Tennessee Comprehensive Assessment Program

TCAP

Algebra II
Practice Test

Please **PRINT** *all information in the box.*

Student Name: _____

Teacher Name: _____

School: _____

District: _____

All practice test items represent the appropriate grade level/content standards—however, the practice test may contain item types that no longer appear on the operational assessment.

TNReady Math Reference Sheet—High School

1 inch = 2.54 centimeters	Exponential Growth: $y = a(1 + r)^t$
1 mile = 5,280 feet	
1 mile = 1,760 yards	Exponential Decay: $y = a(1 - r)^t$
1 mile = 1.609 kilometers	
1 kilometer = 0.62 mile	Compound Interest: $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$
1 meter = 39.37 inches	
	Continually Compounding Interest:
1 pound = 16 ounces	$A = Pe^{rt}$
1 pound = 0.454 kilograms	
1 kilogram = 2.2 pounds	
1 ton = 2,000 pounds	Arithmetic Sequence: $a_n = a_1 + (n - 1)d$
1 cup = 8 fluid ounces	Geometric Sequence: $a_n = a_1(r)^{n-1}$
1 pint = 2 cups	
1 quart = 2 pints	Finite Geometric Series: $S_n = \dfrac{a_1\left(1 - r^n\right)}{1 - r}$
1 gallon = 4 quarts	
1 gallon = 3.785 liters	
1 liter = 0.264 gallons	Degrees: 1 degree = $\dfrac{\pi}{180}$ radians
1 liter = 1,000 cubic centimeters	
	Radians: 1 radian = $\dfrac{180}{\pi}$ degrees

Directions

This test has Subpart 1, Subpart 2, and Subpart 3. Each subpart contains various types of assessment questions.

You <u>MAY NOT</u> use a calculator in Subpart 1 of this test.

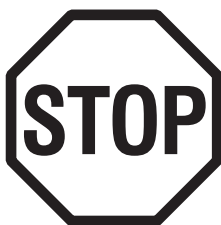### Sample: Multiple choice (one correct response)

Which expression is equivalent to $\dfrac{x^2 + 2x - 24}{3x + 18}$?

A. $\dfrac{x - 4}{3}$

B. $\dfrac{x + 6}{3x + 6}$

C. $\dfrac{x - 4}{x + 6}$

D. $\dfrac{x^2 + 2x - 4}{3x^2 + 3}$

STOP

Do not go on to the next page until told to do so.

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.

Enter your answer in the space provided.

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

Enter your answer in the space provided.

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

     M. $16x^2 + 36y^2$

     P. $4x^2 + 2(4x)(6y) + 6y^2$

     R. $(4x)^2 + 2(4x)(6y) + (6y)^2$

     S. $(4x)^2 + (4x)(6y) + (6y)^2$

5   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. $(x - y)(x^2 + 2xy + y^2)(x + y)(x^2 - 2xy + y^2)$

6   What value of x makes the equation $\dfrac{3}{x+3} = \dfrac{9}{x^2-9}$ true?

     Enter your answer in the space provided.


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7 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.

Enter your answer in the space provided.

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8 Which expression is equivalent to $\sqrt{16a^4x^6}$, when $a > 0$ and $x > 0$?

M. $4a^2x^3$

P. $4a^2x^4$

R. $8a^2x^3$

S. $8a^2x^4$

ASSESSMENT MATERIAL
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    4   **Go on ⇨**

9   The formula to determine the *pH* of a solution, given its hydronium ion concentration, is $y = -\log(x)$.

- *x* represents the hydronium concentration

- *y* represents the *pH* of the solution

What equation represents the hydronium ion concentration in terms of the *pH*?

A. $x = (-10)^y$

B. $x = -10^y$

C. $x = (-10)^{-y}$

D. $x = 10^{-y}$

STOP

**This is the end of Subpart 1 of the Algebra II Test.
Do not go on to the next page until told to do so.**

10   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 $f(n)$.

Enter your answer in the space provided.

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11   What is one solution to $3x^2 + 4x + 8 = 0$?

Enter your answer in the space provided.

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12   A system of equations is shown.

$$f(x) = -x^2 + 6x - 4$$

$$g(x) = |x - 3| - 1$$

What is the greatest value of x for which $f(x)=g(x)$?

Enter your answer in the space provided.

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13   **Part A**

A person's batting average is determined by dividing the number of hits by the number of at bats. William has 11 hits in 53 at bats and has a batting average of 0.208. He wants to have a batting average of at least 0.300.

Which equation could be used to determine x, the number of hits in a row William needs to get in order to have a batting average of at least 0.300?

A. $0.300 \leq \dfrac{11x}{53x}$

B. $0.300x \leq \dfrac{11}{53}$

C. $0.300 \leq \dfrac{11 + x}{53}$

D. $0.300 \leq \dfrac{11 + x}{53 + x}$

Part B

How many hits in a row after his first 53 times at bat would William have to hit in order to have a batting average of exactly 0.300?

Enter your answer in the space provided.

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

   M. $\dfrac{\sqrt{2}}{2}$

   P. $-\dfrac{\sqrt{2}}{2}$

   R. $\dfrac{1}{2}$

   S. $-\dfrac{1}{2}$

15 A researcher wants to determine 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

16   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.

x	−2	−1	0	1	2
$h(x)$	6	−3	−6	−3	6

Which statement about the y-intercept of $f(x)$ is true?

M. It is 12 units above the y-intercept of $h(x)$.

P. It is 8 units above the y-intercept of $h(x)$.

R. It is 6 units above the y-intercept of $h(x)$.

S. It is 4 units above the y-intercept of $h(x)$.

17   A survey asked 410 students whether they would eat food served in the school cafeteria. The results are recorded in the table shown.

Grade	Yes	No
9th	67	33
10th	63	47
11th	32	68
12th	12	88

What is the probability that a student will **not** eat food served in the school cafeteria, given that the student is in 10th grade?
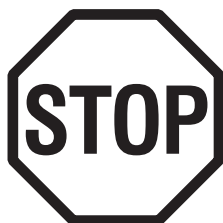
Enter your answer, rounded to the nearest hundredth, in the space provided.

18 A rock is dropped from a hot air balloon at a height of 100 meters. The rock's height from the ground in meters, $h(t)$, is modeled by the formula $h(t) = -4.9t^2 + 100$, where t is the time in seconds.

What is the average rate of change in *m/s* of the height of the rock between 2 and 4 seconds?

A. -4.9

B. -9.8

C. -29.4

D. -58.8

**This is the end of Subpart 2 of the Algebra II Test.
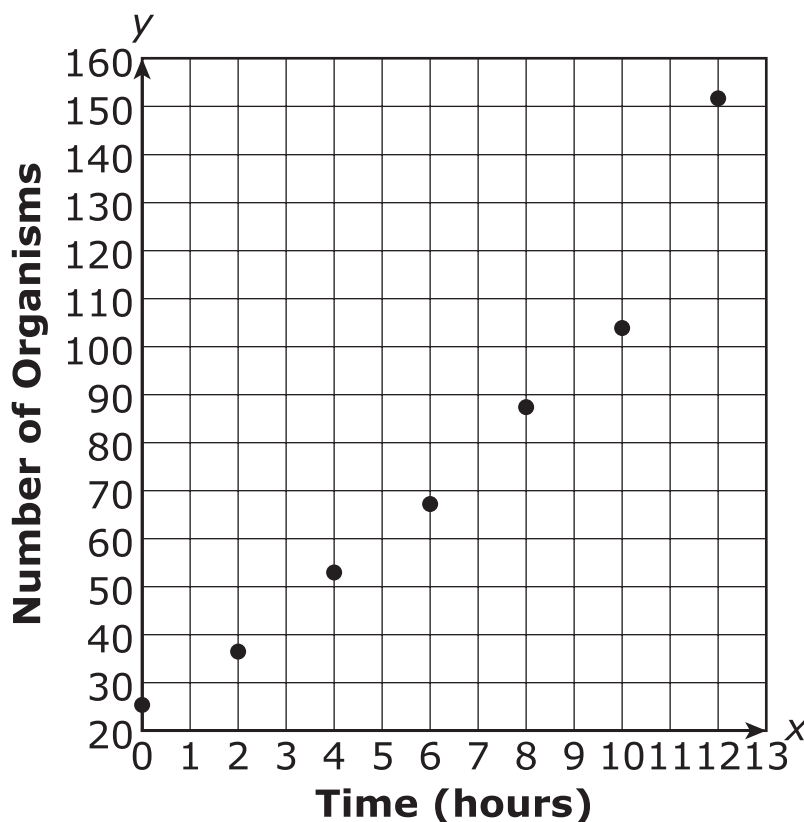Do not go on to the next page until told to do so.**

19 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.

20 The graph shows the exponential growth of the number of organisms in a Petri dish over a 12-hour period.

Time (hours)	Number of Organisms
0	25
2	36
4	52
6	68
8	88
10	104
12	151

To the nearest whole organism, how many organisms are expected to be in the Petri dish at 15 hours?

Enter your answer in the space provided.

21   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?

M. $f(t) = 32{,}300(0.917^{\frac{1}{12}})^{t}$

P. $f(t) = 32{,}300(1.083^{\frac{1}{12}})^{t}$

R. $f(t) = 32{,}300(0.917^{\frac{1}{12}})^{12t}$

S. $f(t) = 32{,}300(1.083^{\frac{1}{12}})^{12t}$

22 Two students work the same problem:

Jamie:	**Taylor:**
$\dfrac{1}{x+3} = \dfrac{5}{2x+5}$	$\dfrac{1}{x+3} = \dfrac{5}{2x+5}$
Step 1: $\dfrac{1}{x+3} = \dfrac{1}{2x+1}$	Step 1: $2x+5 = 5x+15$
Step 2: $2x+1 = x+3$	Step 2: $5-15 = 5x-2x$
Step 3: $2x-x = 3-1$	Step 3: $-10 = 3x$
Step 4: $x = 2$	Step 4: $\dfrac{-10}{3} = x$

Which statement is true?

A. Jamie is right, because the 5 in the numerator and the 5 in the denominator will simplify to 1.

B. Taylor is right, because $1(2x+5) = 5(x+3)$ is one method to solve a proportion.

C. Jamie is wrong, because from step 2 to step 3 she should have added x to both sides.

D. Taylor is wrong, because from step 3 to step 4 he should have divided both sides by -10.

23 The graph of a system of equations is shown.
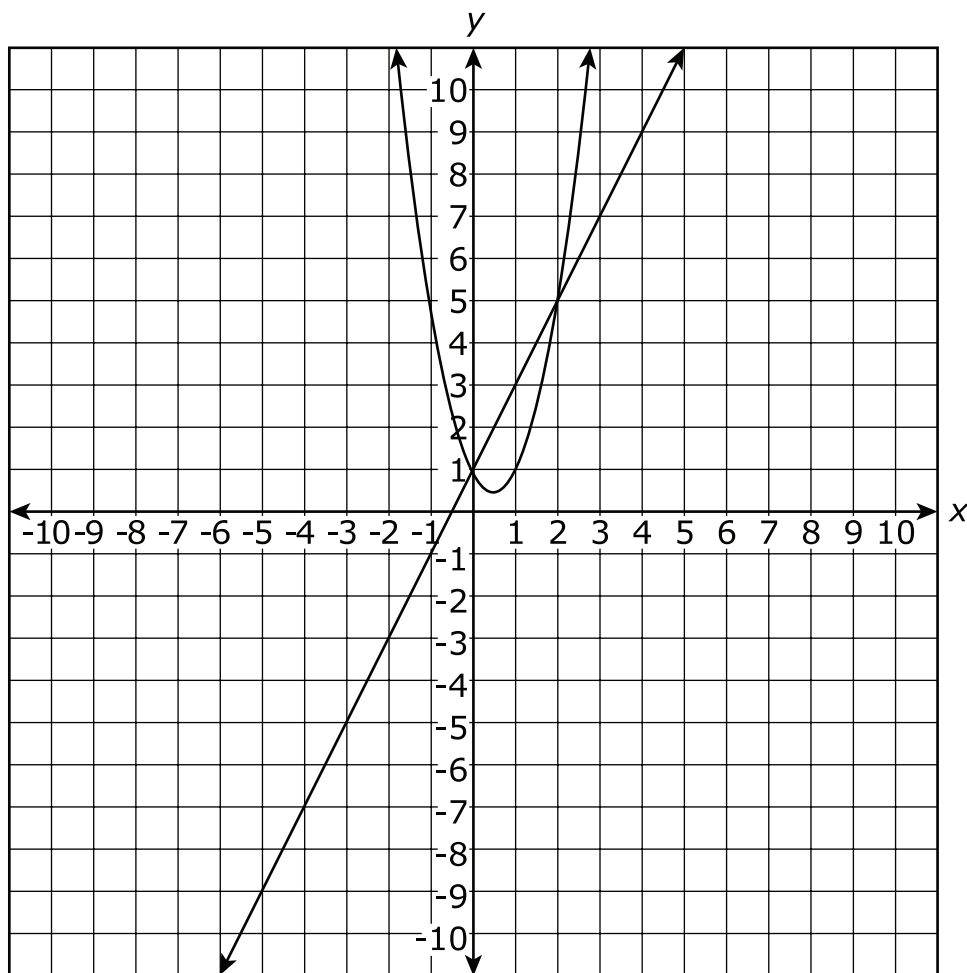
What is the *x*-coordinate of one of the solutions to the system of equations?

Enter your answer in the space provided.

24　A chemical is added to water to a concentration of 15 parts per million (ppm). Readings are taken every one half hour to see how much of the chemical remains. The readings are recorded in the table shown.

Time, t (hours)	0.0	0.5	1.0	1.5	2.0
Concentration, C (ppm)	15.0	13.4	12.0	10.7	9.6

Which function models the concentration of the chemical in t hours?

M. $C(t) = 0.3143(14.99)^t$

P. $C(t) = 14.99(0.3143)^t$

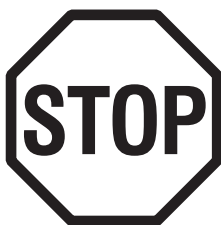**R.** $C(t) = 14.99(0.7997)^t$

S. $C(t) = 0.7997(14.99)^t$

25　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. $f(x) = \dfrac{3}{2}x + 2$

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

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

26   What value of t, to the nearest hundredth, makes the equation $4(10)^{3t} = 12$ true?

Enter your answer in the space provided.

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This is the end of the test.

Subpart 1 Practice Test Questions

1. Ⓐ Ⓑ Ⓒ ●

2.
> $f(w) = w(w + 10)$ or equivalent

3.
> 10 or $\dfrac{10}{x - 3}$

4. Ⓜ Ⓟ ● Ⓢ

5. Ⓐ Ⓑ ● Ⓓ

6.
> 6

7.
> $J(t) = 627(1.00875)^{4t}$ or equivalent

8. ● Ⓟ Ⓡ Ⓢ

9. Ⓐ Ⓑ Ⓒ ●

Subpart 2 Practice Test Questions

10.

$$f(n) = 4(3^{n-1})$$

11.

$$\dfrac{-2 + 2i\sqrt{5}}{3} \quad \text{or} \quad \dfrac{-2 - 2i\sqrt{5}}{3} \quad \text{or equivalent}$$

12.

5

13. **Part A:** Ⓐ Ⓑ Ⓒ ●

Part B:

7

14. Ⓜ ● Ⓡ Ⓢ

15. Ⓐ Ⓑ ● Ⓓ

16. ● Ⓟ Ⓡ Ⓢ

17.

0.43

18. Ⓐ Ⓑ ● Ⓓ

Subpart 3 Practice Test Questions

19. Ⓐ Ⓑ ● Ⓓ

20.

> Accept any answer from 219 to 233

21. Ⓜ Ⓟ ● Ⓢ

22. Ⓐ ● Ⓒ Ⓓ

23.

> 0 or 2

24. Ⓜ Ⓟ ● Ⓢ

25. Ⓐ ● ● ● Ⓔ   (Select **all** that apply)

26.

> 0.16

TN Department of **Education**

**TNReady Practice Test Standards Alignment and Key - Algebra II**
Subpart 1	**Key**	**Standard**
1	D	A2.N.CN.A.2
2	$f(w) = w(w+10)$	A2.F.BF.A.1
3	10 or 10/(x-3)	A2.A.APR.A.1
4	R	A2.A.SSE.A.1
5	C	A2.A.SSE.A.1
6	6	A2.A.REI.A.2
7	$J(t) = 627(1.00875)^{4t}$ or equivalent	A2.F.LE.A.1
8	M	A2.N.RN.A.2
9	D	A2.A.CED.A.2
Subpart 2		
10	$f(n) = 4(3^{n-1})$	A2.F.BF.A.2
11	$\dfrac{-2 + 2i\sqrt{5}}{3}$ or $\dfrac{-2 - 2i\sqrt{5}}{3}$	A2.N.CN.B.3
12	5	A2.A.REI.D.6
13	Part A: D Part B: 7	A2.A.CED.A.1
14	P	A2.F.TF.B.3b
15	C	A2.S.IC.A.1
16	M	A2.F.IF.B.5
17	0.43	A2.S.CP.A.3
18	C	A2.F.IF.A.2
Subpart 3		
19	C	A2.A.ARP.A.1
20	Accept any answer from 219 to 233	A2.S.ID.B.2a
21	R	A2.A.SSE.B.2a
22	B	A2.A.REI.A.1
23	0 or 2	A2.A.REI.C.5
24	R	A2.A.SSE.B.2
25	B, C, D	A2.F.BF.B.4
26	0.16	A2.F.LE.A.2