

Problem-Based Task: Estimating Depreciation

Coaching Sample Responses

- a. Which variable needs to be determined in the equation $c = 22,000 \cdot d^t$ so that Yasmina can estimate the value of a car in year t ?

The variable c represents the value of the car in year t ; t is the independent variable and c is the dependent variable. The only variable that needs to be determined is d .

- b. Use the data about the older car to help Yasmina complete the equation. Which variables are known for this equation?

For the older car, Yasmina knows the current value, c , and the time, t , in years.

- c. Substitute the known quantities for the variables in the equation.

$$c = \$16,905$$

$$t = 2.5 \text{ years}$$

$$16,905 = 22,000 \cdot d^{2.5}$$

- d. Use inverse operations to find an equivalent equation in the form $x^a = b$.

$$16,905 = 22,000 \cdot d^{2.5}$$

$$0.768 \approx d^{2.5}$$

- e. Solve for the variable.

$$0.768 \approx d^{2.5}$$

$$0.768 \approx d^{\frac{5}{2}}$$

$$(0.768)^{\frac{2}{5}} \approx \left(d^{\frac{5}{2}} \right)^{\frac{2}{5}}$$

$$0.90 \approx d$$

- f. What is the equation Yasmina can use to estimate the value of a car purchased for \$22,000 in any year t ?

Replace d with the calculated value of 0.90.

$$c = 22,000(0.90)^t$$

- g. How much will Yasmina's new car be worth after 6 years?

Replace t with 6 in the equation found in part f.

$$c = 22,000(0.90)^6$$

$$c = 11,691.70$$

After 6 years, the car will be worth approximately \$11,692, or about half of its original value.

Recommended Closure Activity

Select one or more of the essential questions for a class discussion or as a journal entry prompt.