

1.5 Use Problem Solving Strategies and Models

EXAMPLE 1 Use a formula

HIGH-SPEED TRAIN The Acela train travels between Boston and Washington, a distance of 457 miles. The trip takes 6.5 hours. What is the average speed?

$$\frac{d}{t} = r \frac{t}{t}$$

$$r = \frac{d_{mi}}{t_{hr}} = \frac{457}{6.5} = \boxed{70.3 \text{ mph}}$$

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EXAMPLE 2 Look for a pattern

PARAMOTORING A paramotor is a parachute propelled by a fan-like motor. The table shows the height h of a paramotorist t minutes after beginning a descent. Find the height of the paramotorist after 7 minutes.

Time (min), t	0	1	2	3	4
Height (ft), h	2000	1750	1500	1250	1000

$$h = -250t + 2000$$

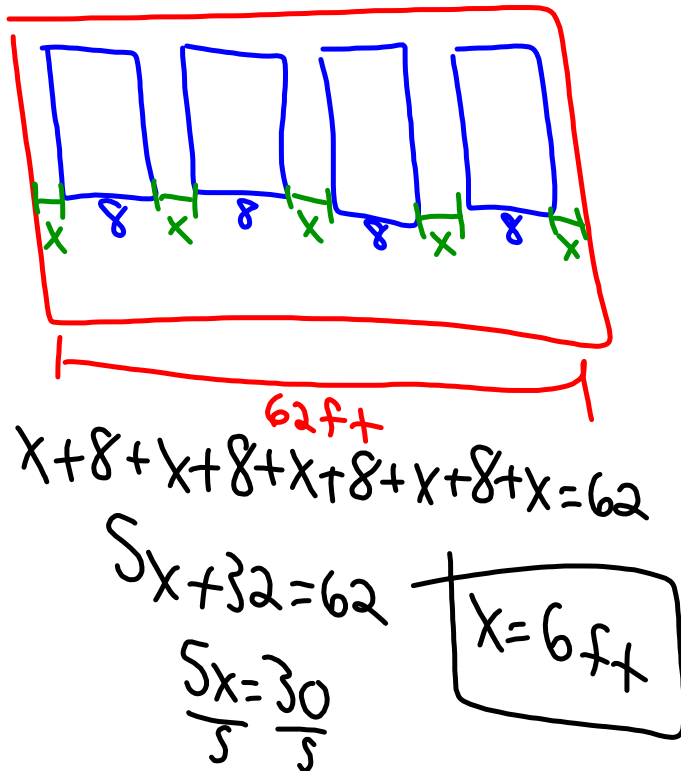
$$= -250(7) + 2000$$
$$h = 250 \text{ ft}$$

$$\begin{array}{cccc} \checkmark & \checkmark & \checkmark & \checkmark \\ -250 & -250 & -250 & -250 \end{array}$$

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EXAMPLE 3 Draw a diagram

BANNERS You are hanging four championship banners on a wall in your school's gym. The banners are 8 feet wide. The wall is 62 feet long. There should be an equal amount of space between the ends of the wall and the banners, and between each pair of banners. How far apart should the banners be placed?



EXAMPLE 4

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A car used 16 gallons of gasoline and traveled a total distance of 460 miles. The car's fuel efficiency is 30 miles per gallon on the highway and 25 miles per gallon in the city. How many gallons of gasoline were used on the highway?

$$\text{mpg} = \frac{\text{miles}}{\text{gal}}$$

$$\begin{aligned} (h \text{ mpg})(h \text{ gal}) &= h \text{ miles} \\ (c \text{ mpg})(c \text{ gal}) &= c \text{ miles} \end{aligned}$$

$$30(x) + 25(16-x) = 460$$

$$30x + 400 - 25x = 460$$

$$\frac{5x}{5} = \frac{60}{5}$$

$$x = 12 \text{ gal}$$

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USING A FORMULA Use the formula $d = rt$ for distance traveled to solve for the missing variable.

3. $d = 20 \text{ mi}$, $r = 40 \text{ mi/h}$, $t = \underline{\quad? \quad}$

$$\frac{d}{r} = \frac{rt}{r}$$

$$t = \frac{d}{r} = \frac{20 \text{ mi}}{40 \frac{\text{mi}}{\text{hr}}} = \frac{1}{2} \text{ hr}$$

$$\frac{\text{mi}}{\frac{\text{mi}}{\text{hr}}} = \text{mi} \left(\frac{\text{hr}}{\text{mi}} \right)$$

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USING PATTERNS Look for a pattern in the table. Then write an equation that represents the table.

12.

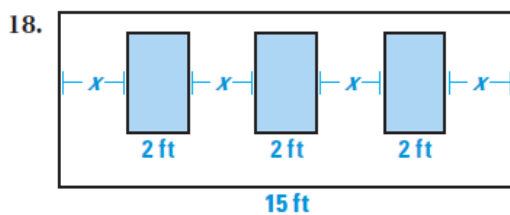
x	0	1	2	3
y	60	45	30	15

-15 -15 -15

$$y = -15x + 60$$

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USING DIAGRAMS Write and solve an equation to find x .



$$15 = 4x + 6$$

$$\begin{array}{r} -6 \\ \hline \end{array}$$

$$\frac{9}{4} = \frac{4x}{4}$$

$$x = \frac{9}{4} \text{ ft} = 2.25 \text{ ft}$$