

Student Name _____

P



Algebra II
Test Booklet

Practice Test

Large Print

TEST BOOKLET SECURITY BARCODE

Section 1

(Non-Calculator)

Directions:

Today, you will take Section 1 of the Algebra II Practice Test. You will not be able to use a calculator.

Read each question. Then, follow the directions to answer each question. Circle the answer or answers you have chosen in your test booklet. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses entered within the space provided will be scored.

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EXAMPLES

To answer -3 in a question, fill in the answer grid as shown below.

| | | | | | |
|---|---|---|---|---|---|
| - | 3 | | | | |
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To answer $.75$ in a question, fill in the answer grid as shown below.

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|---|---|---|---|---|---|
| . | 7 | 5 | | | |
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- 1** Which number is equivalent to $(5 + i)^2$, where i is the imaginary unit?

Select one answer.

- A** 24
- B** $24 + 10i$
- C** 26
- D** $26 + 10i$

- 2** What are the solutions of the equation $\frac{x}{x+6} = \frac{2x-3}{x+12}$?

Select **all** that apply.

- A** $x = -12$
- B** $x = -6$
- C** $x = -3$
- D** $x = 0$
- E** $x = \frac{3}{2}$
- F** $x = 3$
- G** $x = 6$

- 3 The recursive rule for a sequence is shown, where n represents a positive integer.

$$f(1) = 5$$

$$f(n) = 3 \cdot f(n - 1), \text{ for } n > 1$$

Which is an explicit rule for the sequence?

- A** $f(n) = 3(5)^{n-1}$, for $n \geq 1$
- B** $f(n) = 5(3)^{n-1}$, for $n \geq 1$
- C** $f(n) = 3 + 5(n - 1)$, for $n \geq 1$
- D** $f(n) = 5 + 3(n - 1)$, for $n \geq 1$
- 4 The binomial $(x - 2)$ is a factor of the polynomial function $P(x) = x^3 - x^2 + ax - 6$, where a is a constant.

What is the value of a ?

Enter your answer in the space provided.

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- 5 Function f is defined as $f(x) = (0.5)^{2x}$.

Which statement correctly describes how the value of $f(x)$ is changing for every increase of 1 in the value of x ?

Select one answer.

- A** The value of $f(x)$ increases by 25%.
- B** The value of $f(x)$ decreases by 25%.
- C** The value of $f(x)$ increases by 75%.
- D** The value of $f(x)$ decreases by 75%.

- 6 An expression is shown.

$$\left(\frac{64}{27}\right)^{-\frac{1}{3}}$$

Using the properties of exponents, the expression can be rewritten as which of the fractions shown?

A $-\frac{4}{3}$

B $-\frac{3}{4}$

C $\frac{3}{4}$

D $\frac{4}{3}$

- 7 The function f is defined by $f(x) = 2x + 5$.

If $f(a) = c$, which of the following equations gives the value of a in terms of c ?

Select one answer.

A $a = 2c + 5$

B $a = 5c + 2$

C $a = \frac{c - 5}{2}$

D $a = \frac{c}{2} - 5$

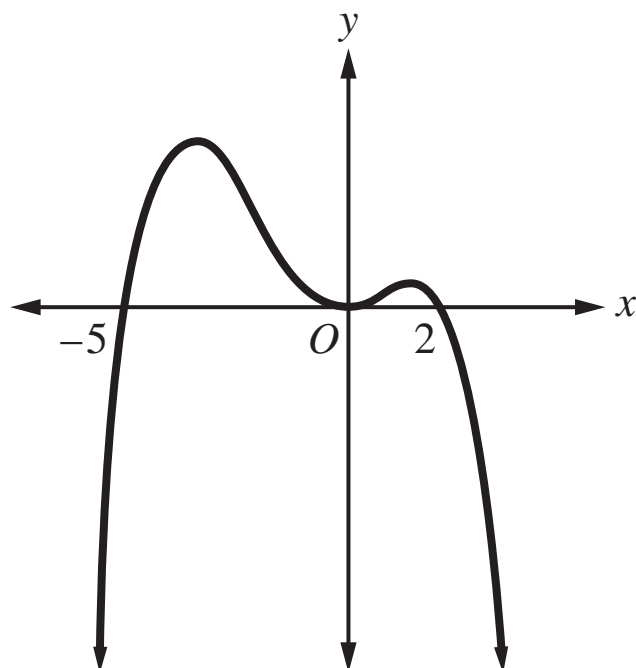
- 8 The expression $x^3 - 3x^2 - 4x + 12$ can be written as $(x^2 - a)(x - b)$, where a and b are constants.

What are the values of a and b ?

- A** $a = 1$ and $b = 12$
- B** $a = 2$ and $b = 6$
- C** $a = 3$ and $b = 4$
- D** $a = 4$ and $b = 3$
- 9 Which value of x makes the equation $5(e)^{4x} = 25$ true?

- A** $x = \ln \frac{5}{4}$
- B** $x = \frac{1}{4} \ln 2$
- C** $x = \frac{1}{4} \ln 5$
- D** $x = \frac{1}{20} \ln 25$

10 The graph of a polynomial function is shown in the following xy -plane.

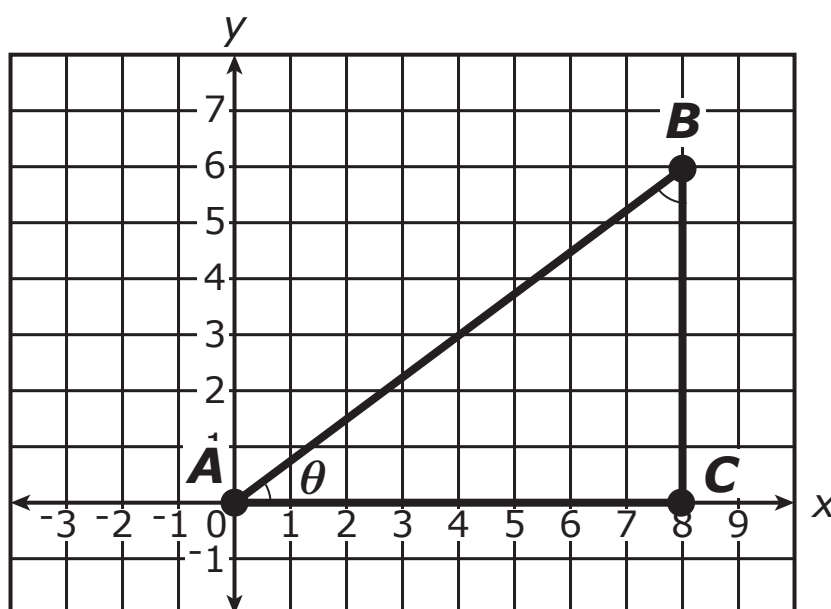


Which equation could represent the graph of the polynomial function?

Select one answer.

- A $y = x^2(x + 5)(x - 2)$
- B $y = -x^2(x + 5)(x - 2)$
- C $y = x^2(x - 5)(x + 2)$
- D $y = -x^2(x - 5)(x + 2)$

- 11** Right triangle ABC is shown in the xy -coordinate plane. Point B has coordinates $(8, 6)$.



Which statements are true?

Select **all** that apply.

A $\sin \theta = -\frac{4}{5}$

B $\sin \theta = \frac{3}{5}$

C $\sin \theta = \frac{4}{5}$

D $\sin(\pi + \theta) = -\frac{4}{5}$

E $\sin(\pi + \theta) = -\frac{3}{5}$

F $\sin(\pi + \theta) = \frac{3}{5}$

12 Which table shows the three quantities 4^7 , $(4^6)(4^2)$, and $9^{3.5}$ in order from **least to greatest**?

A

| | |
|----------|--------------|
| Least | $9^{3.5}$ |
| | $(4^6)(4^2)$ |
| Greatest | 4^7 |

B

| | |
|----------|--------------|
| Least | $9^{3.5}$ |
| | 4^7 |
| Greatest | $(4^6)(4^2)$ |

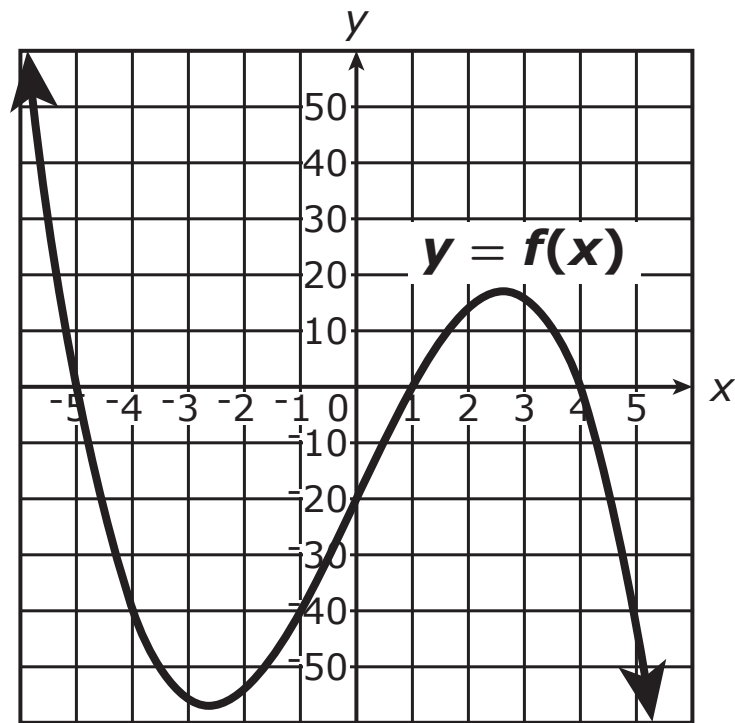
C

| | |
|----------|--------------|
| Least | 4^7 |
| | $9^{3.5}$ |
| Greatest | $(4^6)(4^2)$ |

D

| | |
|----------|--------------|
| Least | 4^7 |
| | $(4^6)(4^2)$ |
| Greatest | $9^{3.5}$ |

13 The graph of the polynomial function f is shown in the xy -coordinate plane.



Which of the equations shown could define f ?

- A** $f(x) = -(x + 5)(x - 1)(x - 4)$
- B** $f(x) = (x + 5)(x - 1)(x - 4)$
- C** $f(x) = -(x - 5)(x + 1)(x + 4)$
- D** $f(x) = (x - 5)(x + 1)(x + 4)$





You have come to the end of Section 1 of the test. Review your answers from Section 1 only.





GO ON TO NEXT PAGE



Section 2

(Calculator)

Directions:

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Section 2

EXAMPLES

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| . | 7 | 5 | | | | |
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| | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |



- 1 The table shows the percent of US households with computers for selected years between 1984 and 2003.

Percent of Households with Computers

| Year | Percent |
|------|---------|
| 1984 | 8.2 |
| 1989 | 15.0 |
| 1993 | 22.9 |
| 1997 | 36.6 |
| 2000 | 51.0 |
| 2001 | 56.3 |
| 2003 | 61.8 |

Which of the equations shown **best** models the data in the table, where y is the percent of households with computers and x is the number of years after 1980?

- A $y = 5.6(1.08)^x$
- B $y = 5.6(1.09)^x$
- C $y = 5.6(1.11)^x$
- D $y = 5.6(1.14)^x$



2 The functions f and g are defined as shown.

$$f(x) = x^3 + x^2 - 2x$$

$$g(x) = 0.5x^2 + 1$$

The values of x for which $f(x) = g(x)$ lie in which of the intervals shown?

Select **all** that apply.

A $-3 < x < -2$

B $-2 < x \leq -1$

C $-1 < x \leq 0$

D $0 < x \leq 1$

E $1 < x \leq 2$

F $2 < x < 3$



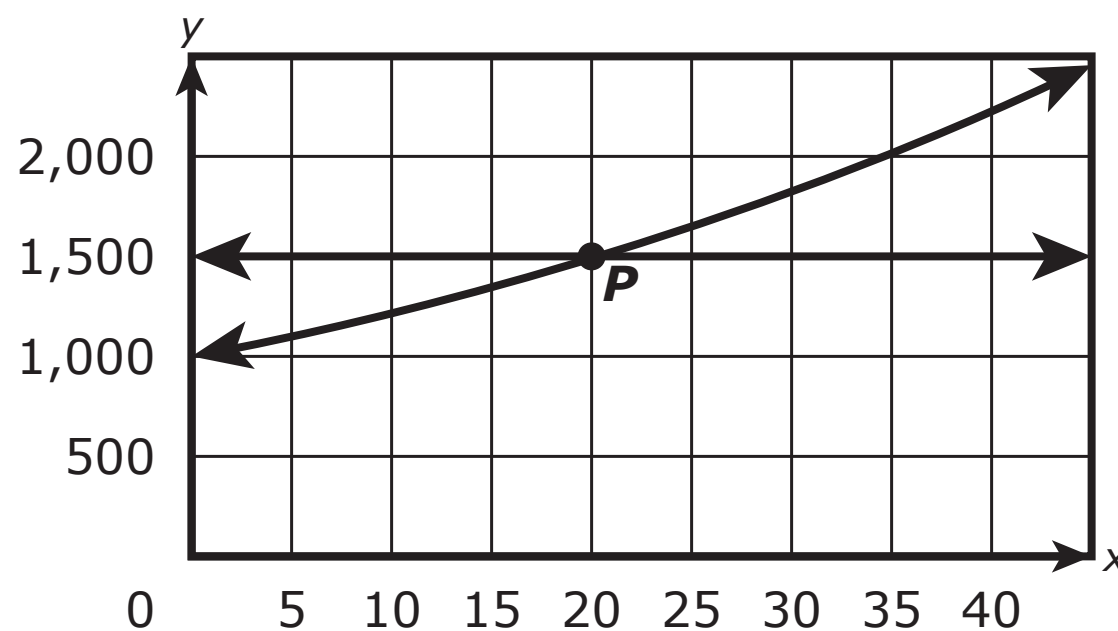
Mathematics

Section 2

- 3 An account that pays 0.5% interest was opened with an initial deposit, and no additional deposits to or withdrawals from the account were made. The equation $y = 1000(1.005)^{4x}$ models the amount, in dollars, in the account x years after it was opened.

The graph of the model and the graph of the equation $y = 1500$ are shown in the xy -coordinate plane.

The intersection of the two graphs is marked with the point P .



What is revealed by the coordinates of the point P ?

- A the yearly interest rate for the account
- B the amount of the initial deposit in the account
- C the number of years it takes for the account value to reach \$1500
- D the number of years it takes for the initial amount in the account to double



GO ON TO NEXT PAGE



Mathematics

- 4 Claim: There is no quadratic equation with real coefficients for which $x = -5i$ is a solution.

Part A

Show that the claim is not correct by providing an example of a quadratic equation for which $x = -5i$ is a solution. Include any other solutions to your equation in your answer.

Enter your answer and your explanation in the space provided.

Section 2

4 Part A

**Part B**

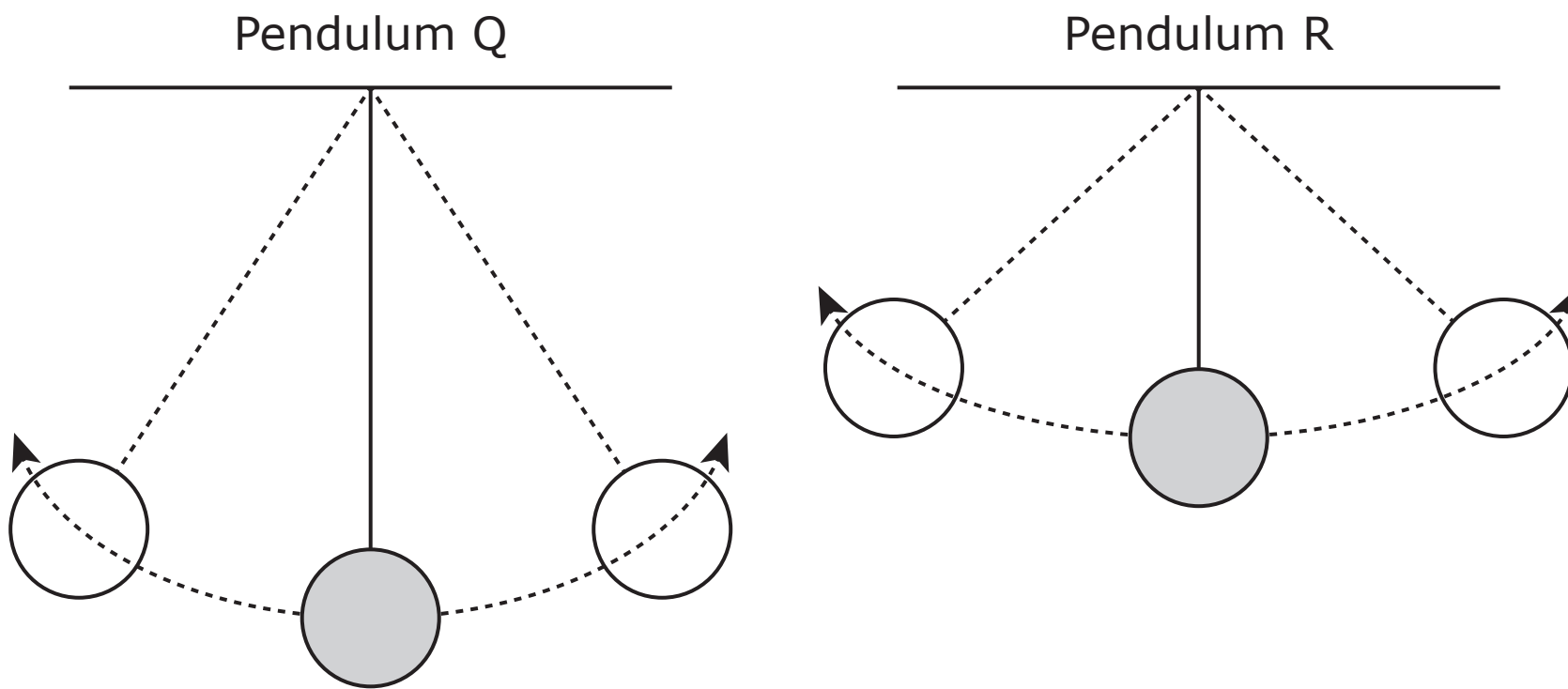
Is it possible for a quadratic equation with real coefficients to have $x = -5i$ as its **only** solution? Justify your answer.

Enter your answer and your justification in the space provided.

4 Part B



- 5 For the two pendulums shown, a weight swings back and forth from left to right. Both pendulums start at the left position at time $t = 0$ seconds.



For each pendulum, the horizontal distance, in inches, of the weight from the center position at time t seconds is given by functions Q and R , respectively. A negative distance represents the weight being to the left of the center position, and a positive distance represents the weight being to the right of the center position.

$$Q(t) = -6\cos(\pi t)$$

$$R(t) = -4\cos\left(\frac{4}{3}\pi t\right)$$

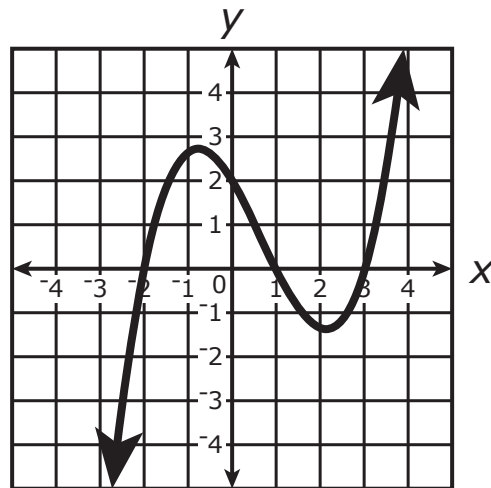
The maximum horizontal distance of pendulum Q to the right of its starting position is how much greater, in inches, than the maximum horizontal distance of pendulum R to the right of its starting position?

Enter your answer in the space provided.

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|---|--|--|--|--|--|--|--|
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- 6 Consider the polynomial function P , defined by $P(x) = x^3 + cx^2 + x + 2$, where c is a constant, and consider the graph shown in the xy -coordinate plane.



If $P(-2) = 0$, can the graph shown be the graph of $y = P(x)$?

- A Yes, because c would equal -2 , and the points $(1, 0)$ and $(3, 0)$ would be on the graph of $y = P(x)$.
- B Yes, because c would equal 2 , and the points $(1, 0)$ and $(3, 0)$ would be on the graph of $y = P(x)$.
- C No, because c would equal -2 , and the points $(-2, 0)$ and $(3, 0)$ would not be on the graph of $y = P(x)$.
- D No, because c would equal 2 , and the points $(1, 0)$ and $(3, 0)$ would not be on the graph of $y = P(x)$.



Mathematics

- 7 When a customer pays with a debit card at a clothing store, the owner pays a processing fee. The function P represents the processing fee, in dollars, for a debit card purchase of x dollars.

$$P(x) = 0.035x + 0.15$$

How is the processing fee calculated based on the purchase amount?

- A** The processing fee consists of a fixed amount of \$0.15 plus 0.35% of the purchase amount.
- B** The processing fee consists of a fixed amount of \$0.15 plus 3.5% of the purchase amount.
- C** The processing fee consists of a fixed amount of \$0.35 plus 1.5% of the purchase amount.
- D** The processing fee consists of a fixed amount of \$0.35 plus 15% of the purchase amount.

- 8 An equation is shown.

$$\sqrt{x^2 + 19} - 100 = 0$$

What are the solutions of the equation?

- A** $x = 9$ only
- B** $x = 3\sqrt{1109}$ only
- C** $x = -9$ and $x = 9$
- D** $x = -3\sqrt{1109}$ and $x = 3\sqrt{1109}$





You have come to the end of Section 2 of the test. Review your answers from Section 2 only.





Section 3 (Calculator)

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| | | | | | |
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| . | 7 | 5 | | | |
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Mathematics

- 1 The function C approximates the number of calories recommended per day for a dog, based on the weight, in pounds, of the dog.

The table gives values of C for selected values of p , where $C(p)$ represents the recommended number of calories per day for a dog that weighs p pounds.

Recommended Number of Calories for Dogs

| p (pounds) | $C(p)$ |
|--------------|--------|
| 11 | 250 |
| 22 | 450 |
| 33 | 750 |
| 44 | 1000 |
| 55 | 1250 |
| 66 | 1500 |
| 77 | 1700 |
| 88 | 1880 |

Which of the equations shown **most** closely approximates C ?

- A** $C(x) = 18p + 22$
- B** $C(x) = 22p + 18$
- C** $C(x) = 40(1.06)^p$
- D** $C(x) = 48(1.07)^p$



2 Claim: $\sqrt[3]{x} \leq x$, where x is a real number

For which intervals is the claim true for all values of x in the interval?

Select **all** that apply.

A $x > 1$

B $0 < x < 1$

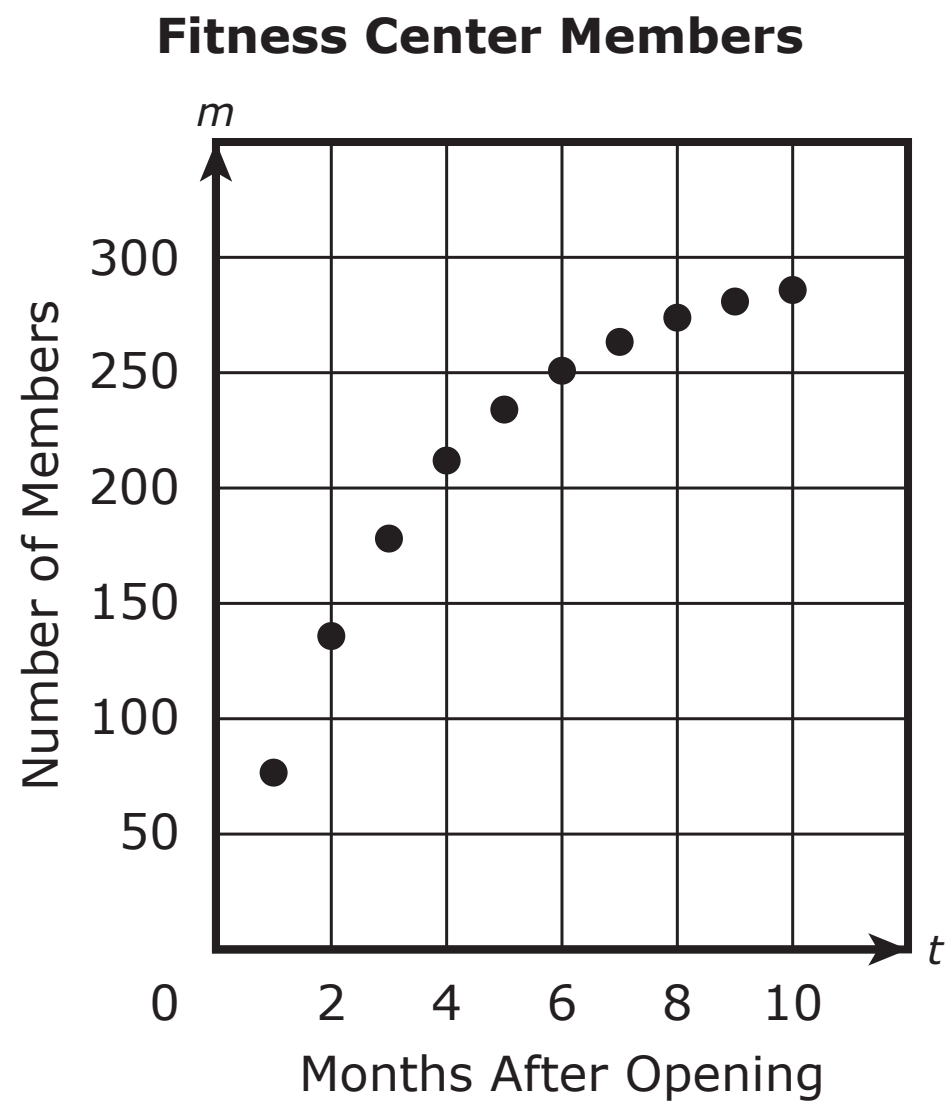
C $-1 < x < 0$

D $-2 < x < -1$

E $x < -2$



- 3 The number of members, m , that a new fitness center expects to have t months after the opening of the center is shown in the scatter plot.



The fitness center constructed the model $m(t) = 300 - 280(0.76)^t$ to project the number of members that can be accommodated t months after opening.

- What is the average rate of change, in members per month, in the number of members the fitness center expects to have from the 4th to the 8th month after opening? Show your work.
- What is the significance of the number 300 in the model? Explain your answer.

Enter your answers and your work and explanation in the space provided.



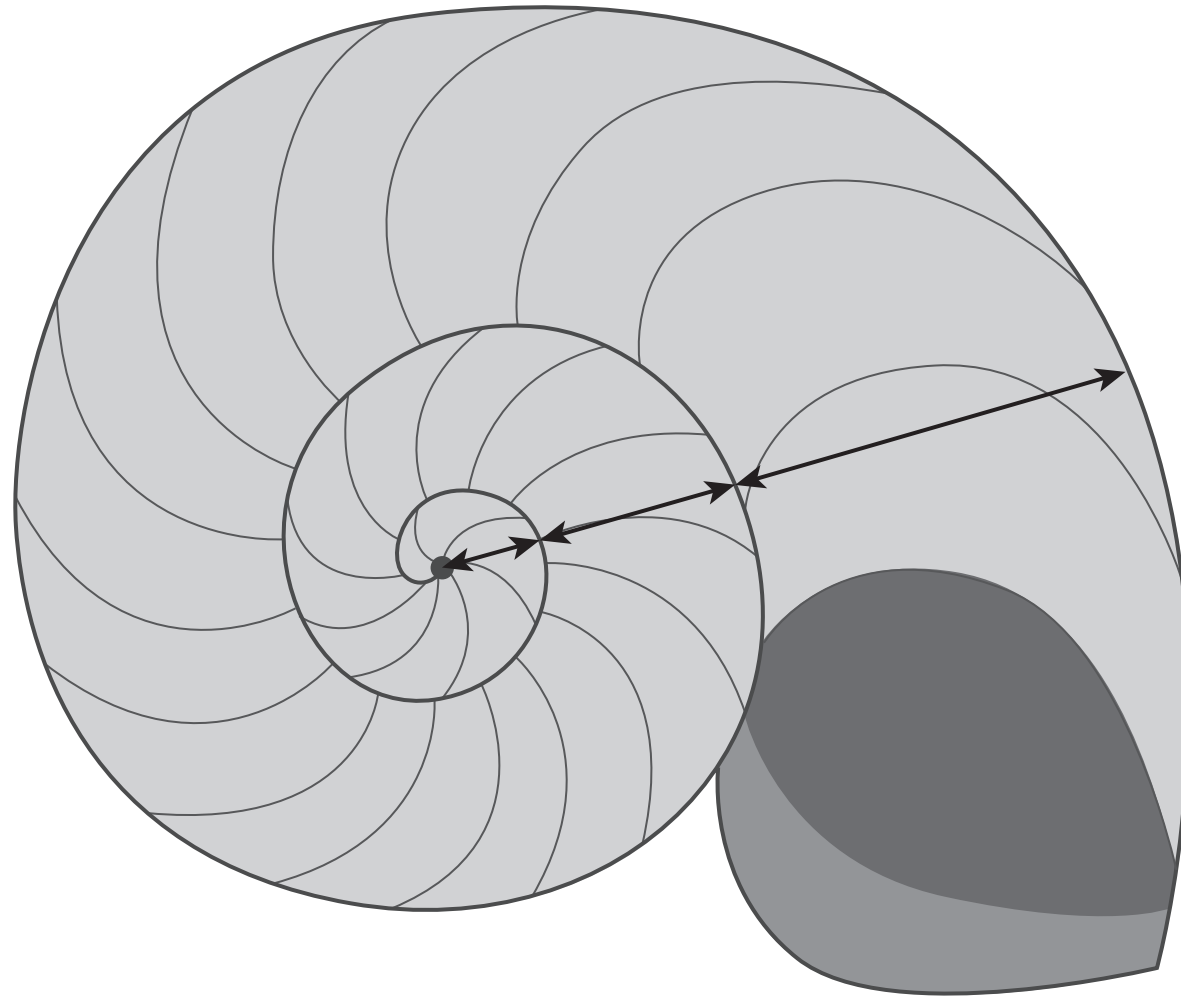
3

A large empty rectangular box for writing answers.

Section 3



- 4 The students in a class are analyzing several examples of spirals in nature. The students measured the distances shown in the picture for different shells.



Each student measured the three distances shown in the picture by starting from the outside of the shell and moving toward the center.

One student's measurements were 8.1 centimeters, 4.2 centimeters, and 2.1 centimeters. A second student's measurements of a different shell were 7.6 centimeters, 3.7 centimeters, and 1.8 centimeters.

Which equation could be used to model the students' data, where a represents the first measurement, in centimeters, and d represents the n th measurement, in centimeters, where $n = 1, 2,$ or 3 ?

A $d = a\left(\frac{1}{2}\right)^{n-1}$

B $d = a(2^{n-1})$

C $d = a\left(\frac{1}{2}\right)^n$

D $d = a(2^n)$



GO ON TO NEXT PAGE

Section 3



Mathematics

5 Consider the functions P and Q , defined as shown.

$$P(x) = x^2 + 7x - 14$$

$$Q(x) = -3x + 10$$

In the xy -coordinate plane, what are the coordinates of the points at which the graphs of the equations $y = P(x)$ and $y = Q(x)$ intersect?

Explain how you determined your answer.

Enter your answer and your explanation in the space provided.



5

A large, empty rectangular box with a black border, intended for the student to show their work for question 5.

Section 3



Mathematics

- 6 The approximate number of cars parked in a garage x hours after 6:00 a.m. can be modeled by the function $y = 180 + 130\sin\left(\frac{x}{12}\pi\right)$, where $0 \leq x \leq 16$.

Based on the model, for which time interval did the number of cars parked in the garage increase?

- A 7:00 a.m. to 9:00 a.m.
- B 1:00 p.m. to 4:00 p.m.
- C 5:00 p.m. to 7:00 p.m.
- D 8:00 p.m. to 10:00 p.m.





Section 3

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Section 4 (Calculator)

Directions:

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Mathematics

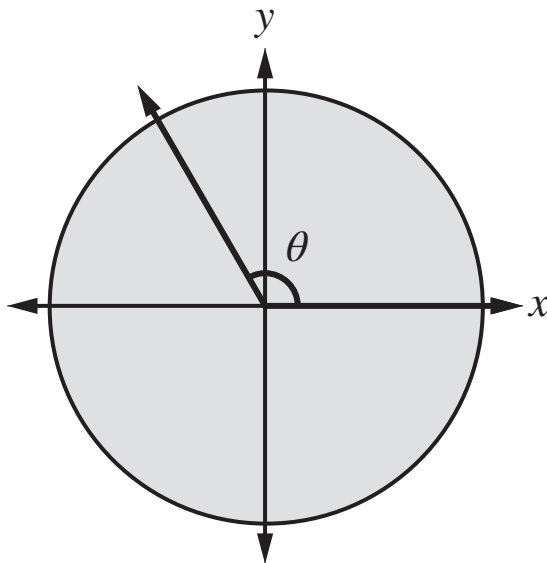
- 1 The half-life of the isotope Francium-223 is 22 minutes. For a sample that starts with F grams of Francium-223, the expression $F(0.5)^{\frac{m}{22}}$ represents the number of grams remaining after m minutes.

Which expression represents the number of grams of Francium-223 remaining after h hours?

- A $F(0.151)^h$
- B $F(0.5)^{\frac{h}{60}}$
- C $F(0.5)^{60h}$
- D $F(0.969)^h$



- 2 Angle θ is positioned in a circle with its initial ray on the positive x -axis and its terminal ray $\frac{1}{3}$ of one complete revolution about the origin, as shown in the following diagram.



Which of the following statements correctly expresses the measure of θ in both degrees and radians?

Select one answer.

- A The measure of angle θ is 120 degrees or $\frac{\pi}{3}$ radians.
 - B The measure of angle θ is 120 degrees or $\frac{2\pi}{3}$ radians.
 - C The measure of angle θ is 150 degrees or $\frac{5\pi}{12}$ radians.
 - D The measure of angle θ is 150 degrees or $\frac{7\pi}{12}$ radians.
- 3 Claim: For every value of the constant c , the equation $x^4 + (1 - c^2)x^2 - c^2 = 0$ has at least two distinct real solutions.

What value of c refutes the claim?

Enter your answer in the space provided.

| | | | | | | | |
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Mathematics

- 4 The table shows the box office revenue, in millions of dollars, for the first 10 weeks after a movie opened in theaters.

Box Office Revenue for a Movie

| Number of Weeks after Opening | Box Office Revenue (in millions) |
|-------------------------------|----------------------------------|
| 0 | \$85.63 |
| 1 | \$51.97 |
| 2 | \$37.21 |
| 3 | \$25.20 |
| 4 | \$15.22 |
| 5 | \$11.17 |
| 6 | \$7.02 |
| 7 | \$4.03 |
| 8 | \$4.42 |
| 9 | \$1.95 |

**Part A**

Create a function to model the data. Explain why you chose the type of function and explain the meaning of the parameters of the function.

Enter your answer and your explanation in the space provided.

4 Part A



Mathematics

Part B

The theaters will stop showing the movie when the weekly box office revenue is below \$100,000. In what week does your model predict that the theaters will stop showing the movie?

Show your work or explain how you found your answer.

Enter your answer and your work or explanation in the space provided.

4 Part B



5 Consider the equation $a = \sqrt{x + b}$, where a and b represent real numbers.

Which statement is true about the number of real solutions to the equation?

- A The number of real solutions depends only on the value of a .
 - B The number of real solutions depends only on the value of b .
 - C The number of real solutions depends on the relationship between a and b .
 - D The values of a and b do not affect the number of real solutions.
- 6 The world population in 1997 was 5.88 billion.

The world population in 2017 was 7.53 billion.

Assume that the ratio between the population in two consecutive years was constant between 1997 and 2017.

Which equation can be used to find r , the rate of growth per year of the world population?

- A $5.88 = 7.53r^{10}$
- B $5.88 = 7.53r^{20}$
- C $7.53 = 5.88r^{10}$
- D $7.53 = 5.88r^{20}$



Mathematics

7 Consider the system of equations shown.

$$y = (x - 3)^2$$
$$y = x - 1$$

On the coordinate plane, what are the coordinates of the points that represent solutions (x, y) of the system?

- A** $(-5, -6)$ and $(-2, -3)$
- B** $(-5, -6)$ and $(2, 1)$
- C** $(5, 4)$ and $(-2, -3)$
- D** $(5, 4)$ and $(2, 1)$
- 8 A kitchen supply store sells a set of 4 food storage containers.
- From largest to smallest, the volumes of the containers are $v_1, v_2, v_3,$ and v_4 .
 - v_n is 20% less than v_{n-1} , where n is 2, 3, or 4.
 - $v_n = kv_{n-1}$, where n is 2, 3, or 4.

What is the value of k ?

- A** $\frac{3}{4}$
- B** $\frac{4}{5}$
- C** $\frac{5}{4}$
- D** $\frac{4}{3}$





You have come to the end of Section 4 of the test. Review your answers from Section 4 only.

Section 4



ALG II