

2026 UIL INTERMEDIATE CALCULATOR CHAMPIONSHIP – GRADE 6 DIVISION – 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	415	4.15×10^2	[413, 417]
2	859	8.59×10^2	[857, 861]
3	15.8	1.58×10^1	[15.6, 16.0]
4	149	1.49×10^2	[147, 151]
5	46 [INT]	4.60×10^1	[46]
6	64 [INT]	6.40×10^1	[64]
7	32 [INT]	3.20×10^1	[32]
8	80 [INT]	8.00×10^1	[80]
9	\$15708.00	1.57×10^4	$[1.55, 1.59] \times 10^4$
10	2400 [INT] m	2.40×10^3	[2400]
11	0.833	8.33×10^{-1}	[0.831, 0.835]
12	0.875	8.75×10^{-1}	[0.873, 0.877]
13	0.933	9.33×10^{-1}	[0.931, 0.935]
14	2 [INT]	2.00×10^0	[2]
15	2.50	2.50×10^0	[2.48, 2.52]
16	60 [INT] mph	6.00×10^1	[60]
17	0.571	5.71×10^{-1}	[0.569, 0.573]
18	0.667	6.67×10^{-1}	[0.665, 0.669]
19	6 [INT]	6.00×10^0	[6]
20	3 [INT] cups	3.00×10^0	[3]
21	81 [INT]	8.10×10^1	[81]
22	98 [INT]	9.80×10^1	[98]
23	80 [INT]	8.00×10^1	[80]
24	\$60.00	6.00×10^1	[59.8, 60.2]
25	\$129.90	1.30×10^2	[128, 132]

2026 UIL INTERMEDIATE CALCULATOR CHAMPIONSHIP – GRADE 6 DIVISION – 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	\$71.25	7.12×10^1	[71.0, 71.5]
27	25.0 %	2.50×10^1	[24.8, 25.2]
28	25.0 %	2.50×10^1	[24.8, 25.2]
29	\$77.13	7.71×10^1	[76.9, 77.3]
30	\$80.71	8.07×10^1	[80.5, 80.9]
31	115 cm²	1.15×10^2	[113, 117]
32	184 m²	1.84×10^2	[182, 186]
33	315 m²	3.15×10^2	[313, 317]
34	237 m²	2.37×10^2	[235, 239]
35	102 cm	1.02×10^2	[99.8, 104]
36	104 m	1.04×10^2	[102, 106]
37	141 in	1.41×10^2	[139, 143]
38	2.50×10^3 cm³	2.50×10^3	$[2.48, 2.52] \times 10^3$
39	160 ft²	1.59×10^2	[158, 162]
40	81.7 in	8.17×10^1	[81.5, 81.9]
41	10 [INT]	1.00×10^1	[10]
42	27 [INT]	2.70×10^1	[27]
43	2.94	2.94×10^0	[2.92, 2.96]
44	7.46	7.46×10^0	[7.44, 7.48]
45	383	3.83×10^2	[381, 385]
46	15 [INT] gal	1.50×10^1	[15]
47	1050 [INT]	1.05×10^3	[1050]
48	\$191.47	1.91×10^2	[189, 193]
49	108 min	1.08×10^2	[106, 110]
50	307 mi	3.07×10^2	[305, 309]

STACKCALC32 RPM BENCHMARK: 292 KEYSTROKES vs. 477 ALGEBRAIC (SAVING 185 KEYS, 38.8% 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: \$15708.00**

A microelectronics distributor receives 34 crates each containing 28 boxed StackCalc microcontroller kits priced at \$16.50 each. Calculate the total wholesale value in dollars.

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: [34] [ENTER] [28] [×] [16.5] [×] -> \$15708.00

PROBLEM 10 • 3D PRINTING FILAMENT & LINEAR DENSITY**ANSWER: 2400 [INT] m**

Flexible 1.75 mm TPU 3D printing filament weighs 5.25 grams per meter. How many meters of filament are on a 12.60 kilogram commercial shipping reel?

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: [12.6] [ENTER] [1000] [×] [5.25] [÷] -> 2400 [INT] m

PROBLEM 19 • SPOOL STOCK / RAIL SUBTRACTION & REMAINDER**ANSWER: 6 [INT]**

A maker cuts an extruded aluminum 3D printer frame rail measuring 7 1/2 feet long into smaller bracket supports measuring 1 1/4 feet each. How many smaller supports can be cut?

GOVERNING MODEL: Remaining = Initial Stock - (Number of Cuts × Cut Length)

NUMERICAL SETUP: Remaining = Stock_0 - (n × L_cut)

STEP-BY-STEP MATHEMATICAL REASONING:

Multiply number of cut rail sections by length per section, and subtract from initial stock length.

CALCULATOR FLOW: [7.5] [ENTER] [1.25] [×] -> 6 [INT]

PROBLEM 20 • RESIN & POLYURETHANE CASTING PROPORTIONAL MIXTURE**ANSWER: 3 [INT] cups**

A two-part polyurethane casting mix for mechanical keycaps requires 3/4 cup of activator for every 2 1/2 cups of resin base. How many cups of activator are required for a batch using 10 cups of resin base?

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: [10] [ENTER] [0.75] [×] [2.5] [÷] -> 3 [INT] cups

PROBLEM 29 • TEST BENCH TOOL DISCOUNT & SALES TAX**ANSWER: \$77.13**

A digital temperature-controlled soldering station originally priced at \$95.00 is discounted by 25%. With an 8.25% sales tax applied to the discounted sale price, calculate the total final purchase cost in dollars.

GOVERNING MODEL: Final Cost = Original Price $\times$ (1 - Discount Rate) $\times$ (1 + Tax Rate)

NUMERICAL SETUP: Final Cost = $P_0 \times (1 - d) \times (1 + t)$

STEP-BY-STEP MATHEMATICAL REASONING:

Calculate net purchase price after lab equipment discount: $P_{\text{net}} = P_0 \cdot (1 - d)$. Then apply sales tax: $P_{\text{final}} = P_{\text{net}} \cdot (1 + t)$. In competition scoring, currency answers [\$] are rounded to the nearest cent.

CALCULATOR FLOW: [95] [ENTER] [0.75] [$\times$] [1.0825] [$\times$] -> \$77.13

PROBLEM 30 • FABRICATION INVOICE & EXPRESS COURIER SURCHARGE**ANSWER: \$80.71**

An expedited PCB prototype fabrication invoice totals \$68.40. If the customer adds an 18% express courier shipping fee, what is the total amount paid in dollars?

GOVERNING MODEL: Total Invoice = Base Cost $\times$ (1 + Fee Rate)

NUMERICAL SETUP: Total = Base_Invoice $\times$ (1 + r_fee)

STEP-BY-STEP MATHEMATICAL REASONING:

Apply express logistics / courier surcharge rate to the base electronics fabrication invoice: multiply base cost by (1 + fee rate). Round currency [\$] to the nearest cent.

CALCULATOR FLOW: [68.4] [ENTER] [1.18] [$\times$] -> \$80.71

PROBLEM 39 • TRIANGULAR STIFFENER BRACKET SURFACE AREA**ANSWER: 160 ft²**

A 3D printed triangular stiffener bracket for a 3D printer gantry has a horizontal base of 14.5 feet and a vertical height of 22.0 feet. Calculate the total surface area of the bracket in square feet.

GOVERNING MODEL: Area = $(1/2) \times \text{Base} \times \text{Height}$

NUMERICAL SETUP: Area = $0.5 \times \text{Base} \times \text{Height}$

STEP-BY-STEP MATHEMATICAL REASONING:

The surface area of a triangular gantry bracket equals one-half base times vertical height: $A = 1/2 \cdot b \cdot h$. Multiply base by height and divide by 2.

CALCULATOR FLOW: [14.5] [ENTER] [22] [$\times$] [2] [$\div$] -> 160 ft²

PROBLEM 40 • 3D PRINTER PULLEY & ENCODER CIRCUMFERENCE**ANSWER: 81.7 in**

A 3D printer GT2 timing belt pulley has a pitch diameter of 26.0 inches. How many inches does the printer carriage travel in one complete revolution of the pulley?

GOVERNING MODEL: Circumference = $\pi \times d$ [or $C = 2 \times \pi \times r$]

NUMERICAL SETUP: $C = \pi \times \text{Diameter}$ or $2 \times \pi \times \text{Radius}$

STEP-BY-STEP MATHEMATICAL REASONING:

One complete rotation or belt travel step equals circular circumference $C = \pi \cdot d$ (or $2 \cdot \pi \cdot r$). Multiply diameter or radius by π (and 2 if radius).

CALCULATOR FLOW: [26] [π] [$\times$] -> 81.7 in

PROBLEM 49 • LASER GANTRY TRIANGULATION & VERTICAL MAST HEIGHT**ANSWER: 108 min**

Two automated guided vehicles (AGVs) in an electronics plant separated by 92.0 miles travel directly toward each other at steady speeds of 22.5 mph and 28.5 mph. In how many minutes will they meet?

GOVERNING MODEL: $h = \text{Baseline Distance} / [\cot(\theta_1) - \cot(\theta_2)]$

NUMERICAL SETUP: $h = d / [(1 / \tan(\theta_1)) - (1 / \tan(\theta_2))]$

STEP-BY-STEP MATHEMATICAL REASONING:

From two calibration baseline positions separated by advance distance d, vertical height h satisfies $\cot(\theta_1) - \cot(\theta_2) = d / h$. Invert $\tan(\theta_1)$ and $\tan(\theta_2)$, subtract on the stack, take reciprocal $[1/x]$, and multiply by distance d.

CALCULATOR FLOW: [92] [ENTER] [22.5] [ENTER] [28.5] [+] [+] [60] [×] -> 108 min

PROBLEM 50 • CAD LAYOUT PROPORTIONAL SCALE & DISPLAY CONVERSION**ANSWER: 307 mi**

A multi-layer PCB layout CAD view uses a display scale of 1.00 inch = 48.0 miles. If two microcontroller pins are 6.40 inches apart on the screen, calculate the actual physical distance in miles.

GOVERNING MODEL: Actual Dimension = Display Dimension × Scale Ratio

NUMERICAL SETUP: Actual = CAD_Measure × (Actual Units / Screen Unit)

STEP-BY-STEP MATHEMATICAL REASONING:

Determine scaling ratio between actual units and drawing units, then multiply by measured drawing dimension.

CALCULATOR FLOW: [6.4] [ENTER] [48] [×] -> 307 mi