

2009-10 UIL Calculator Applications Contest Stated Problem Study List

- 04B-78. A machinist vise opens 3 inches and is closed by a screw that advances by 0.4 inches per revolution. If the handle extends 10 inches from the axis of the screw, how far does the tip of the handle travel in closing the vise from full open to full closed? ----- 78=_____ ft
- 04C-67. The life expectancy for men is 74.8 years and for women is 80.1. If the total average is 77.5 years, what is the number of women divided by the number of men? ----- 67=_____
- 04E-67. A 9-inch diameter 3-layer cake calls for 1 1/2 cups raisins. If layers have constant thickness, how many cups raisins would be used in a 12-inch diameter, 4-layer cake? --- 67=_____ cups
- 04I-68. Two cars sit at a traffic light with the first one three feet ahead. When the light turns green, the first starts accelerating at 12 ft/s^2 , and, after a delay of 1 second, the second car has the same acceleration. How far apart are they when the first reaches 35 mph? ----- 68=_____ ft
- 05A-38 (modified). A pendulum has a period that is directly proportional to its distance from the center of the earth and also proportional to the square root of the pendulum length. If a 24-inch pendulum has a 2 second period at sea level, what would be the period of a 20-inch pendulum at altitude of 1 mile? ----- 38=_____ sec
- 05C-37. The velocity of a car increases with time at $v(t) = 12t$ mph, where t is in seconds from the time the car began moving. How long before the car is 100 ft from where it began? ----- 37=_____ sec
- 05D-27. The height of a clothesline follows the equation $h(x) = 3 + 0.005(x-20)^2$ ft. What is the minimum height of the line above the ground? ----- 27=_____ ft
- 05E-38. Consider a cube that can be stretched in one direction while the square cross section decreases in such a way as to keep the volume constant. What is the length to side ratio if the final area divided by the original area of the cube equals the natural logarithm of pi? ----- 38=_____
- 05I-37. The intensity of light varies as the inverse of the square of the distance from the source. How far from a 60 watt bulb is there adequate light for reading if the distance from a 75-watt bulb is 12 ft? Assume that light output is proportional to wattage. ----- 37=_____ ft
- 06A-27. What is the roaming area of a goat on a 20 ft leash tied to the corner of a shed that is 8 ft by 12 ft? ----- 27=_____ ft^2
- 06B-37. A 2 meter long piece of dental floss is pulled tight 1 meter above the ground. It is then relaxed by moving one end 175 mm towards the other end. Assuming the sagged floss forms a circular arc, how far above the ground is the midpoint of the floss? ----- 37=_____ cm

- 06C-37. An insect population, if unchecked, would triple every 15 days. What fraction of the original population must be annihilated every 7 days to keep the population in check (i.e., to keep it from growing)? ----- 37=_____%
- 06E-38. A 4.5 ft cord is sectioned into three pieces to form a right triangle. If the hypotenuse is 2.1 ft, what is the ratio of the lengths of the other two pieces, a number greater than 1? ----- 38=_____
- 06G-26. Ten tablespoons of dye are added to a gallon of water to make dyestock. How much dye is needed to make twenty 55-gallon drums of diestock? ----- 26=_____gal
- 06I-38. Peter had two measuring tapes, one for long distances and one for short distances. He measured a length by combining both. One tape read 54.6 yards, and the other read 24.9 ft. What was the total length? ----- 38=_____yd(SD)
- 07A-38. On a Texas ranch, a pond is 285 ft in diameter and the land slopes at 4° (from horizontal) away from the pond. What is the pond diameter after a 1.5 in rain if 40% of the rain runs into the pond, and the rain gathering area is 3 acres? ----- 38=_____ft
- 07C-38. A gun fires a bullet at 500 mph. What is the bullet's maximum range, the farthest horizontal distance it can travel? ----- 38=_____mi
- 07E-37. Two ships travel east at 25 mph, one exactly 15 mi behind the other. They simultaneously change course, one heading 20° northward, and the other heading southward at the same angle. How far apart are the ships after 2 hr? ----- 37=_____mi
- 07H-37. Don peels an orange in 45 s, and Daniel can peel one in 56 s. Don starts peeling 500 oranges at 8 AM, and after a time t , Daniel joins him and they work together until all oranges are peeled, finishing at 2 PM. What is t ? ----- 37=_____min
- 08A-38. A car accelerates from rest, drives a certain distance at 60 mph, and then decelerates to rest. Acceleration and deceleration have equal magnitude but opposite sign. If the total distance traveled was 18 mi and the total elapsed time was 20 min, what was the (positive) acceleration? ----- 38=_____ft/s²
- 08C-37. A municipal firework is fired, traveling 350 ft into the air. It then free falls to an elevation of 250 ft, at which point it is detonated. If the fuse is 6 in long and burns at a rate of 0.4 in/s, how long after lighting the fuse should the firework be fired? ----- 37=_____s
- 08D-36. What percent of the earth's surface can be seen in an airplane flying at 30,000 ft elevation? Neglect refraction. ----- 36=_____%
- 08E-37. A hiker and a jogger start out together on a 5 mi long trail. The jogger runs a mi in 8 min 10 s, and the hiker travels at 2.5 mph. When the jogger got to the end of the trip, she turned around and ran back to the hiker. She then reversed direction again, heading back towards the end of the trail. This continued until the hiker finished the trail. How far did the jogger run? ----- 37=_____mi

