

Name _____

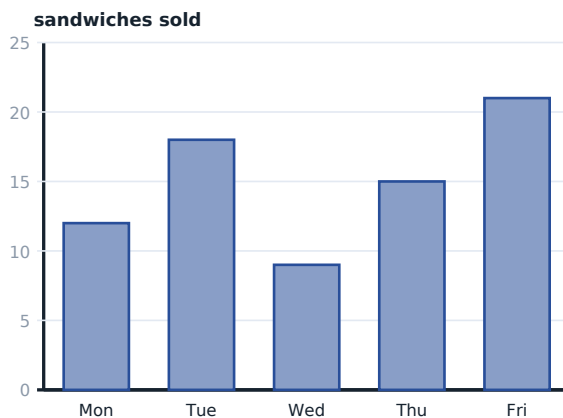
Date _____

16.4 Reading charts and graphs — worked answers

Read and interpret bar charts, line graphs and pie charts, and recognise when a chart is misleading. · 64 questions

A · Fluency — Reading bars, lines and sectors.

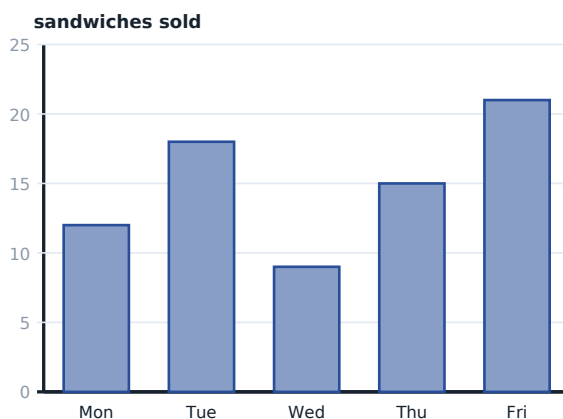
- 1 Which day has the highest bar? Give the label.



Answer: Fri

The tallest bar reaches 21, and it is the one labelled **Fri**.

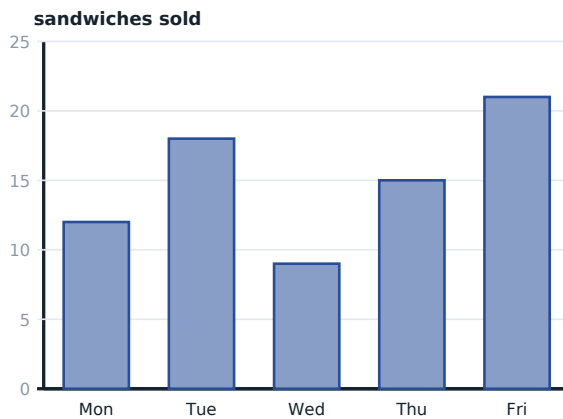
- 2 Which day has the lowest bar? Give the label.



Answer: Wed

The shortest bar reaches 9, at **Wed**.

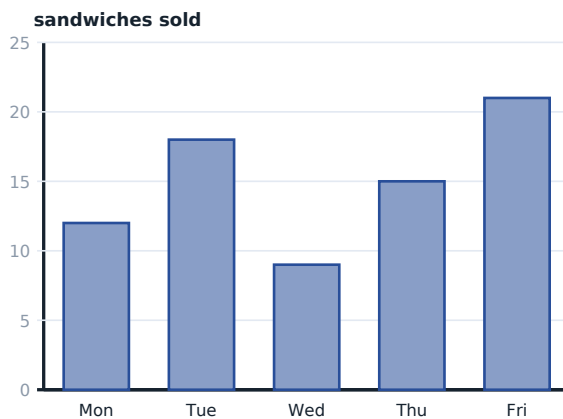
- 3 What is the value of the bar for **Tue**?



Answer: 18

Read across from the top of that bar to the vertical scale: 18.

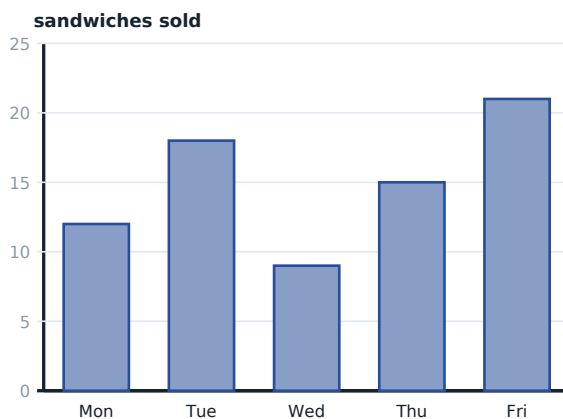
- 4 What is the total of all the bars?



Answer: 75

$12 + 18 + 9 + 15 + 21 = 75$.

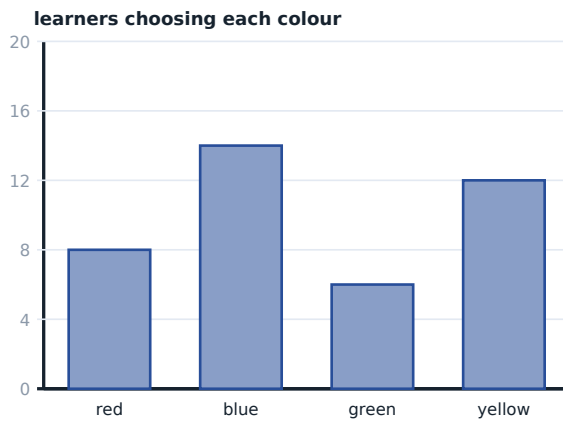
- 5 How much taller is the bar for **Fri** than the bar for **Wed**?



Answer: 12

$21 - 9 = 12$. This is the range of the data.

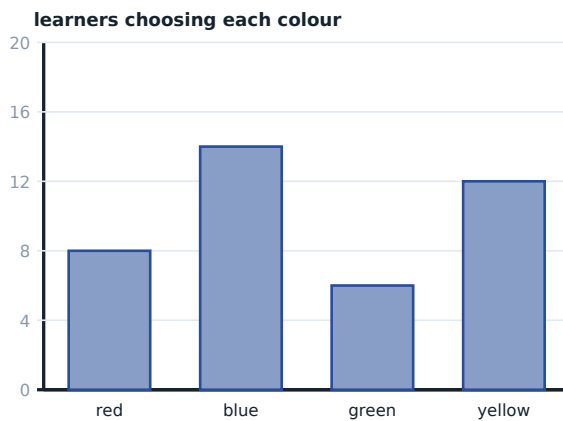
- 6 Which colour has the highest bar? Give the label.



Answer: blue

The tallest bar reaches 14, and it is the one labelled **blue**.

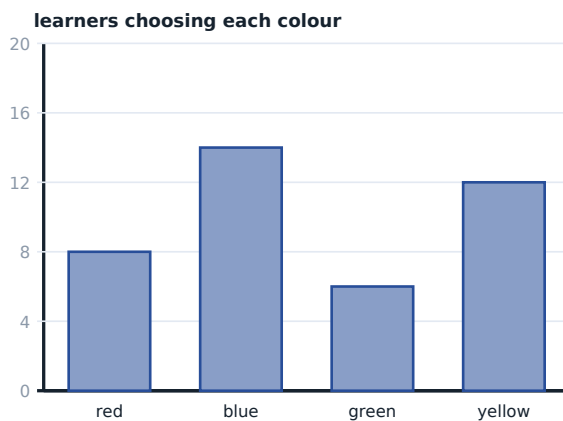
- 7 Which colour has the lowest bar? Give the label.



Answer: green

The shortest bar reaches 6, at **green**.

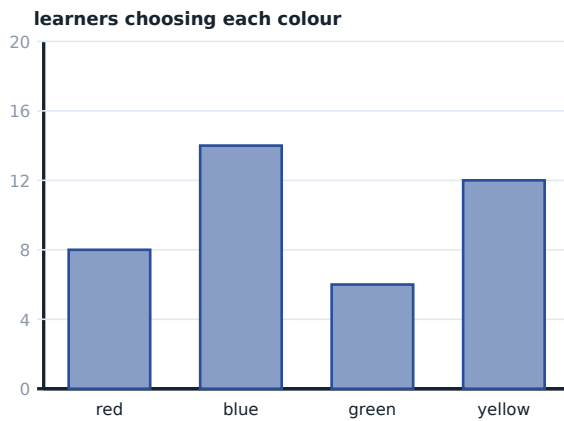
- 8 What is the value of the bar for **blue**?



Answer: 14

Read across from the top of that bar to the vertical scale: 14.

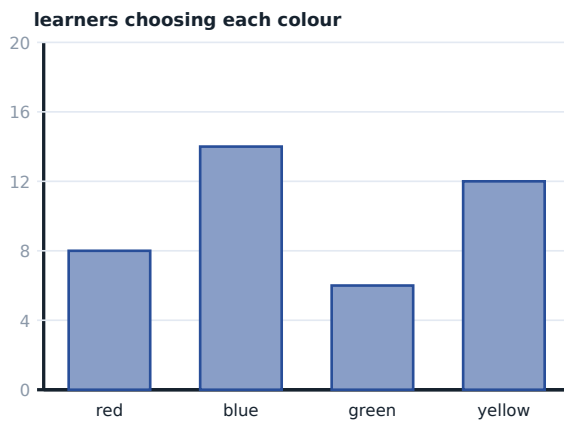
- 9 What is the total of all the bars?



Answer: 40

$$8 + 14 + 6 + 12 = 40.$$

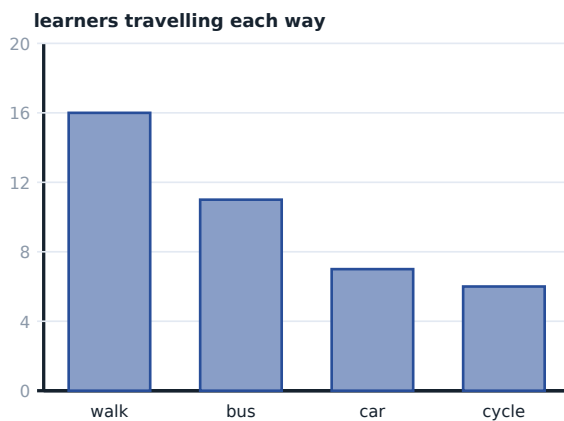
- 10 How much taller is the bar for **blue** than the bar for **green**?



Answer: 8

$14 - 6 = 8$. This is the range of the data.

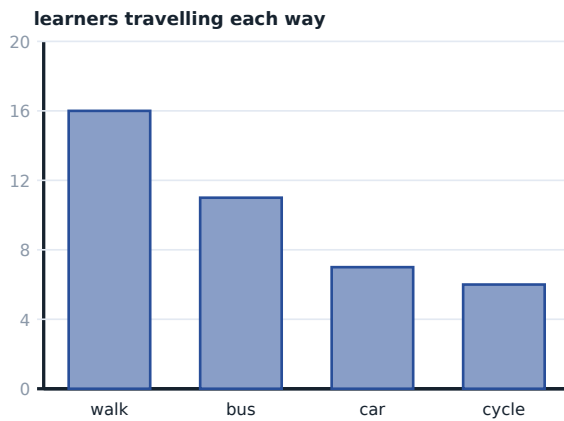
- 11 Which method has the highest bar? Give the label.



Answer: walk

The tallest bar reaches 16, and it is the one labelled **walk**.

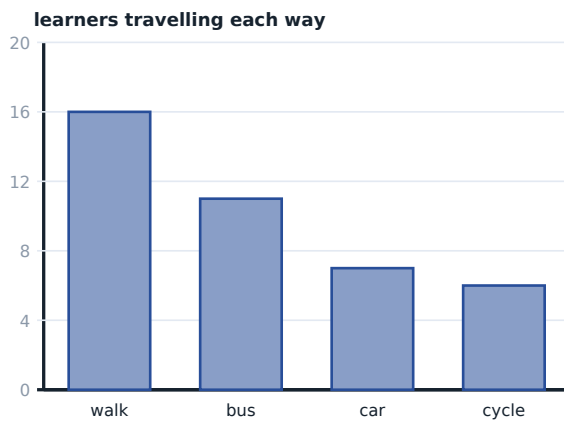
- 12** Which method has the lowest bar? Give the label.



Answer: cycle

The shortest bar reaches 6, at **cycle**.

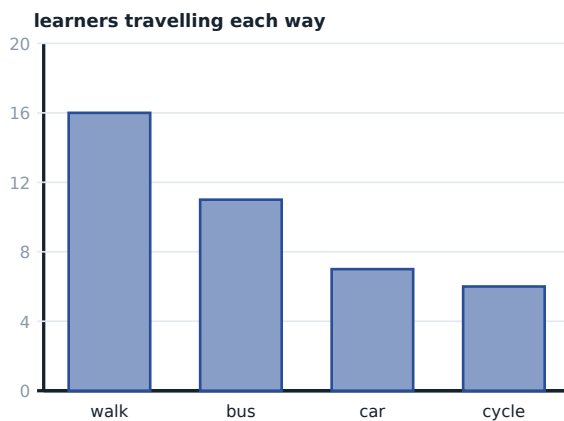
- 13** What is the value of the bar for **bus**?



Answer: 11

Read across from the top of that bar to the vertical scale: 11.

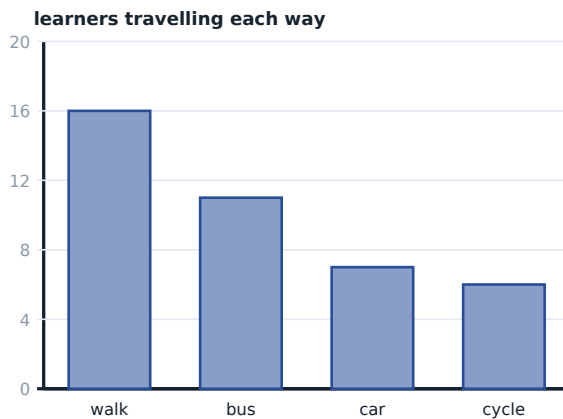
- 14** What is the total of all the bars?



Answer: 40

$16 + 11 + 7 + 6 = 40$.

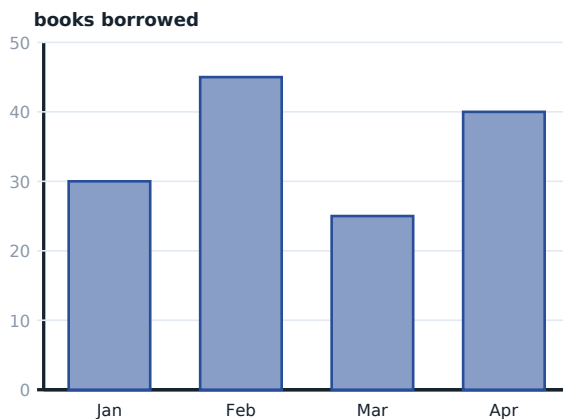
- 15** How much taller is the bar for **walk** than the bar for **cycle**?



Answer: 10

$16 - 6 = 10$. This is the range of the data.

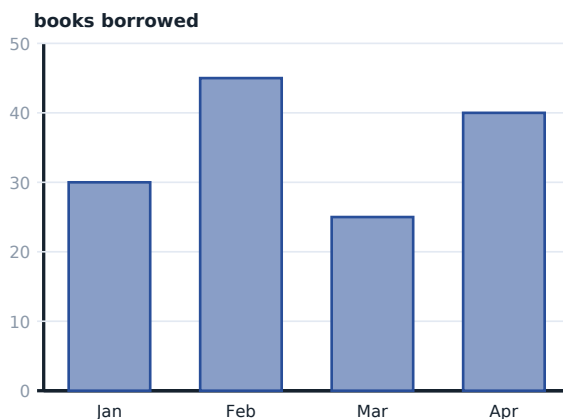
- 16** Which month has the highest bar? Give the label.



Answer: Feb

The tallest bar reaches 45, and it is the one labelled **Feb**.

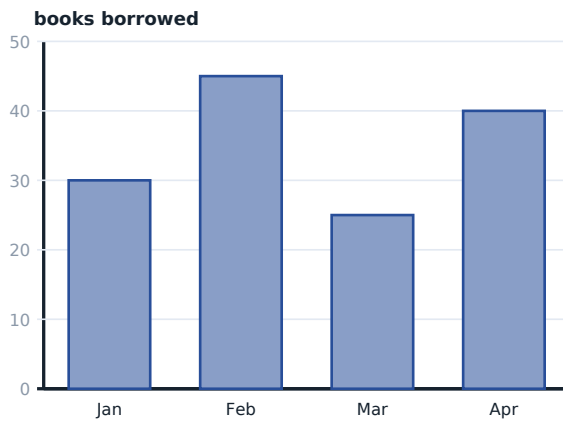
- 17** Which month has the lowest bar? Give the label.



Answer: Mar

The shortest bar reaches 25, at **Mar**.

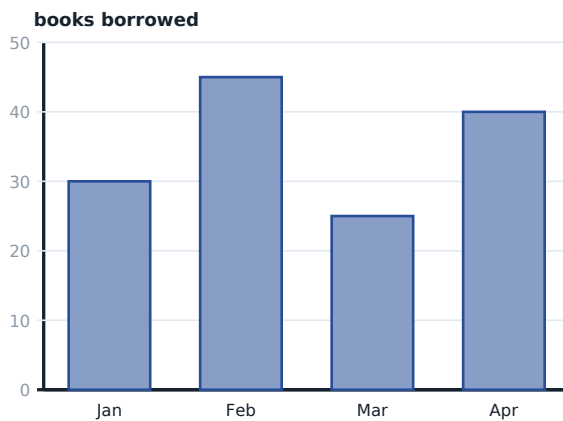
18 What is the value of the bar for **Feb**?



Answer: 45

Read across from the top of that bar to the vertical scale: 45.

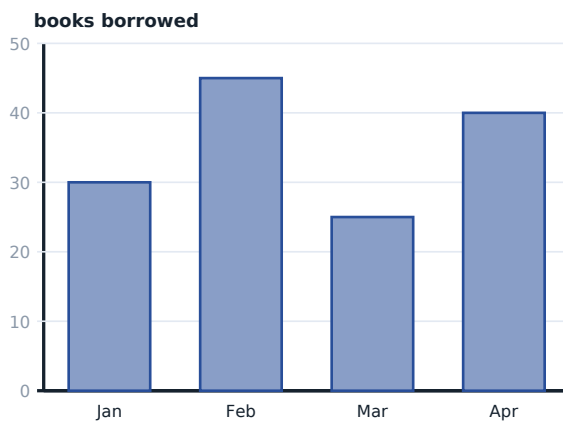
19 What is the total of all the bars?



Answer: 140

$30 + 45 + 25 + 40 = 140$.

20 How much taller is the bar for **Feb** than the bar for **Mar**?



Answer: 20

$45 - 25 = 20$. This is the range of the data.

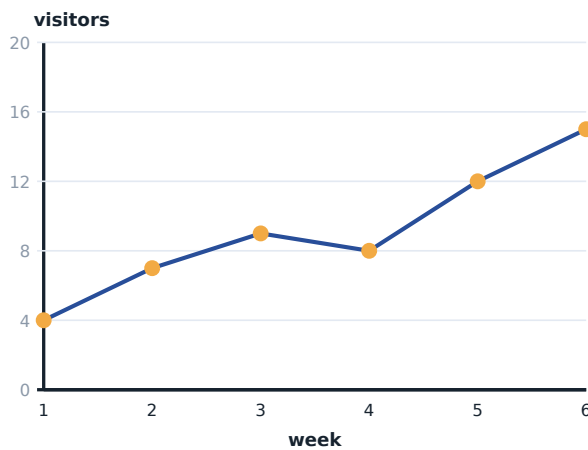
21 What is the value at **week 1**?



Answer: 4

Go up from 1 on the horizontal axis to the line, then across to the scale: 4.

22 What is the highest value shown?



Answer: 15

The highest point on the line is at 15.

23 Between how many pairs of neighbouring points does the line **rise**?



Answer: 4

Reading left to right, the line goes up 4 times out of 5 steps.

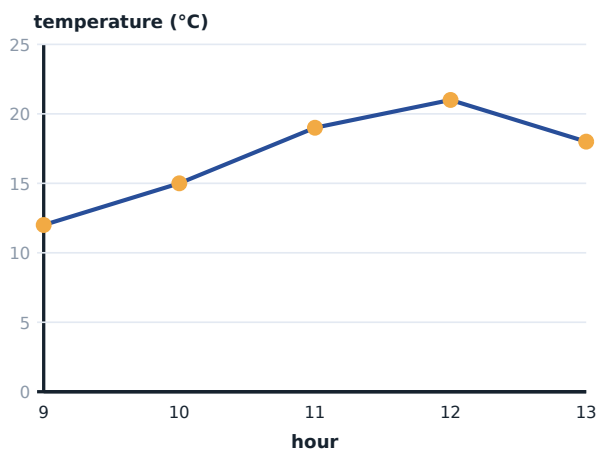
24 What is the difference between the highest and the lowest value?



Answer: 11

$$15 - 4 = 11.$$

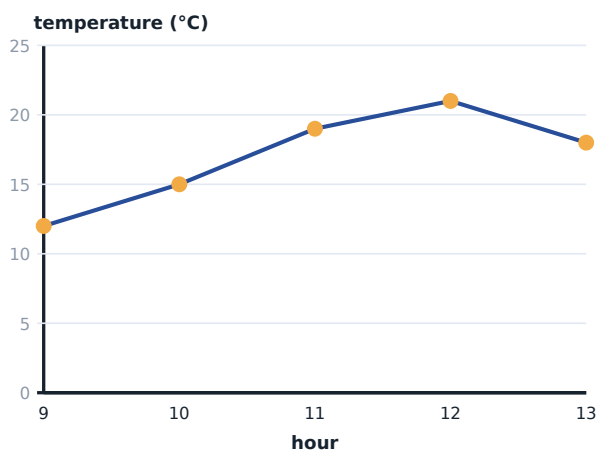
25 What is the value at **hour 9**?



Answer: 12

Go up from 9 on the horizontal axis to the line, then across to the scale: 12.

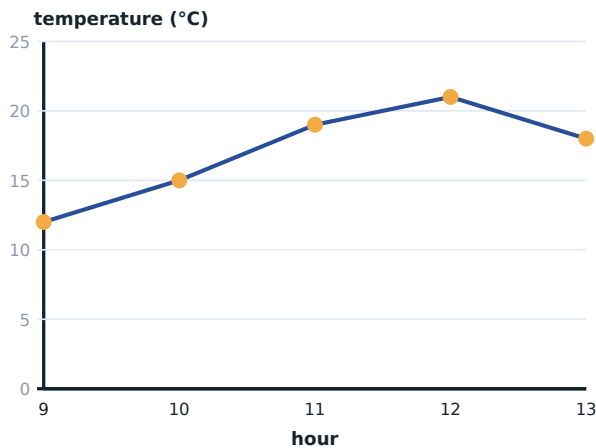
26 What is the highest value shown?



Answer: 21

The highest point on the line is at 21.

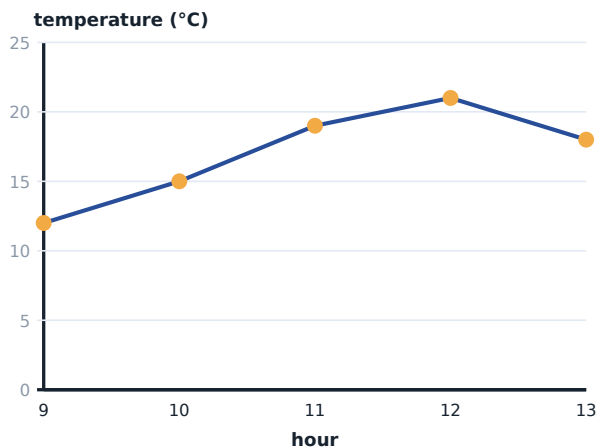
- 27** Between how many pairs of neighbouring points does the line **rise**?



Answer: 3

Reading left to right, the line goes up 3 times out of 4 steps.

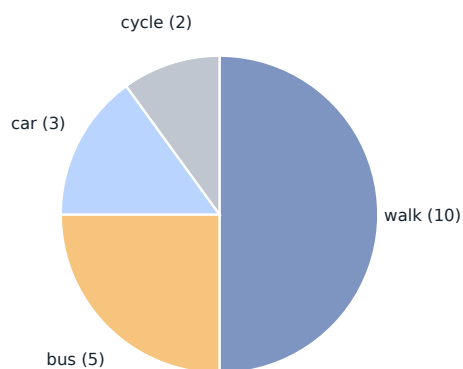
- 28** What is the difference between the highest and the lowest value?



Answer: 9

$21 - 12 = 9$.

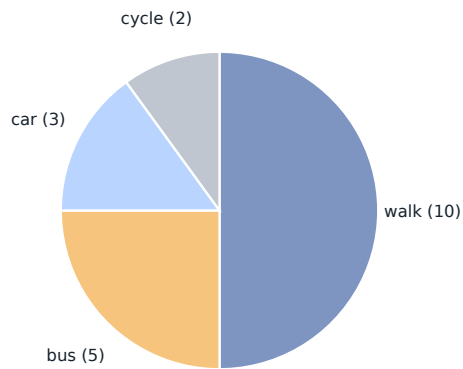
- 29** In this pie chart of 20 people, what angle does the **walk** sector have, in degrees?



Answer: 180

Each person is worth $360 \div 20 = 18^\circ$, and 10 people chose walk: $10 \times 18 = 180^\circ$.

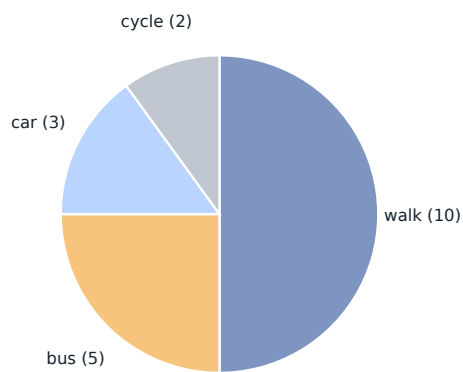
- 30** In this pie chart of 20 people, what angle does the **bus** sector have, in degrees?



Answer: 90

Each person is worth $360 \div 20 = 18^\circ$, and 5 people chose bus: $5 \times 18 = 90^\circ$.

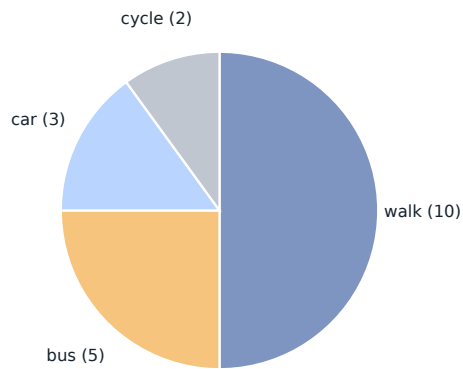
- 31** In this pie chart of 20 people, what angle does the **car** sector have, in degrees?



Answer: 54

Each person is worth $360 \div 20 = 18^\circ$, and 3 people chose car: $3 \times 18 = 54^\circ$.

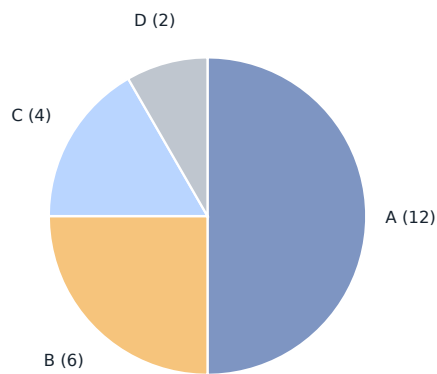
- 32** In this pie chart of 20 people, what angle does the **cycle** sector have, in degrees?



Answer: 36

Each person is worth $360 \div 20 = 18^\circ$, and 2 people chose cycle: $2 \times 18 = 36^\circ$.

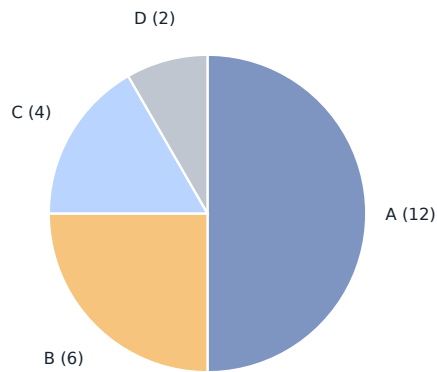
- 33** In this pie chart of 24 people, what angle does the **A** sector have, in degrees?



Answer: 180

Each person is worth $360 \div 24 = 15^\circ$, and 12 people chose A: $12 \times 15 = 180^\circ$.

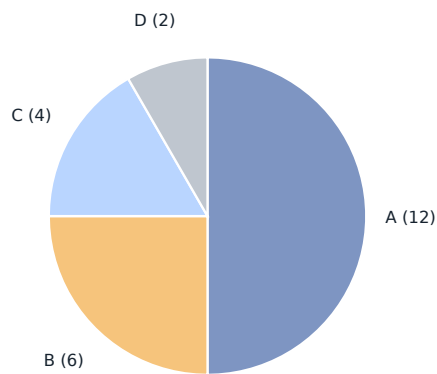
- 34** In this pie chart of 24 people, what angle does the **B** sector have, in degrees?



Answer: 90

Each person is worth $360 \div 24 = 15^\circ$, and 6 people chose B: $6 \times 15 = 90^\circ$.

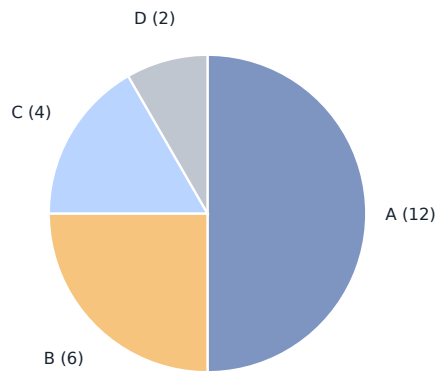
- 35** In this pie chart of 24 people, what angle does the **C** sector have, in degrees?



Answer: 60

Each person is worth $360 \div 24 = 15^\circ$, and 4 people chose C: $4 \times 15 = 60^\circ$.

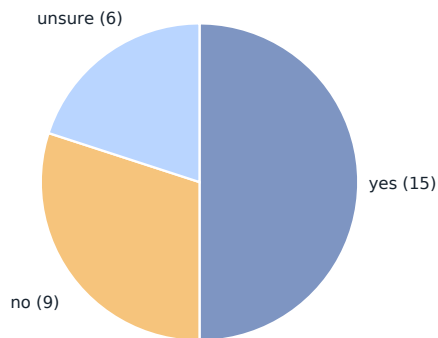
- 36** In this pie chart of 24 people, what angle does the **D** sector have, in degrees?



Answer: 30

Each person is worth $360 \div 24 = 15^\circ$, and 2 people chose D: $2 \times 15 = 30^\circ$.

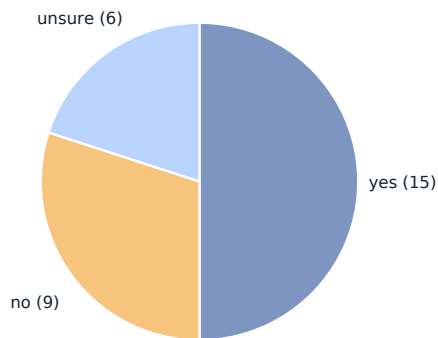
- 37** In this pie chart of 30 people, what angle does the **yes** sector have, in degrees?



Answer: 180

Each person is worth $360 \div 30 = 12^\circ$, and 15 people chose yes: $15 \times 12 = 180^\circ$.

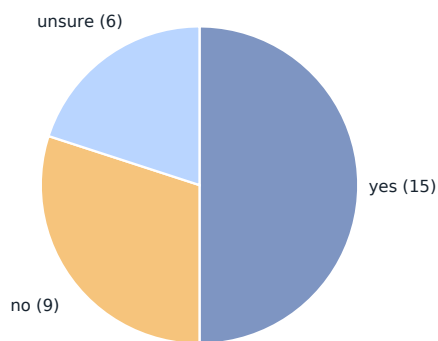
- 38** In this pie chart of 30 people, what angle does the **no** sector have, in degrees?



Answer: 108

Each person is worth $360 \div 30 = 12^\circ$, and 9 people chose no: $9 \times 12 = 108^\circ$.

- 39** In this pie chart of 30 people, what angle does the **unsure** sector have, in degrees?



Answer: 72

Each person is worth $360 \div 30 = 12^\circ$, and 6 people chose unsure: $6 \times 12 = 72^\circ$.

B · Reasoning — What each chart is for, and how one can mislead.

- 40** What must every bar chart have?
- ☐ Colours
 - ☐ Labelled axes and a scale that starts at zero
 - ☐ Exactly five bars
 - ☐ A title only

Answer: Labelled axes and a scale that starts at zero

Without a labelled scale a bar means nothing, and a scale that does not start at zero exaggerates the differences.

41 In a pie chart, what does the whole circle represent?

- ☐ 100 people
- ☐ The largest category
- ☐ The whole data set
- ☐ 360 categories

Answer: The whole data set

So each sector is that category's share of the total, and the sectors must add to 360° .

42 A pie chart shows 20 people. What angle is one person worth?

- ☐ 18°
- ☐ 20°
- ☐ 36°
- ☐ 360°

Answer: 18°

$360 \div 20 = 18^\circ$.

43 Which chart is best for showing how something changes over time?

- ☐ pie chart
- ☐ bar chart
- ☐ line graph
- ☐ tally chart

Answer: line graph

The joined points make the trend visible at a glance.

44 Which chart is best for comparing separate categories?

- ☐ line graph
- ☐ bar chart
- ☐ pie chart
- ☐ none of them

Answer: bar chart

The heights are easy to compare directly. A pie chart is better for shares of a whole.

45 Should a bar chart's vertical scale always start at zero?

- ☐ Yes
- ☐ No

Answer: Yes

Starting it higher makes small differences look enormous. That is the classic misleading graph.

46 The sectors of a pie chart must add to ...

- ☐ 100°
- ☐ 180°
- ☐ 360°
- ☐ the number of people

Answer: 360°

A full turn. If your angles do not total 360, check the arithmetic.

- 47 A pie chart shows that 40% chose blue. What is its angle?

- ☐ 40°
☐ 144°
☐ 180°
☐ 360°

Answer: 144°

40% of 360 is $0.4 \times 360 = 144^\circ$.

- 48 Can you tell from a pie chart alone how many people were asked?

- ☐ Yes
☐ No

Answer: No

It shows proportions only. The total must be written on it — which is why good pie charts say “out of 30”.

- 49 Two bar charts use different vertical scales. Comparing their bar heights directly is ...

- ☐ fine
☐ misleading, because the scales differ
☐ impossible
☐ the best method

Answer: misleading, because the scales differ

Always read the numbers, not the picture.

C · Challenge — Angles both ways, and totals from charts.

- 50 A pie chart of 60 people has a sector of 90° . How many people does it represent?

Answer: 15

Each person is $360 \div 60 = 6^\circ$, so $90 \div 6 = 15$ people.

- 51 A pie chart of 24 people has a sector for 9 people. What is its angle, in degrees?

Answer: 135°

Each person is $360 \div 24 = 15^\circ$, and $9 \times 15 = 135^\circ$.

- 52 A pie chart has sectors of 120° , 90° and 60° . What is the angle of the fourth sector, in degrees?

Answer: 90°

The four must total 360: $120 + 90 + 60 = 270$, so the fourth is $360 - 270 = 90^\circ$.

- 53 In a pie chart, one category is 25% of the total. What is its angle, in degrees?

Answer: 90°

25% of 360 is $360 \div 4 = 90^\circ$.

- 54 A bar chart shows 12, 18, 9, 15 and 21 sandwiches. What is the mean number sold per day?

Answer: 15

$12 + 18 + 9 + 15 + 21 = 75$, and $75 \div 5 = 15$.

- 55 A line graph of visitors shows 4, 7, 9, 8, 12, 15 over six weeks. Between which two consecutive weeks did the number fall? Give the earlier week number.

Answer: 3

The only fall is from 9 in week 3 to 8 in week 4.

- 56** A pie chart of 36 people has a sector of 150° . How many people is that?

Answer: 15

Each person is $360 \div 36 = 10^\circ$, so $150 \div 10 = 15$ people.

D · Word problems — Libraries, buses, shops and truncated scales.

- 57** A bar chart shows 30, 45, 25 and 40 books borrowed over four months. How many were borrowed altogether?

Answer: 140

$30 + 45 + 25 + 40 = 140$.

- 58** In that chart, how many more books were borrowed in the busiest month than the quietest?

Answer: 20

$45 - 25 = 20$.

- 59** A pie chart shows how 30 learners travel to school. The bus sector is 96° . How many take the bus?

Answer: 8

Each learner is $360 \div 30 = 12^\circ$, so $96 \div 12 = 8$ learners.

- 60** A shop's sales over five days were 20, 24, 18, 30 and 28. What is the mean daily sales figure?

Answer: 24

$20 + 24 + 18 + 30 + 28 = 120$, and $120 \div 5 = 24$.

- 61** A line graph of temperature reads 12, 15, 19, 21 and 18°C over five hours. What is the range, in degrees?

Answer: 9

$21 - 12 = 9^\circ\text{C}$.

- 62** A pie chart of 40 people has a "yes" sector of 180° . What percentage said yes?

Answer: 50

180° is half of 360° , so half of the people said yes: 50%.

- 63** A bar chart's vertical scale starts at 90 instead of 0. Two bars read 95 and 100. By what percentage is the second actually larger than the first, to the nearest whole percent?

Answer: 5

The real difference is $100 - 95 = 5$, and $5 \div 95$ is about 5%. On the chart the visible bars are 5 and 10 units, so the second looks twice the first. That is exactly how a truncated scale misleads.

- 64** A pie chart of 72 people has a sector of 45° . How many people is that?

Answer: 9

Each person is $360 \div 72 = 5^\circ$, so $45 \div 5 = 9$ people.