

Quadratic and exponential word problems

A factory designs cylindrical cans 10 cm in height to hold exactly 500 cm^3 of liquid. Which of the following best approximates the radius of these cans?

(A) 4 cm

(B) 8 cm

(C) 12.5 cm

(D) 15.9 cm

A minor league hockey team has been collecting ticket sales data over the past year. At a current price of \$25 per ticket, an average of 4000 seats are purchased. They predict that for each \$1 increase in ticket price, 100 fewer tickets will be sold. Which of the following functions best models the amount of money that the hockey teams expect to collect from ticket sales, y , based on an $\$x$ increase in ticket price?

(A) $y = (25 + x)(4000 - 100x)$

(B) $y = (25 - x)(4000 + 100x)$

(C) $y = x(4000 - 100x)$

(D) $y = 4000(25 + x)$

Rajeev has \$175 that he earned from his summer job. He puts the money in an account that yields 4% interest compounded annually. Assume that Rajeev does not make any other deposits or withdrawals from his account. After how many years from the time he deposited the money will Rajeev have at least \$200 in his account?

(A) 1 year

(B) 2 years

(C) 3 years

(D) 4 years

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Lamian is a Chinese noodle made by repeatedly folding and stretching dough to make noodles of varying thickness. A ball of dough is rolled into a long "rope" 2 centimeters (cm) in diameter. One end of the dough is held in each hand, and the dough is stretched and folded, making 2 separate strands. This process is repeated until the strands are the desired thickness.

Assume that each time the dough is stretched, the thickness of each noodle decreases by 30%. How many folds will be needed to produce noodles whose thickness is at most 0.5 cm?

A 2

B 3

C 4

D 5

$$p = \frac{1}{2}kx^2$$

The seat on a tractor is mounted on springs in order to absorb impact. The driver sits on the seat, and the springs compress a distance of x meters, **m**. As the springs compress, potential energy, p , in joules (**J**), is stored in them according to the equation above. The spring constant, k , describes the strength of the springs in newtons per meter ($\frac{\text{N}}{\text{m}}$). If the springs have a spring constant of $25,600 \frac{\text{N}}{\text{m}}$, how much must the springs stretch, in meters, in order to store 8 J of potential energy?

A 0.000625 meters

B 0.025 meters

C 3200 meters

D 102,400 meters