

StackCalc Calculator Applications

UIL-Style speed and accuracy proficiency tests aligned to maximum stack depth limits.

1. INVITATIONAL TIME TRIAL & SPEED SCORING RULES

Modeled after University Interscholastic League (UIL) Calculator Applications competitions, these timed trials challenge students to build rapid, instinctive fluency with Reverse Polish Notation (RPN). Each sprint tests numerical accuracy, operand sequencing, and strict stack depth consciousness.

CORRECT ANSWER
+5 Points

INCORRECT / ERROR
-2 Points

UNATTEMPTED / SKIP
0 Points

SPEED BONUS
+1 pt / rem. min

2. MAXIMUM STACK LEVEL DISCIPLINE

Competitors must respect the Max Stack Depth badge on each trial. Problems must be solved using only the allowed stack registers (Stack Level 1 = single register X; Stack Level 2 = registers X & Y; Stack Level 4 = full 4-register stack T-Z-Y-X). Solutions requiring deeper stacks are disqualified.

3. OFFICIAL COMPETITOR TIME TRIAL LOG SHEET

Trial	Topic / Stage	Max Stack	Time	Attempt	Correct	Errors	
T-1	Unit 1 Time Trial: Step Counter & Accumu	Level 1	5 min	___/10	___(+5)	___(-2)	-----
T-2	Unit 2 Time Trial: Part-Part-Whole & Sta	Level 2	5 min	___/10	___(+5)	___(-2)	-----
T-3	Unit 3 Time Trial: Ten-Frames & Compleme	Level 2	5 min	___/10	___(+5)	___(-2)	-----
T-4	Unit 4 Time Trial: Number Racks, Doubles	Level 2	5 min	___/10	___(+5)	___(-2)	-----
T-CUM_1	Cumulative Trial C1: Primary Stack Funda	Level 2	10 min	___/10	___(+5)	___(-2)	-----
T-5	Unit 5 Time Trial: 4-Register Stack & Fo	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-6	Unit 6 Time Trial: Fraction Studio & Mix	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-7	Unit 7 Time Trial: Postfix Evaluation &	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-8	Unit 8 Time Trial: Tactile Algebra & Qua	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-CUM_2	Cumulative Trial C2: Intermediate Stack	Level 4	15 min	___/10	___(+5)	___(-2)	-----
T-9	Unit 9 Time Trial: Trigonometry, Vectors	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-10	Unit 10 Time Trial: Exponential Growth &	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-11	Unit 11 Time Trial: Combinatorics, Stats	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-12	Unit 12 Time Trial: Digital Logic, Base	Level 4	10 min	___/10	___(+5)	___(-2)	-----
T-CUM_3	Cumulative Trial C3: Grand RPN Invitatio	Level 4	20 min	___/10	___(+5)	___(-2)	-----

Classroom Implementation

Run time trials as weekly sprint rounds. Time starts when students turn the page. All keystrokes must be entered on the physical StackCalc hardware or firmware simulator.

Unit 1 Time Trial: Step Counter & Accumulator

Foundations of Counting, Cardinality & The One-More Step Counter • Stage: Ten-Frame Stage (4x2)

MAX STACK DEPTH: 1

TIME LIMIT: 5 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 1 + 1 + 1 (Count 3 steps)

Stack Hint: Single register accumulator

Keystroke Entry:

Final Answer:

2 5 + 1 + 1 (Start at 5, step 2)

Stack Hint: Accumulate in X

Keystroke Entry:

Final Answer:

3 Step count 4 items: start 0, step +1

Stack Hint: Repeat + key

Keystroke Entry:

Final Answer:

4 Count 8 items with auto-lift

Stack Hint: Continuous + entry

Keystroke Entry:

Final Answer:

5 Count down: start 6, step -1, step -1

Stack Hint: Subtract step

Keystroke Entry:

Final Answer:

6 Clear and count: C then 1+1+1+1

Stack Hint: Clear before count

Keystroke Entry:

Final Answer:

7 Count by 2s: 2 + 2 + 2

Stack Hint: Skip count by 2

Keystroke Entry:

Final Answer:

8 Step count to ten: 7 + 1 + 1 + 1

Stack Hint: Reach upper frame

Keystroke Entry:

Final Answer:

9 Zero set: 0 + 9

Stack Hint: Identity of zero

Keystroke Entry:

Final Answer:

10 Count back from 10: 10 - 1 - 1 - 1

Stack Hint: Decrement from 10

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 1 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 2 Time Trial: Part-Part-Whole & Stack Add

Part-Part-Whole Domino Decompositions via Stack Registers Y and X • Stage: Math Domino Studio (12-Frame Tray)

MAX STACK DEPTH: 2

TIME LIMIT: 5 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	Part 4, Part 3 -> Whole? Stack Hint: Y=4, X=3, [+] combines	Keystroke Entry:	Final Answer:
2	Part 5, Part 5 -> Whole? Stack Hint: Ten bond	Keystroke Entry:	Final Answer:
3	Whole 9, Part 6 -> Missing Part? Stack Hint: Decompose whole 9	Keystroke Entry:	Final Answer:
4	Whole 10, Part 4 -> Missing Part? Stack Hint: Decompose whole 10	Keystroke Entry:	Final Answer:
5	Part 8, Part 7 -> Whole? Stack Hint: Sum past ten	Keystroke Entry:	Final Answer:
6	Whole 14, Part 8 -> Missing Part? Stack Hint: Decompose 14	Keystroke Entry:	Final Answer:
7	Part 6, Part 7 -> Whole? Stack Hint: Part combination	Keystroke Entry:	Final Answer:
8	Whole 18, Part 9 -> Missing Part? Stack Hint: Double decomposition	Keystroke Entry:	Final Answer:
9	Part 12, Part 8 -> Whole? Stack Hint: Full twenty bond	Keystroke Entry:	Final Answer:
10	Whole 25, Part 11 -> Missing Part? Stack Hint: Two-digit decompose	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 2 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 3 Time Trial: Ten-Frames & Complements to

5-Structure, Complements & Bridging Through 10 • Stage: Ten-Frame Stage (4x2)

MAX STACK DEPTH: 2

TIME LIMIT: 5 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	Complement of 7 to 10 Stack Hint: 10 in Y, 7 in X	Keystroke Entry:	Final Answer:
2	Complement of 4 to 10 Stack Hint: 10 in Y, 4 in X	Keystroke Entry:	Final Answer:
3	Bridge: 8 + 5 = 8 + 2 + 3 Stack Hint: Bridge through 10	Keystroke Entry:	Final Answer:
4	Bridge: 9 + 6 = 9 + 1 + 5 Stack Hint: Bridge through 10	Keystroke Entry:	Final Answer:
5	Bridge: 7 + 6 = 7 + 3 + 3 Stack Hint: Bridge through 10	Keystroke Entry:	Final Answer:
6	Complement of 1 to 10 Stack Hint: 10 in Y, 1 in X	Keystroke Entry:	Final Answer:
7	Double frame: 20 - 7 Stack Hint: Subtract across 2 frames	Keystroke Entry:	Final Answer:
8	Bridge: 8 + 7 = 8 + 2 + 5 Stack Hint: Bridge through 10	Keystroke Entry:	Final Answer:
9	Place value: 10 + 6 Stack Hint: Teen number formation	Keystroke Entry:	Final Answer:
10	Frame difference: 10 - 2 Stack Hint: Ten complement	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 2 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 4 Time Trial: Number Racks, Doubles & Gro

5-Structure, Automatic Lift Duplication & Early Multiplication • Stage: Number Rack (4x2)

MAX STACK DEPTH: 2

TIME LIMIT: 5 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	Double 6: 6 ENTER + Stack Hint: ENTER duplicates to Y	Keystroke Entry:	Final Answer:
2	Double 8: 8 ENTER + Stack Hint: ENTER duplicates to Y	Keystroke Entry:	Final Answer:
3	Near-Double: 7 + 8 Stack Hint: Double 7 plus 1	Keystroke Entry:	Final Answer:
4	Near-Double: 6 + 7 Stack Hint: Double 6 plus 1	Keystroke Entry:	Final Answer:
5	Double 9: 9 ENTER + Stack Hint: ENTER duplicates to Y	Keystroke Entry:	Final Answer:
6	Near-Double: 8 + 9 Stack Hint: Double 8 plus 1	Keystroke Entry:	Final Answer:
7	Equal groups: 3 groups of 4 Stack Hint: Multiply group size	Keystroke Entry:	Final Answer:
8	Equal groups: 4 groups of 5 Stack Hint: Multiply group size	Keystroke Entry:	Final Answer:
9	Double 12: 12 ENTER + Stack Hint: ENTER duplicates to Y	Keystroke Entry:	Final Answer:
10	Near-Double: 9 + 10 Stack Hint: Double 9 plus 1	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 2 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Cumulative Trial C1: Primary Stack Fundamental

Comprehensive Time Trial across Units 1–4 (Max Stack Depth 2) • Stage: Gridfinity 4x4
Primary Desk Dock

MAX STACK DEPTH: 2

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	Step count 7 items from 1 Stack Hint: Accumulate in X	Keystroke Entry:	Final Answer:
2	Number bond: 9 and 7 -> Whole? Stack Hint: Y=9, X=7	Keystroke Entry:	Final Answer:
3	Decompose: Whole 17, Part 8 Stack Hint: 17 in Y, 8 in X	Keystroke Entry:	Final Answer:
4	Complement of 3 to 10 Stack Hint: Ten complement	Keystroke Entry:	Final Answer:
5	Double 14: 14 ENTER + Stack Hint: Duplicate to Y	Keystroke Entry:	Final Answer:
6	Near-double: 11 + 12 Stack Hint: Double 11 plus 1	Keystroke Entry:	Final Answer:
7	Bridge through 10: 9 + 8 Stack Hint: Bridge with frame	Keystroke Entry:	Final Answer:
8	Equal groups: 6 groups of 5 Stack Hint: 5 in Y, 6 in X	Keystroke Entry:	Final Answer:
9	Decompose: Whole 30, Part 12 Stack Hint: Missing part	Keystroke Entry:	Final Answer:
10	Combined: Double 8 then add 5 Stack Hint: Chained operations	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 2 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 5 Time Trial: 4-Register Stack & Four Oper

T-Z-Y-X Flow, Automatic Lift & Parenthesis-Free Arithmetic • Stage: SC-32 Hardware LCD
Stack & Place Value Studio

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 $(18 - 6) \times 3$
Stack Hint: Auto-lift pushes 12 to Y

Keystroke Entry:

Final Answer:

2 $(24 + 16) \div 8$
Stack Hint: Sum in Y, divide by 8

Keystroke Entry:

Final Answer:

3 $45 \div (12 - 3)$
Stack Hint: Push 45 to Y, sub in X

Keystroke Entry:

Final Answer:

4 $(15 \times 4) + (18 \div 2)$
Stack Hint: Two branch accumulation

Keystroke Entry:

Final Answer:

5 $(50 - 14) \div (3 + 6)$
Stack Hint: Stack holds numerator in Y

Keystroke Entry:

Final Answer:

6 $12 \times 5 - 8 \times 4$
Stack Hint: Two branch subtraction

Keystroke Entry:

Final Answer:

7 $((20 - 8) \times 4) \div 6$
Stack Hint: Chained pipeline

Keystroke Entry:

Final Answer:

8 $72 \div (4 + 5) \times 3$
Stack Hint: Parenthesis-free stack

Keystroke Entry:

Final Answer:

9 $100 - (16 \times 5 - 12)$
Stack Hint: Deep stack evaluate

Keystroke Entry:

Final Answer:

10 $(8 + 4) \times (9 - 3) \div 12$
Stack Hint: Multi-step evaluate

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 6 Time Trial: Fraction Studio & Mixed Num

Two-Dot Notation, Reciprocals & Height Equivalence • Stage: Fraction Studio (4x2)

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	1/2 + 1/4 (Two-dot entry) Stack Hint: Decimal equivalent 0.75	Keystroke Entry:	Final Answer:
2	3/4 - 1/2 Stack Hint: Decimal equivalent 0.25	Keystroke Entry:	Final Answer:
3	Mixed: 2 1/2 + 1 1/4 Stack Hint: Mixed number addition	Keystroke Entry:	Final Answer:
4	Reciprocal of 4/5: .4.5 (1/x) Stack Hint: Reciprocal key	Keystroke Entry:	Final Answer:
5	3/8 + 1/4 Stack Hint: Three eighths plus fourth	Keystroke Entry:	Final Answer:
6	2/3 × 3/4 Stack Hint: Fraction multiplication	Keystroke Entry:	Final Answer:
7	3/4 ÷ 1/2 Stack Hint: Fraction division	Keystroke Entry:	Final Answer:
8	1 1/2 × 4 Stack Hint: Mixed scaling	Keystroke Entry:	Final Answer:
9	5 - 2 3/4 Stack Hint: Subtract mixed number	Keystroke Entry:	Final Answer:
10	(1/3 + 1/6) × 12 Stack Hint: Combined fraction pipeline	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: (+5 × Correct) - (2 × Incorrect). Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 7 Time Trial: Postfix Evaluation & Chained

Postfix Evaluation, Stack Registers & Parenthesis Elimination • Stage: Interlocking Cubes & SC-32 Hardware Stack

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 $(8 + 2) \times (9 - 4)$

Stack Hint: Left-Right-Multiply

Keystroke Entry:

Final Answer:

2 $((14 - 6) \times 3) + (24 \div 4)$

Stack Hint: Two subtree combine

Keystroke Entry:

Final Answer:

3 $(30 - (4 \times 5)) \times (12 \div (2 + 4))$

Stack Hint: Deep nested subtrees

Keystroke Entry:

Final Answer:

4 $(5 + 3) \times (8 - 2) \div (6 - 2)$

Stack Hint: Three branch traversal

Keystroke Entry:

Final Answer:

5 $((18 \div 3) + 4) \times ((15 - 7) \div 2)$

Stack Hint: Postorder multiplication

Keystroke Entry:

Final Answer:

6 $(10 + 5 \times 2) \div (12 - 2 \times 4)$

Stack Hint: Eliminating PEMDAS ambiguity

Keystroke Entry:

Final Answer:

7 $(25 - 5 \times 3) \times (4 + 6 \div 2)$

Stack Hint: Nested tree traversal

Keystroke Entry:

Final Answer:

8 $((7 + 3) \times 4 - 8) \div 4$

Stack Hint: Chained operations

Keystroke Entry:

Final Answer:

9 $(48 \div (2 + 6)) \times (15 - 3 \times 3)$

Stack Hint: Tree sub-expression

Keystroke Entry:

Final Answer:

10 $(16 - (4 + 2)) \times (18 \div (3 \times 2))$

Stack Hint: Stack tree depth 4

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 8 Time Trial: Tactile Algebra & Quadratic

Area Modeling, Zero-Pair Trinomials & [EQN] Solver • Stage: Algebra Studio & Factoring Stage

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 Factor $x^2 + 5x + 6$ via [EQN]
Stack Hint: Roots -2, -3; factors $(x+2)(x+3)$

Keystroke Entry:

Final Answer:

2 Factor $x^2 + 7x + 12$ via [EQN]
Stack Hint: Roots -3, -4; factors $(x+3)(x+4)$

Keystroke Entry:

Final Answer:

3 Factor $x^2 + 8x + 15$ via [EQN]
Stack Hint: Roots -3, -5; factors $(x+3)(x+5)$

Keystroke Entry:

Final Answer:

4 Factor $x^2 - x - 6$ via [EQN]
Stack Hint: Roots 3, -2; factors $(x-3)(x+2)$

Keystroke Entry:

Final Answer:

5 Factor $x^2 - 5x + 6$ via [EQN]
Stack Hint: Roots 2, 3; factors $(x-2)(x-3)$

Keystroke Entry:

Final Answer:

6 Difference of squares: $x^2 - 9$
Stack Hint: Roots 3, -3; factors $(x-3)(x+3)$

Keystroke Entry:

Final Answer:

7 Difference of squares: $x^2 - 16$
Stack Hint: Roots 4, -4; factors $(x-4)(x+4)$

Keystroke Entry:

Final Answer:

8 Polynomial at $x=3$: $2x^2 + 4x - 5$
Stack Hint: Quadratic evaluation

Keystroke Entry:

Final Answer:

9 Factor $2x^2 + 5x + 2$ via [EQN]
Stack Hint: Roots -0.5, -2; $(2x+1)(x+2)$

Keystroke Entry:

Final Answer:

10 Double root: $x^2 + 10x + 25$
Stack Hint: Double root -5; $(x+5)^2$

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Cumulative Trial C2: Intermediate Stack Master

Comprehensive Time Trial across Units 1–8 (Max Stack Depth 4) • Stage: SC-32 Hardware LCD Stack & Manipulative Lab

MAX STACK DEPTH: 4

TIME LIMIT: 15 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	(32 - 14) × 5 ÷ 6 Stack Hint: Auto-lift chaining	Keystroke Entry:	Final Answer:
2	$\frac{3}{4} + \frac{1}{2} \times \frac{1}{4}$ (order of ops) Stack Hint: Fractions on stack	Keystroke Entry:	Final Answer:
3	Distance: P1(3, 4) to P2(9, 12) Stack Hint: Pythagorean distance	Keystroke Entry:	Final Answer:
4	Mixed: 3 1/2 - 1 3/4 Stack Hint: Two-dot fraction subtraction	Keystroke Entry:	Final Answer:
5	Postfix evaluation: ((15+5)×(8-3))÷10 Stack Hint: Postfix evaluation	Keystroke Entry:	Final Answer:
6	Double 18 then sub 9 Stack Hint: Duplicate to Y	Keystroke Entry:	Final Answer:
7	Slope: P1(-1, -2) to P2(3, 10) Stack Hint: Negative coordinates	Keystroke Entry:	Final Answer:
8	Four operations: 80 - 15 × 4 + 12 Stack Hint: RPN stack evaluation	Keystroke Entry:	Final Answer:
9	Reciprocal sum: 1/(1/4 + 1/6) Stack Hint: Reciprocal pipeline	Keystroke Entry:	Final Answer:
10	Distance from origin to (12, 16) Stack Hint: Radial distance	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: (+5 × Correct) - (2 × Incorrect). Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 9 Time Trial: Trigonometry, Vectors & Polar

Right Triangles, Polar Conversions & Vector Decomposition • Stage: Unit Circle Trigonometry
Volveille

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1	sin(30°) Stack Hint: Basic sine ratio	Keystroke Entry:	Final Answer:
2	cos(60°) Stack Hint: Basic cosine ratio	Keystroke Entry:	Final Answer:
3	tan(45°) Stack Hint: Tangent ratio	Keystroke Entry:	Final Answer:
4	Hypotenuse 10, angle 30° -> Opposite (y) Stack Hint: Opposite = h × sin(θ)	Keystroke Entry:	Final Answer:
5	Adjacent (x): Hypotenuse 12, angle 60° Stack Hint: Adjacent = h × cos(θ)	Keystroke Entry:	Final Answer:
6	Polar to Rect: r=10, θ=0° -> x Stack Hint: Polar conversion key	Keystroke Entry:	Final Answer:
7	Rect to Polar: x=3, y=4 -> magnitude r Stack Hint: Vector magnitude	Keystroke Entry:	Final Answer:
8	Rect to Polar: x=5, y=12 -> magnitude r Stack Hint: Vector magnitude	Keystroke Entry:	Final Answer:
9	Vector magnitude: components 8 and 6 Stack Hint: Polar magnitude	Keystroke Entry:	Final Answer:
10	asin(0.5) in degrees Stack Hint: Inverse sine	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: (+5 × Correct) - (2 × Incorrect). Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 10 Time Trial: Exponential Growth & Logarithms

Natural Base e, Continuous Compounding & Doubling Time • Stage: Fraction Studio & SC-32
Hardware LCD Stack

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 **2^5 (Power key)**

Stack Hint: y to power x

Keystroke Entry:

Final Answer:

2 **3^4 (Power key)**

Stack Hint: y to power x

Keystroke Entry:

Final Answer:

3 **ln(e)**

Stack Hint: Natural log inverse

Keystroke Entry:

Final Answer:

4 **e^0**

Stack Hint: Base e exponent

Keystroke Entry:

Final Answer:

5 **log10(1000)**

Stack Hint: Common log

Keystroke Entry:

Final Answer:

6 **Compound: 1000 × (1.05)^2**

Stack Hint: Annual compounding

Keystroke Entry:

Final Answer:

7 **Doubling time: ln(2) ÷ 0.07**

Stack Hint: Continuous doubling rule

Keystroke Entry:

Final Answer:

8 **Half-life: 100 × (0.5)^3**

Stack Hint: Decay model

Keystroke Entry:

Final Answer:

9 **Continuous: 500 × e^(0.04 × 5)**

Stack Hint: P e^(rt) formula

Keystroke Entry:

Final Answer:

10 **2^10**

Stack Hint: Powers of two

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: (+5 × Correct) - (2 × Incorrect). Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 11 Time Trial: Combinatorics, Stats & Prob

Factorials, Permutations, Combinations & [Σ+] Accumulation • Stage: Probability Dice & Modular Spinner

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	5! (Factorial) Stack Hint: x factorial key	Keystroke Entry:	Final Answer:
2	6! (Factorial) Stack Hint: x factorial key	Keystroke Entry:	Final Answer:
3	Permutations $P(5, 2) = 5! / 3!$ Stack Hint: Stack permutation	Keystroke Entry:	Final Answer:
4	Permutations $P(6, 3) = 6! / 3!$ Stack Hint: Stack permutation	Keystroke Entry:	Final Answer:
5	Combinations $C(5, 2) = 5! / (2! \times 3!)$ Stack Hint: n choose r	Keystroke Entry:	Final Answer:
6	Combinations $C(6, 2) = 6! / (2! \times 4!)$ Stack Hint: n choose r	Keystroke Entry:	Final Answer:
7	Combinations $C(7, 3) = 7! / (3! \times 4!)$ Stack Hint: n choose r	Keystroke Entry:	Final Answer:
8	Series sum $1+2+3+4+5$ via [Σ+] Stack Hint: Statistical summation	Keystroke Entry:	Final Answer:
9	4! (Factorial) Stack Hint: x factorial key	Keystroke Entry:	Final Answer:
10	Probability: $1 \div C(6, 2)$ Stack Hint: Reciprocal combination	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Unit 12 Time Trial: Digital Logic, Base Conversion

HEX/DEC/OCT/BIN Radix Modes & Bitwise AND, OR, XOR Operations • Stage: Ten-Frame Stage (4x2)

MAX STACK DEPTH: 4

TIME LIMIT: 10 MIN

MAX SCORE: 50 PTS

Competitor: _____ Date: _____ Elapsed: ____:____ Score: ____ / 50

1 DEC 255 to HEX
Stack Hint: Radix mode cycle

Keystroke Entry:

Final Answer:

2 HEX 10 to DEC
Stack Hint: Hex to decimal

Keystroke Entry:

Final Answer:

3 DEC 15 to BIN
Stack Hint: Dec to binary

Keystroke Entry:

Final Answer:

4 BIN 1010 to DEC
Stack Hint: Bin to decimal

Keystroke Entry:

Final Answer:

5 Bitwise AND: 12 AND 10
Stack Hint: 1100 AND 1010 = 1000

Keystroke Entry:

Final Answer:

6 Bitwise OR: 12 OR 10
Stack Hint: 1100 OR 1010 = 1110

Keystroke Entry:

Final Answer:

7 Bitwise XOR: 12 XOR 10
Stack Hint: 1100 XOR 1010 = 0110

Keystroke Entry:

Final Answer:

8 HEX 20 to DEC
Stack Hint: Hex 20 is 32

Keystroke Entry:

Final Answer:

9 DEC 64 to OCT
Stack Hint: Dec 64 is octal 100

Keystroke Entry:

Final Answer:

10 Bitwise AND: 255 AND 15
Stack Hint: Low nybble mask

Keystroke Entry:

Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Cumulative Trial C3: Grand RPN Invitational Challenge

Master UIL-Style Time Trial across Units 1-12 (Complete Architecture) • Stage: Master
Gridfinity Classroom Ecosystem

MAX STACK DEPTH: 4

TIME LIMIT: 20 MIN

MAX SCORE: 50 PTS

Competitor: _____

Date: _____

Elapsed: ____:____

Score: ____ / 50

1	Compound pipeline: $250 \times (1 + .06/12)^{24}$ Stack Hint: TVM compounding	Keystroke Entry:	Final Answer:
2	Pythagorean distance: P1(-3, 5) to P2(5, -10) Stack Hint: Distance pipeline triple	Keystroke Entry:	Final Answer:
3	Polar vector: $12 \cos(45^\circ) + 5 \sin(45^\circ)$ Stack Hint: Vector projection	Keystroke Entry:	Final Answer:
4	Fractions: $3 \frac{1}{3} \div 1 \frac{1}{4} + \frac{2}{5}$ Stack Hint: Mixed operations	Keystroke Entry:	Final Answer:
5	Combinations: $C(8, 3) = 8! / (3! \times 5!)$ Stack Hint: Lottery combination	Keystroke Entry:	Final Answer:
6	Exponential: $1500 \times e^{(0.05 \times 10)}$ Stack Hint: Continuous growth	Keystroke Entry:	Final Answer:
7	Postfix evaluation: $((35-7) \times 4) \div (14+2)$ Stack Hint: Parenthesis elimination	Keystroke Entry:	Final Answer:
8	Bitmasking: 192 AND 240 (Subnet mask) Stack Hint: Network bitwise logic	Keystroke Entry:	Final Answer:
9	Double & near-double sum: (6 ENTER +) + (8 ENTER +) Stack Hint: Stack auto-lift chain	Keystroke Entry:	Final Answer:
10	Radix conversion: DEC 4095 to HEX Stack Hint: Maximum 12-bit hex	Keystroke Entry:	Final Answer:

UIL Calculator Competition Rules

Scoring: $(+5 \times \text{Correct}) - (2 \times \text{Incorrect})$. Skipped items receive 0. Enforce Max Stack Depth 4 on this trial. Round decimals to 4 significant digits or write exact rational fractions.

Answer keys, required numerical results, and canonical keystroke sequences for Trials 1 to 6 and C1.

Accept equivalent decimal fractions (e.g. 0.75 or 3/4). If a student pressed superfluous ENTER keys exceeding the maximum stack depth, deduct 2 points for stack overflow violation.

Official Solutions & Keystrokes – Part 2

Answer keys, required numerical results, and canonical keystroke sequences for Trials 7 to 12, C2 & C3.

Unit 7 Time Trial: Postfix Evalu (Stack 4)

- Ans: 50 – [8] [ENTER] [2] [+] [9] [ENTER]
- Ans: 30 – [14] [ENTER] [6] [-] [3] [×]
- Ans: 20 – [30] [ENTER] [4] [ENTER] [5] [×]
- Ans: 12 – [5] [ENTER] [3] [+] [8] [ENTER]
- Ans: 40 – [18] [ENTER] [3] [+] [4] [+]
- Ans: 5 – [10] [ENTER] [5] [ENTER] [2] [×]
- Ans: 70 – [25] [ENTER] [5] [ENTER] [3] [×]
- Ans: 8 – [7] [ENTER] [3] [+] [4] [×]
- Ans: 36 – [48] [ENTER] [2] [ENTER] [6] [+]
- Ans: 30 – [16] [ENTER] [4] [ENTER] [2] [+]

Unit 10 Time Trial: Exponential (Stack 4)

- Ans: 32 – [2] [ENTER] [5] [y[□]]
- Ans: 81 – [3] [ENTER] [4] [y[□]]
- Ans: 1 – [1] [e[□]] [LN]
- Ans: 1 – [0] [e[□]]
- Ans: 3 – [1000] [yellow] [LOG]
- Ans: 1102.5 – [1000] [ENTER] [1.05] [ENTER] [2]
- Ans: 9.9021 – [2] [LN] [.07] [÷]
- Ans: 12.5 – [100] [ENTER] [.5] [ENTER] [3] [y[□]]
- Ans: 610.7014 – [.04] [ENTER] [5] [×] [e[□]] [500]
- Ans: 1024 – [2] [ENTER] [10] [y[□]]

Unit 8 Time Trial: Tactile Algeb (Stack 4)

- Ans: -2 – [1] [ENTER] [5] [ENTER] [6] [EQN]
- Ans: -3 – [1] [ENTER] [7] [ENTER] [12] [EQN]
- Ans: -3 – [1] [ENTER] [8] [ENTER] [15] [EQN]
- Ans: 3 – [1] [ENTER] [1] [+/-] [ENTER] [6]
- Ans: 2 – [1] [ENTER] [5] [+/-] [ENTER] [6]
- Ans: 3 – [1] [ENTER] [0] [ENTER] [9] [+/-]
- Ans: 4 – [1] [ENTER] [0] [ENTER] [16] [+/-]
- Ans: 25 – [3] [ENTER] [x[□]] [2] [×] [3]
- Ans: -0.5 – [2] [ENTER] [5] [ENTER] [2] [EQN]
- Ans: -5 – [1] [ENTER] [10] [ENTER] [25] [EQN]

Unit 11 Time Trial: Combinatoric (Stack 4)

- Ans: 120 – [5] [yellow] [x!]
- Ans: 720 – [6] [yellow] [x!]
- Ans: 20 – [5] [yellow] [x!] [3] [yellow] [x!]
- Ans: 120 – [6] [yellow] [x!] [3] [yellow] [x!]
- Ans: 10 – [5] [yellow] [x!] [2] [yellow] [x!]
- Ans: 15 – [6] [yellow] [x!] [2] [yellow] [x!]
- Ans: 35 – [7] [yellow] [x!] [3] [yellow] [x!]
- Ans: 15 – [1] [□+] [2] [□+] [3] [□+]
- Ans: 24 – [4] [yellow] [x!]
- Ans: 0.0667 – [6] [yellow] [x!] [2] [yellow] [x!]

Cumulative Trial C2: Intermediat (Stack 4)

- Ans: 15 – [32] [ENTER] [14] [-] [5] [×]
- Ans: 0.875 – [.1.2] [ENTER] [.1.4] [×] [.3.4] []
- Ans: 10 – [9] [ENTER] [3] [-] [x[□]] [12]
- Ans: 1.75 – [3.1.2] [ENTER] [1.3.4] [-]
- Ans: 10 – [15] [ENTER] [5] [+] [8] [ENTER]
- Ans: 27 – [18] [ENTER] [+] [9] [-]
- Ans: 3 – [10] [ENTER] [2] [+/-] [-] [3]
- Ans: 32 – [80] [ENTER] [15] [ENTER] [4] [×]
- Ans: 2.4 – [.1.4] [ENTER] [.1.6] [+] [1/x]
- Ans: 20 – [12] [x[□]] [16] [x[□]] [+] [√[□]]

Unit 12 Time Trial: Digital Logi (Stack 4)

- Ans: FF – [255] [yellow] [BASE] [HEX]
- Ans: 16 – [HEX] [10] [yellow] [BASE] [DEC]
- Ans: 1111 – [15] [yellow] [BASE] [BIN]
- Ans: 10 – [BIN] [1010] [yellow] [BASE] [DEC]
- Ans: 8 – [12] [ENTER] [10] [AND]
- Ans: 14 – [12] [ENTER] [10] [OR]
- Ans: 6 – [12] [ENTER] [10] [XOR]
- Ans: 32 – [HEX] [20] [yellow] [BASE] [DEC]
- Ans: 100 – [64] [yellow] [BASE] [OCT]
- Ans: 15 – [255] [ENTER] [15] [AND]

Unit 9 Time Trial: Trigonometry, (Stack 4)

- Ans: 0.5 – [30] [SIN]
- Ans: 0.5 – [60] [COS]
- Ans: 1 – [45] [TAN]
- Ans: 5 – [10] [ENTER] [30] [SIN] [×]
- Ans: 6 – [12] [ENTER] [60] [COS] [×]
- Ans: 10 – [10] [ENTER] [0] [yellow] [□y,x]
- Ans: 5 – [3] [ENTER] [4] [yellow] [□□,r]
- Ans: 13 – [5] [ENTER] [12] [yellow] [□□,r]
- Ans: 10 – [8] [ENTER] [6] [yellow] [□□,r]
- Ans: 30 – [.5] [yellow] [ASIN]

Cumulative Trial C3: Grand RPN I (Stack 4)

- Ans: 281.79 – [.06] [ENTER] [12] [÷] [1] [+]
- Ans: 17 – [5] [ENTER] [3] [+/-] [-] [x[□]]
- Ans: 12.0208 – [12] [ENTER] [45] [COS] [×] [5]
- Ans: 3.0667 – [3.1.3] [ENTER] [1.1.4] [+] [.2.5]
- Ans: 56 – [8] [yellow] [x!] [3] [yellow] [x!]
- Ans: 2473.08 – [.05] [ENTER] [10] [×] [e[□]] [1500]
- Ans: 7 – [35] [ENTER] [7] [-] [4] [×]
- Ans: 192 – [192] [ENTER] [240] [AND]
- Ans: 29 – [6] [ENTER] [+] [8] [ENTER] [+]
- Ans: FFF – [4095] [yellow] [BASE] [HEX]

Scoring Adjudication

Accept equivalent scientific notation for large magnitudes (e.g. 1024 or 1.024e3). All answers match canonical RPNCore engine execution.