

2026 UIL / TMSCA JUNIOR HIGH CALCULATOR CONTEST – GRADE 8 CHAMPIONSHIP

GRADE 8 JUNIOR HIGH DIVISION • 50 PROBLEMS • 30-MINUTE SPEED SPRINT • SC-32 / SC-6

// OFFICIAL CONTESTANT IDENTIFICATION

CONTESTANT NAME: _____

SCHOOL / CAMPUS: _____

GRADE LEVEL: [] 6 [] 7 [] 8

CONTESTANT ID #: _____

OFFICIAL SCORING GRID (GRADER VERIFIED)						
PAGE	P1	P2	P3	P4	P5	TOTAL
Correct (+5):						
Errors (-4):						
Subtotal:						

CONTEST RULES: 30 MINUTES • ALL ANSWERS TO 3 SIGNIFICANT DIGITS UNLESS INTEGER (INT) OR DOLLARS [\$].
SCORING: +5 points per correct response; -4 points per wrong/skipped question up to last attempted. Zero after last attempted.

SECTION 1: EXPONENTS & SCIENTIFIC NOTATION

Integer Exponent Laws, Negative Powers & Scientific Notation Arithmetic

MODE: [123] EXPONENTS

- G8-1.

$(3.4 \times 10^5) \times (1.8 \times 10^{-2})$

1 = _____

INT
- G8-2.

$(4.8 \times 10^8) \div (1.2 \times 10^3)$

2 = _____
- G8-3.

$(2.5 \times 10^{-4}) \times (6.0 \times 10^8)$

3 = _____

INT
- G8-4.

$3^4 - 2^5$

4 = _____

INT
- G8-5.

$(4.5 \times 10^4) + (8.2 \times 10^3)$

5 = _____

INT
- G8-6.

$(1.6 \times 10^7) \div (4.0 \times 10^{-2})$

6 = _____
- G8-7.

$2^{-3} + 4^{-2}$

7 = _____
- G8-8.

$(5.2 \times 10^3) \times (3.5 \times 10^2)$

8 = _____
- G8-9.

An RP2040 embedded microcontroller executes 1.496×10^8 instructions during a benchmark run. If a coprocessor executes instructions at 3.00×10^5 instructions per second, how many seconds would the coprocessor require to execute that same workload?

9 = _____

s
- G8-10.

A high-density solder paste contains 4.50×10^4 microscopic alloy solder spheres per milliliter. How many total solder spheres are contained in a 250 milliliter laboratory dispenser flask?

10 = _____

SECTION 2: SQUARE ROOTS & RADICAL EXPRESSIONS

Evaluating Square Roots, Cube Roots, Estimating Irrationals & Radical Chains

MODE: [123] RADICALS

G8-11. $\sqrt{484} + \sqrt{289}$ **11** = _____ INT

G8-12. $\sqrt{750}$ **12** = _____

G8-13. $\sqrt[3]{1728} + \sqrt{625}$ **13** = _____ INT

G8-14. $\sqrt{(14.5^2 + 8.2^2)}$ **14** = _____

G8-15. $\sqrt{(28.5^2 - 16.4^2)}$ **15** = _____

G8-16. $\sqrt[3]{850}$ **16** = _____

G8-17. $\sqrt{1250} - \sqrt{450}$ **17** = _____

G8-18. $\sqrt{(184 + 325)}$ **18** = _____

G8-19. A square magnetic PEI build plate for a 3D printer has a surface area of 450 square meters.
Calculate the side length of the build plate in meters.
19 = _____ m

G8-20. A cubic modular learning block enclosure has an internal volume of 85.0 cubic meters. Determine the
edge length of the cube in meters.
20 = _____ m

SECTION 3: PYTHAGOREAN THEOREM & DISTANCE

MODE: [123] PYTHAGORAS

Right Triangle Hypotenuse & Legs ($a^2 + b^2 = c^2$), 2D Distance Formula & Diagonals

- G8-21.** Hypotenuse: $\sqrt{(36^2 + 48^2)}$ **21 =** _____ INT
- G8-22.** Hypotenuse: $\sqrt{(18.5^2 + 24.2^2)}$ **22 =** _____
- G8-23.** Leg: $\sqrt{(65^2 - 39^2)}$ **23 =** _____ INT
- G8-24.** Leg: $\sqrt{(44.5^2 - 28.0^2)}$ **24 =** _____
- G8-25.** Distance: $\sqrt{[(14 - 2)^2 + (18 - 3)^2]}$ **25 =** _____
- G8-26.** Distance: $\sqrt{[(-5 - 7)^2 + (8 - (-4))^2]}$ **26 =** _____
- G8-27.** 3D Diagonal: $\sqrt{(12^2 + 9^2 + 8^2)}$ **27 =** _____ INT
- G8-28.** Square diagonal: $15.0 \times \sqrt{2}$ **28 =** _____
- G8-29.** An articulated support strut for a 3D printer overhead spool rack is 32.0 feet long with its base placed 9.50 feet from the vertical frame. What vertical height in feet does the top of the strut reach?
29 = _____ ft
- G8-30.** A high-speed differential signal trace crosses a rectangular PCB ground plane measuring 85.0 meters long and 42.0 meters wide along the straight diagonal path. How many meters shorter is the diagonal path than routing along both orthogonal edges?
30 = _____ m

SECTION 4: 3-D GEOMETRY: CYLINDERS, CONES & SPHERES

MODE: [123] 3D VOLUMES

Cylinder Volume ($\pi r^2 h$), Cone Volume ($\frac{1}{3} \pi r^2 h$) & Sphere Volume ($\frac{4}{3} \pi r^3$)

- G8-31.** Cylinder Volume: $\pi \times 6.5^2 \times 14.2$ **31** = _____ cm^3
- G8-32.** Cylinder Volume: $\pi \times 8.4^2 \times 22.0$ **32** = _____ m^3
- G8-33.** Cone Volume: $(\frac{1}{3}) \times \pi \times 5.4^2 \times 12.5$ **33** = _____ cm^3
- G8-34.** Cone Volume: $(\frac{1}{3}) \times \pi \times 9.2^2 \times 18.0$ **34** = _____ m^3
- G8-35.** Sphere Volume: $(\frac{4}{3}) \times \pi \times 7.5^3$ **35** = _____ cm^3
- G8-36.** Sphere Volume: $(\frac{4}{3}) \times \pi \times 12.0^3$ **36** = _____ m^3
- G8-37.** Cylinder Area: $2\pi(6.0)(15.0) + 2\pi(6.0^2)$ **37** = _____ cm^2
- G8-38.** Sphere Surface Area: $4\pi \times 8.5^2$ **38** = _____ m^2
- G8-39.** A spherical acoustic resonance chamber in a custom 3D printed speaker enclosure has an internal radius of 14.5 feet. Calculate the storage capacity of the chamber in cubic feet.
39 = _____ ft^3
- G8-40.** An industrial 3D printing pellet hopper consists of a vertical cylinder with radius 8.00 meters and height 18.5 meters, topped by a conical funnel of the same radius and height 4.50 meters. Determine the total internal volume in cubic meters.
40 = _____ m^3

SECTION 5: LINEAR FUNCTIONS, SLOPE & RATE LABS

Slope Calculation ($m=\frac{y}{x}$), Linear Systems, Density & Simultaneous Motion

MODE: [123] LINEAR RATES

- G8-41.** Slope: $(148.5 - 62.0) / (18.5 - 6.0)$ **41** = _____
- G8-42.** Slope: $(45 - (-15)) / (12 - (-8))$ **42** = _____ INT
- G8-43.** Linear eval: $y = 4.5(18.0) - 22.5$ **43** = _____
- G8-44.** Solve: $3.2x - 14.4 = 1.6x + 24.0$ **44** = _____ INT
- G8-45.** Density: $425.0 \text{ g} / 54.2 \text{ cm}^3$ **45** = _____ g/cm^3
- G8-46.** $1 / (1/18.5 + 1/26.0)$ **46** = _____
- G8-47.** $(18.5 \times 12.4) + \sqrt{(450)}$ **47** = _____
- G8-48.** Distance: $64.5 \text{ mph} \times 3 \text{ hr } 45 \text{ min}$ **48** = _____ mi
- G8-49.** 3D Print Bureau A quotes custom enclosures for \$39.95 plus \$0.45 per unit. Bureau B charges \$49.95 plus \$0.35 per unit. At how many units produced is the fabrication cost identical for both bureaus?
49 = _____ mi
- G8-50.** An autonomous delivery drone carrying sensor payloads flies 1,280 miles with a steady tailwind in 2.50 hours. On the return flight against the same wind, the flight takes 3.20 hours. Calculate the speed of the drone in still air in miles per hour.
50 = _____ mph