Tennessee Comprehensive Assessment Program

TCAP

Math EOC Item Release
Algebra II

2018–2019

TN Department of **Education**

Item Information

Item Code:	TN0002997	Grade Level:	Algebra II
Standard Code:	A2.A.APR.A.2	Position No:	1

Standard Text: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Reporting Category: 1: Structure and Operations

Calculator: Z

Correct Answer:	D	DOK Level: 2		Item Type: O

Four students rewrote the function $y = 6x^2 + 27x - 15$ in factored form and stated the zeros.

Which solution correctly shows the function in factored form and identifies the zeros of the function?

A. $y = (6x - 3)(x + 5)$
zeros: 2 and −5

B. $y = (6x - 3)(x + 5)$
zeros: −2 and 5

C. $y = 3(2x - 1)(x + 5)$
zeros: −0.5 and 5

D. $y = 3(2x - 1)(x + 5)$
zeros: 0.5 and −5

Item Information

Item Code: TN013606	Grade Level: Algebra II
Standard Code: A2.A.APR.A.2	Position No: 2
Standard Text: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
Reporting Category: 1: Structure and Operations	
Calculator: Z	
Correct Answer: A	DOK Level: 2	Item Type: O

What are the real zeros of the function $f(x) = x^4 - 3x^3 + 2x^2 - 6x$?

A. $x = 0$ and $x = 3$

B. $x = 0$ and $x = -3$

C. $x = -\sqrt{2}$, $x = 0$, $x = \sqrt{2}$, and $x = -3$

D. $x = -\sqrt{2}$, $x = 0$, $x = \sqrt{2}$, and $x = 3$

Item Information

Item Code:	TN348131	Grade Level:	Algebra II
Standard Code:	A2.A.APR.B.3	Position No:	3
Standard Text:	Know and use polynomial identities to describe numerical relationships.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	A	DOK Level: 2	Item Type: O

Which expression is equivalent to $55^2 - 45^2$?

A. $(10)(100)$

B. $(55 - 45)^2$

C. $5(11^2 - 9^2)$

D. $110 - 90$

Item Information

Item Code:	TN748139	Grade Level:	Algebra II
Standard Code:	A2.A.APR.B.3	Position No:	4
Standard Text:	Know and use polynomial identities to describe numerical relationships.		
Reporting Category:	1: Structure and Operations		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

Which expression is equivalent to $12^3 - 10^3$?

A. $(12 - 10)(144 + 100)$

B. $(12 + 10)(144 - 100)$

C. $(12 - 10)(144 + 120 + 100)$

D. $(12 + 10)(144 - 120 + 100)$

Item Information

Item Code: TN413897	Grade Level: Algebra II
Standard Code: A2.A.APR.C.4	Position No: 5
Standard Text: Rewrite rational expressions in different forms.	
Reporting Category: 1: Structure and Operations	
Calculator: Z	
Correct Answer: B DOK Level: 2	Item Type: O

Which expression is equivalent to $\dfrac{9x^3 + 18x^2 - x - 2}{3x + 1}$ for $x \neq -\dfrac{1}{3}$?

A. $(3x - 2)(x + 1)$

B. $(3x - 1)(x + 2)$

C. $(3x + 1)(x - 2)$

D. $(3x + 2)(x - 1)$

Item Information

Item Code: TN346731   Grade Level: Algebra II

Standard Code: A2.A.SSE.A.1   Position No: 6

Standard Text: Use the structure of an expression to identify ways to rewrite it.

Reporting Category: 1: Structure and Operations

Calculator: N

Correct Answer: B   DOK Level: 2   Item Type: O

Which expression is equivalent to $\dfrac{x^3 - x}{x - 1}$ for $x \neq 1$?

A. x^2

B. $x^2 + x$

C. $x^2 - 1$

D. $\dfrac{x^2(x - 1)}{x - 1}$

Item Information

Item Code: TN016374

Standard Code: A2.N.CN.A.2

Standard Text: Know and use the relation i^2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

Reporting Category: 1: Structure and Operations

Calculator: Z

Correct Answer: C

Grade Level: Algebra II

Position No: 7

DOK Level: 2

Item Type: O

Let $a = 2i + 3$, $b = i - 1$, and $c = -3i + 2$.

Which expression is equivalent to $a - b - c$?

A. $-2i + 2$

B. $-2i + 4$

C. $4i + 2$

D. $4i + 4$

Item Information

Item Code:	TN246076	Grade Level:	Algebra II
Standard Code:	A2.N.Q.A.1	Position No:	8

Standard Text: Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.
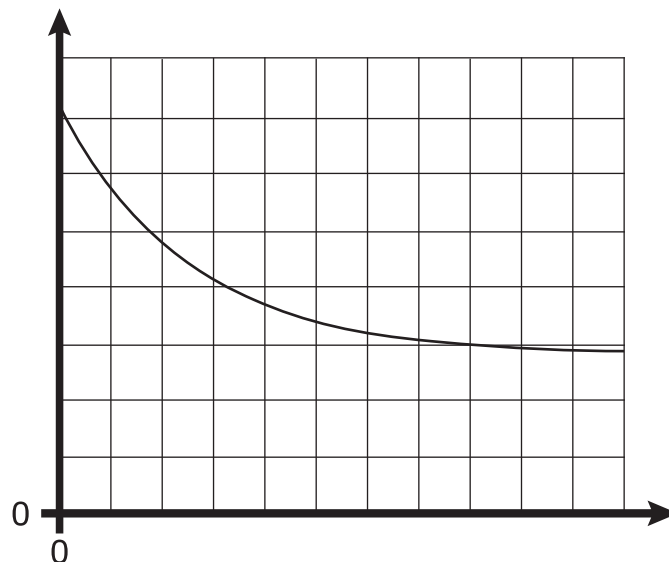
Reporting Category: 1: Structure and Operations

Calculator: Z

Correct Answer:	C	DOK Level:	2	Item Type: O

The graph of an exponential function is shown. The horizontal axis represents time.

Which quantity could the vertical axis represent?

A. the height of a growing tree

B. the speed of a car as it coasts to a stop

C. the temperature of a cup of boiling water sitting at room temperature

D. the temperature of an ice cube sitting at room temperature

Item Information

Item Code: TN016766

Standard Code: A2.N.RN.A.2

Standard Text: Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Reporting Category: 1: Structure and Operations

Calculator: Z

Correct Answer: B,C,F   DOK Level: 1   Item Type: O

Grade Level: Algebra II

Position No: 9

Given the equation $x^3 = 27$, which expressions are equivalent to x?

Select **all** that apply.

A. 9

B. 3

C. $27^{\frac{1}{3}}$

D. $\sqrt{27}$

E. $\sqrt[3]{3}$

F. $\sqrt[3]{27}$

Item Information

Item Code:	TN246034	Grade Level:	Algebra II
Standard Code:	A2.N.RN.A.2	Position No:	10

Standard Text: Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Reporting Category: 1: Structure and Operations

Calculator: Z

Correct Answer: D   DOK Level: 2   Item Type: O

Which expression shows $\left(\sqrt[3]{8x}\right)^2$ rewritten with rational exponents?

A. $3(8x)^{\frac{1}{2}}$

B. $2\left(8x^{\frac{1}{3}}\right)$

C. $\left(8x^{\frac{1}{2}}\right)^3$

D. $(8x)^{\frac{2}{3}}$

Item Information

Item Code: TN246051	Grade Level: Algebra II
Standard Code: A2.N.RN.A.2	Position No: 11
Standard Text: Rewrite expressions involving radicals and rational exponents using the properties of exponents.	
Reporting Category: 1: Structure and Operations	
Calculator: Z	
Correct Answer: B,D,F DOK Level: 2	Item Type: O

Which expressions are equivalent to $27^{\frac{4}{3}}$?

Select the **three** correct answers.

A. 4^3

B. $(27^{\frac{1}{3}})^4$

C. $3^{\frac{1}{4}}$

D. 81

E. $3\sqrt{4}$

F. $(\sqrt[3]{27})^4$

Item Information

Item Code:	TN348044	Grade Level:	Algebra II
Standard Code:	A2.A.REI.C.4	Position No:	12
Standard Text:	Write and solve a system of linear equations in context.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	D	DOK Level: 2	Item Type: O

Bailey is twice as old as Cala. Antoine is 9 years older than Cala and 3 years older than Bailey. How old is Antoine?

A. 6

B. 9

C. 12

D. 15

Item Information

Item Code: TN116412	Grade Level: Algebra II
Standard Code: A2.N.CN.B.3	Position No: 13
Standard Text: Solve quadratic equations with real coefficients that have complex solutions.	
Reporting Category: 2: Equations and Inequalities	
Calculator: Z	
Correct Answer: D	DOK Level: 2	Item Type: O

What is the solution to the equation $2x^2 + 2x + 5 = 0$?

A. $x = 1$ and $x = -2$

B. $x = -1$ and $x = -2$

C. $x = -1 + 3i$ and $x = -1 - 3i$

D. $x = \dfrac{-1 + 3i}{2}$ and $\dfrac{-1 - 3i}{2}$

Item Information

Item Code:	TN116468	Grade Level:	Algebra II
Standard Code:	A2.N.CN.B.3	Position No:	14
Standard Text:	Solve quadratic equations with real coefficients that have complex solutions.		
Reporting Category:	2: Equations and Inequalities		
Calculator:	Z		
Correct Answer:	C,D	DOK Level: 2	Item Type: O

Which values of x are solutions for the equation $x^2 + 15 = -2x^2 - 21$?

Select the **two** that apply.

A. $x = -i\sqrt{2}$

B. $x = -2\sqrt{3}$

C. $x = -2i\sqrt{3}$

D. $x = 2i\sqrt{3}$

E. $x = 2\sqrt{3}$

F. $x = i\sqrt{2}$

Item Information

Item Code: TN346669	Grade Level: Algebra II
Standard Code: A2.F.BF.A.2	Position No: 15

Standard Text: Write arithmetic and geometric sequences with an explicit formula and use them to model situations.

Reporting Category: 3: Functions

Calculator: Z

Correct Answer: D	DOK Level: 2	Item Type: O

Every year Beth doubles the amount of money she donates to charity. She donated $1 to charity at age 10.

How much money will she donate at age 20?

A. $21

B. $41

C. $512

D. $1,024

Item Information

Item Code:	TN546541	Grade Level:	Algebra II
Standard Code:	A2.F.BF.A.2	Position No:	16
Standard Text:	Write arithmetic and geometric sequences with an explicit formula and use them to model situations.		
Reporting Category:	3: Functions		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

Which of these is a formula that can be used to determine the nth term of the arithmetic sequence $15, 27, 39, 51, \ldots$?

A. $a_n = 3n + 12$

B. $a_n = 12n + 3$

C. $a_n = 12n + 15$

D. $a_n = 15n + 12$

Item Information

Item Code:	TN516743
Standard Code:	A2.F.IF.A.1

Grade Level: Algebra II

Position No: 17

Standard Text: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

Reporting Category: 3: Functions

Calculator: Z

Correct Answer: A,D,E   DOK Level: 2   Item Type: O

A craft store sells wooden boxes shaped like rectangular prisms. They come in heights from 5 inches to 10 inches. The table represents the function $f(x)$, which gives the volume of a box as a function of its height.

Height (in.)	5	6	7	8	9	10
Volume (in.³)	210	336	504	720	990	1,320

Which statements accurately describe the function $f(x)$?

Select **all** that apply.

A. The function is increasing.

B. The volume increases by a common factor of 1.6.

C. The function is decreasing.

D. The function is **not** linear.

E. The maximum value of the function is 1,320.

Item Information

Item Code:	TN716760	Grade Level:	Algebra II
Standard Code:	A2.F.LE.A.1	Position No:	18

Standard Text: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs.

Reporting Category: 3: Functions

Calculator: Z

Correct Answer:	D	DOK Level:	2	Item Type:	O

What is the expression, in terms of n, for the sequence a_n as defined in the input-output table?

n	a_n
1	21
2	26
3	31
4	36

A. $a_n = 1 + 10n$

B. $a_n = 4 + n$

C. $a_n = 5 + n$

D. $a_n = 16 + 5n$

Item Information

Item Code:	TN346113	Grade Level:	Algebra II
Standard Code:	A2.F.TF.B.3.b	Position No:	19

Standard Text: Given the quadrant of the angle, use the identity sin^2 θ + cos^2 θ = 1 to find sin θ given cos θ, or vice versa.

Reporting Category: 3: Functions

Calculator: Z

Correct Answer:	A	DOK Level:	2	Item Type:	O

Angle θ is in quadrant II and $\sin \theta = \dfrac{11}{61}$. What is the value of $\cos \theta$?

A. $-\dfrac{60}{61}$

B. $-\dfrac{50}{61}$

C. $\dfrac{50}{61}$

D. $\dfrac{60}{61}$

Item Information

Item Code:	TN348276	Grade Level:	Algebra II
Standard Code:	A2.S.CP.A.1	Position No:	20

Standard Text: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

Reporting Category: 4: Interpreting Data

Calculator: Y

Correct Answer: C   DOK Level: 3   Item Type: O

The faces of a fair number cube are labeled 1 through 6. The number cube is rolled once.

- A possible outcome is the event that the number 1 is rolled.
- Another possible outcome is the event that an even number is rolled.

How many outcomes are **not** in either of these events?

A. 0

B. 1

C. 2

D. 4

Item Information

Item Code: TN0001725	Grade Level: Algebra II
Standard Code: A2.S.ID.B.2	Position No: 21

Standard Text: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
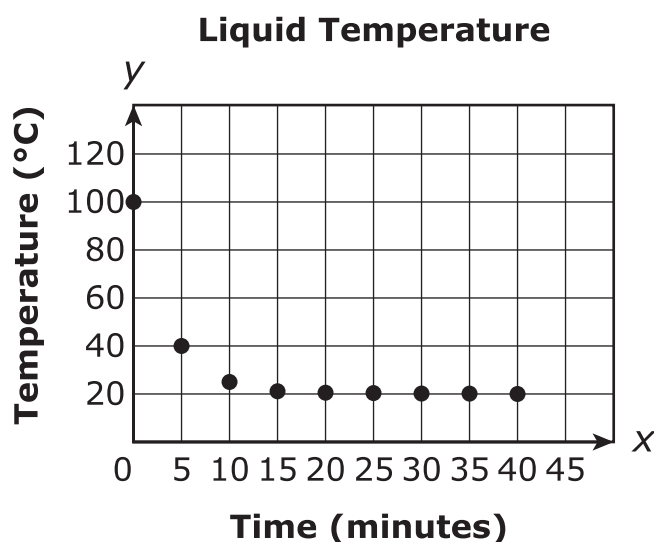
Reporting Category: 4: Interpreting Data

Calculator: Y

Correct Answer: C	DOK Level: 2	Item Type: O

During a science experiment, a chemist boils a liquid and then sets it on the lab table and records the temperatures as it cools. The graph shows y, the temperature in degrees Centigrade, and x is the number of minutes after the liquid is set on the table.

Liquid Temperature

Which equation is the best model for this data?

A. $y = 100(0.75)^x$

B. $y = (0.75)^x + 100$

C. $y = 80(0.75)^x + 20$

D. $y = 20(0.75)^x + 80$

Algebra II to Integrated Math Courses Standard Crosswalk

The Tennessee Academic Standards for Mathematics are grouped by conceptual category — not by course — to allow for two approaches. The traditional approach consists of three courses: Algebra I, Geometry, and Algebra II. The integrated approach also consists of three courses: Integrated Math I, Integrated Math II, and Integrated Math III. Both pathways include the same content standards. Across the three courses, students in the traditional pathway will study the same content as students in the integrated pathway. The two pathways will provide the same entry point and the same exit point in the content standards. Because of limitations in the item bank for integrated pathway courses, only operational items from the traditional pathway assessments can be publicly released at this time. In order to provide assessment resources applicable to both pathways, the released items from traditional pathway assessments have been linked to standards in the integrated pathways. The table below lists the released items from the designated traditional pathway course, the standards they assess in that course, and the corresponding standards in the integrated pathway courses.

Algebra 2 To Integrated Math Courses			
Sequence	Item Code	Algebra 2 Standard	Int Math Standard
1	TN0002997	A2.A.APR.A.2	M3.A.APR.A.2
2	TN013606	A2.A.APR.A.2	M3.A.APR.A.2
3	TN348131	A2.A.APR.B.3	M3.A.APR.B.3
4	TN748139	A2.A.APR.B.3	M3.A.APR.B.3
5	TN413897	A2.A.APR.C.4	M3.A.APR.C.4
6	TN346731	A2.A.SSE.A.1	M3.A.SSE.A.1
7	TN016374	A2.N.CN.A.2	M2.N.CN.A.2
8	TN246076	A2.N.Q.A.1	M3.N.Q.A.1
9	TN016766	A2.N.RN.A.2	M2.N.RN.A.2
10	TN246034	A2.N.RN.A.2	M2.N.RN.A.2
11	TN246051	A2.N.RN.A.2	M2.N.RN.A.2
12	TN348044	A2.A.REI.C.4	M2.A.REI.C.3
13	TN116412	A2.N.CN.B.3	M2.N.CN.B.3
14	TN116468	A2.N.CN.B.3	M2.N.CN.B.3
15	TN346669	A2.F.BF.A.2	M1.F.BF.A.2
16	TN546541	A2.F.BF.A.2	M1.F.BF.A.2
17	TN516743	A2.F.IF.A.1	M2.F.IF.A.1
18	TN716760	A2.F.LE.A.1	M1.F.LE.A.2
19	TN346113	A2.F.TF.B.3.b	M3.F.TF.B.3b
20	TN348276	A2.S.CP.A.1	M2.S.CP.A.1
21	TN0001725	A2.S.ID.B.2a	M2.S.ID.A.1a