Pie Charts — Key Facts

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A **pie chart** is a circle split into **sectors.** Each sector shows what **proportion** (fraction) of the whole each category makes up. The whole circle is **360°,** so all the angles must add up to 360°.

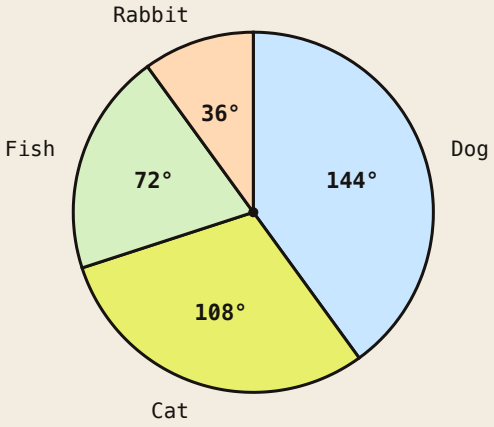
The 3 formulas you need

$$\text{angle for 1 item} = \frac{360°}{\text{total}}$$

$$\text{angle} = \text{frequency} \times \text{angle for 1 item}$$

$$\text{frequency} = \frac{\text{angle}}{360°} \times \text{total}$$

Favourite pets (30 students)



12 dogs × 12° = 144°

Useful angles to remember

Fraction	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{12}$
Percentage	50%	25%	75%	$33\frac{1}{3}\%$	20%	$16\frac{2}{3}\%$	12.5%	10%	$8\frac{1}{3}\%$
Angle	**180°**	**90°**	**270°**	**120°**	**72°**	**60°**	**45°**	**36°**	**30°**

PERCENTAGES ↔ ANGLES

1% of a pie chart = 3.6°
angle = percentage × 3.6
percentage = angle ÷ 3.6

CHECK EVERY TIME

Your angles must add up to **360°.**
Your frequencies must add up to the **total.**

WHAT YOU'LL BE ASKED IN THE EXAM

1. Draw a pie chart from a frequency table · **2.** Read frequencies off a pie chart · **3.** Find the total from one sector · **4.** Find a missing angle · **5.** Compare two pie charts (the trap question!)

Drawing a Pie Chart

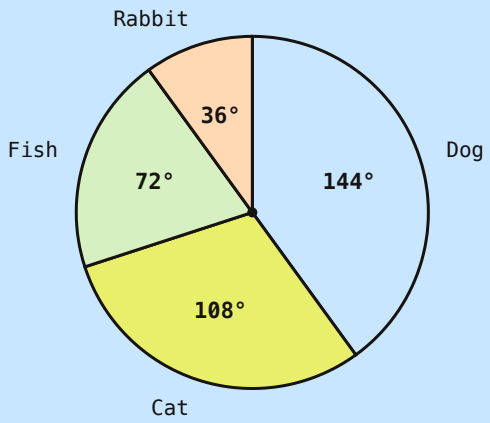
Method — 5 steps

1. Add up the frequencies to find the **total**.
2. Work out the angle for 1 item: **360 ÷ total**.
3. Multiply each frequency by that number to get each **angle**.
4. **Check** the angles add up to 360°.
5. Draw a radius, then use a protractor to measure each angle from the last line. **Label** every sector.

WORKED EXAMPLE 1

30 students were asked their favourite pet. Draw a pie chart.

Category	Frequency	Angle
Dog	12	**12 × 12 = 144°**
Cat	9	**9 × 12 = 108°**
Fish	6	**6 × 12 = 72°**
Rabbit	3	**3 × 12 = 36°**



Step 1: total = 12 + 9 + 6 + 3 = **30**

Step 2: 360 ÷ 30 = **12°** per student

Step 4: 144 + 108 + 72 + 36 = **360°** ✓

WORKED EXAMPLE 2 — WHEN 360 ÷ TOTAL ISN'T A WHOLE NUMBER

A survey of 80 people: Tea 26, Coffee 34, Water 20. 360 ÷ 80 = **4.5°** per person.

Tea: 26 × 4.5 = **117°** · Coffee: 34 × 4.5 = **153°** · Water: 20 × 4.5 = **90°**

· Check: 117 + 153 + 90 = 360° ✓

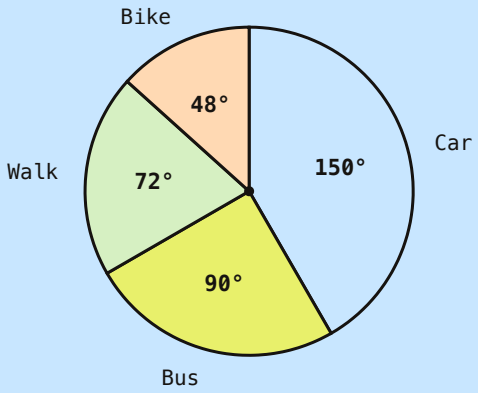
PROTRACTOR TIPS

Line the protractor's centre up exactly on the centre of the circle and the 0° line along your last radius. Draw the **smallest** angles first — mistakes add up, so the last sector absorbs any error. Examiners allow ±2°.

Reading a Pie Chart

WORKED EXAMPLE 3 — FINDING FREQUENCIES

The pie chart shows how 60 people travel to work. How many people walk?



$$\text{frequency} = \frac{\text{angle}}{360} \times \text{total}$$

$$\text{Walk} = \frac{72}{360} \times 60 = \textbf{12 people}$$

Shortcut: 360 ÷ 60 = 6° per person, so each frequency = angle ÷ 6.

Travel	Angle	People
Car	150°	**25**
Bus	90°	**15**
Walk	72°	**12**
Bike	48°	**8**

WORKED EXAMPLE 4 — FINDING THE TOTAL FROM ONE SECTOR

In a pie chart, the "Football" sector has an angle of 80° and represents 20 people. How many people were surveyed?

80° ÷ 20 = **4°** per person

total = 360 ÷ 4 = **90 people**

WORKED EXAMPLE 5 — FRACTIONS AND PERCENTAGES

In the travel pie chart, what fraction of people go by car? What percentage take the bus?

Car: $\frac{150}{360} = \frac{5}{12}$ Bus: 90 ÷ 3.6 = **25%**

WORKED EXAMPLE 6 — MISSING ANGLES

A pie chart has angles 110°, 95°, 85° and x. Find x. x = 360 − (110 + 95 + 85) = 360 − 290 = **70°**

Comparing Pie Charts

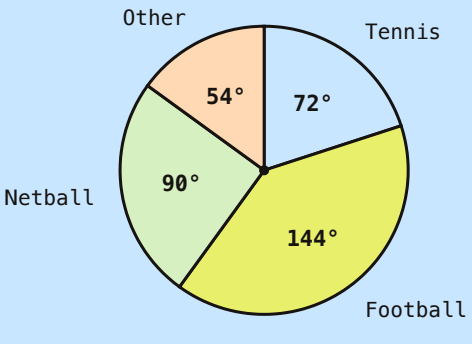
THE TRAP QUESTION ⚠

A bigger sector does **not** always mean more people. A pie chart shows **proportions**, not amounts. You can only compare actual numbers if you know the **total** for each chart.

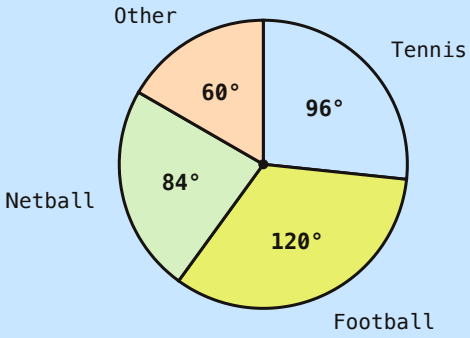
WORKED EXAMPLE 7

The pie charts show the favourite sport of Year 10 (200 students) and Year 11 (150 students).

Year 10 (200)



Year 11 (150)



Sam says "*More Year 11 students chose tennis because the sector is bigger.*" Is Sam right?

Year 10: $\frac{72}{360} \times 200 = \mathbf{40}$ Year 11: $\frac{96}{360} \times 150 = \mathbf{40}$

No. The same number (40) chose tennis in each year. Year 11's sector is bigger because tennis is a bigger **proportion** of a smaller group.

HOW TO WRITE A COMPARISON ANSWER

✓ Say a **proportion** or **fraction** is bigger — "a greater proportion of Year 11 chose tennis".
✓ If you're given totals, **work out the actual numbers** and quote them.
✗ Never say "more people" just from the size of the angle.

Common mistakes

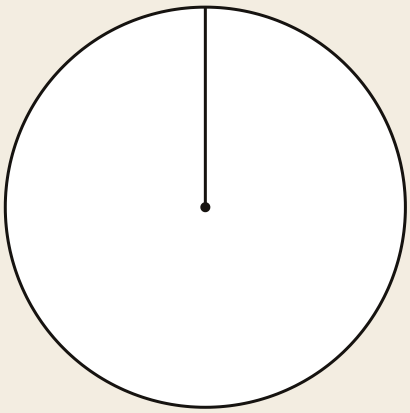
Mistake	Fix
Using 100 instead of 360	A circle is 360°. Angle = frequency × (360 ÷ total).
Angles don't add to 360°	Recheck the total and your multiplication before drawing.
Measuring from the wrong line	Always measure from the **last line you drew**, not from the start.
Reading the wrong protractor scale	Start at 0 on the scale lined up with your line. Sense-check: is it acute or obtuse?
No labels / no key	Label every sector — you lose a mark without them.
Comparing angles across charts	Convert to actual frequencies using each chart's total.

Practice Questions

Have a go without looking at the answers. Show your working — method marks count!

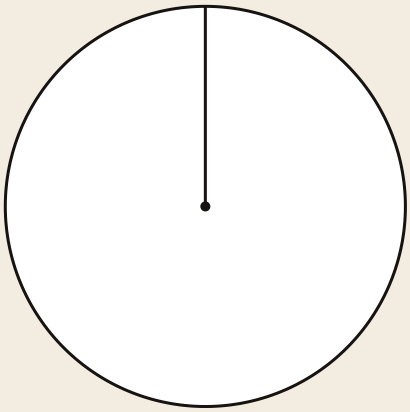
1 40 people chose their favourite fruit. Complete the table and draw a pie chart. [4 marks]

Category	Frequency	Angle
Apple	14	
Banana	10	
Orange	8	
Grape	8	

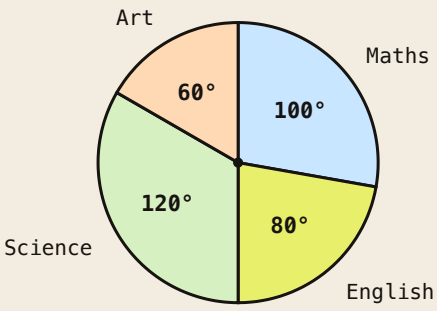


2 The colours of 90 cars in a car park were recorded. Draw a pie chart. [4 marks]

Category	Frequency	Angle
Red	25	
Blue	30	
Silver	20	
Black	15	



3 The pie chart shows the favourite subject of 72 students. How many chose each subject? [3 marks]



Practice Questions (cont.)

4 In a pie chart, a sector of 45° represents 15 people. How many people are represented altogether? [2 marks]

5 A pie chart has four sectors. Three of the angles are 110°, 95° and 85°. Work out the fourth angle. [1 mark]

6 What angle would represent 35% in a pie chart? [1 mark]

7 A pie chart has three sectors in the ratio 2 : 3 : 4. Work out the size of each angle. [2 marks]

8 180 people were asked their favourite drink. In the pie chart, Tea is 60° and Coffee is 150°. The angle for Water is twice the angle for Juice. [4 marks]

(a) Work out the angle for Juice. (b) How many people chose Water? (c) What fraction chose Coffee? Simplify.

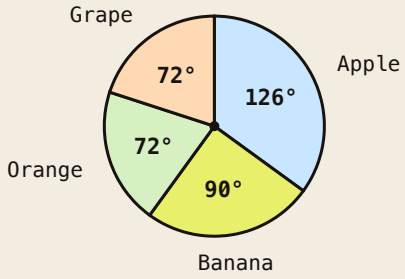
9 In School A (120 students) the "walk to school" sector is 90°. In School B (300 students) it is 60°. Jo says "More students walk to School A." Is Jo correct? Show your working. [3 marks]

10 A pie chart shows how Mia spends her £48 pocket money. She spends £20 on clothes. What angle is the clothes sector? [2 marks]

Answers

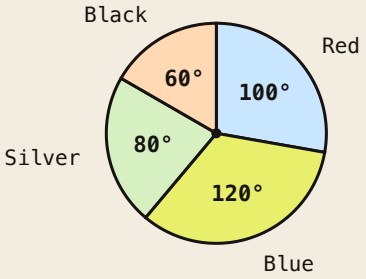
1. FRUIT (360 ÷ 40 = 9° EACH)

Apple: 14 × 9 = **126°** · Banana: 10 × 9 = **90°** · Orange: 8 × 9 = **72°** · Grape: 8 × 9 = **72°**
Check: 126 + 90 + 72 + 72 = 360° ✓



2. CARS (360 ÷ 90 = 4° EACH)

Red: 25 × 4 = **100°** · Blue: 30 × 4 = **120°** · Silver: 20 × 4 = **80°** · Black: 15 × 4 = **60°**
Check: 100 + 120 + 80 + 60 = 360° ✓



3. SUBJECTS (360 ÷ 72 = 5° PER STUDENT, SO FREQUENCY = ANGLE ÷ 5)

Maths: 100 ÷ 5 = **20** · English: 80 ÷ 5 = **16** · Science: 120 ÷ 5 = **24** · Art: 60 ÷ 5 = **12** Check: total = 72 ✓

4.

45 ÷ 15 = 3° per person
360 ÷ 3 = **120 people**

5.

360 − (110 + 95 + 85)
= 360 − 290 = **70°**

6.

35 × 3.6 = **126°**

7.

2 + 3 + 4 = 9 parts, 360 ÷ 9 = 40°
80°, 120°, 160°

8.

(a) 360 − 60 − 150 = 150°
x + 2x = 150 → **Juice = 50°**

(b) Water = 100° → $\frac{100}{360}$ × 180 = **50**

(c) $\frac{150}{360}$ = $\frac{\mathbf{5}}{\mathbf{12}}$

9.

A: $\frac{90}{360}$ × 120 = 30

B: $\frac{60}{360}$ × 300 = 50

Jo is wrong — more walk to School B even though its sector is smaller.

10.

$\frac{20}{48}$ × 360 = **150°**