GRADE 7 · UNIT 7 · LESSON 2

Sectors of a Circle

MA.7.DP.1.4

I can find the central angle of a sector from its fraction of the whole, and the fraction of the whole from its angle.

Warm-Up

1. A circle graph: 45%, 20% and one more sector. The last one?
2. Map scale 1 cm : 4 km. Towns 6.5 cm apart on it. How far?
3. A circle's diameter is 14 cm. What is its radius?
4. What is $\frac{3}{8}$ of 48?

Warm-Up

1. A circle graph: 45%, 20% and one more sector. The last one?

   35%

2. Map scale 1 cm : 4 km. Towns 6.5 cm apart on it. How far?

   26 km

3. A circle's diameter is 14 cm. What is its radius? **7 cm**

4. What is $\frac{3}{8}$ of 48? **18**

Vocabulary

central angle

an angle whose vertex is the center of a circle: the angle between a sector's two radii

degree

the unit an angle is measured in: a full turn is 360 degrees, written 360°

full turn

once all the way around the center of a circle: 360°

right angle

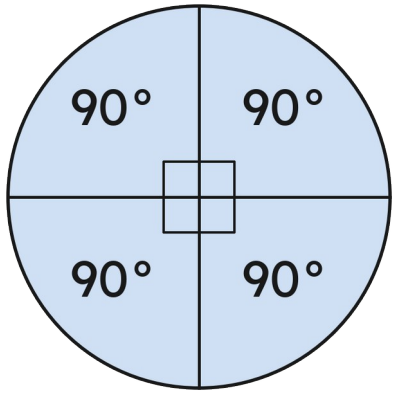
a quarter turn: 90°

straight angle

a half turn, a straight line through the center: 180°

Notes

I. A full turn is 360°



Four right angles make a full turn: 90° + 90° + 90° + 90° = 360°.

Half a turn is 180°, a straight angle. A quarter turn is 90°.

Notes

II. A sector's angle is its fraction of 360°

9 of a class's 36 students walk to school: $\frac{9}{36}$ of the class.

Central angle: the fraction of the total, then · 360.

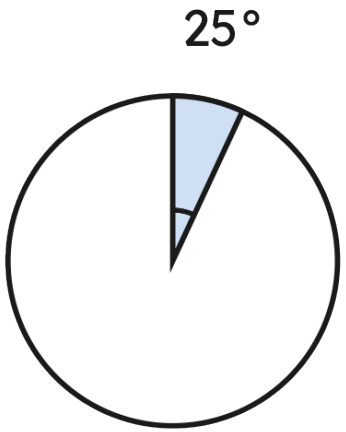
$$\frac{9}{36} \cdot 360 = 9 \cdot 10 = 90$$

360 ÷ 36 = 10: each student is 10° of the circle. The angle is 90°.

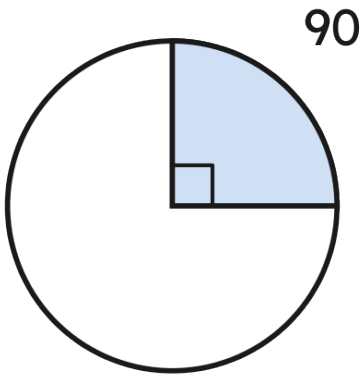
As a percent, 9 of 36 is 25%: $0.25 \cdot 360 = 90$ too.

Notes

III. Not the percent as degrees



an angle of 25°



25% of the circle

25° is less than a tenth of the circle. 25% is a quarter of it.

A percent is out of 100. An angle is out of 360. 25% of 360° = 90°.

Example 1

Mia sleeps 9 hours of the day's 24 hours.

In a circle graph of her day, what is the central angle of the sleep sector?

Example 1

Sleep is 9 of the day's 24 hours. Each hour is 360 ÷ 24 = 15 degrees.

$$\frac{9}{24} \cdot 360 = 9 \cdot 15 = 135$$

Answer: 135°

Your Turn

Leo is at school 7 hours of the day's 24 hours.

In a circle graph of his day, what is the central angle of the school sector?

Your Turn

Leo is at school 7 hours of the day's 24 hours.

In a circle graph of his day, what is the central angle of the school sector?

School: $\frac{7}{24}$ of the day

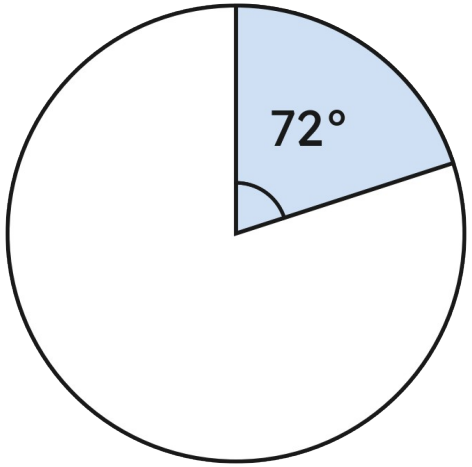
$\frac{7}{24} \cdot 360 = 7 \cdot 15 = 105$, so the angle is 105°

Answer: 105°

Example 2

A sector of a circle graph has a central angle of 72°.

What fraction of the circle is it? What percent?



Example 2

$$\frac{72}{360} = \frac{1}{5}$$

$$\frac{1}{5} = 0.2 = 20\%$$

Answer: 1/5 of the circle, 20%

Your Turn

A sector of a circle graph has a central angle of 126°.

What fraction of the circle is it? What percent?

Your Turn

A sector of a circle graph has a central angle of 126°.

What fraction of the circle is it? What percent?

$$\frac{126}{360} = \frac{7}{20}$$

$$\frac{7}{20} = 0.35 = 35\%$$

Answer: 7/20 of the circle, 35%

Whiteboards · Question 1 of 9

A sector is $\frac{5}{12}$ of a circle. What is its central angle?

Answer it.

Whiteboards · Question 1 of 9

A sector is $\frac{5}{12}$ of a circle. What is its central angle?

$\frac{5}{12} \cdot 360 = 5 \cdot 30 = 150$, so the angle is 150°

Answer: 150°

Whiteboards · Question 2 of 9

A soccer team won 33 of its 60 games.

In a circle graph of its games, what is the angle of the wins sector?

Answer it.

Whiteboards · Question 2 of 9

A soccer team won 33 of its 60 games.

In a circle graph of its games, what is the angle of the wins sector?

Wins: $\frac{33}{60}$ of the games

$\frac{33}{60} \cdot 360 = 33 \cdot 6 = 198$, so the angle is 198°

Answer: 198°

Whiteboards · Question 3 of 9

A sector is 15% of a circle graph. What is its central angle?

A. 5.4°

B. 54°

C. 24°

D. 15°

Answer it.

Whiteboards · Question 3 of 9

A sector is 15% of a circle graph. What is its central angle?

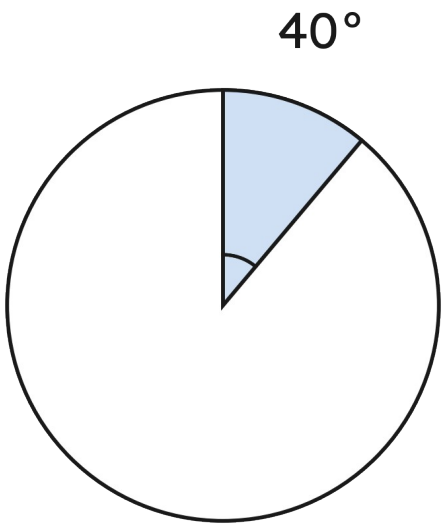
15% of 360°

$0.15 \cdot 360 = 54$, so the angle is 54°

Answer: B — 54°

Whiteboards · Question 4 of 9

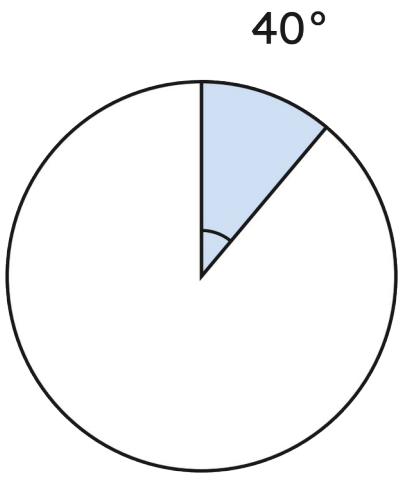
A sector's central angle is 40°. What fraction of the circle is it?



Answer it.

Whiteboards · Question 4 of 9

A sector's central angle is 40°. What fraction of the circle is it?

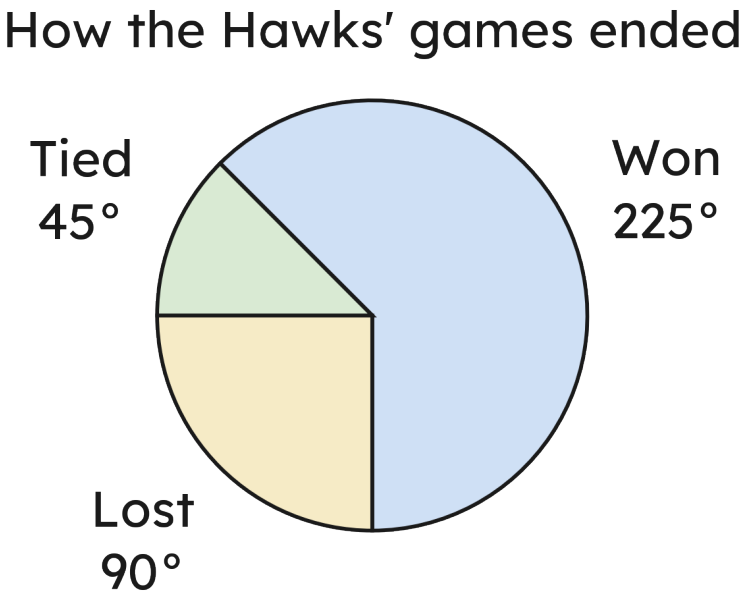


$$\frac{40}{360} = \frac{1}{9}$$

Answer: 1/9 of the circle

Whiteboards · Question 5 of 9

What percent of the Hawks' games were ties?

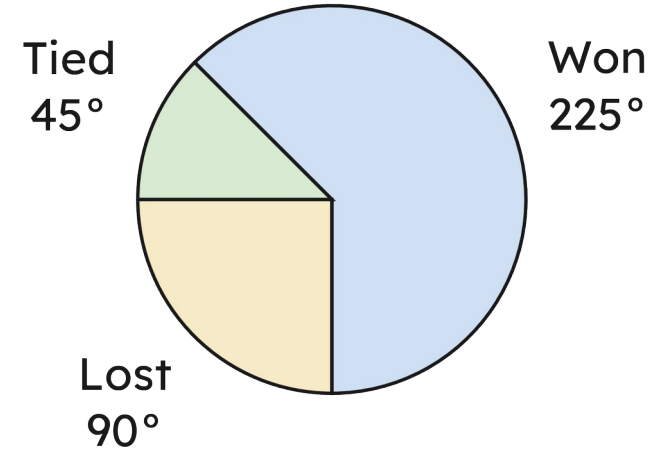


Answer it.

Whiteboards · Question 5 of 9

What percent of the Hawks' games were ties?

How the Hawks' games ended



Ties: $\frac{45}{360} = \frac{1}{8}$

$\frac{1}{8} = 0.125 = 12.5\%$

Answer: 12.5%

Whiteboards · Question 6 of 9

Which is larger: a 30% sector or a 100° sector of the same circle?

A. The 30% sector: it is 108°

B. The 100° sector: 30% is 30°

C. You cannot tell without the total

D. The 100° sector: 30% is 10.8°

Answer it.

Whiteboards · Question 6 of 9

Which is larger: a 30% sector or a 100° sector of the same circle?

30% of 360°: $0.3 \cdot 360 = 108$

108° is more than 100°

Answer: A — the 30% sector (108°)

Whiteboards · Question 7 of 9

A circle graph's sectors have angles of 140°, 95°, 70° and 45°.

Do they make a whole circle?

Answer it.

Whiteboards · Question 7 of 9

A circle graph's sectors have angles of 140°, 95°, 70° and 45°.

Do they make a whole circle?

$140 + 95 + 70 + 45 = 350$

A full turn is 360°: $360 - 350 = 10$ short

Answer: No: they total 350°, 10° short of 360°

Whiteboards · Question 8 of 9

12 of the 45 students in a class ride the bus, a 25-minute ride.

What is the bus sector's angle in a circle graph of the class?

Answer it.

Whiteboards · Question 8 of 9

12 of the 45 students in a class ride the bus, a 25-minute ride.

What is the bus sector's angle in a circle graph of the class?

Bus: $\frac{12}{45}$ of the class

$\frac{12}{45} \cdot 360 = 12 \cdot 8 = 96$, so the angle is 96°

Answer: 96°

Whiteboards · Question 9 of 9

Kai says a 40% sector has a 40° angle.

What did Kai do wrong? What is the angle?

Write your answer in sentences.

Whiteboards · Question 9 of 9

Kai says a 40% sector has a 40° angle.

What did Kai do wrong? What is the angle?

Kai read the percent as degrees. 40% is of 360°, not of 100.

$0.4 \cdot 360 = 144$, so the angle is 144°

Answer: Kai read 40% as 40°; the angle is 144°.

Independent Practice

1. What is the central angle of a sector that is $\frac{1}{6}$ of a circle?
2. 21 of a class's 36 students have a pet. What is the angle of the pet sector?
3. What is the central angle of a 65% sector?
4. What fraction of a circle is a 160° sector?
5. What percent of a circle is a 252° sector?
6. Do angles of 130°, 125° and 105° make a whole circle?

Before You Go

A full turn is 360°.

A sector's angle is its fraction of 360°: part over whole, times 360.

Tomorrow: we build a circle graph from a table.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. Today's skill is still V76: keep going to 60. Every Unit 7 skill is due by the Unit 7 test.

Today's skills — all required

Use fractions to find the measure of an angle (V76)