

## Bell Work

Use  $f(x) = x^3 + 3x - 1$  for #1 and 2.

1.  $f(4) =$

2.  $f(-5) =$

3. Solve and show all work.  $5(x - 1) = 2x + 3.$

4. Solve and write in set and interval notation. No graphing is needed.

$$7a - 6 \leq 4(a + 3) + 1$$

Today you will solve proportions and word problems dealing with proportions.

$$\frac{3}{4} = \frac{12}{16}$$

$$\frac{\%}{100} = \frac{\text{Is}}{\text{Of}}$$

$$\frac{28}{36} = \frac{a}{54}$$

$$\frac{24}{h-3} = \frac{42}{h+6}$$

**Proportion:**

**Two equal ratios or fractions**

$$\begin{array}{ccc} 48 & & 48 \\ & \frac{3}{4} & \frac{12}{16} \\ & \swarrow \quad \searrow & \\ & & \end{array}$$

**The cross products will always be equal.**

## Solving Proportions

Multiply the 2 cross product numbers and divide by the 3<sup>rd</sup>.

$$\frac{28}{36} = \frac{a}{54}$$

$$\div \frac{28}{36} = \frac{a}{54}$$

$$a = 42$$

$$\frac{3.5}{6.3} = \frac{-8}{b}$$

$$b = -14.4$$

## Solving Proportions

$$\frac{10}{c + 7} = \frac{28}{70}$$

$$28(c + 7) = 10(70)$$

$$\begin{array}{r} 28c + 196 = 700 \\ - 196 \quad - 196 \\ \hline \end{array}$$

$$\frac{28c}{28} = \frac{504}{28}$$

$$c = 18$$

## Solving Proportions

$$\frac{24}{h-3} = \frac{42}{h+6}$$

$$\begin{aligned} 24(h+6) &= 42(h-3) \\ 24h + 144 &= 42h - 126 \\ -24h + 126 &- 24h + 126 \end{aligned}$$

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$$\frac{270}{18} = \frac{18h}{18}$$

$$15 = h$$

One college states that 18% of the students are majoring in business. There are 281 students in the business department. How many students attend the college?

$$\frac{\%}{100} = \frac{\text{Is}}{\text{Of}} \quad \frac{18}{100} = \frac{281}{x}$$

$$x = 1,561 \frac{1}{9}$$

1561 or 1562 students

There are 334 engineering majors. What percent is that?

$$\frac{\%}{100} = \frac{\text{Is}}{\text{Of}}$$

$$\frac{x}{100} = \frac{334}{1561}$$

$$x = 21.4\%$$



A new road is being built to the top of a hill that will have a vertical rise of 145 feet and a horizontal run 2,792 feet. What will be the grade of the new road?

$$\frac{x}{100} = \frac{145}{2792} \quad \frac{\text{Rise}}{\text{Run}}$$

$$x = 5.2\%$$

Wheelchair ramps in public buildings can not be more than a 8.3% grade (or steepness). A new building needs a ramp that rises 6.5 inches. What is the shortest length in feet that the ramp can be?

$$\frac{8.3}{100} = \frac{6.5}{x} \quad \frac{\text{Rise}}{\text{Run}}$$

$$x = 78.3 \text{ inches} \div 12$$

$$x = 6.5 \text{ feet}$$

## Assignment:

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Solve.

22.  $\frac{4}{9} = \frac{r+3}{45}$

23.  $\frac{2.8}{1.5} = \frac{t}{0.09}$

24.  $\frac{9+m}{5} = \frac{15}{4}$

25.  $\frac{2}{u-5} = \frac{6}{9}$

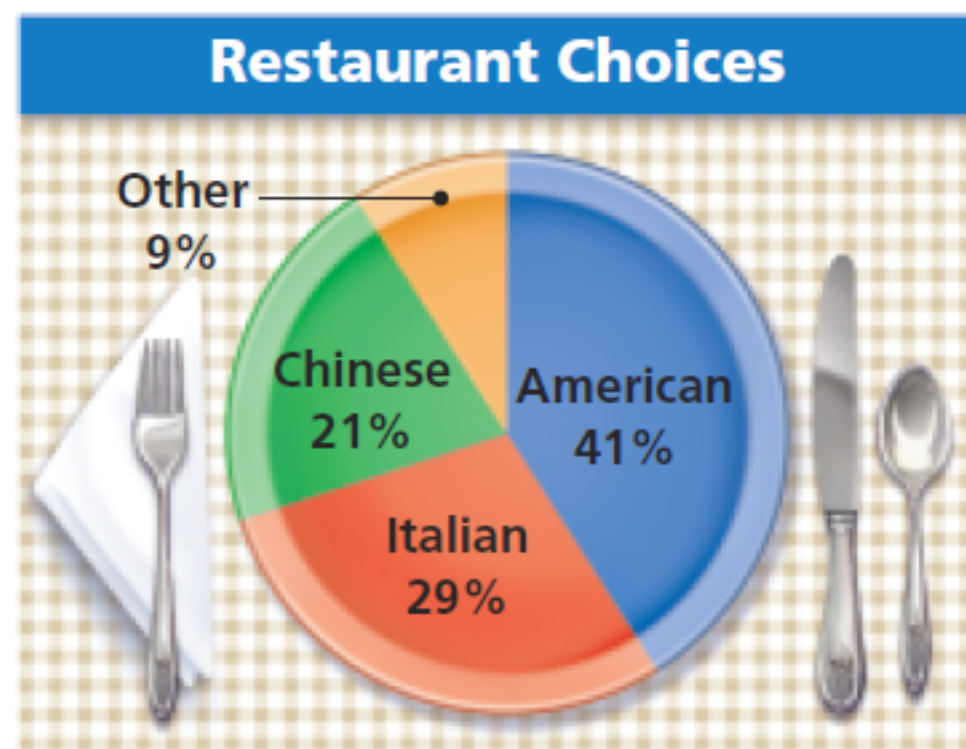
26.  $\frac{12}{27} = \frac{3r}{3}$

27.  $\frac{-11}{0.11h} = \frac{10}{3}$

28.  $\frac{25}{75} = \frac{80}{5x}$

29.  $\frac{0}{17} = \frac{0.5x}{170}$

30. **Food** A sample of students was asked what type of restaurant they visit most often. Their answers are shown in the circle graph. If 126 students chose Chinese restaurants, how many students were polled?



Use the following for Exercises 38–40.

*Grade* is a measure of the steepness of surfaces, such as roads and ramps. Grade is expressed as a percent based on the ratio  $\frac{\text{vertical rise}}{\text{horizontal run}}$ . For example, a ramp that is 5 feet long and rises 1 foot has a grade of  $\frac{1}{5}$ , or 20%.

**38. Construction** A crew is building a stretch of road with a vertical rise of 15 m and a horizontal run of 375 m. Find the grade of the road.

**39. Fitness** A treadmill has a 9% grade. If the treadmill has a horizontal run of 5 feet, what is the treadmill's vertical rise in inches?

**40. Accessibility** The Americans with Disabilities Act set the maximum grade for wheelchair-accessible ramps at  $8\frac{1}{3}\%$ . What is the minimum horizontal run in feet required for a ramp designed to rise 30 inches?



Solve.

52.  $\frac{-2}{x+5} = \frac{8}{x-3}$       53.  $\frac{h+4}{9} = \frac{h-3}{4}$       54.  $\frac{n-2}{4} = \frac{3n+3}{18}$