Session 1

Session 1 Directions

You may NOT use a calculator in this session. When you have finished the session, you may check over your work in this session only.

1. The hypotenuse of a right triangle is $\sqrt{61}$ centimeters long. Which of the following is closest to that length?

A. 6.1 centimeters

B. 7.8 centimeters

C. 7.9 centimeters

D. 30.5 centimeters

2. Solve $x(5x + 3) = 0$.

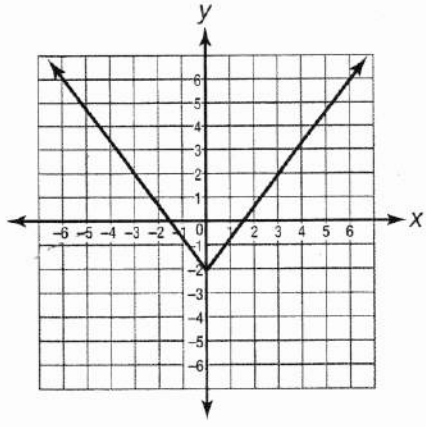
A. $x = -\frac{3}{5}$ only

B. $x = \frac{3}{5}$ only

C. $x = 0$ and $x = -\frac{3}{5}$

D. $x = 0$ and $x = \frac{3}{5}$

3. Consider the graph below.



Which function best represents this graph?

A. $f(x) = \left|\frac{4}{3}(x - 2)\right|$

B. $f(x) = \left|\frac{4}{3}(x + 2)\right|$

C. $f(x) = \left|\frac{4}{3}\right|x - 2$

D. $f(x) = \left|\frac{4}{3}x\right| - 2$

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4. Below is a set of data.

5, 5, 10, 15, 25

The same value, n, will be added to each data point above. Which describes how the mean will be affected?

A. The mean will stay the same.

B. The mean will change from 5 to $5 + n$.

C. The mean will change from 12 to $12 + n$.

D. The mean will change from 12 to $12 + 5n$.

5. Express $\frac{\sqrt{5} + \sqrt{10}}{\sqrt{2}}$ with a rational denominator.

A. $\frac{\sqrt{5} + \sqrt{10}}{2}$

B. $\frac{\sqrt{10} + 2\sqrt{5}}{2}$

C. $\frac{\sqrt{30}}{2}$

D. $\sqrt{2.5} + \sqrt{5}$

6. Which equation below has an infinite number of solutions?

A. $x + 3 = x + 6$

B. $x + 3 = 6$

C. $3x = x$

D. $3x + 0 = 3x$

7. Solve $n = 7m^2p + 3p$ for p.

A. $p = \frac{n}{7m^2 + 3}$

B. $p = \frac{n}{7m^2}$

C. $p = 7m^2n + 3n$

D. $p = n - 7m^2 + 3$

8. A microscope is set so it makes an object appear 2×10^2 times larger than its actual size. A platelet being observed under the microscope has a diameter of 3×10^{-6} meters. What size will the diameter appear to be when viewed under the microscope?

A. 6,000 meters

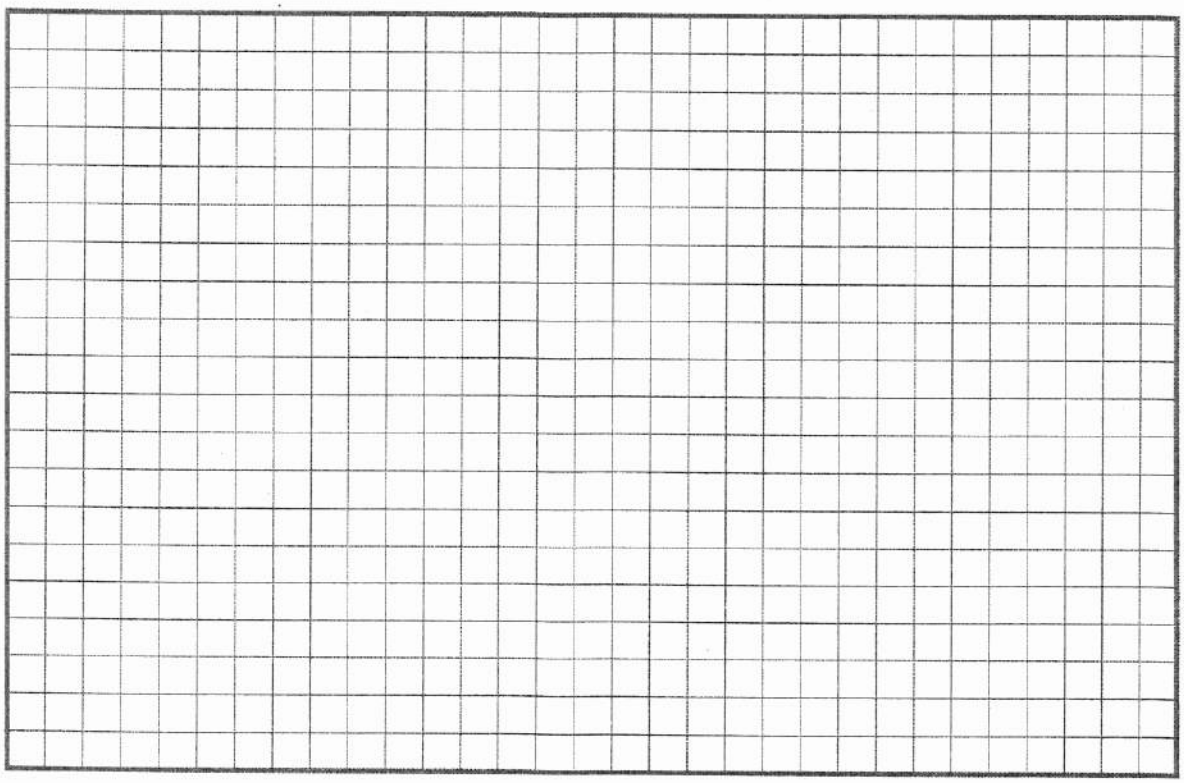
B. 0.006 meter

C. 0.0006 meter

D. 0.00006 meter

Duplicating any part of this book is prohibited by law.

9. Solve $2|x + 7| = 16$ for x. Show or explain your work.



10. A researcher wants to determine how students can best prepare for a math test. Based only on the information given, which of the following does not describe a randomized experiment the researcher could perform? Assume all students are grouped randomly.

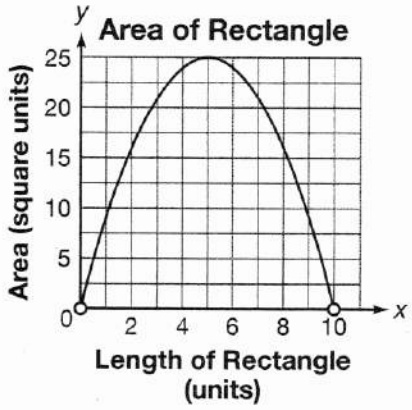
A. One group of students is given a math test after eating a full breakfast. The other group takes the same test, having not eaten a full breakfast.

B. One group of students is given a math test after eating fruit and oatmeal. The other group takes the same test, having eaten only sugar cereal.

C. One group of students is given a math test after having gotten 8 hours of sleep the night before. The other group takes the same test, having only gotten 6 hours of sleep.

D. One group of students is given a math test after eating fruit and oatmeal. The other group of students takes the same math test, having only gotten six hours of sleep.

11. The area of a rectangle with length x and width $10 - x$ is modeled by the equation $y = -x^2 + 10x$. The graph below also represents this function.



What is the maximum area possible for the rectangle?

A. 5 square units

B. 20 square units

C. 25 square units

D. 30 square units

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12. The graph below shows that the amount Mrs. Michaels pays for her son's day care, y, is directly proportional to the time, t, in hours that her son is in day care.

Which equation best represents the direct proportion shown in the graph?

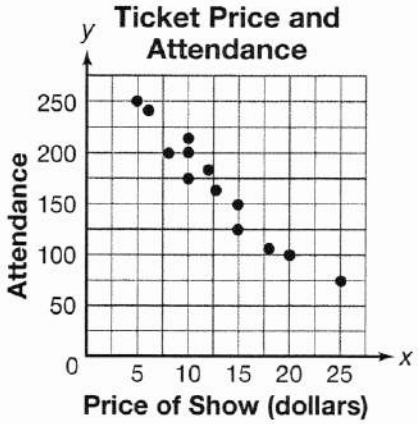
A. $y = 6.50t$

B. $y = 7.50t$

C. $y = 15t$

D. $y = 30t$

13. A community theater manager has kept track of the prices of recent shows and attendance at the shows. She plotted the data points on the scatter plot below.



Which describes the general trend, if any, shown by the scatter plot?

A. As ticket price increases, show attendance also increases.

B. As ticket price increases, show attendance decreases.

C. As ticket price increases, show attendance stays the same.

D. There appears to be no relationship between ticket price and show attendance.

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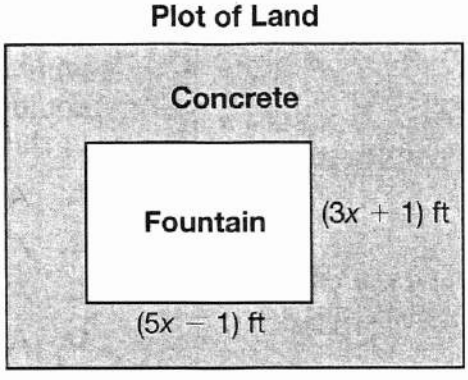
14. Park officials have set aside a rectangular plot of land. On this plot, they will build a rectangular fountain and lay concrete around it, as shown below. The shaded region shows the area that will be covered by concrete.



Part A Determine the area covered by the fountain in terms of x. Write your answer as a trinomial and include units. Show or explain your work.

Part B The outside edges of the entire plot form a rectangle whose length and width are proportional to the sides of the fountain, increased by a scale factor of 2. Determine the length and width of the outside edges of the plot. Write your answer in simplest form.

Part C Determine the area that will be covered by concrete in terms of x. Write your answer in simplest form. Show or explain your work.

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15. What is the equation of the line passing through the points $(-4, 6)$ and $(4, 4)$?

A. $y = -4x - 10$

B. $y = -\frac{1}{4}x + 5$

C. $y = \frac{1}{4}x + 5$

D. $y = 4x + 16$

16. The first four terms of a sequence are given below.

$-5, -9, -13, -17, \ldots$

If -5 is considered the first term when $n = 1$, which linear equation could generate $A(n)$, the nth term in this sequence?

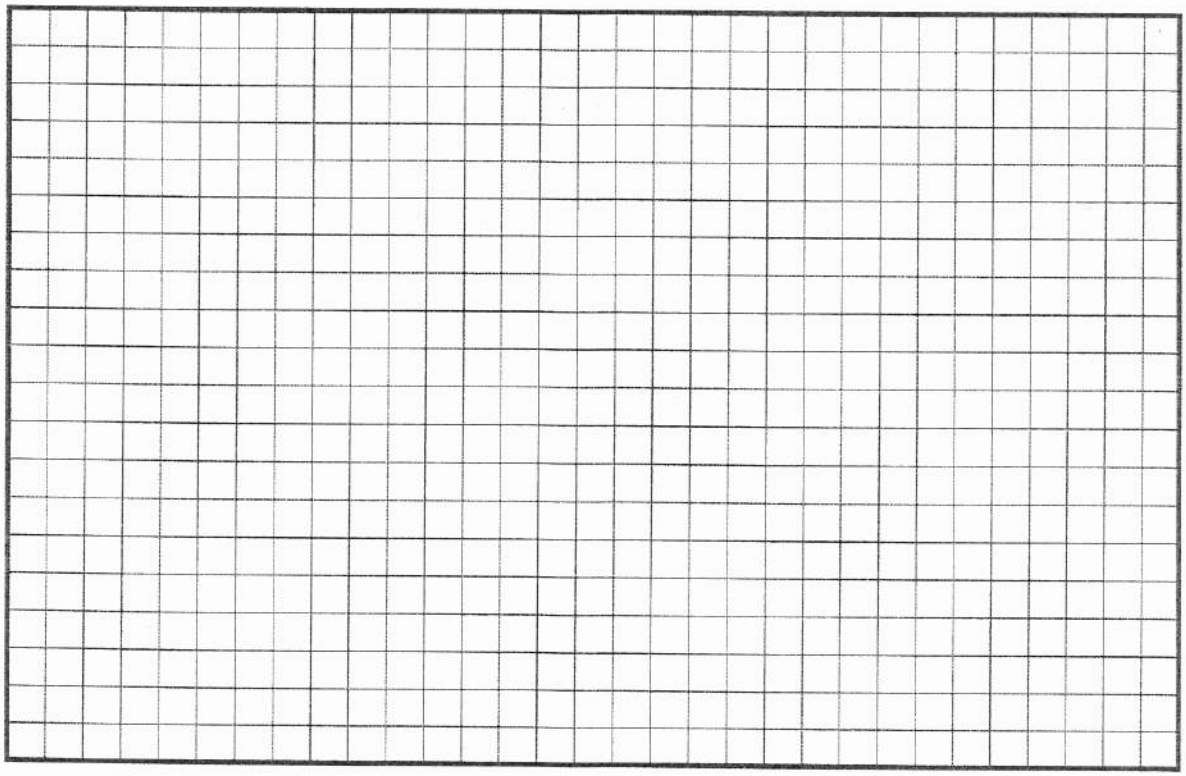
A. $A(n) = -4x - 1$

B. $A(n) = -4x - 5$

C. $A(n) = -5x$

D. $A(n) = -5x + (-5)$

17. Given $y = 8$, solve $(x + 2)^2 - (y - 3)^2 = -(4^2)$ for x.



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18. Look at the increasing numerical pattern below.

5, 11, 21, 35, n, ...

What is the value of n if a quadratic relationship exists between the numbers in the pattern?

A. 39

B. 45

C. 52

D. 53

19. Factor $4x^2 - 8x - 5$.

A. $(2x - 5)(2x + 1)$

B. $(2x - 5)(2x - 1)$

C. $(4x - 1)(x + 5)$

D. $(4x + 1)(x - 5)$

20. Consider the system of equations below.

$$2x - y = -1$$

$$y = 2x + 4$$

Which statement correctly describes the graphs of these equations?

A. The lines coincide.

B. The lines are parallel.

C. The lines intersect at $(-2, -3)$.

D. The lines intersect at (3, 2).

21. Which coordinates name the x-intercepts of the function $y = x^2 + 4x - 12$?

A. $(-12, 0)$ and $(-6, 0)$

B. $(-6, 0)$ and $(6, 0)$

C. $(-6, 0)$ and $(2, 0)$

D. $(2, 0)$ and $(6, 0)$

22. Which best describes the solutions for this system of linear equations?

$$y = -\frac{1}{2}x + 7$$

$$-2x + y = 2$$

A. (2, 6)

B. (6, 2)

C. no solution

D. infinitely many solutions

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23. Which of the following best describes the graph of the function $f(x) = (-x + 2)(x - 4)$?

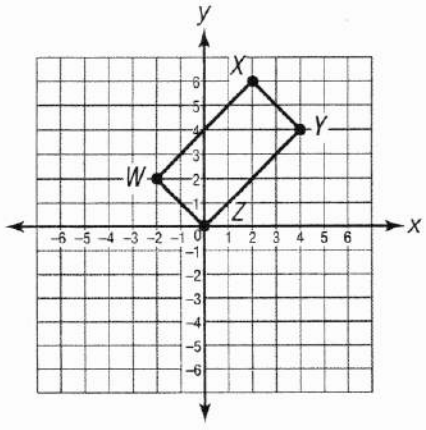
A. opens down and x-intercepts at $(4, 0)$ and $(2, 0)$

B. opens down and x-intercepts at $(-4, 0)$ and $(-2, 0)$

C. opens up and x-intercepts at $(-4, 0)$ and $(2, 0)$

D. opens up and x-intercepts at $(-5, 0)$ and $(-2, 0)$

24. Rectangle $WXYZ$ is graphed below.



What is the perimeter of rectangle $WXYZ$?

A. $6\sqrt{2}$ square units

B. $12\sqrt{2}$ square units

C. $4 + 4\sqrt{2}$ square units

D. 16 square units

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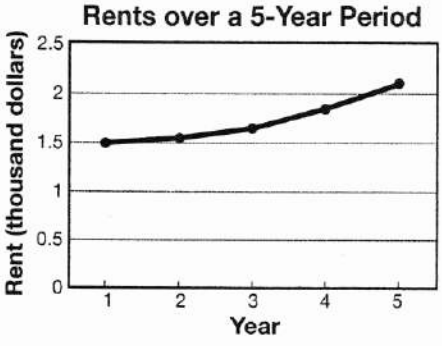
25. The average rents charged by landlords for one-bedroom apartments in a certain neighborhood over a five-year period are shown in the table below.

Year	1	2	3	4	5
Rent	$1,500	$1,550	$1,650	$1,850	$2,100

Which of the following data displays would best accompany an article entitled "Our Neighborhood: Five Years of Consistently Low Rents"?

A.



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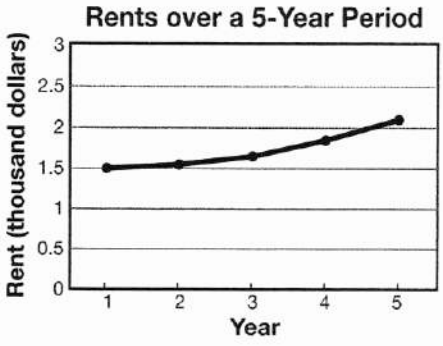
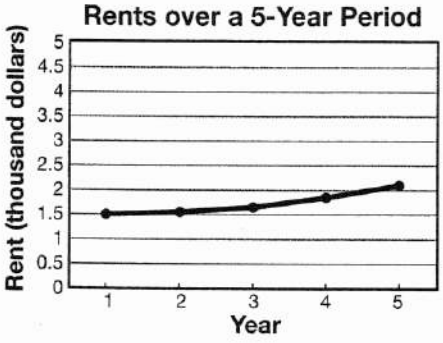
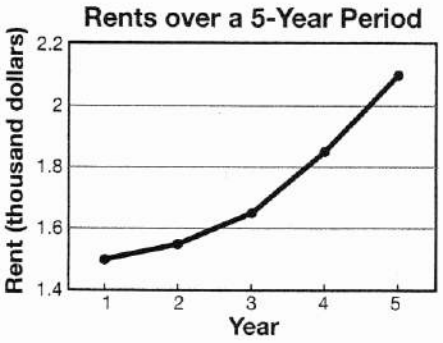


C.



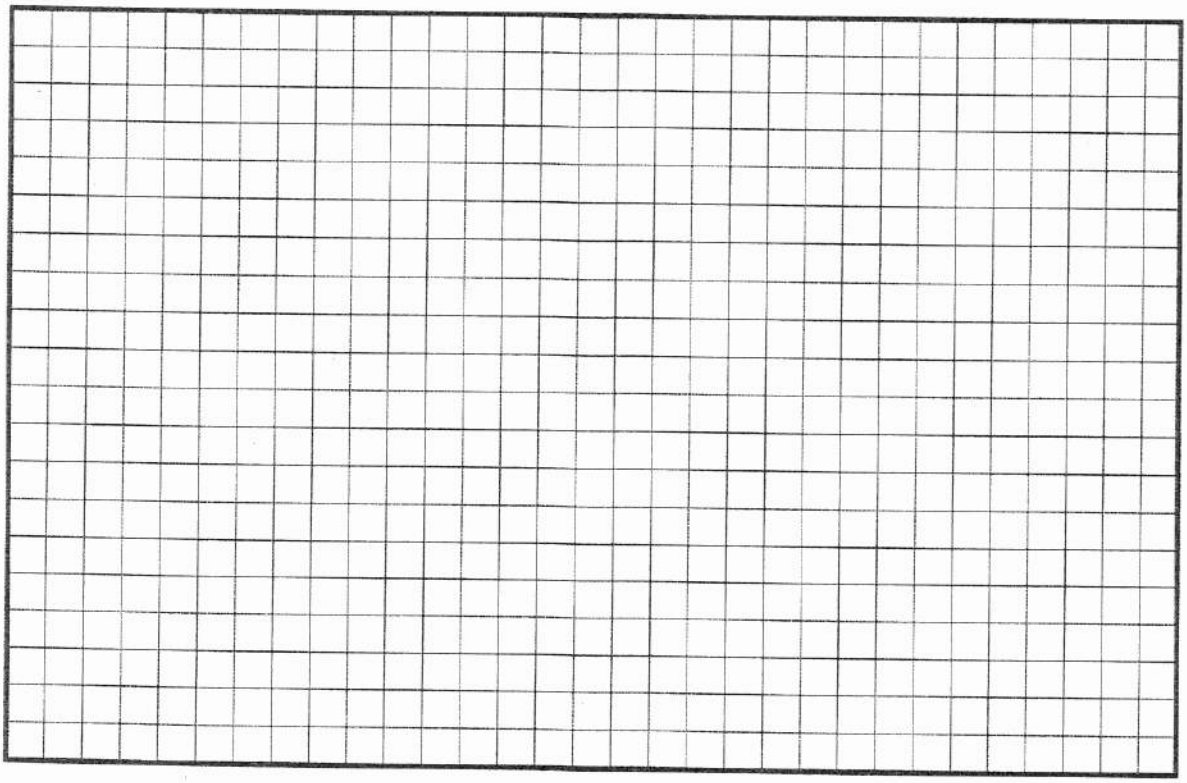
D.



26. Consider the table below.

x	*y*
0	4
1	32
2	*s*

What value of *s* will make the table a representation of an exponential function? Explain your answer.



End of Session 1

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