Topic: Equation modeling

Question: A car and a truck were driven for a week. The car traveled 400 miles more than the truck. Each vehicle had different fuel mileage. Write an equation using c to calculate the total number of gallons g, used that week.

	car	truck
mileage	27 mpg	18 mpg
distance	c miles	t miles

Answer choices:

A $g = \dfrac{5c - 1{,}200}{54}$

B $g = \dfrac{5c + 1{,}200}{54}$

C $g = \dfrac{c - 1{,}200}{18}$

D $g = \dfrac{c + 400}{27}$

Solution: A

Write an expression in c for the distance traveled by the truck. We know $c = t + 400$ or rearranging, $t = c - 400$.

To get gallons used, divide distance by mileage.

Adding the new information:

	car	truck
mileage	27 mpg	18 mpg
distance	c miles	$c - 400$ miles
gallons used, g	$\frac{c}{27}$	$\frac{c-400}{18}$

We can write:

$$g = \frac{c}{27} + \frac{c - 400}{18}$$

$$g = \left(\frac{2}{2}\right)\frac{c}{27} + \left(\frac{3}{3}\right)\frac{c - 400}{18}$$

$$g = \frac{2c}{54} + \frac{3c - 1{,}200}{54}$$

$$g = \frac{2c + 3c - 1{,}200}{54}$$

$$g = \frac{5c - 1{,}200}{54}$$

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Question: A ball is thrown at a speed of 12 ft/s straight downward from a tall cliff. The distance it travels can be calculated using $D = 16t^2 + 12t$, where t is the time of falling.

The average speed of any object can be calculated using $V = D/t$.

Write an equation giving the time of fall in terms of V.

Answer choices:

A $t = \dfrac{V + 12}{16}$

B $t = \dfrac{V}{28}$

C $t = \dfrac{V - 12}{16}$

D $t = \dfrac{V}{4}$

Solution: C

Start with $V = D/t$ and substitute $16t^2 + 12t$ for D.

$$V = \frac{16t^2 + 12t}{t}$$

Simplify.

$$V = 16t + 12$$

$$t = \frac{V - 12}{16}$$