1,3)$ is $(-3,1)$. This is an example of a reflection across the

A. line $y = x$.

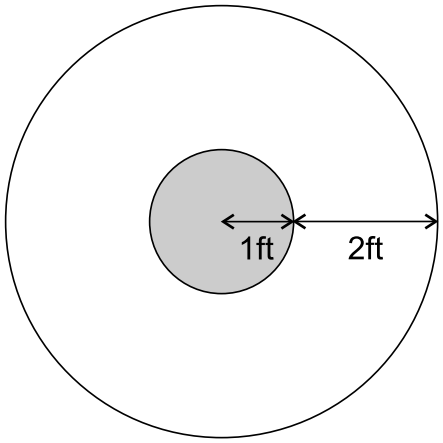
✔ B. line $y = -x$.

C. x-axis.

D. y-axis.

Reporting Category for Item 8: ***Geometry*** **(p.316)**

9 Julie designed a target computer game. On her computer screen, the circular targets look like the circular areas shown below.



If the computer randomly generates a dot that lands within the circular areas, what is the approximate probability that the dot will land in the **shaded** area?

✔ A. $\frac{1}{9}$

B. $\frac{2}{9}$

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

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

Reporting Category for Item 9: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

10 Which of the following is **always** true?

✔ A. The product of any two integers is an integer.

B. The quotient of any two integers is an integer.

C. The product of any two irrational numbers is irrational.

D. The quotient of any two irrational numbers is irrational.

Reporting Category for Item 10: ***Number Sense and Operations*** **(p.315)**

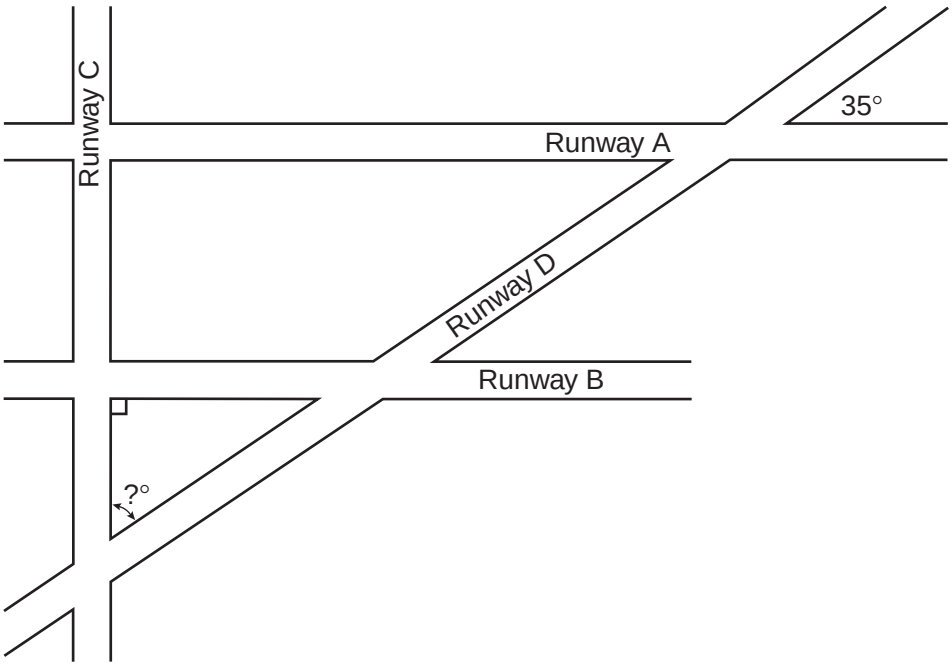
Session 1, Short-Answer Questions

11 In Oak Park, a picnic table is located 70 feet from the water fountain and 90 feet from the swings. What is the longest possible distance that the water fountain could be from the swings?

Correct Answer:
160 feet

Reporting Category for Item 11: ***Geometry*** **(p. 287)**

Use the diagram below to answer question 12.



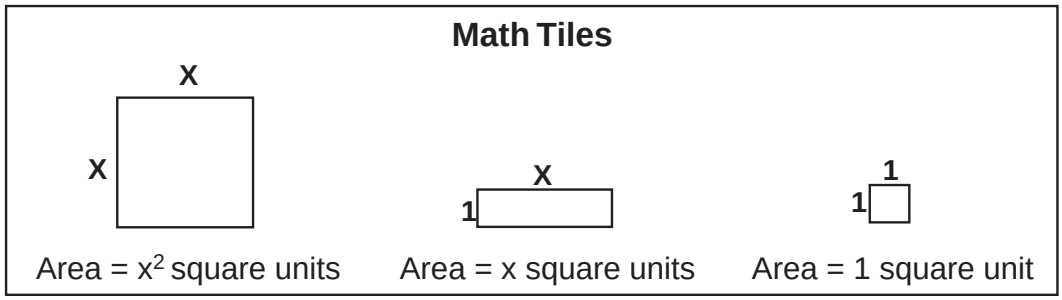
12 Runways A and B are parallel to each other and perpendicular to Runway C. If Runway D makes a 35° angle with Runway A as shown in the diagram, what is the measure of the angle marked in the diagram between Runways C and D?

Correct Answer:
55°

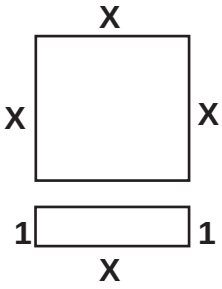
Reporting Category for Item 12: ***Geometry*** **(p. 287)**

Session 1, Open-Response Question

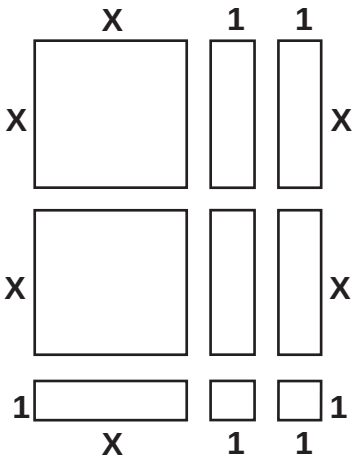
Use the figure below to answer question 13.



13 In the figures below, math tiles were used to build rectangular arrays to represent each of the quadratic expressions.



$x(x + 1)$ or $x^2 + x$



$(x + 2)(2x + 1)$ or $2x^2 + 5x + 2$

a. Show how to build rectangular arrays, if possible, for each of the following expressions using the three math tiles.

$2x^2 + 3x + 1$ $3x^2 + 2x$ $3x^2 + 6x + 5$

b. How can you determine if a rectangular array can be built for an expression?

Reporting Category for Item 13: ***Patterns, Relations, and Algebra*** **(p.316)**

Session 1, Short-Answer Questions

14 Find **all** the values of x that satisfy the following equation.

$$x^2 + 2x - 15 = 0$$

Correct Answer:

-5, 3, or $x = -5$ and $x = 3$

Reporting Category for Item 14: ***Patterns, Relations, and Algebra*** **(p.316)**

15 At the first stop, $\frac{3}{4}$ of the passengers on the bus got off and 8 people got on. A total of 16 passengers were left on the bus. Write an equation that can be solved to find how many passengers were on the bus before the first stop. Let x represent the number of passengers on the bus before the first stop. (You do **not** have to solve the equation.)

Correct Answer:

$\frac{1}{4}x + 8 = 16$ or equivalent equation

Reporting Category for Item 15: ***Patterns, Relations, and Algebra*** **(p.316)**

Session 1, Open-Response Question

16 When Elena works on Saturdays, she buys a salad and juice for lunch. There are two take-out restaurants near where she works. The prices in the two restaurants are given below.

Hector's To-Go	Tammy's Take-Out
Juice.....$2.00 per bottle	Juice.....$1.00 per bottle
Salad bar.....25¢ per ounce	Salad bar.....50¢ per ounce

a. How many ounces of salad, together with a bottle of juice, can Elena buy at Hector's To-Go for $4.50?

b. Write an equation that shows the cost, *C*, of Elena's lunch at Hector's To-Go if she buys a bottle of juice and *n* ounces of salad.

c. On the grid in your Student Answer Booklet, graph the equation you wrote in part b.

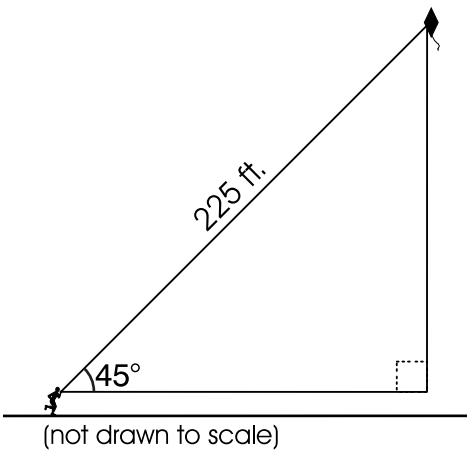
- Use the horizontal axis for the number of ounces, with each increment representing one ounce.
- Use the vertical axis for cost, with each increment representing 50¢.

d. What are the different amounts of salad that Elena can buy so her complete lunch is less expensive at Tammy's Take-Out than at Hector's To-Go? Remember that Elena always buys a bottle of juice with her salad. Show or explain how you found your answer.

Reporting Category for Item 16: ***Patterns, Relations, and Algebra*** **(p.316)**

Session 2, Multiple-Choice Questions

Use the diagram below to answer question 17.



17 It is believed that the best angle to fly a kite is 45°. If you fly a kite at this angle and let out 225 feet of string, **approximately** how high above the ground will the kite be?

A. 250 feet

B. 200 feet

✔ C. 150 feet

D. 100 feet

Reporting Category for Item 17: ***Geometry*** **(p.316)**

18 The table below shows the distribution of CD sales of different types of music in a local store over a three-year period.

CD Sales

Type	Year 1	Year 2	Year 3
Rock	39.4%	36.2%	35.6%
Pop	17.8%	16.5%	15.5%
Rap	11.6%	10.4%	10.7%
Country	7.7%	7.9%	7.8%
Other	23.5%	29.0%	30.4%
Total Sales (in thousands)	**$1,732.10**	**$2,269.30**	**$2,639.80**

Based on this information, from Year 1 to Year 3 the **total dollar value** of this store's sales of pop music

✔ A. increased.

B. decreased.

C. stayed the same.

D. Not enough information is given to tell.

Reporting Category for Item 18: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

Use the expression below to answer question 19.

$$2x - 3(5x - 8)$$

19 Which could be the first step in simplifying the expression above?

A. $2x - 15x + 8$

B. $2x - 15x - 24$

C. $2x - 15x - 8$

✔ D. $2x - 15x + 24$

Reporting Category for Item 19: ***Number Sense and Operations*** **(p.315)**

Use the pattern below to answer question 20.

1, 3, 7, 15, 31, 63

20 The 14th term in this pattern is 16,383. What is the 15th term?

A. 16,385

B. 16,415

✔ C. 32,767

D. 32,781

Reporting Category for Item 20: ***Patterns, Relations, and Algebra*** **(p.316)**

Session 2, Open-Response Questions

21 Ms. Kemay started a small computer software business seven months ago. The following spreadsheet shows her income and expenses for each of the seven months.

Kemay Computer Software		
Month	**Income**	**Expenses**
Sept.	$7,550	$9,700
Oct.	$9,500	$10,250
Nov.	$11,510	$10,850
Dec.	$13,400	$11,280
Jan.	$15,580	$11,870
Feb.	$17,450	$12,320
Mar.	$19,620	$12,950

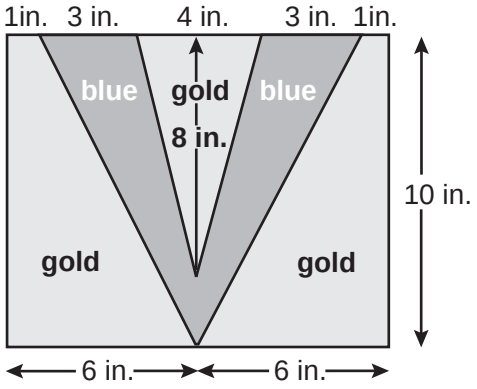
a. On the grid in your Student Answer Booklet, construct two line graphs using the **same axes**, one showing Ms. Kemay's income and one showing her expenses for the seven-month period.

b. Assuming that her income and expenses continue to grow at approximately the same rate, estimate her income and expenses for the month of May. Explain or show how you found your estimates.

c. Again, assuming that her income and expenses continue to grow at approximately the same rate, estimate in which month her profit (profit = income minus expenses) will, for the first time, be greater than $13,000. Explain or show how you found your estimates.

Reporting Category for Item 21: ***Number Sense and Operations*** **(p.315)**

Use the graphic below to answer question 22.



22 Students at Viking High School decide to have T-shirts made with a blue "V" inside a gold rectangle as shown in the diagram above.

The costs are as follows:

- plain T-shirt $8.50
- blue coloring $0.02 per square inch
- gold coloring $0.04 per square inch

a. What is the area of the blue "V" in the diagram above? Show your work.

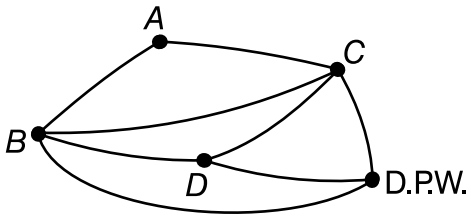
b. Explain how you can determine the area that will be colored gold.

c. What will be the total cost for each T-shirt shown above? Show your work.

Reporting Category for Item 22: ***Measurement*** **(p.317)**

Session 3, Multiple-Choice Questions

Use the map below to answer question 23.



23 Mr. Hendricks operates a snowplow for the Department of Public Works (D.P.W.). He found that he can

- begin snowplowing at the D.P.W.
- plow every street shown on the map above without going over any street more than once, and
- end at his home.

Where is his home located?

A. at *A*

B. at *B*

C. at *C*

✔ D. at *D*

Reporting Category for Item 23: ***Geometry*** **(p.316)**

24 Which of the following shows an application of the distributive property?

A. $(6xy + 4xy) + 2xz = 6xy + (4xz + 2xz)$

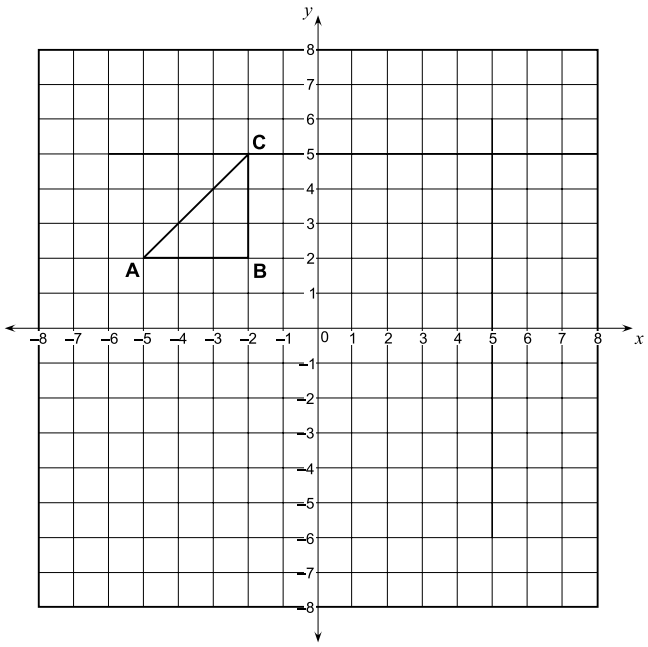
B. $2xy + 3xz + 5xy = 2xy + 5xy + 3xz$

✔ C. $4xy - 12xz = 4x(y - 3z)$

D. $-5xy + 5xy + 3xz = 3xz$

Reporting Category for Item 24: ***Number Sense and Operations*** **(p.315)**

Use the graph below to answer question 25.



25 Suppose that ΔABC is reflected over the x-axis. What are the coordinates of the image of point C?

A. (2,5)

B. (2,−5)

C. (−2,5)

✔ D. (−2,−5)

Reporting Category for Item 25: ***Geometry*** **(p.316)**

26 A set of 36 cards is numbered with the positive integers from 1 to 36. If the cards are shuffled and one is chosen at random, what is the probability that the number on the card is a multiple of **both 4 and 6**?

✔ A. $\frac{1}{12}$

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

C. $\frac{5}{12}$

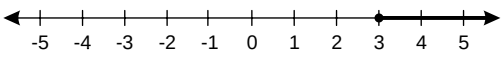
D. $\frac{2}{3}$

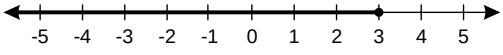
Reporting Category for Item 26: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

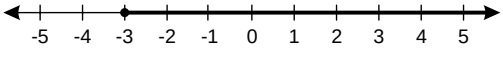
Use the inequality below to answer question 27.

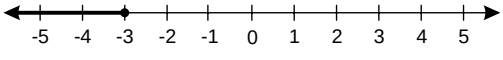
$$5 - x \leq 8$$

27 Which graph represents the solution set for the inequality?

A. 

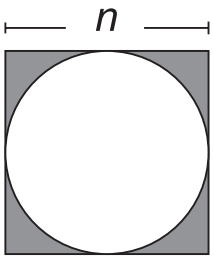
B. 

✔ C. 

D. 

Reporting Category for Item 27: ***Patterns, Relations, and Algebra*** **(p. 286)**

28 Which expression represents the area of the shaded portion of the square below?



A. $n^2 - \pi n$

B. $n^2 - 2\pi n$

C. $n^2 - (\pi n^2)$

✔ D. $n^2 - \left(\frac{n}{2}\right)^2 \pi$

Reporting Category for Item 28: ***Measurement*** **(p.317)**

29 The expression $4x^2 + 2x - 6 - x(3 - x)$ is equivalent to

✔ A. $5x^2 - x - 6$.

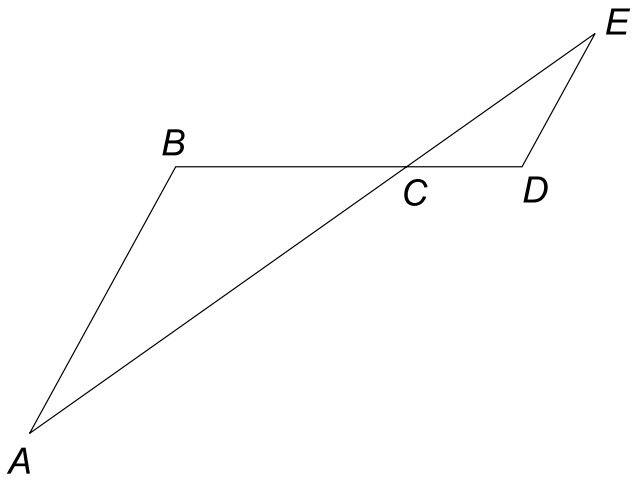
B. $4x^2 - 2x - 6$.

C. $3x^2 + 2x - 6$.

D. $5x^2 - 6$.

Reporting Category for Item 29: ***Patterns, Relations, and Algebra*** **(p.316)**

Use the figure below to answer question 30.



30 Which of the following statements gives enough additional information about the figure above to prove that ΔABC is similar to ΔEDC?

A. $\overline{BC}$ is the same length as $\overline{EC}$.

B. $\overline{BC}$ is twice as long as $\overline{CD}$.

✔ C. $\angle B$ is congruent to $\angle D$.

D. $\angle BCA$ is congruent to $\angle CED$.

Reporting Category for Item 30: ***Geometry*** **(p. 287)**

31 The following formula can be used to calculate the monthly payment, M, on a loan:

$$M = \frac{P(rt + 1)}{12t}$$

where P is the principal, r is the annual rate, and t is the length of the loan in years.

Based on this formula, what is the monthly payment on a 2-year loan for $3,000 at an annual rate of 8%?

A. $605

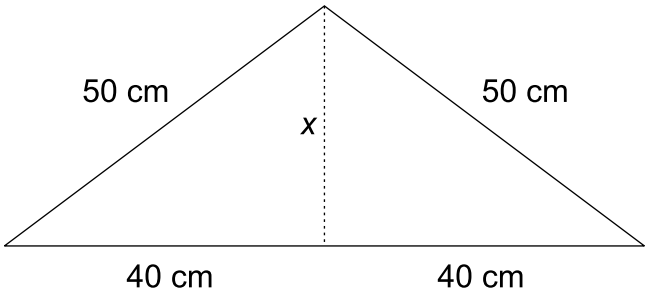
✔ B. $145

C. $480

D. $125

Reporting Category for Item 31: ***Patterns, Relations, and Algebra*** **(p.316)**

Use the triangle below to answer question 32.



32 What is the length x of the altitude of the triangle shown above?

A. 20 cm

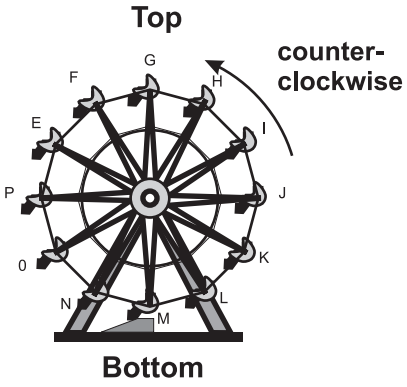
B. 25 cm

✔ C. 30 cm

D. 40 cm

Reporting Category for Item 32: ***Geometry*** **(p.316)**

33 Each ride on the Ferris wheel consists of 6 rotations. If the length of each of the spokes from the center of the wheel to a seat is t feet, how far will each passenger travel during a ride?



A. $6t$ feet

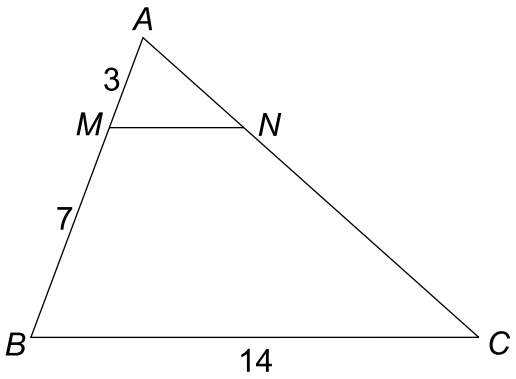
B. $6\pi t$ feet

C. $12t$ feet

✔ D. $12\pi t$ feet

Reporting Category for Item 33: ***Measurement*** **(p.317)**

Use the triangle below to answer question 34.



34 In ΔABC above, $\overline{MN}$ is parallel to $\overline{BC}$. What is the length of $\overline{MN}$?

✔ A. 4.2

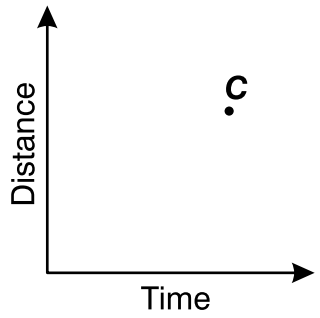
B. 6.0

C. 8.4

D. 7.0

Reporting Category for Item 34: ***Geometry*** **(p. 287)**

Use the graph below to answer question 35.



35 Point *C* on the graph above represents the distance and time that Catlyn traveled on her trip. Which of the following represents her average speed?

A. *x*-coordinate of point *C*

B. *y*-coordinate of point *C*

✔ C. slope of line through *C* and (0,0)

D. distance from the origin to point *C*

Reporting Category for Item 35: ***Geometry*** **(p.316)**

36 The mean salary of the ten clerks at the Corner Shop was $8.50 per hour. One of the clerks, who had been making $9.50 per hour, was given a raise of $1.00 per hour. What is the new mean salary of the ten clerks?

A. $8.50

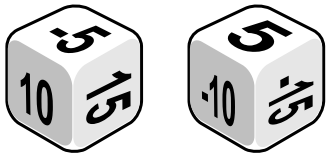
✔ B. $8.60

C. $8.80

D. $9.00

Reporting Category for Item 36: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

37 Joseph has two number cubes, each with faces labeled by the numbers −15, −10, −5, 5, 10, and 15.



If Joseph rolls the two cubes and adds the resulting numbers, what is the probability that the sum will be 0?

A. $\frac{1}{36}$

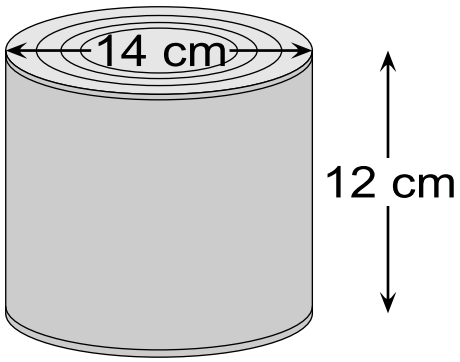
B. $\frac{1}{12}$

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

✔ D. $\frac{1}{6}$

Reporting Category for Item 37: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

38 CanCorp is determining the cost of labels for new cans with the dimensions shown below.



The label for each can will wrap around the side of the can with no overlap. What is the approximate area of one label?

A. 1847 cm^2

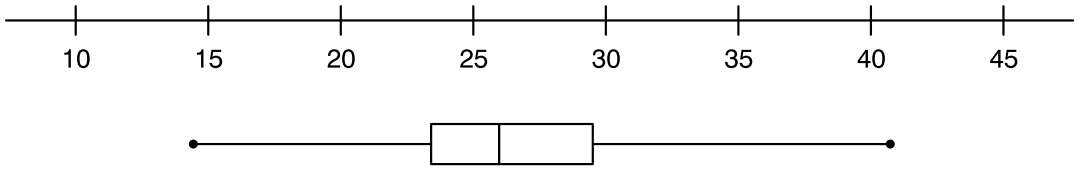
B. 264 cm^2

✔ C. 528 cm^2

D. 924 cm^2

Reporting Category for Item 38: ***Measurement*** **(p.317)**

39 The box and whisker graph shown below represents the results of a survey of the estimated gas mileage of 100 car models.



Which statistics—mean, median, mode, range—can be determined from this graph?

A. mean only

B. median only

C. range and mean

✔ D. range and median

Reporting Category for Item 39: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

Session 3, Open-Response Questions

40 A class of 25 students is asked to determine approximately how much time the average student spends on homework during a one-week period. Each student is to ask one of his/her friends for the information, making sure that no one student is asked more than once. The numbers of hours spent on homework per week are as follows:

8, 0, 25, 9, 4, 19, 25, 9, 9, 8, 0, 8, 25, 9, 8, 7, 8, 3, 7, 8, 5,
3, 25, 8, 10

a. Find the mean, median, and mode for these data. Explain or show how you found each answer.

b. Based on this sample, which measure (or measures) that you found in part a best describes the typical student? Explain your reasoning.

c. Describe a sampling procedure that would have led to more representative data.

Reporting Category for Item 40: ***Data Analysis, Statistics, and Probability*** **(p. 288)**

Use the chart below to answer question 41.

Billing Plans for Cellular Phone

	Basic charge per month	Number of free minutes per month	Charge per minute
Plan 1	$16	0	$0.35
Plan 2	$30	50	$0.15 after free minutes are used

41 Mr. Chrostowski is choosing one of the billing plans shown above for his cellular phone. He estimates that he will use the phone less than 50 minutes per month.

a. If he chooses Plan 1 and uses the phone exactly 50 minutes in one month, what will his bill be for that month?

b. Suppose that he chooses Plan 1 and uses the phone *m* minutes in one month. Write an equation for his total bill, *B*, for that month.

c. On the grid in your Student Answer Booklet, construct a graph that shows the monthly bills for Plan 1 for between 0 and 50 minutes of calls.

d. Using your equation or graph, find the number of minutes of phone use for which the two plans cost the same. Show or explain how you found your answer.

Reporting Category for Item 41: ***Patterns, Relations, and Algebra*** **(p.316)**