

2026 UIL CALCULATOR APPLICATIONS INVITATIONAL EXAM B

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.

26B-1. $58.2 + 149.7 - 48.6$ 1 = _____

26B-2. $(18.4 \times 4.25) + 96.2 - 34.8$ 2 = _____

26B-3. $(92.5 + 248) / 18.2$ 3 = _____

26B-4. $(314 - 82.5) / (15.8 + 24.6)$ 4 = _____

26B-5. $1 / 31.5 + 1 / 46.8$ 5 = _____

26B-6. $\sqrt{(42.5^2 + 56.8^2)}$ 6 = _____

26B-7. $12450 / (18.5 \times 9.40 \times 4.15)$ 7 = _____

26B-8. $(24.2 + 58.6)^{1.38}$ 8 = _____

26B-9. A digital storage oscilloscope priced at \$112.00 is discounted by 20%. With 8.25% state sales tax applied to the discounted price, calculate the total final cost.
9 = \$ _____

26B-10. High-conductivity bronze 3D printing filament weighs 4.12 grams per linear meter. How many meters of filament are wound onto a 5.80 kilogram commercial spool?
10 = _____ m

26B-11. $(\sqrt{512 + 89.2}) / (19.5 \times 4.25)$ **11 =** _____

26B-12. $\sqrt{(185 + \sqrt{68.4 + 112})}$ **12 =** _____

26B-13. $\sqrt{(1/18.5 + 1/36.2)}$ **13 =** _____

26B-14. $(96.4^2 - 44.2^2) / (24.5 + 36.8)$ **14 =** _____

26B-15. $(18.2^{2.5} + 245) / (34.5^2 - 418)$ **15 =** _____

26B-16. $\sqrt{[(185 \times 36.5) / (42.5 + 98.4)]}$ **16 =** _____

26B-17. $\sqrt[3]{(645 + 48.5 \times 24.2)}$ **17 =** _____

26B-18. $(1/9.85 - 1/24.6)^2$ **18 =** _____

26B-19. In an automated vacuum chamber for degassing 3D printing silicone molds, primary vacuum line A evacuates the tank in 4.50 hours, while auxiliary pump line B requires 6.80 hours. How many hours will it take to evacuate the tank if both pumps operate together?

19 = _____ hrs

26B-20. A circular 3D printed mechanical turntable ring has an inside opening radius of 23.5 meters bordered by an exterior mounting flange extending out to a radius of 28.0 meters. Calculate the surface area of the flange in square meters.

20 = _____ m²

26B-21. $98.2^{0.72} + 24.5^{-0.38}$ **21 =** _____

26B-22. $18.5 + 34.2 / [9.8 + (19.4 / 6.4)]$ **22 =** _____

26B-23. $1 / 15.6^{1.4} + 1 / 9.80^{2.2}$ **23 =** _____

26B-24. $\sqrt[3]{68.5^3 - 42.8^3}$ **24 =** _____

26B-25. $[178 - (56.4 / 7.8)] / [34.2 + (118 / 16.5)]$... **25 =** _____

26B-26. $(42.0^{2.3} \times 9.45^{-1.1}) / \sqrt{580}$ **26 =** _____

26B-27. $\sqrt{\sqrt{590} + \sqrt{165}}$ **27 =** _____

26B-28. $[(94.2 + 48.5) / (85.6 - 34.2)]^{2.85}$ **28 =** _____

26B-29. Two mobile modular robotics test platforms separated by 64.0 miles travel directly toward each other with ground speeds of 15.2 mph and 19.8 mph. In how many minutes will they pass each other?
29 = _____ min

26B-30. An articulated pick-and-place camera boom 38.0 feet long leans against a vertical electronics rack with its ground base resting 9.20 feet away from the foundation. Determine the acute angle in degrees between the boom and the horizontal ground.
30 = _____ deg

26B-31. $\sin(2.25 \text{ rad}) + \cos(1.15 \text{ rad})$ **31 =** _____

26B-32. $\tan(54.2^\circ) \times \sin(31.8^\circ)$ **32 =** _____

26B-33. $\ln(185) + \ln(48.2) - \ln(16.5)$ **33 =** _____

26B-34. $\log(980) / [\log(42.5) + 1.85]$ **34 =** _____

26B-35. $e^{1.95} - e^{-0.95}$ **35 =** _____

26B-36. $\sin(2.45 \text{ rad}) / [\ln(58.4) + \sqrt{24.5}]$ **36 =** _____

26B-37. $\cos^2(42.5^\circ) + \sin(64.2^\circ)$ **37 =** _____

26B-38. $(10^{1.62} - 10^{-1.62}) / (10^{1.62} + 10^{-1.62})$ **38 =** _____

26B-39. A radioactive calibration source for an electronic radiation monitor has a disintegration half-life of 16.8 days. If a test specimen initially contains 120.0 grams of the active isotope, what mass in grams remains active after 44.5 days?

39 = _____ g

26B-40. From calibration point P on a level test bed, the angle of elevation to an optical sensor mast is 38.5° . Advancing 54.0 meters directly toward the mast to point Q, the angle of elevation is 52.4° . Determine the height of the mast in meters.

40 = _____ m

26B-41. $\arcsin(0.562) + \arccos(0.418)$ [rad] **41** = _____

26B-42. $\arctan(86.5 / 51.4)$ [deg] **42** = _____

26B-43. $\sinh(1.48) \times \cosh(0.96)$ **43** = _____

26B-44. $\tanh(0.86 + 1.34)$ **44** = _____

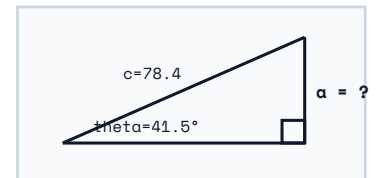
26B-45. $[\cos(0.92 \text{ rad})]^{\sin(1.28 \text{ rad})}$ **45** = _____

26B-46. $\sqrt{ \ln^2(34.8) + \ln^2(118) }$ **46** = _____

26B-47. $\arctan(3.15) / \arcsin(0.74)$ [rad] **47** = _____

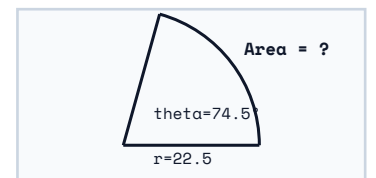
26B-48. $18.5^{\log(46.8)}$ **48** = _____

26B-49. RIGHT TRIANGLE: In the right triangle shown below, hypotenuse $c = 78.4$ cm and acute angle $\theta = 41.5^\circ$. Calculate the length of opposite side a .



49 = _____ cm

26B-50. CIRCULAR SECTOR: For the circular sector diagrammed below, radius $r = 22.5$ m and central angle $\theta = 74.5^\circ$. Determine the total area of the shaded sector in square meters.



50 = _____ m^2

26B-51. 21 C 8 **51 =** _____ INT

26B-52. 15 P 6 **52 =** _____ INT

26B-53. $\sqrt[4]{(42.5^3 + 22.4^2 \times 11.8)}$ **53 =** _____

26B-54. $(18 \text{ C } 7) / (12 \text{ C } 5)$ **54 =** _____

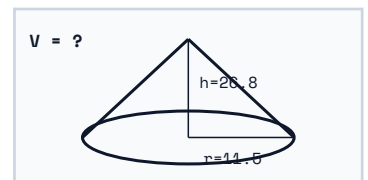
26B-55. $[e^{1.58} - \ln(24.5)]^{2.35}$ **55 =** _____

26B-56. $\sqrt{\cosh(2.65) - \sinh(2.10)}$ **56 =** _____

26B-57. $\sqrt{56 + \sqrt{56 + \sqrt{56}}}$ **57 =** _____

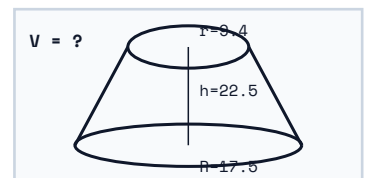
26B-58. $\log_{8.4}(1250)$ **58 =** _____

26B-59. RIGHT CIRCULAR CONE: The solid cone shown has base radius $r = 11.5$ cm and vertical height $h = 26.8$ cm. Calculate the volume of the cone in cubic centimeters.



59 = _____ cm³

26B-60. CONICAL FRUSTUM: A truncated cone has lower base radius $R = 17.5$ cm, upper base radius $r = 9.40$ cm, and vertical height $h = 22.5$ cm. Calculate the frustum volume in cubic centimeters.



60 = _____ cm³

26B-61. $\sqrt{(78.5^2 + 48.2^2)} / [\ln(240) + \sin(1.62 \text{ rad})]$... **61** = _____

26B-62. $[(e^{1.85} - 1) / (4.15 \times \log(580))]^{1.92}$... **62** = _____

26B-63. $[\tan(68.5^\circ) - \tan(34.2^\circ)] / [1 + \tan(68.5^\circ)\tan(34.2^\circ)] =$ _____

26B-64. $\sinh(2.15) / [\cosh(1.48) + \tanh(0.78)]$... **64** = _____

26B-65. $\sqrt{165 + \sqrt{112}} / \sqrt[3]{64 + \sqrt{38}}$... **65** = _____

26B-66. $[\ln(72.5) + \cos(0.85 \text{ rad})]^{\sin(1.38 \text{ rad})}$... **66** = _____

26B-67. $(1/\sqrt{24.5} + 1/\sqrt{48.2})^{-1.82}$... **67** = _____

26B-68. $(15.2^{2.9} - 9.80^{2.1}) / [(15.2 \times 9.80) + (2.9 \times 2.1)]$ **68** = _____

26B-69. A 3D printed modular electronics enclosure with an open top and square base is constructed from 480 square inches of polymer sheet. Using calculus optimization, determine the maximum theoretical volume of the box in cubic inches.

69 = _____ in³

26B-70. In an automated drop-and-ejection test rig for mechanical switches, a key switch stem is launched from ground level with launch velocity $v_0 = 94.5 \text{ m/s}$ at an elevation angle of 42.0° above horizontal. Taking gravitational acceleration $g = 9.81 \text{ m/s}^2$, determine the horizontal flight range in meters.

70 = _____ m