

# Tennessee Comprehensive Assessment Program

# TCAP

## Algebra II Practice Test Subpart 1, Subpart 2, & Subpart 3

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Student Name

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Teacher Name



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**Test Administrator Instructions:**

This practice test has Subpart 1, Subpart 2, and Subpart 3. There is also an answer document and an answer key at the end of this document. It is recommended that you print one copy of this practice test and pull the answer key before copying and distributing the practice test and answer document to your students.

This practice test is representative of the operational test but is shorter than the actual operational test. To see the details about the operational test, please see the blueprints located on the Tennessee Department of Education website.

**Directions**

Subpart 1 of this Practice Test booklet contains constructed-response items and selected-response items in Algebra II. Write all answers on your answer document.

**You MAY NOT use a calculator in Subpart 1 of this test booklet.**

**Sample 1: Constructed-Response**

1. The sum of two consecutive odd integers is 72.
1. Write an algebraic equation to determine the two integers.
  2. What are the two integers?

Write your answers in the spaces provided on your answer document.

**Sample 2: Selected-Response**

2. Factor the polynomial:

$$s^2 + 12s + 32$$

- A.**  $(s + 4)(s - 8)$   
**B.**  $(s - 2)(s + 16)$   
**C.**  $(s + 4)(s + 8)$   
**D.**  $(s + 16)(s + 2)$



1. Simplify the expression  $(2 - 3i)(4 + 2i)$ .

- A. 14
- B.  $6i$
- C.  $2 - 8i$
- D.  $14 - 8i$

2. Fannie is making a rectangular blanket. The length of the blanket is 10 inches greater than its width,  $w$ , in inches.

Write the function,  $f(w)$ , that describes the area, in square inches, of Fannie's blanket as a function of the width,  $w$ .

Write your answer in the space provided on your answer document.

3. What is the remainder when  $f(x) = x^3 + 3x^2 - 10x - 14$  is divided by  $(x - 3)$ ?

Write your answer in the space provided on your answer document.

4. Which is equivalent to  $(4x + 6y)^2$ ?

- A.  $16x^2 + 36y^2$
- B.  $4x^2 + 2(4x)(6y) + 6y^2$
- C.  $(4x)^2 + 2(4x)(6y) + (6y)^2$
- D.  $(4x)^2 + (4x)(6y) + (6y)^2$

5. A sequence is given as 6, 18, 54, . . .

Write an expression that can be used to find the sum of the first twelve terms of the sequence.

Write your answer in the space provided on your answer document.



6. Which expression is the correct factorization of  $x^6 - y^6$ ?

- A.  $(x + y)^3(x - y)^3$
- B.  $(x^2 - y^2)(x^4 + 2xy + y^4)$
- C.  $(x - y)(x + y)(x^2 + xy + y^2)(x^2 - xy + y^2)$
- D.  $(x - y)(x^2 + 2xy + y^2)(x + y)(x^2 - 2xy + y^2)$

7. What value(s) of  $x$  makes the equation  $\frac{3}{x+3} = \frac{9}{x^2-9}$  true? Enter your answer(s) in the space provided on your answer document. If there is only one answer, leave the other space blank.

8. Jamie deposits \$627 into a savings account. The account has an interest rate of 3.5%, compounded quarterly.

Write the function that gives the amount of money in dollars,  $J(t)$ , in Jamie's account  $t$  years after the initial deposit.

Write your answer in the space provided on your answer document.

9. Consider the equation  $\frac{x}{3} - \frac{x-4}{4} = 2$ .

What is the resulting equivalent equation after multiplying both sides by 12?

- A.  $4x - 3x - 12 = 2$
- B.  $4x - 3x + 12 = 2$
- C.  $4x - 3x - 12 = 24$
- D.  $4x - 3x + 12 = 24$



**This is the end of Subpart 1 of the Algebra II Practice Test.  
Proceed to Subpart 2.**

**Directions**

Subpart 2 of this Practice Test booklet contains constructed-response items and selected-response items in Algebra II. Write all answers on your answer document.

**You MAY use a calculator in Subpart 2 of this test booklet.**

- 10.** A scientist wants to find the water quality of a river. He collects 100 water samples and runs quality tests on the water.

Which method of water collection will give him the most accurate result?

- A.** collecting water from the same point in the river every Monday
  - B.** collecting water on different days of the week from the same point in the river
  - C.** collecting water from different parts of the river every Monday
  - D.** collecting water from different parts of the river on different days of the week
- 11.** The 4th term of a sequence is 108. Each term after the first is three times the previous term.

Write an explicit function that models the general term of the sequence  $f(n)$ .

Write your answer in the space provided on your answer document.

- 12.** A quadratic equation is given as  $3x^2 + 4x + 8 = 0$ . Write the solution(s) of the equation in simplest form. Enter one solution in each response box on your answer document. If there is only one solution, leave one response box blank.



13. A system of functions is given.

$$f(x) = -x^2 - 2x + 6$$

$$g(x) = 2x^2 + 5x + 3$$

Select **all** values of  $x$ , to the nearest tenth, for which  $f(x) = g(x)$ .

- A. -2.7
  - B. -1.8
  - C. -0.6
  - D. 0.4
  - E. 4.1
  - F. 5.1
  - G. 7.0
14. The focus of a parabola is  $(3, -5)$  and the equation of the directrix is  $y = 3$ . What is the equation of this parabola?
- A.  $(x + 1)^2 = -4(y + 4)$
  - B.  $(x - 3)^2 = -16(y + 1)$
  - C.  $(x + 1)^2 = 24(y + 5)$
  - D.  $(x - 3)^2 = 32(y + 1)$





15. What is  $\sin\theta$  if  $\theta$  is an angle in the third quadrant and  $\tan\theta = 1$ ?

A.  $\frac{\sqrt{2}}{2}$

B.  $-\frac{\sqrt{2}}{2}$

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

D.  $-\frac{1}{2}$

16. The number of people,  $d$ , in thousands, applying for medical benefits per week in a particular county can be modeled by the equation  $d(t) = 2.5 \sin(0.76t + 0.3) + 3.8$ , where  $t$  is the time, in years, since January 2004.

Based on the equation, what is the maximum number of people, in thousands, applying for medical benefits per year in this county?

Write your answer in the space provided on your answer document.

17. The equation of the directrix of a parabola is  $y = 0$ , and the focus of the parabola is located at  $(-3, 6)$ .

What is the equation of the parabola?

A.  $(x - 3)^2 = 4(y - 3)$

B.  $(x - 3)^2 = 12(y - 3)$

C.  $(x + 3)^2 = 12(y - 3)$

D.  $(x - 3)^2 = 24(y - 3)$



18. The function  $f(x)$  is given by the equation  $f(x) = 3(x^2 + 2)$ . The values for the quadratic function  $h(x)$  are shown in the table.

<b><math>x</math></b>	-2	-1	0	1	2
<b><math>h(x)</math></b>	6	-3	-6	-3	6

Which statement is true?

- A.** The  $y$ -intercept of  $h(x)$  is 12 units below the  $y$ -intercept of  $f(x)$ .
- B.** The  $y$ -intercept of  $f(x)$  is 12 units below the  $y$ -intercept of  $h(x)$ .
- C.** The  $y$ -intercept of  $f(x)$  is 4 units above the  $y$ -intercept of  $h(x)$ .
- D.** The  $y$ -intercept of  $f(x)$  is 6 units above the  $y$ -intercept of  $h(x)$ .
19. The probability of rolling  $N$  on a 6-sided number cube is  $\frac{1}{6}$ . Which result is **not** consistent with this model for getting  $N$ ?
- A.** The student gets  $N$  4 times in a row.
- B.** The student does not get  $N$  in 4 throws.
- C.** The student gets  $N$  12 times in 60 throws.
- D.** The student gets  $N$  12 times in 200 throws.
20. A researcher wants to find if the behavior of children is affected by playing video games that have violent content. He asks the parents of 100 children in a day care center how often each child plays video games and whether the video games they play have violent content. The children are then allowed to play in a controlled environment, such as the day care center's playground. Any violent behaviors are then noted.

What type of study is the researcher conducting?

- A.** census
- B.** experiment
- C.** observational study
- D.** sample survey

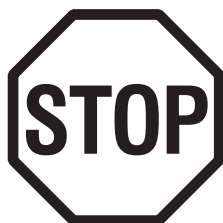


- 21.** A sample for a sociologist’s study is composed of people who were chosen randomly from shoppers at five different malls in a city. Which population can this group of people represent?
- A.** residents of the city who live near the mall
  - B.** residents of the state who live near the mall
  - C.** residents of the city who like to shop at malls
  - D.** residents of the state who like to shop at malls
- 22.** A survey asked whether students would eat food served in the school cafeteria. The results are recorded in the table shown.

<b>Grade</b>	<b>Yes</b>	<b>No</b>
9th	67	33
10th	63	47
11th	32	68
12th	12	88

What is the probability that a tenth-grade student will not eat food served in the school cafeteria, rounded to the nearest hundredth?

Write your answer in the space provided on your answer document.



**This is the end of Subpart 2 of the Algebra II Practice Test.  
Proceed to Subpart 3.**

**Directions**

Subpart 3 of this Practice Test booklet contains constructed-response items and selected-response items in Algebra II. Write all answers on your answer document.

**You MAY use a calculator in Subpart 3 of this test booklet.**

- 23.** Reference the table below, and write an expression equivalent to  $x^6$  for each of the attributes listed. Write your answers in the space provided on your answer document.

<b>Attribute</b>	<b>Expression</b>
Contains a negative exponent	1.
Contains a squared factor	2.
Contains a fraction	3.

- 24.** A quadratic equation has the following coefficients:  $a = 2$ ,  $b = -3$ , and  $c = 3$ . Write the solution(s) of the equation on your answer document. Enter one solution in each response box. If there is only one solution, leave one response box blank.



- 25.** The polynomial  $2x^2 + x - 15$  can be written as  $(2x - 5)(x + 3)$ . At which values of  $x$  does the graph of the polynomial cross the  $x$ -axis?

One solution to  $x$  is

- 2.5
- 2.5
- 5
- 5

The other solution to  $x$  is

- 1.5
- 3
- 1.5
- 3

Mark your answers on your answer document.

- 26.** Is  $(x + 2)$  a factor of  $x^3 - x^2 - x - 2$ ?
- A.** Yes, the remainder is  $-12$ .
  - B.** No, the remainder is  $0$ .
  - C.** No, the remainder is  $-12$ .
  - D.** Yes, the remainder is  $0$ .
- 27.** Makenna purchases a car for  $\$27,500$ . The value of the car will depreciate each year at a rate of  $12.4\%$ . What is the approximate equivalent monthly depreciation rate, to the nearest tenth of a percent?

Write your answer in the space provided on your answer document.



- 28.** Calvin purchases a piece of heavy machinery for \$32,300. The value of the machine depreciates at an annual rate of 8.3%. Which function represents the value of the machine with an approximate equivalent monthly depreciation rate?

**A.**  $f(t) = 32,300 \left( 0.917^{\frac{1}{12}} \right)^t$

**B.**  $f(t) = 32,300 \left( 1.083^{\frac{1}{12}} \right)^t$

**C.**  $f(t) = 32,300 \left( 0.917^{\frac{1}{12}} \right)^{12t}$

**D.**  $f(t) = 32,300 \left( 1.083^{\frac{1}{12}} \right)^{12t}$

- 29.** Each day, an investor deposits twice as much into the bank as she did the day before. Her initial investment is \$3.

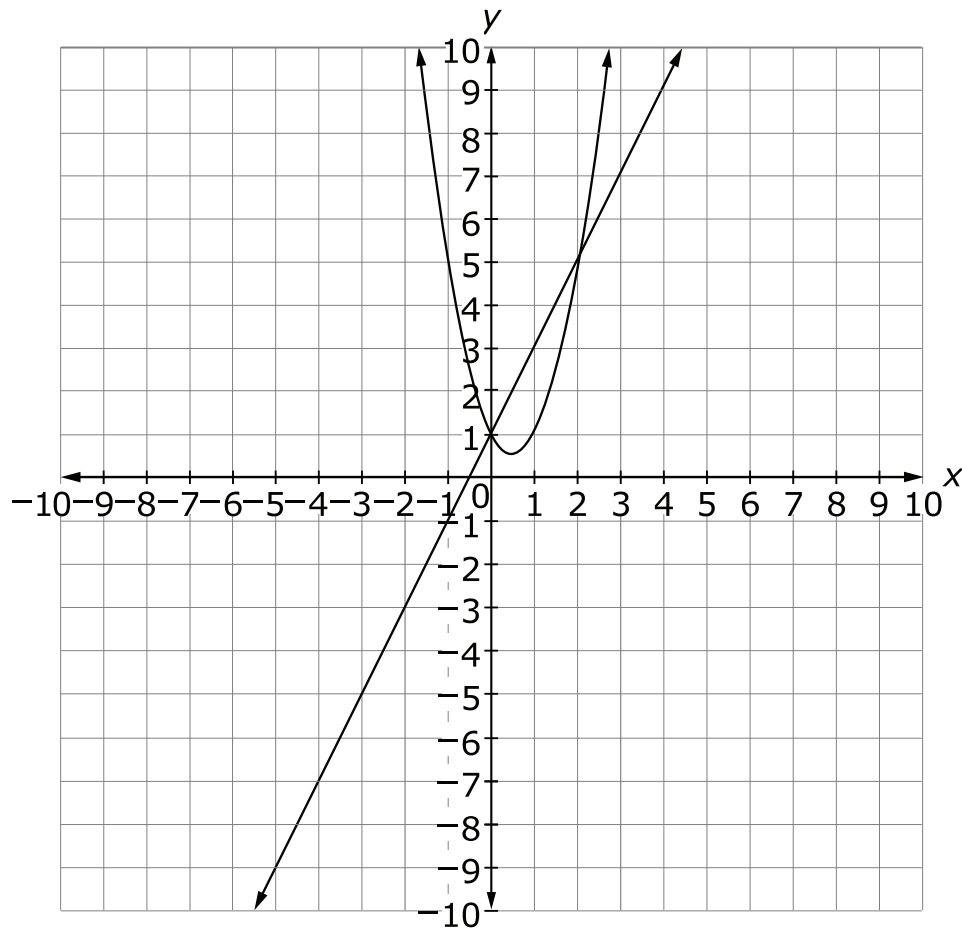
Using the elements 1, 2, 3, 6, 9, and  $x$ , write an exponential equation to model her daily deposit,  $y$ , on day  $x$ .

Write the complete equation in the space provided on your answer document.

$$y = \underline{\hspace{2cm}} (\underline{\hspace{2cm}})^{\underline{\hspace{2cm}}}$$



30. The graph of a system of equations is shown.



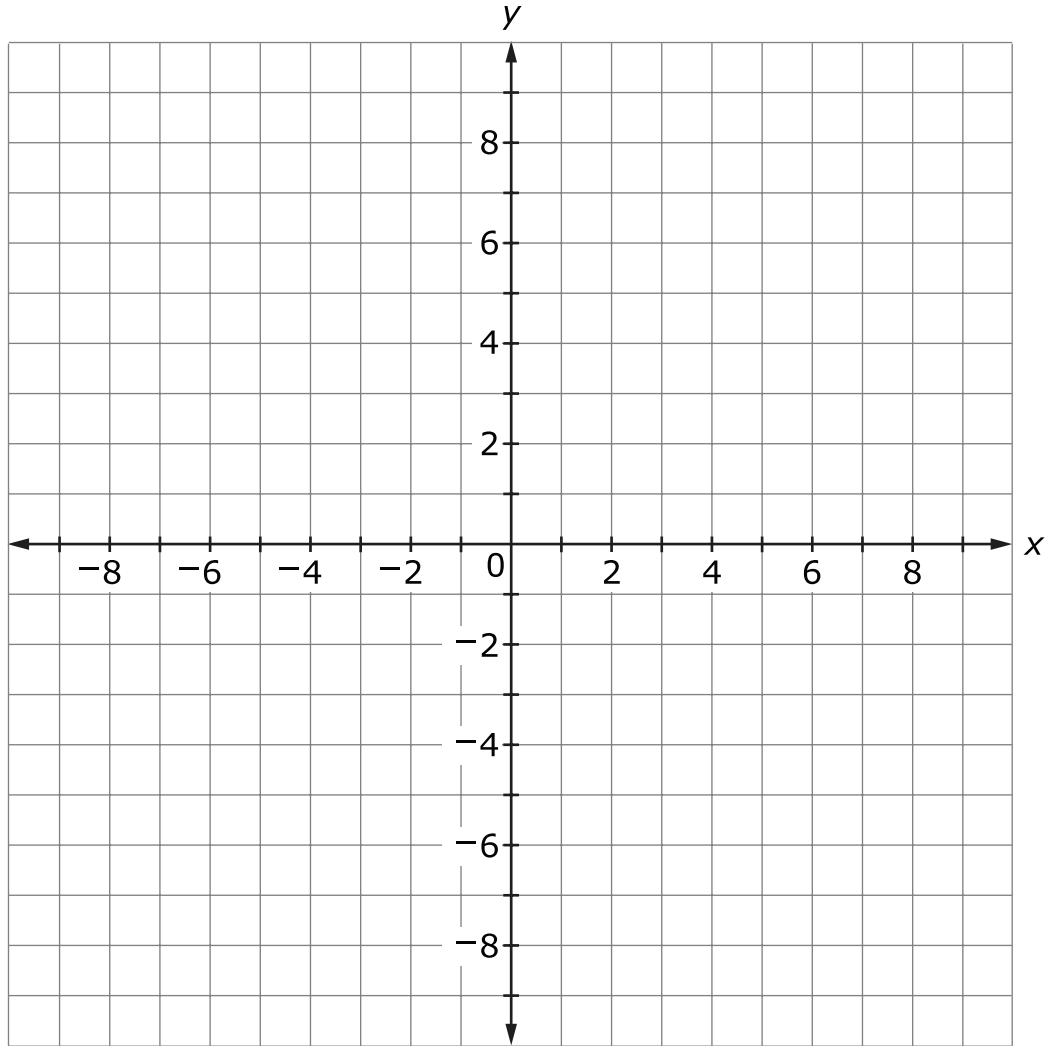
What are the  $x$ -values for the solutions to this system?

Write your answers in the space provided on your answer document.



- 31.** The graph of a function  $f(x) = 3x^2 - 5x - 7$  is a parabola.

Plot the points for the  $x$ -intercept(s),  $y$ -intercept(s), and maximum or minimum point to the nearest half unit, whichever one exists, on the coordinate grid provided on your answer document.







**32.** Select each function that has an inverse that is also a function for **all** values of  $x$ .

**A.**  $f(x) = 2x^2 + 4x - 3$

**B.**  $f(x) = 2x + 3$

**C.**  $f(x) = \frac{3}{2}x + 2$

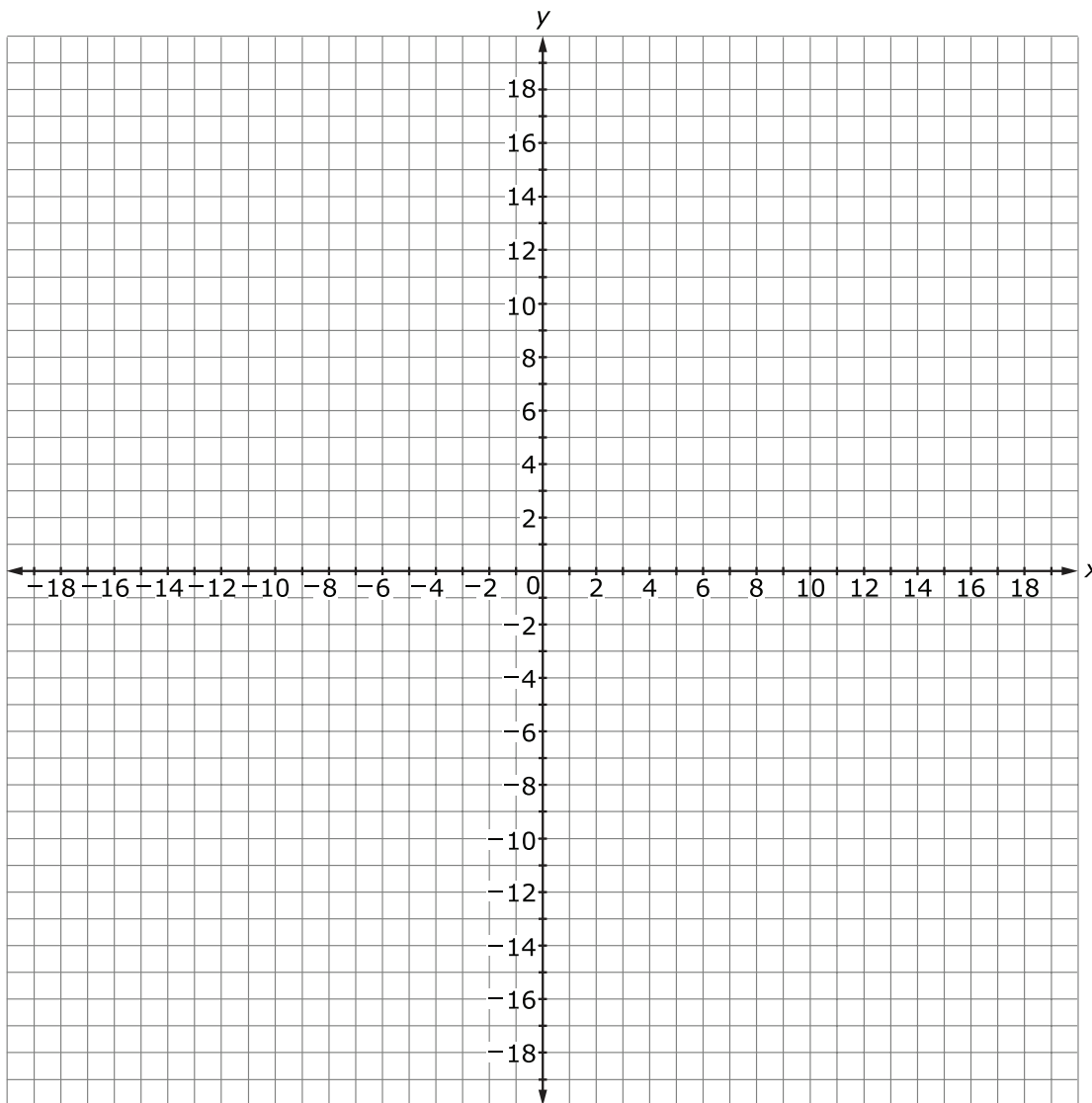
**D.**  $f(x) = 2x^3 + 2$

**E.**  $f(x) = 2x^4 + 3x^2 - x + 1$



- 33.** The equation  $y = -2(x - 1)^2 + 18$  is used to determine the profit earned,  $y$ , from the sales of a product, with  $x$  representing the price per unit sold.

Plot the points representing the  $x$ -intercept(s),  $y$ -intercept(s), and maximum or minimum point, whichever one is appropriate, on the coordinate grid provided on your answer document.





- 34.** In the table below, four functions are shown on the left. Find the inverse for each function and mark the letter for the inverse on your answer document.

Function	Inverse
<b>1.</b> $f(x) = \sqrt[4]{x}$	<b>A.</b> $f^{-1}(x) = 5x + \frac{1}{2}$
<b>2.</b> $f(x) = 2x - 10$	<b>B.</b> $f^{-1}(x) = 3x - 15$
<b>3.</b> $f(x) = \frac{1}{7}x + 3$	<b>C.</b> $f^{-1}(x) = 7x + 4$
<b>4.</b> $f(x) = \frac{1}{3}x + 5$	<b>D.</b> $f^{-1}(x) = x^4$ <b>E.</b> $f^{-1}(x) = 7x - 21$ <b>F.</b> $f^{-1}(x) = \frac{1}{2}x + 5$ <b>G.</b> $f^{-1}(x) = 7x - 3$



- 35.** The focus of a parabola is located at  $(5, -6)$  and the directrix at  $y = 12$ . Complete the equation of the parabola by circling the appropriate term from the list below each blank in the equation. Write the complete equation on your answer document.

$$(x \quad \quad \quad)^2 = \quad \quad (y \quad \quad \quad)$$

+	3	-36	+	3
-	4	-9	-	4
	5	9		5
	9	36		9
	12			12
	18			18
	36			36

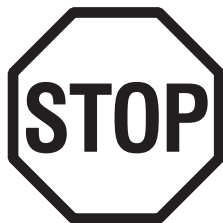
- 36.** What value of  $t$ , to the nearest hundredth, makes the equation  $4(10)^{3t} = 12$  true? Write your answer in the space provided on your answer document.
- 37.** The federal government defines a 100-year flood as "a flood that has a 1% chance of being equaled or exceeded in any single year." What should be the effect on the government's definition if a 100-year flood were to occur 2 years in a row?
- A.** The definition should stay unchanged.
  - B.** The definition should begin to describe a 50-year flood.
  - C.** The amount of water expected in a 100-year flood should be increased.
  - D.** The amount of water expected in a 100-year flood should be decreased.



38. A quadratic function is given as  $f(x) = 4x^2 + 8x + 10$ .

Write an equivalent function by inserting the numerals 1–9 and operational signs (+, -) into the vertex form given. Write the complete equation in the space provided on your answer document.

$$f(x) = \underline{\hspace{1cm}} (x \underline{\hspace{1cm}} \underline{\hspace{1cm}})^2 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$$



**This is the end of the test.**

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## TNReady Math Reference Sheet—High School

1 inch = 2.54 centimeters

1 meter = 39.37 inches

1 mile = 5,280 feet

1 mile = 1,760 yards

1 mile = 1.609 kilometers

1 kilometer = 0.62 mile

1 pound = 16 ounces

1 pound = 0.454 kilograms

1 kilogram = 2.2 pounds

1 ton = 2000 pounds

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 gallon = 3.785 liters

1 liter = 0.264 gallons

1 liter = 1000 cubic centimeters

Pythagorean Theorem:  $a^2 + b^2 = c^2$

Quadratic Formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Arithmetic Sequence:  $a_n = a_1 + (n - 1)d$

Geometric Sequence:  $a_n = a_1 r^{n-1}$

Finite Geometric Series:  $S_n = \frac{a_1(1 - r^n)}{1 - r}$

Degrees: 1 degree =  $\frac{\pi}{180}$  radians

Radians: 1 radian =  $\frac{180}{\pi}$  degrees

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Name: \_\_\_\_\_

**Subpart 1 Sample Questions**

1. 1.

2.

2. (A) (B) (C) (D)

**Subpart 1 Practice Test Questions**

1. (A) (B) (C) (D)

2.

3.

4. (A) (B) (C) (D)

5.

6. (A) (B) (C) (D)

7.

8.

9. (A) (B) (C) (D)

Subpart 2 Practice Test Questions

10. (A) (B) (C) (D)

11.

12.

13. (A) (B) (C) (D) (E) (F) (G)

14. (A) (B) (C) (D)

15. (A) (B) (C) (D)

16.

17. (A) (B) (C) (D)

18. (A) (B) (C) (D)

19. (A) (B) (C) (D)

20. (A) (B) (C) (D)

21. (A) (B) (C) (D)

22.

Subpart 3 Practice Test Questions

23. 1. \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_

24.

25.  -2.5  
 2.5  
 5  
 -5

- 1.5  
 3  
 -1.5  
 -3

26. (A) (B) (C) (D)

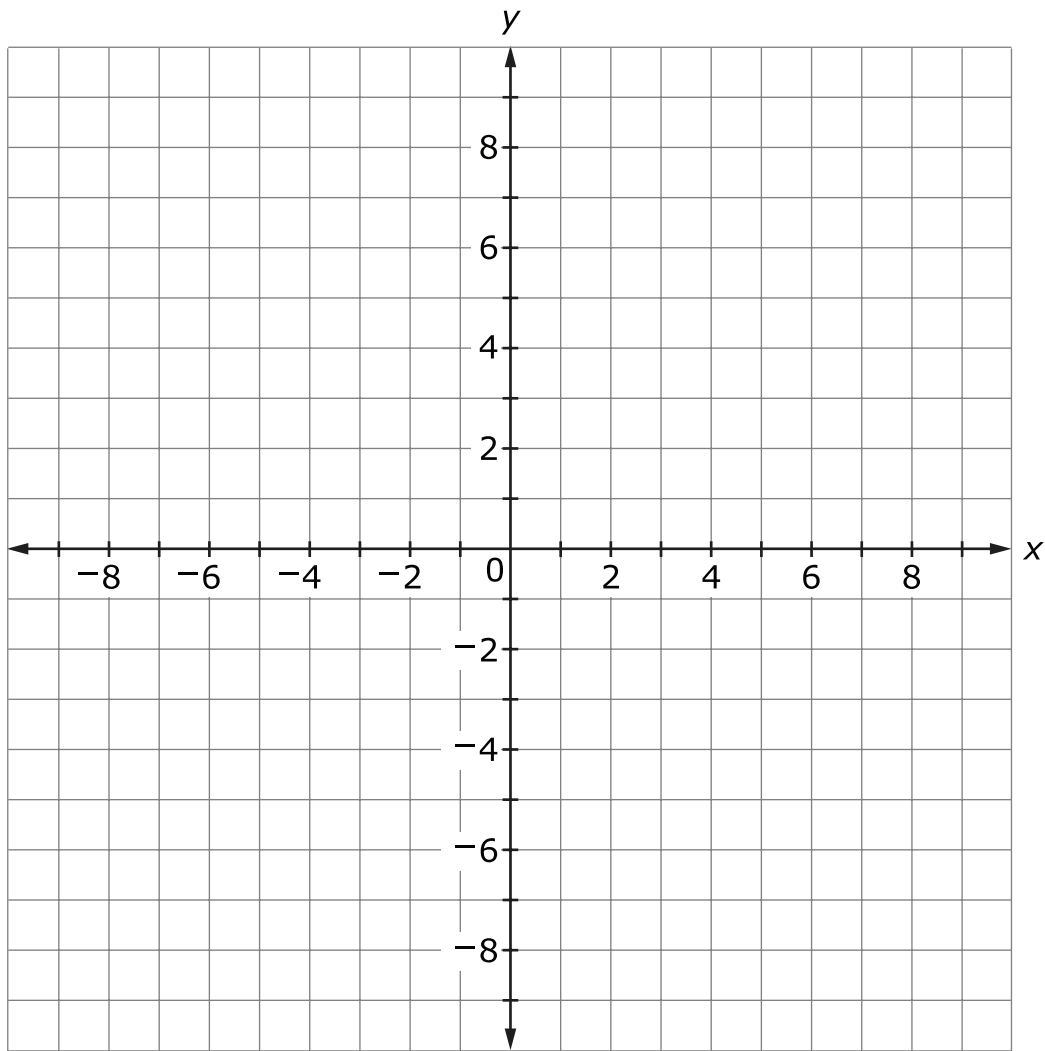
27.

28. (A) (B) (C) (D)

29.  $y = \underline{\hspace{2cm}} (\underline{\hspace{2cm}}) \text{—}$

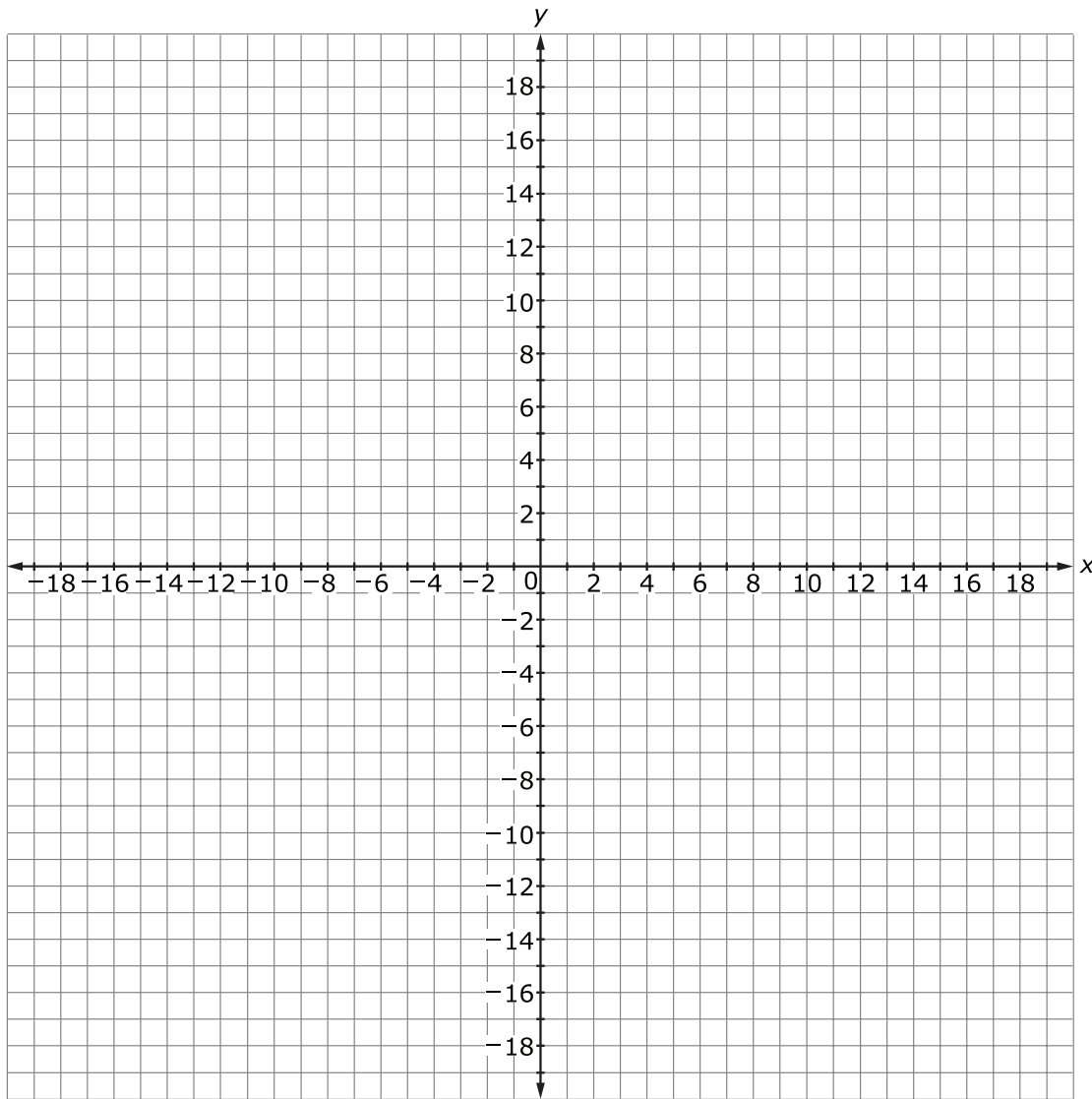
30.

31.



32. (A) (B) (C) (D) (E)

33.



34. Function 1: \_\_\_\_\_

Function 2: \_\_\_\_\_

Function 3: \_\_\_\_\_

Function 4: \_\_\_\_\_

35.  $(x \text{ --- } \text{---})^2 = \text{---} (y \text{ --- } \text{---})$

+	3	-36	+	3
-	4	-9	-	4
	5	9		5
	9	36		9
	12			12
	18			18
	36			36

36.

37. (A) (B) (C) (D)

38.  $f(x) = \text{---} (x \text{ --- } \text{---})^2 \text{---} \text{---}$

## Subpart 1 Sample Questions

1. 1.  $x + x + 2 = 72$   
 2. 35, 37
2.  A  B  C  D

## Subpart 1 Practice Test Questions

1.  A  B  C  D
2.  $f(w) = w(w + 10)$
3. 10
4.  A  B  C  D
5.  $\frac{6(1 - 3^{12})}{-2}$
6.  A  B  C  D
7. 6
8.  $J(t) = 627 \left( 1 + \frac{0.035}{4} \right)^{4t}$
9.  A  B  C  D

## Subpart 2 Practice Test Questions

10.  A  B  C  D
11.  $f(n) = 4(3^{n-1})$
12.  $\frac{-2 + 2i\sqrt{5}}{3}$   
 $\frac{-2 - 2i\sqrt{5}}{3}$
13.  A  B  C  D  E  F  G
14.  A  B  C  D
15.  A  B  C  D

16. 6.3
17. (A) (B) ● (D)
18. ● (B) (C) (D)
19. (A) (B) (C) ●
20. (A) (B) ● (D)
21. (A) (B) ● (D)
22. 0.43

**Subpart 3 Practice Test Questions**

23. 1.  $x^7 * x^{-1}$   
2.  $x^4 * x^2$   
3.  $x^7 * \frac{1}{x}$

24. 
$$\frac{3+i\sqrt{15}}{4}$$
$$\frac{3-i\sqrt{15}}{4}$$

25. 

<input type="radio"/> -2.5
<input checked="" type="radio"/> 2.5
<input type="radio"/> 5
<input type="radio"/> -5

- |                                     |
|-------------------------------------|
| <input type="radio"/> 1.5           |
| <input type="radio"/> 3             |
| <input type="radio"/> -1.5          |
| <input checked="" type="radio"/> -3 |

26. (A) (B) ● (D)
27. 1.1

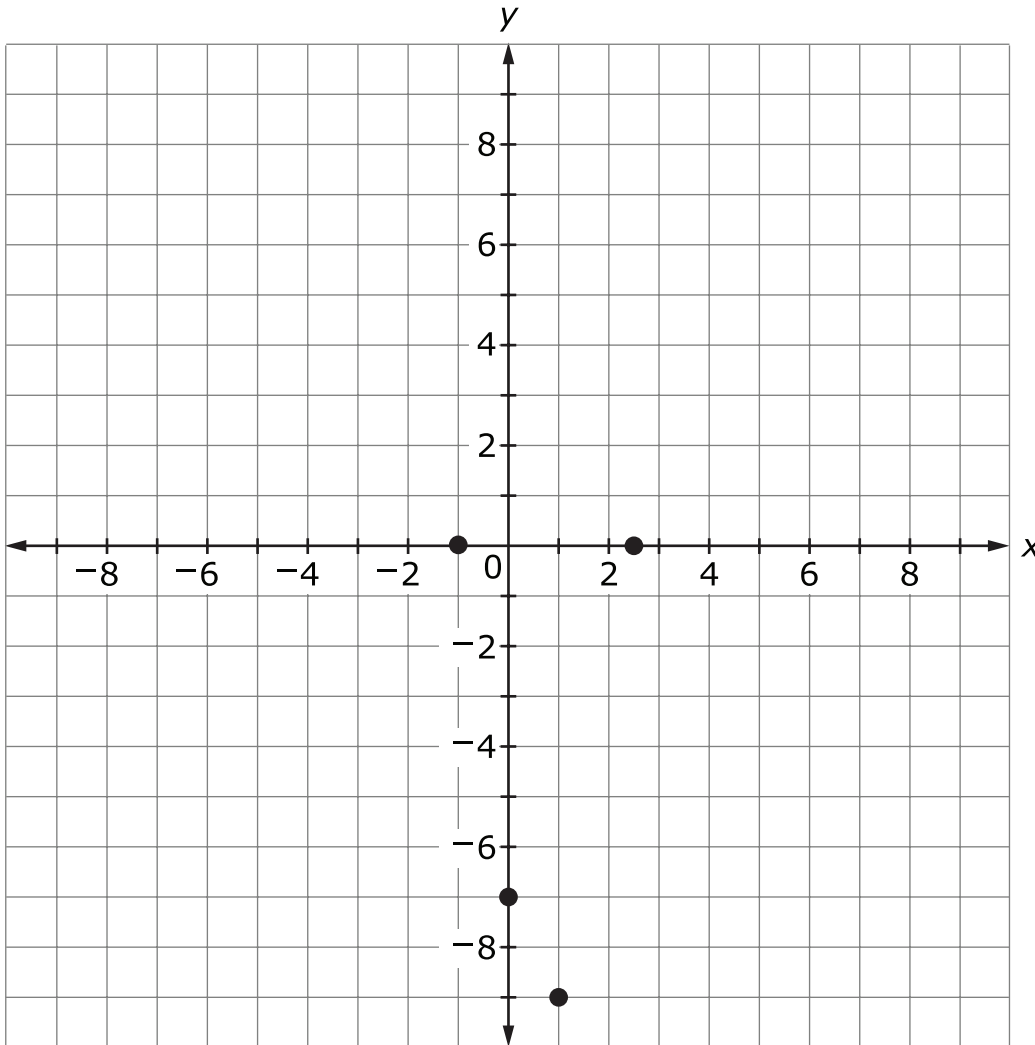


28. (A) (B) ● (D)

29.  $y = 3(2)^x$

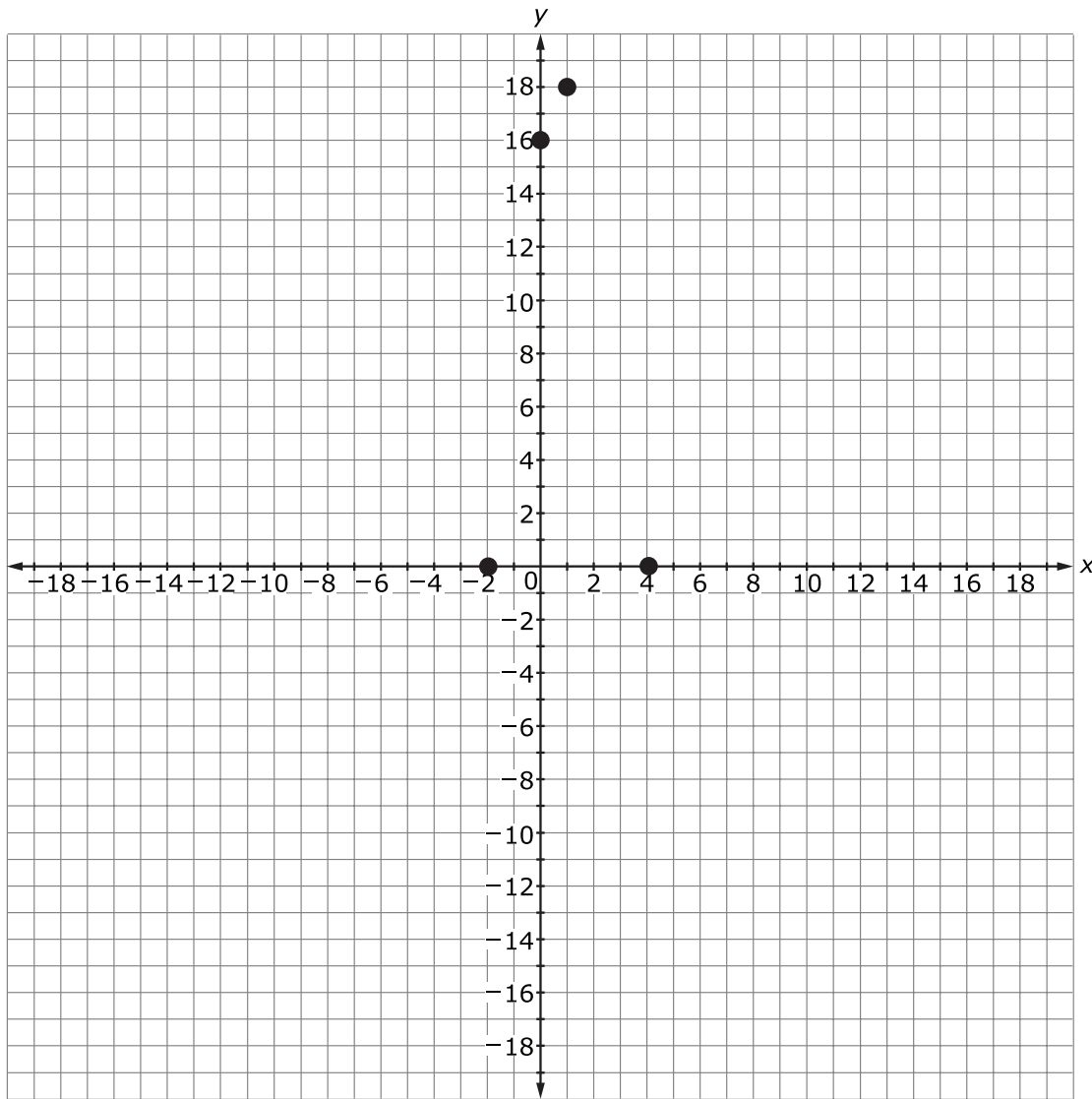
30. 0 and 2

31.



32. (A) ● ● ● (E)

33.



34. Function 1: D

Function 2: F

Function 3: E

Function 4: B

35.  $(x - 5)^2 = -36(y - 3)$

36. 0.16

37. ● Ⓑ Ⓒ Ⓓ

38.  $(x - 5)^2 = -36(y - 3)$