

2026 UIL CALCULATOR APPLICATIONS INVITATIONAL EXAM A

HIGH SCHOOL CHAMPIONSHIP DIVISION • 70 PROBLEMS • 30-MINUTE SPEED SPRINT

// OFFICIAL CONTESTANT IDENTIFICATION

CONTESTANT NAME: _____

SCHOOL / CAMPUS: _____

GRADE LEVEL: [] 9 [] 10 [] 11 [] 12

CONTESTANT ID #: _____

OFFICIAL SCORING GRID (GRADER VERIFIED)

PAGE	P1	P2	P3	P4	P5	P6	P7	FINAL
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.

26A-1. $45.8 + 128.4 - 39.2$ 1 = _____

26A-2. $(14.2 \times 3.85) + 84.1 - 29.7$ 2 = _____

26A-3. $(78.4 + 192.6) / 14.8$ 3 = _____

26A-4. $(248.5 - 63.8) / (12.4 + 18.9)$ 4 = _____

26A-5. $1 / 24.5 + 1 / 38.2$ 5 = _____

26A-6. $\sqrt{(34.2^2 + 48.6^2)}$ 6 = _____

26A-7. $8940 / (14.2 \times 8.65 \times 3.48)$ 7 = _____

26A-8. $(18.6 + 42.9)^{1.45}$ 8 = _____

26A-9. A digital logic probe kit priced at \$84.50 is discounted by 15%. With an 8.25% sales tax applied to the discounted price, what is the final purchase cost?

9 = \$ _____

26A-10. Conductive copper-infused 3D printing filament weighs 3.65 grams per meter. How many meters of filament are wound onto a 4.25 kilogram spool?

10 = _____ m

26A-11. $(\sqrt{428} + 74.5) / (16.2 \times 3.84)$ **11** = _____

26A-12. $\sqrt{(148 + \sqrt{(54.2 + 89.6)})}$ **12** = _____

26A-13. $\sqrt{(1/14.8 + 1/29.4)}$ **13** = _____

26A-14. $(84.2^2 - 38.6^2) / (19.4 + 27.8)$ **14** = _____

26A-15. $(14.5^{2.5} + 185) / (28.4^2 - 312)$ **15** = _____

26A-16. $\sqrt{[(148.5 \times 29.4) / (34.2 + 78.9)]}$ **16** = _____

26A-17. $\sqrt[3]{(482 + 38.5 \times 19.4)}$ **17** = _____

26A-18. $(1/8.45 - 1/19.2)^2$ **18** = _____

26A-19. In an automated resin 3D printing station, vacuum degassing pump A evacuates the resin chamber in 3.80 hours, while auxiliary pump B requires 5.40 hours. How many hours will it take to degas the chamber if both pumps run simultaneously?

19 = _____ hrs

26A-20. A 3D printed circular planetary gear has an inner sun gear radius of 18.5 meters surrounded by an outer ring gear radius of 22.0 meters. Find the surface area of the gear annulus in square meters.

20 = _____ m²

26A-21. $84.5^{0.68} + 19.4^{-0.42}$ **21 =** _____

26A-22. $14.2 + 28.5 / [8.4 + (16.2 / 5.8)]$ **22 =** _____

26A-23. $1 / 12.4^{1.3} + 1 / 8.65^{2.4}$ **23 =** _____

26A-24. $\sqrt[3]{(58.4^3 - 34.2^3)}$ **24 =** _____

26A-25. $[142 - (48.5 / 6.2)] / [28.4 + (95 / 14.6)]$ **25 =** _____

26A-26. $(34.5^{2.4} \times 8.15^{-1.2}) / \sqrt{450}$ **26 =** _____

26A-27. $\sqrt{(\sqrt{485} + \sqrt{124})}$ **27 =** _____

26A-28. $[(84.5 + 39.2) / (72.4 - 28.6)]^{2.65}$ **28 =** _____

26A-29. Two autonomous mobile educational delivery rovers situated 52.0 miles apart travel directly toward each other with constant speeds of 13.5 mph and 17.5 mph respectively. In how many minutes will they meet?

29 = _____ min

26A-30. An articulated robotic pick-and-place boom measuring 32.0 feet long leans against a vertical test fixture with its base resting 8.50 feet away from the fixture. What acute angle in degrees does the boom make with the horizontal ground?

30 = _____ deg

26A-31. $\sin(1.85 \text{ rad}) + \cos(0.92 \text{ rad})$ **31 =** _____

26A-32. $\tan(48.5^\circ) \times \sin(24.2^\circ)$ **32 =** _____

26A-33. $\ln(148.5) + \ln(39.4) - \ln(12.8)$ **33 =** _____

26A-34. $\log(845) / [\log(32.4) + 1.45]$ **34 =** _____

26A-35. $e^{1.75} - e^{-0.85}$ **35 =** _____

26A-36. $\sin(2.14 \text{ rad}) / [\ln(45.2) + \sqrt{18.5}]$ **36 =** _____

26A-37. $\cos^2(38.4^\circ) + \sin(52.6^\circ)$ **37 =** _____

26A-38. $(10^{1.35} - 10^{-1.35}) / (10^{1.35} + 10^{-1.35})$ **38 =** _____

26A-39. A radioactive sensor calibration isotope used in an electronic scintillation detector has a half-life of 14.2 days. If an initial laboratory vial contains 85.0 grams of the active isotope, what mass in grams remains active after 38.5 days?

39 = _____ g

26A-40. An optical laser inspection sensor measures the vertical height of a 3D printer gantry tower. From calibration point A, the angle of elevation to the gantry apex is 34.2° . Moving 45.0 meters closer along the rail to point B, the elevation angle increases to 48.6° . Determine the height of the gantry tower in meters.

40 = _____ m

26A-41. $\arcsin(0.485) + \arccos(0.312)$ [rad] **41 =** _____

26A-42. $\arctan(78.4 / 42.6)$ [deg] **42 =** _____

26A-43. $\sinh(1.24) \times \cosh(0.85)$ **43 =** _____

26A-44. $\tanh(0.74 + 1.15)$ **44 =** _____

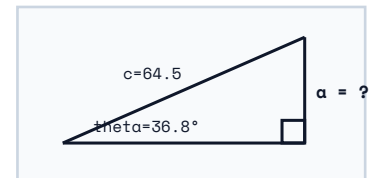
26A-45. $[\cos(0.84 \text{ rad})]^{\sin(1.12 \text{ rad})}$ **45 =** _____

26A-46. $\sqrt{ \ln^2(28.5) + \ln^2(94.2) }$ **46 =** _____

26A-47. $\arctan(2.45) / \arcsin(0.68)$ [rad] **47 =** _____

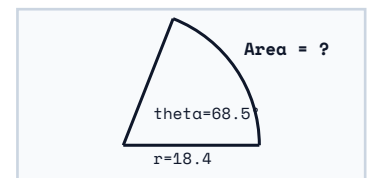
26A-48. $14.8^{\log(38.2)}$ **48 =** _____

26A-49. RIGHT TRIANGLE: In the right triangle shown below, hypotenuse $c = 64.5$ cm and acute angle $\theta = 36.8^\circ$. Calculate the length of opposite side a .



49 = _____ cm

26A-50. CIRCULAR SECTOR: For the circular sector diagrammed below, radius $r = 18.4$ m and central angle $\theta = 68.5^\circ$. Determine the total area of the shaded sector in square meters.



50 = _____ m^2

26A-51. $19 \text{ C } 7$ 51 = _____ INT

26A-52. $14 \text{ P } 5$ 52 = _____ INT

26A-53. $^4\sqrt{(34.2^3 + 18.5^2 \times 9.45)}$ 53 = _____

26A-54. $(16 \text{ C } 6) / (11 \text{ C } 4)$ 54 = _____

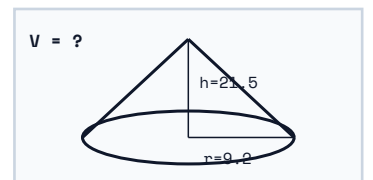
26A-55. $[e^{1.42} - \ln(18.5)]^{2.15}$ 55 = _____

26A-56. $\sqrt{\cosh(2.35) - \sinh(1.85)}$ 56 = _____

26A-57. $\sqrt{42 + \sqrt{42 + \sqrt{42}}}$ 57 = _____

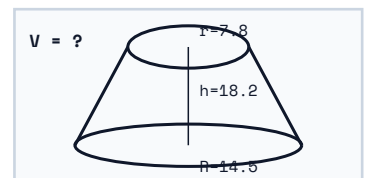
26A-58. $\log_{7.5}(842)$ 58 = _____

26A-59. RIGHT CIRCULAR CONE: The solid cone shown has base radius $r = 9.20$ cm and vertical height $h = 21.5$ cm. Calculate the volume of the cone in cubic centimeters.



59 = _____ cm³

26A-60. CONICAL FRUSTUM: A truncated cone has lower base radius $R = 14.5$ cm, upper base radius $r = 7.80$ cm, and vertical height $h = 18.2$ cm. Calculate the frustum volume in cubic centimeters.



60 = _____ cm³

26A-61. $\sqrt{(64.2^2 + 39.8^2)} / [\ln(185) + \sin(1.45 \text{ rad})]$... **61** = _____

26A-62. $[(e^{1.65} - 1) / (3.42 \times \log(428))]^{1.85}$... **62** = _____

26A-63. $[\tan(62.4^\circ) - \tan(28.5^\circ)] / [1 + \tan(62.4^\circ)\tan(28.5^\circ)] =$ _____

26A-64. $\sinh(1.85) / [\cosh(1.24) + \tanh(0.65)]$... **64** = _____

26A-65. $\sqrt{(124 + \sqrt{85})} / \sqrt[3]{(48 + \sqrt{28})}$... **65** = _____

26A-66. $[\ln(54.2) + \cos(0.78 \text{ rad})]^{[\sin(1.24 \text{ rad})]}$... **66** = _____

26A-67. $(1/\sqrt{18.4} + 1/\sqrt{34.8})^{-1.75}$... **67** = _____

26A-68. $(12.4^{2.8} - 8.65^{1.9}) / [(12.4 \times 8.65) + (2.8 \times 1.9)]$ **68** = _____

26A-69. A 3D printed modular electronics enclosure with an open top and square base is sliced using 360 square inches of polymer wall area. Using calculus optimization, determine the maximum theoretical internal volume in cubic inches.

69 = _____ in³

26A-70. In an automated tactile switch testing rig, a spring-loaded key switch plunger is ejected with launch velocity $v_0 = 86.4 \text{ m/s}$ at an elevation angle of 39.5° above horizontal across a level test track. Taking gravitational acceleration $g = 9.81 \text{ m/s}^2$, determine the horizontal trajectory distance in meters.

70 = _____ m