

2026 UIL ELEMENTARY CALCULATOR CHAMPIONSHIP – GRADE 5 CHAMPIONSHIP – OFFICIAL SCORING KEY

CANONICAL ANSWERS (3 SIGNIFICANT DIGITS) • SCIENTIFIC NOTATION • GRADING TOLERANCES [PAGE 1 OF 5]

#	OFFICIAL CONTEST ANSWER (3 SIG FIGS)	SCIENTIFIC NOTATION	ACCEPTANCE INTERVAL (±2 UNITS)
1	183	1.83×10^2	[181, 185]
2	157	1.57×10^2	[155, 159]
3	82.1	8.21×10^1	[81.9, 82.3]
4	24 [INT]	2.40×10^1	[24]
5	36 [INT]	3.60×10^1	[36]
6	8 [INT]	8.00×10^0	[8]
7	276	2.77×10^2	[274, 278]
8	201	2.01×10^2	[199, 203]
9	56.3 g	5.63×10^1	[56.1, 56.5]
10	25.8 m	2.58×10^1	[25.6, 26.0]
11	1.42	1.42×10^0	[1.40, 1.44]
12	1.21	1.21×10^0	[1.19, 1.23]
13	0.458	4.58×10^{-1}	[0.456, 0.460]
14	0.300	3.00×10^{-1}	[0.298, 0.302]
15	6.17	6.17×10^0	[6.15, 6.19]
16	2.42	2.42×10^0	[2.40, 2.44]
17	1.92	1.92×10^0	[1.90, 1.94]
18	0.667	6.67×10^{-1}	[0.665, 0.669]
19	1.42 cups	1.42×10^0	[1.40, 1.44]
20	2.75 ft	2.75×10^0	[2.73, 2.77]
21	0.343	3.43×10^{-1}	[0.341, 0.345]
22	0.400	4.00×10^{-1}	[0.398, 0.402]
23	180 [INT]	1.80×10^2	[180]
24	74 [INT]	7.40×10^1	[74]
25	24 [INT]	2.40×10^1	[24]

2026 UIL ELEMENTARY CALCULATOR CHAMPIONSHIP – GRADE 5 CHAMPIONSHIP – OFFICIAL SCORING KEY

CANONICAL ANSWERS (3 SIGNIFICANT DIGITS) • SCIENTIFIC NOTATION • GRADING TOLERANCES [PAGE 2 OF 5]

#	OFFICIAL CONTEST ANSWER (3 SIG FIGS)	SCIENTIFIC NOTATION	ACCEPTANCE INTERVAL (±2 UNITS)
26	0.0667	6.67×10^{-2}	[0.0665, 0.0669]
27	12 [INT]	1.20×10^1	[12]
28	0.0800	8.00×10^{-2}	[0.0798, 0.0802]
29	24 [INT]	2.40×10^1	[24]
30	200 [INT] gal	2.00×10^2	[200]
31	1.42×10^3	1.42×10^3	[1.40, 1.44] $\times 10^3$
32	2.98×10^3	2.98×10^3	[2.96, 3.00] $\times 10^3$
33	652	6.53×10^2	[650, 654]
34	600 [INT]	6.00×10^2	[600]
35	932	9.32×10^2	[930, 934]
36	720 [INT]	7.20×10^2	[720]
37	3.50 L	3.50×10^0	[3.48, 3.52]
38	740	7.39×10^2	[738, 742]
39	4.18×10^3 in ³	4.18×10^3	[4.16, 4.20] $\times 10^3$
40	1.03×10^3 cm ³	1.03×10^3	[1.01, 1.05] $\times 10^3$
41	23.9	2.39×10^1	[23.7, 24.1]
42	435	4.35×10^2	[433, 437]
43	68.6	6.86×10^1	[68.4, 68.8]
44	189	1.89×10^2	[187, 191]
45	26.2	2.62×10^1	[26.0, 26.4]
46	\$106.25	1.06×10^2	[104, 108]
47	155	1.55×10^2	[153, 157]
48	8 [INT]	8.00×10^0	[8]
49	28.0 mpg	2.80×10^1	[27.8, 28.2]
50	\$1037.50	1.04×10^3	[1.02, 1.06] $\times 10^3$

STACKCALC32 RPM BENCHMARK: 360 KEYSTROKES vs. 537 ALGEBRAIC (SAVING 177 KEYS, 33.0% FASTER)

GRADER 1 INITIALS: _____ GRADER 2 INITIALS: _____ CONTEST DIRECTOR: _____

SCORING RULE: +5 points for each correct answer; -4 points for each error or skipped question up to last attempted.

PART II: DETAILED WORD PROBLEM & GEOMETRY WORKED SOLUTIONS

Formal Mathematical Modeling, Formula Setups & StackCalc RPN Keystroke Workflows

PROBLEM 9 • RECTANGULAR ELECTRONICS ENCLOSURE VOLUME**ANSWER: 56.3 g**

A digital precision balance measures 3 3D printed mechanical switch housings weighing 14.85 grams, 23.42 grams, and 18.05 grams. Calculate their combined mass in grams.

GOVERNING MODEL: Volume = Length × Width × Height

NUMERICAL SETUP: $V = L \times W \times H$

STEP-BY-STEP MATHEMATICAL REASONING:

Internal volume of the rectangular electronics enclosure equals length times width times height: $V = L \cdot W \cdot H$. Multiply dimensions sequentially.

CALCULATOR FLOW: [14.85] [ENTER] [23.42] [+] [18.05] [+] -> 56.3 g

PROBLEM 10 • 3D PRINTING FILAMENT & LINEAR DENSITY**ANSWER: 25.8 m**

A bulk spool contains 125.0 meters of 3D printer PETG filament. A technician cuts 8 test pieces measuring 12.4 meters each. How many meters of filament remain on the spool?

GOVERNING MODEL: Length = Total Mass / Linear Density [with kg -> g conversion]

NUMERICAL SETUP: Length (m) = [Mass (kg) × 1000 g/kg] / Linear Density (g/m)

STEP-BY-STEP MATHEMATICAL REASONING:

Convert spool shipping mass from kg to grams (multiply by 1,000). Divide total grams by filament linear density in grams per meter to obtain total printable filament length in meters.

CALCULATOR FLOW: [125] [ENTER] [8] [ENTER] [12.4] [×] [-] -> 25.8 m

PROBLEM 19 • RESIN & POLYURETHANE CASTING PROPORTIONAL MIXTURE**ANSWER: 1.42 cups**

An electronics conformal coating mixture requires 2/3 cup of silicone resin and 3/4 cup of hardener catalyst. What is the total volume of coating mixture in cups?

GOVERNING MODEL: Combined Total = Sum of Fractional Components

NUMERICAL SETUP: Total = Part_1 + Part_2

STEP-BY-STEP MATHEMATICAL REASONING:

Add fractional or mixed number recipe quantities together following common denominator arithmetic.

CALCULATOR FLOW: [2] [a b/c] [3] [ENTER] [3] [a b/c] [4] [+] -> 1.42 cups

PROBLEM 20 • FRACTION SUBTRACTION & MATERIAL CONSUMPTION**ANSWER: 2.75 ft**

A student fabricates an extruded aluminum rail measuring 5 1/2 feet long for a 3D printer frame. He saws off a piece measuring 2 3/4 feet. What is the length of the remaining rail in feet?

GOVERNING MODEL: Remaining / Consumed = Initial Measure - Used Measure

NUMERICAL SETUP: Delta = Measure_0 - Used_Measure

STEP-BY-STEP MATHEMATICAL REASONING:

Subtract used or consumed fraction quantity from starting quantity following fraction arithmetic.

CALCULATOR FLOW: [5.5] [ENTER] [2.75] [-] -> 2.75 ft

PROBLEM 29 • RAW MATERIAL BATCH DIVISION & MOLDING YIELD**ANSWER: 24 [INT]**

A 3D printing lab has 18 pounds of PLA pellet stock. If each batch of molded calculator buttons requires $\frac{3}{4}$ pound of pellets, how many batches of buttons can be molded?

GOVERNING MODEL: Batches = Total Stock / Material per Batch

NUMERICAL SETUP: Batches = Stock / (Requirement per Batch)

STEP-BY-STEP MATHEMATICAL REASONING:

Divide total available pellet raw material by the fraction required per batch. In RPN: enter total mass, enter batch requirement, and divide [$\div$].

CALCULATOR FLOW: [18] [ENTER] [0.75] [$\div$] -> 24 [INT]

PROBLEM 30 • PARALLEL PROCESSING & VACUUM CHAMBER EVACUATION**ANSWER: 200 [INT] gal**

An ultrasonic PCB cleaning tank holds 320 gallons of cleaning solution. If $\frac{3}{8}$ of the solution is drained for filtration, how many gallons remain in the tank?

GOVERNING MODEL: $\frac{1}{t_{\text{total}}} = \frac{1}{t_A} + \frac{1}{t_B} \Rightarrow t_{\text{total}} = 1 / (\frac{1}{t_A} + \frac{1}{t_B})$

NUMERICAL SETUP: $t_{\text{total}} = 1 / [(\frac{1}{t_A}) + (\frac{1}{t_B})]$

STEP-BY-STEP MATHEMATICAL REASONING:

Each degassing pump, printer, or resin dispenser operates at rate $\frac{1}{t}$. Running concurrently, their combined rate is $R = \frac{1}{t_A} + \frac{1}{t_B}$. Time to complete is reciprocal $\frac{1}{R}$. In RPN: enter t_A , press [$\frac{1}{x}$], enter t_B , press [$\frac{1}{x}$], add [$+$], and invert with [$\frac{1}{x}$].

CALCULATOR FLOW: [320] [ENTER] [5] [$\times$] [8] [$\div$] -> 200 [INT] gal

PROBLEM 39 • RECTANGULAR ELECTRONICS ENCLOSURE VOLUME**ANSWER: $4.18 \times 10^3 \text{ in}^3$**

A 3D printed desktop electronics housing is 24.0 inches long, 14.5 inches wide, and 12.0 inches high. Calculate the total internal volume of the housing in cubic inches.

GOVERNING MODEL: Volume = Length $\times$ Width $\times$ Height

NUMERICAL SETUP: $V = L \times W \times H$

STEP-BY-STEP MATHEMATICAL REASONING:

Internal volume of the rectangular electronics enclosure equals length times width times height: $V = L \cdot W \cdot H$. Multiply dimensions sequentially.

CALCULATOR FLOW: [24] [ENTER] [14.5] [$\times$] [12] [$\times$] -> $4.18 \times 10^3 \text{ in}^3$

PROBLEM 40 • RECTANGULAR PACKAGING CARTON SURFACE AREA**ANSWER: $1.03 \times 10^3 \text{ cm}^2$**

A modular packaging carton for 48 calculator mechanical key switches has length 18.0 cm, width 12.0 cm, and height 10.0 cm. Calculate the total exterior surface area of the carton in square centimeters.

GOVERNING MODEL: Surface Area = $2 \times (L \times W + L \times H + W \times H)$

NUMERICAL SETUP: $SA = 2 \times [(L \times W) + (L \times H) + (W \times H)]$

STEP-BY-STEP MATHEMATICAL REASONING:

A rectangular carton has six faces in three congruent pairs. Calculate $L \cdot W$, $L \cdot H$, and $W \cdot H$, sum them on the stack, and multiply by 2.

CALCULATOR FLOW: [18] [ENTER] [12] [$\times$] [18] [ENTER] [10] [$\times$] [$+$] [12] [ENTER] [10] [$\times$] [$+$] [2] [$\times$] -> $1.03 \times 10^3 \text{ cm}^2$

PROBLEM 49 • UNIT RATE: MOBILE TESTING ROVER EFFICIENCY**ANSWER: 28.0 mpg**

A battery-powered mobile electronics testing rover travels 210 miles on 7.50 gallons of fuel equivalent. What is the vehicle's fuel efficiency in miles per gallon?

GOVERNING MODEL: Efficiency (Mi/Gal-Eq) = Total Miles / Consumed Energy

NUMERICAL SETUP: Efficiency = Miles / Gallons

STEP-BY-STEP MATHEMATICAL REASONING:

Divide total distance traveled in miles by volume of fuel or battery equivalent energy units consumed to obtain vehicle efficiency.

CALCULATOR FLOW: [210] [ENTER] [7.5] [÷] -> 28.0 mpg

PROBLEM 50 • MULTI-ITEM CALCULATOR & COMPONENT ORDERS**ANSWER: \$1037.50**

A school STEM lab orders 45 SC-6 calculators at \$18.50 each and 60 modular snap block cases at \$4.25 each. With a \$50.00 educational rebate coupon applied, what is the net total invoice in dollars?

GOVERNING MODEL: Total Cost = $(n_1 \times p_1) + (n_2 \times p_2)$

NUMERICAL SETUP: Total = $(\text{Count}_1 \times \text{Price}_1) + (\text{Count}_2 \times \text{Price}_2)$

STEP-BY-STEP MATHEMATICAL REASONING:

Compute subtotal for each item type (calculator, modular blocks, sensors) by multiplying count by unit price, then sum together. Round currency to two decimals [\$].

CALCULATOR FLOW: [45] [ENTER] [18.5] [×] [60] [ENTER] [4.25] [×] [+] [50] [-] -> \$1037.50