

2026 UIL ELEMENTARY CALCULATOR CONTEST – GRADE 4 ELEMENTARY A+ – OFFICIAL SCORING KEY

CANONICAL ANSWERS (3 SIGNIFICANT DIGITS) • SCIENTIFIC NOTATION • GRADING TOLERANCES [PAGE 1 OF 4]

#	OFFICIAL CONTEST ANSWER (3 SIG FIGS)	SCIENTIFIC NOTATION	ACCEPTANCE INTERVAL (±2 UNITS)
1	2941 [INT]	2.94×10^3	[2941]
2	1248 [INT]	1.25×10^3	[1248]
3	2550 [INT]	2.55×10^3	[2550]
4	48 [INT]	4.80×10^1	[48]
5	78 [INT]	7.80×10^1	[78]
6	294 [INT]	2.94×10^2	[294]
7	36 [INT]	3.60×10^1	[36]
8	875 [INT]	8.75×10^2	[875]
9	\$291.00	2.91×10^2	[289, 293]
10	88 [INT]	8.80×10^1	[88]
11	0.875	8.75×10^{-1}	[0.873, 0.877]
12	0.333	3.33×10^{-1}	[0.331, 0.335]
13	4 [INT]	4.00×10^0	[4]
14	2.33	2.33×10^0	[2.31, 2.35]
15	1.88	1.88×10^0	[1.85, 1.90]
16	1.60	1.60×10^0	[1.58, 1.62]
17	0.750	7.50×10^{-1}	[0.748, 0.752]
18	0.667	6.67×10^{-1}	[0.665, 0.669]
19	4.50	4.50×10^0	[4.48, 4.52]
20	0.500 L	5.00×10^{-1}	[0.498, 0.502]
21	191	1.91×10^2	[189, 193]
22	75 [INT]	7.50×10^1	[75]
23	122	1.23×10^2	[120, 124]
24	14.1	1.41×10^1	[13.9, 14.3]
25	0.830	8.30×10^{-1}	[0.828, 0.832]

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CANONICAL ANSWERS (3 SIGNIFICANT DIGITS) • SCIENTIFIC NOTATION • GRADING TOLERANCES [PAGE 2 OF 4]

#	OFFICIAL CONTEST ANSWER (3 SIG FIGS)	SCIENTIFIC NOTATION	ACCEPTANCE INTERVAL (±2 UNITS)
26	31.3	3.13×10^1	[31.1, 31.5]
27	10.8	1.07×10^1	[10.6, 10.9]
28	96.6	9.66×10^1	[96.4, 96.8]
29	\$38.90	3.89×10^1	[38.7, 39.1]
30	56.0 s	5.60×10^1	[55.8, 56.2]
31	3.58 hrs	3.58×10^0	[3.56, 3.60]
32	6.25 hrs	6.25×10^0	[6.23, 6.27]
33	392 m²	3.92×10^2	[390, 394]
34	648 cm²	6.47×10^2	[646, 650]
35	81.0 m	8.10×10^1	[80.8, 81.2]
36	342 m²	3.42×10^2	[340, 344]
37	720 [INT]	7.20×10^2	[720]
38	59.4	5.94×10^1	[59.2, 59.6]
39	319 ft²	3.19×10^2	[317, 321]
40	160 [INT] min	1.60×10^2	[160]

STACKCALC32 RPN BENCHMARK: 244 KEYSTROKES vs. 390 ALGEBRAIC (SAVING 146 KEYS, 37.4% 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 • 3D PRINTING FILAMENT & LINEAR DENSITY**ANSWER: \$291.00**

A school STEM lab buys 18 spools of 3D printer PLA filament for \$14.50 each and 25 mechanical switch keycaps for \$1.20 each. Calculate the total purchase cost in dollars.

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: [18] [ENTER] [14.5] [×] [25] [ENTER] [1.2] [×] [+] → \$291.00

PROBLEM 10 • RESIN & POLYURETHANE CASTING PROPORTIONAL MIXTURE**ANSWER: 88 [INT]**

A custom keyboard matrix has 24 rows with 32 mechanical switch sockets in each row. If 680 switch sockets are populated, how many sockets remain empty?

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: [24] [ENTER] [32] [×] [680] [-] → 88 [INT]

PROBLEM 19 • RESIN & POLYURETHANE CASTING PROPORTIONAL MIXTURE**ANSWER: 4.50**

A 3D printing lab technician mixes 2 3/4 cups of clear UV photopolymer resin and 1 3/4 cups of white opaque resin. How many total cups of mixed resin are prepared?

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] [a b/c] [4] [ENTER] [1] [a b/c] [3] [a b/c] [4] [+] → 4.50

PROBLEM 20 • FRACTION SUBTRACTION & MATERIAL CONSUMPTION**ANSWER: 0.500 L**

A 3D printer resin vat holds 5/6 liter of photopolymer resin. After a print job, 2/6 liter of resin remains. How many liters of resin were consumed?

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] [a b/c] [6] [ENTER] [2] [a b/c] [6] [-] → 0.500 L

PROBLEM 29 • MULTI-ITEM CALCULATOR & COMPONENT ORDERS**ANSWER: \$38.90**

A robotics student purchases 6 packs of conductive prototyping paste at \$4.75 each and 4 rolls of Kapton tape at \$2.60 each. What is the total cost 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: [6] [ENTER] [4.75] [×] [4] [ENTER] [2.6] [×] [+] -> \$38.90

PROBLEM 30 • SMD PICK-AND-PLACE CUMULATIVE CYCLE TIME**ANSWER: 56.0 s**

A four-axis pick-and-place machine executes four component placement cycles in 14.25 seconds, 13.80 seconds, 14.50 seconds, and 13.45 seconds. What was the total placement cycle time in seconds?

GOVERNING MODEL: Total Time = $\text{Cycle}_1 + \text{Cycle}_2 + \text{Cycle}_3 + \text{Cycle}_4$

NUMERICAL SETUP: $T_{\text{total}} = t_1 + t_2 + t_3 + t_4$

STEP-BY-STEP MATHEMATICAL REASONING:

Sum individual pick-and-place component placement durations to obtain total cycle time across all axes.

CALCULATOR FLOW: [14.25] [ENTER] [13.8] [+] [14.5] [+] [13.45] [+] -> 56.0 s

PROBLEM 39 • RECTANGULAR ELECTRONICS ENCLOSURE VOLUME**ANSWER: 319 ft³**

A 3D printer workbench enclosure is 14.5 feet wide and 22.0 feet long. Calculate the base area of the enclosure in square feet.

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: [14.5] [ENTER] [22] [×] -> 319 ft³

PROBLEM 40 • ELAPSED MACHINE CYCLE TIME CALCULATION**ANSWER: 160 [INT] min**

An automated PCB reflow oven soldering profile starts at 7:35 am and finishes at 10:15 am. Calculate the soldering profile duration in minutes.

GOVERNING MODEL: Elapsed Time = End Time - Start Time

NUMERICAL SETUP: $\Delta t = T_{\text{finish}} - T_{\text{start}}$

STEP-BY-STEP MATHEMATICAL REASONING:

Compute total elapsed duration between start and completion timestamps, expressing duration in hours or minutes.

CALCULATOR FLOW: [10.15] [ENTER] [7.35] [CLK-] [60] [×] -> 160 [INT] min