

# Tennessee Comprehensive Assessment Program

# TCAP

## Math EOC Item Release Algebra II





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# Metadata Interpretation Guide - Math

## 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

## Metadata Definitions

<b>Item Code:</b> Unique letter/number code used to identify the item.	<b>Grade Level:</b> Grade level or Course.
<b>Standard Code:</b> Primary educational standard assessed.	<b>Position No:</b> Position of the item in the PDF.
<b>Standard Text:</b> Text of the educational standard assessed.	
<b>Reporting Category:</b> Text of the Reporting Category the standard assesses.	
<b>Calculator:</b> Indicates if usage of a calculator is allowed. Y = calculator is allowed, N = calculator is not allowed, Z = calculator may be allowed.	
<b>Correct Answer:</b> Correct answer. This may be blank for constructed response items where students write or type their responses.	<b>DOK Level:</b> (if listed): Depth of Knowledge (cognitive complexity) is measured on a three-point scale. 1= Recall or simple reproduction of information; 2= Skills and concepts: comprehension and processing of text; 3= Strategic thinking, prediction, elaboration.
	<b>Item Type:</b> Indicates administered usage. O = Operational.

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**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

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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

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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  $x = 3$

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**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

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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

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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  $\frac{9x^3 + 18x^2 - x - 2}{3x + 1}$  for  $x \neq -\frac{1}{3}$ ?

- 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

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

- A.**  $x^2$
- B.**  $x^2 + x$
- C.**  $x^2 - 1$
- D.**  $\frac{x^2(x - 1)}{x - 1}$

---

**Item Information**

Item Code: TN016374

Grade Level: Algebra II

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

Position No: 7

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

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

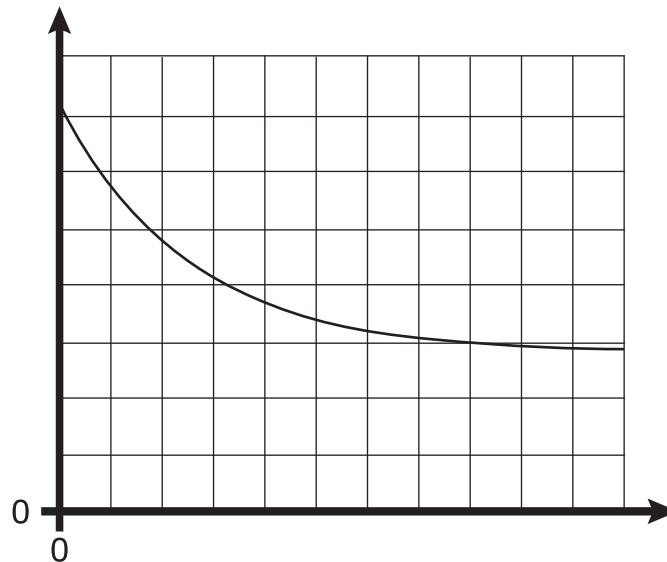
Correct Answer: C

DOK Level: 2

Item Type: O

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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

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**Item Information**

Item Code: TN016766

Grade Level: Algebra II

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

Position No: 9

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

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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

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Which expression shows  $(\sqrt[3]{8x})^2$  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.**  $(8x)^{\frac{2}{3}}$

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**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

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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

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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.**  $x = \frac{-1 + 3i}{2}$  and  $\frac{-1 - 3i}{2}$

**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

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

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**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

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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

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Which of these is a formula that can be used to determine the  $n$ th term of the arithmetic sequence 15, 27, 39, 51, . . .?

- 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

Grade Level: Algebra II

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

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.

<b>Height (in.)</b>	5	6	7	8	9	10
<b>Volume (in.<sup>3</sup>)</b>	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

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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  $\sin^2 \theta + \cos^2 \theta = 1$  to find  $\sin \theta$  given  $\cos \theta$ , or vice versa.

Reporting Category: 3: Functions

Calculator: Z

Correct Answer: A

DOK Level: 2

Item Type: O

---

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

- A.**  $-\frac{60}{61}$
- B.**  $-\frac{50}{61}$
- C.**  $\frac{50}{61}$
- D.**  $\frac{60}{61}$

**Item Information**

Item Code: TN348276

Grade Level: Algebra II

Standard Code: A2.S.CPA.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

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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

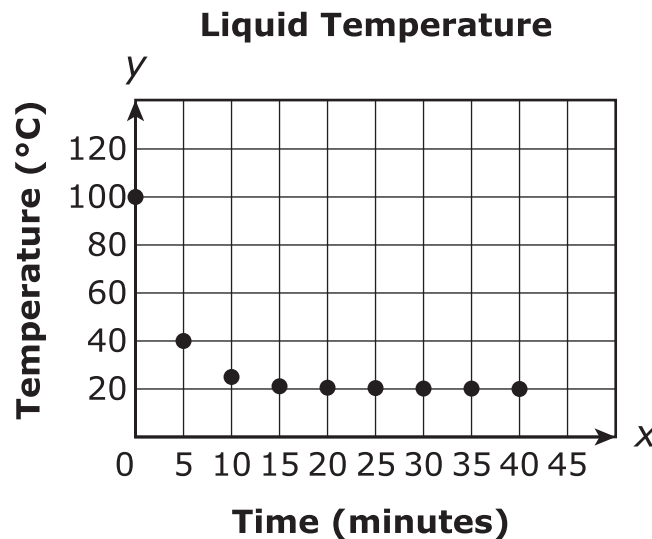
Calculator: Y

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.



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

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