

Construct Meaning

A packaging company located in Iceland exports the country's products and manufactures paper products for schools, homes, and businesses. If Iceland Packaging had 140 employees in 2000 and 175 employees in 2002, what was the percent increase of the number of employees?



Percent increase is a percent change that describes an increase in quantity.

Percent decrease is a percent change that describes a decrease in quantity.

To determine percent increase or percent decrease, first find the amount of change. In this case, subtract the number of employees in 2000 from the number in 2002 to determine the amount of change.

$$175 \text{ employees} - 140 \text{ employees} = 35 \text{ employees}$$

A proportion may be used to find percent changes.

$$\frac{\text{percent change}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

Percent change may be percent increase or percent decrease.

Use the proportion to determine the percent increase in the number of employees at Iceland Packaging. Let n = percent increase.

Substitute the numbers. $\frac{n}{100} = \frac{35}{140}$

Use cross products. $140n = 100 \cdot 35$

Use inverse operations. $\frac{140n}{140} = \frac{3500}{140}$

$$n = 25$$

Write the percent. $\frac{n}{100} = \frac{25}{100} = 25\%$

The percent increase was 25%.

Use the proportion to find the number of tourists taking a shore excursion in Iceland during August. There was a 20% decrease in business from July, when 240 people took the tour. Let x represent the amount of change.

Substitute the numbers. $\frac{20}{100} = \frac{x}{240}$

Use cross products. $20 \cdot 240 = 100x$

Use inverse operations. $\frac{4800}{100} = \frac{100x}{100}$

$$48 = x$$

There were 48 fewer tourists in August.

To find the number of tourists in August, subtract the amount of change from the number of tourists in July.

$$240 - 48 = 192$$

THERE WERE 192 TOURISTS IN AUGUST.



Check Understanding

- a. The number of customers that visited Perry's Bakery doubled in one year. The shop manager put a sign in the window that stated, "We now serve 200% more customers." Is the statement true or false? Explain.
- b. Brooke decreased the amount of time she spent practicing the piano from one hour to 45 minutes. Mentally determine the percent decrease.



- c. If Iceland Packaging hired 12 more employees, which is a 20% increase in the number of employees, what was the original number of employees?

Practice

Determine the percent increase or decrease.

1. Original price **\$40**
Sale price **\$28**
2. Original weight **102 lb**
New weight **127.5 lb**
3. Original number of students **215**
Current number of students **258**

Determine the new amount.

4. \$45 is increased by 15% 5. 120 is decreased by 40% 6. 5 lb is increased by 112%

Determine the original amount.

7. Amount of decrease **\$10**
Percent change **10%**
8. Amount of increase **540**
Percent change **80%**
9. Sale price **\$35**
Discount **30%**

Apply



10. The population of Monterey Heights decreased from 16,750 to 15,745 in one year. Determine the percent decrease.
11. Mr. Divatz's car has decreased in value by 20% of its original price of \$13,500. How much is Mr. Divatz's car worth?
12. Because of the success of the local rugby team, the number of people registered in the fan club increased by 200 people, which is 80% of the original number of fans. How many people are now registered in the fan club?
13. Mr. Bakke recorded the time it took the students to run around the perimeter of the school at the beginning of the year and at the end of the year. Between Gina and Andrea, who had the greater percent of improvement? What was that student's percent of improvement?

Name	Fall Quarter	Spring Quarter
Gina	1 min 30 sec	1 min 15 sec
Andrea	1 min 40 sec	1 min 25 sec

Construct Meaning

Biking is a healthy and enjoyable way to enjoy God's great outdoors. Notice the geometric terms illustrated on the bicycle wheel.



A **circle** is the set of all points in a plane that are **equidistant**, the same distance, from a given point, P , the **center**. The distance from the center to any point on the circle is the **radius**, r . A **chord** is a line segment joining any two points on a circle. The length of a chord that passes through the center is the **diameter**, d . An angle formed by two radii is a **central angle**. The sum of the measures of all central angles in a circle is 360° . Each central angle marks a **sector** of the circle.

The diameter of a circle is twice the radius, $d = 2r$.

What is the formula for the radius of a circle in terms of d ?

The distance around a circle, or its perimeter, is the **circumference**, C .

The ratio of the circumference of a circle to its diameter is always **pi**, or π .

This relationship, $\frac{C}{d} = \pi$, yields the formula $C = \pi d$.

By substitution, $C = 2\pi r$.

Find the circumference of a 14-mm diameter circle.

$$C = \pi d$$

Use the formula.

$$C \approx \frac{22}{7} (14 \text{ mm})$$

Substitute. Use $\frac{22}{7}$ for ease in calculation.

$$C \approx 44 \text{ mm}$$

Simplify.

The approximate value of π is $\frac{22}{7}$ or 3.14.

Find the radius of a circle with a circumference of 314 inches.

$$C = \pi d$$

Use the formula.

$$314 \text{ in.} \approx 3.14d$$

Substitute. Use 3.14 for π .

$$\frac{314 \text{ in.}}{3.14} \approx d$$

Solve.

$$100 \text{ in.} \approx d$$

Simplify.

Since $r = \frac{d}{2}$, the radius is approximately 50 inches.

The area, A , of a circle is the number of square units it contains. The formula is $A = \pi r^2$.

What is the approximate area of a circle with a radius of 5 cm?

$$A = \pi r^2$$

Use the formula.

$$A \approx 3.14(5 \text{ cm})^2$$

Substitute. Use 3.14 for π .

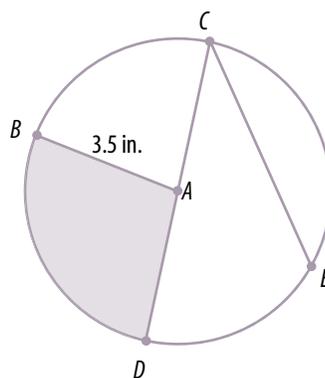
$$A \approx 78.5 \text{ cm}^2$$

Simplify.

Check Understanding

Match each item with the appropriate figure or quantity from the circle. Use 3.14 for π .

a. Central angle	7 in.
b. Chord	$\angle BAC$
c. Diameter length	21.98 in.
d. Radius	$\triangle DAB$
e. Sector	CE
f. Center	A
g. Circumference	AB
h. Area	38.465 sq in.

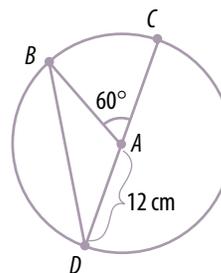


- i. When you found the area and circumference of the circle above, did you find an exact or an approximate answer?

Practice

Use the circle for problems 1 through 6. Use $\pi \approx 3.14$.

1. What is the area of the circle?
2. What fraction of the circle is sector BAC ?
3. What is the area of sector BAC ?
4. Find the measure of $\angle DAB$.
5. Find the approximate circumference of the circle.
6. Classify $\triangle DAB$ by angle size and side lengths.



Apply

7. A student drew a cross-section of a sapling to show its new growth. The diameter of the inner core is 1 inch and the diameter of the tree is 1.4 inches. Use $\pi \approx 3.14$ and round your answer to the nearest hundredth.
 - a. What is the area of the cross-section of the tree?
 - b. What is the area of the tan inner core?
 - c. What is the area of the new growth ring?
8. Consider a bike wheel with a diameter of 24 inches.
 - a. Approximately how far does a point on the wheel travel in one revolution (turn) of the wheel? Use $\pi \approx 3.14$. Round your answer to the nearest inch.
 - b. Approximately how many revolutions are necessary to travel a mile?
9. Determine which of the following covers a greater land area—one spruce tree with a base diameter of 1 meter or three 0.5-meter diameter trees.



Tree cross-section

Challenge

10. Tara wants to cover one-fourth of a 44-square foot garden with bushes. If her design includes 14 bushes, what size (approximate diameter) bushes should she purchase?