

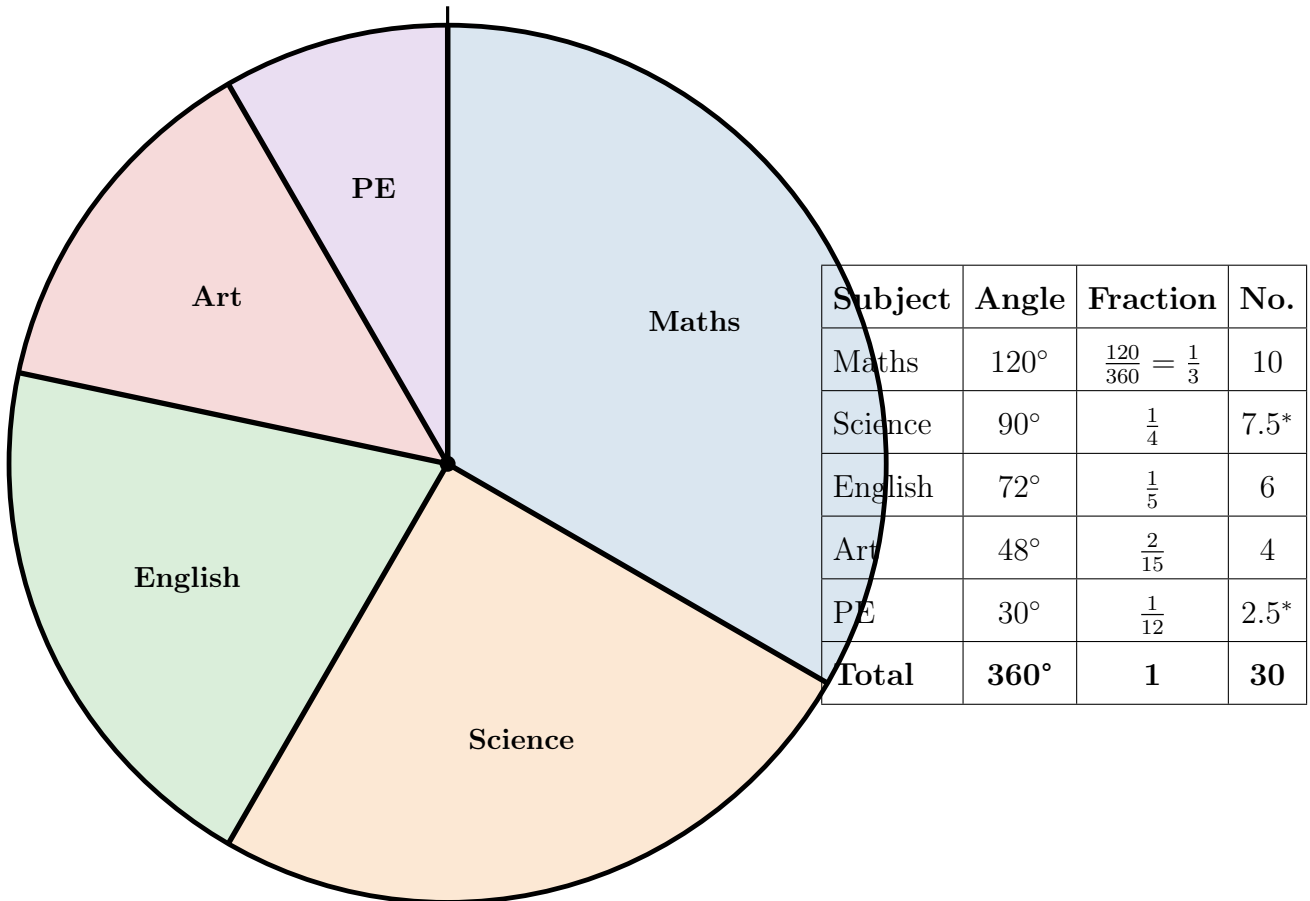
Reading Pie Charts with a Protractor

Worked Solutions

Method: sector fraction = $\frac{\text{sector angle}}{360}$ amount = fraction $\times$ total

For every sector, use the exact angle shown on the chart, then simplify the fraction where possible.

Pie Chart 1 – Favourite School Subjects (30 students)



Note: *The exact angles shown give fractional numbers of students for Science and PE. This is a reminder that a pie chart must be designed carefully if the data are counts of people.

Worked Solutions – Pie Chart 1:

1. Measuring the sectors gives the angles in the table above:

$$120^\circ, 90^\circ, 72^\circ, 48^\circ, 30^\circ.$$

Their sum is

$$120 + 90 + 72 + 48 + 30 = 360^\circ.$$

2. The angles add up to 360° .

3. Maths fraction:

$$\frac{120}{360} = \frac{1}{3}.$$

4. Science students:

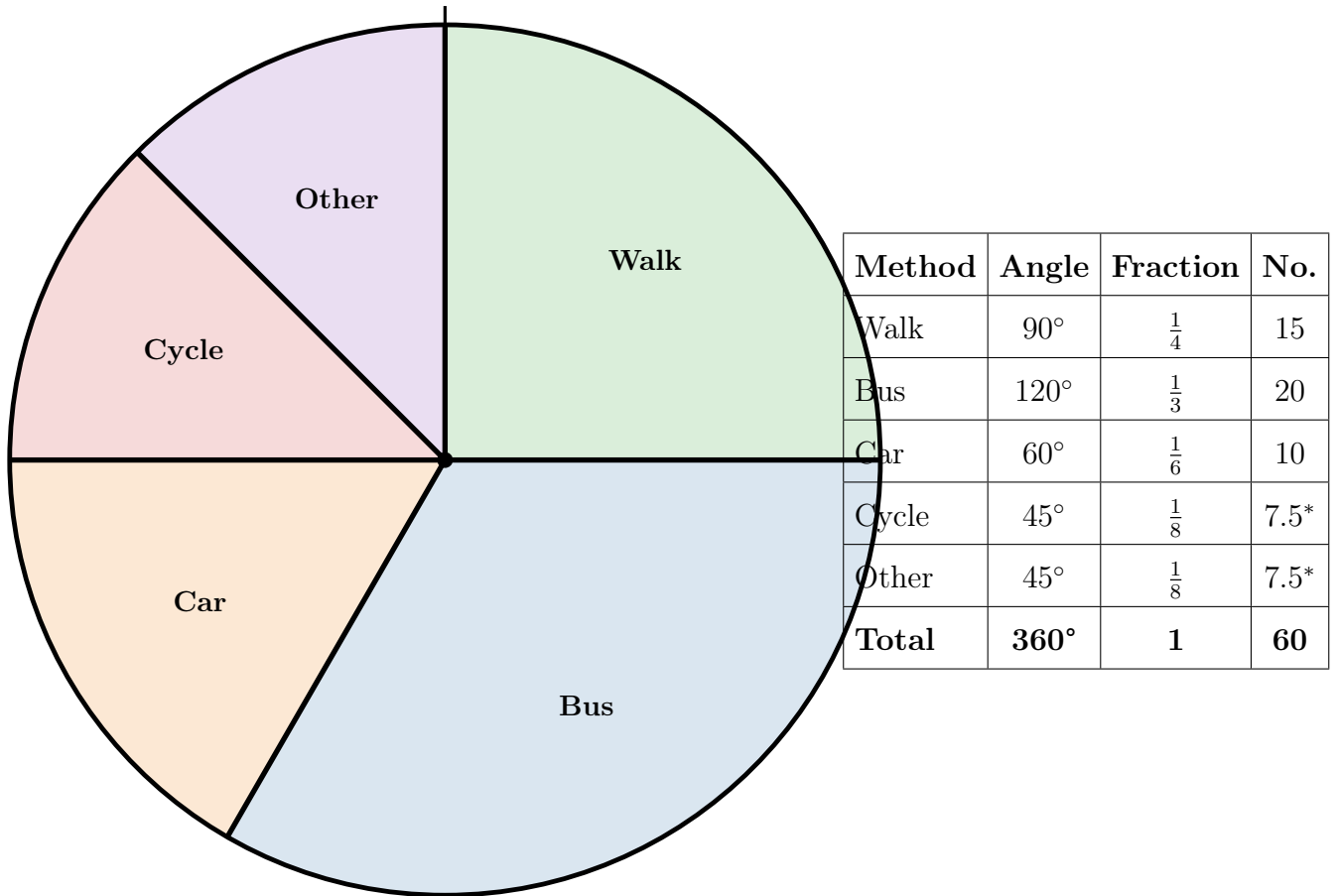
$$\frac{90}{360} \times 30 = \frac{1}{4} \times 30 = \text{7.5 students}.$$

5. A fraction of $\frac{1}{5}$ of the circle is

$$\frac{1}{5} \times 360 = 72^\circ.$$

The 72° sector is English, so the subject is **English**.

Pie Chart 2 – How Students Travel to School (60 students)



Note: *Cycle and Other each give exactly 7.5 students. If whole students are required, each is approximately 8, but the exact calculation using the sector angles is 7.5.

Worked Solutions – Pie Chart 2:

- The measured sector angles are:

$$90^\circ, 120^\circ, 60^\circ, 45^\circ, 45^\circ,$$

and their sum is

$$90 + 120 + 60 + 45 + 45 = 360^\circ.$$

- Students travelling by Bus:

$$\frac{120}{360} \times 60 = \frac{1}{3} \times 60 = \boxed{20 \text{ students}}.$$

- Fraction of students who walk:

$$\frac{90}{360} = \boxed{\frac{1}{4}}.$$

- The two sectors with the same angle are:

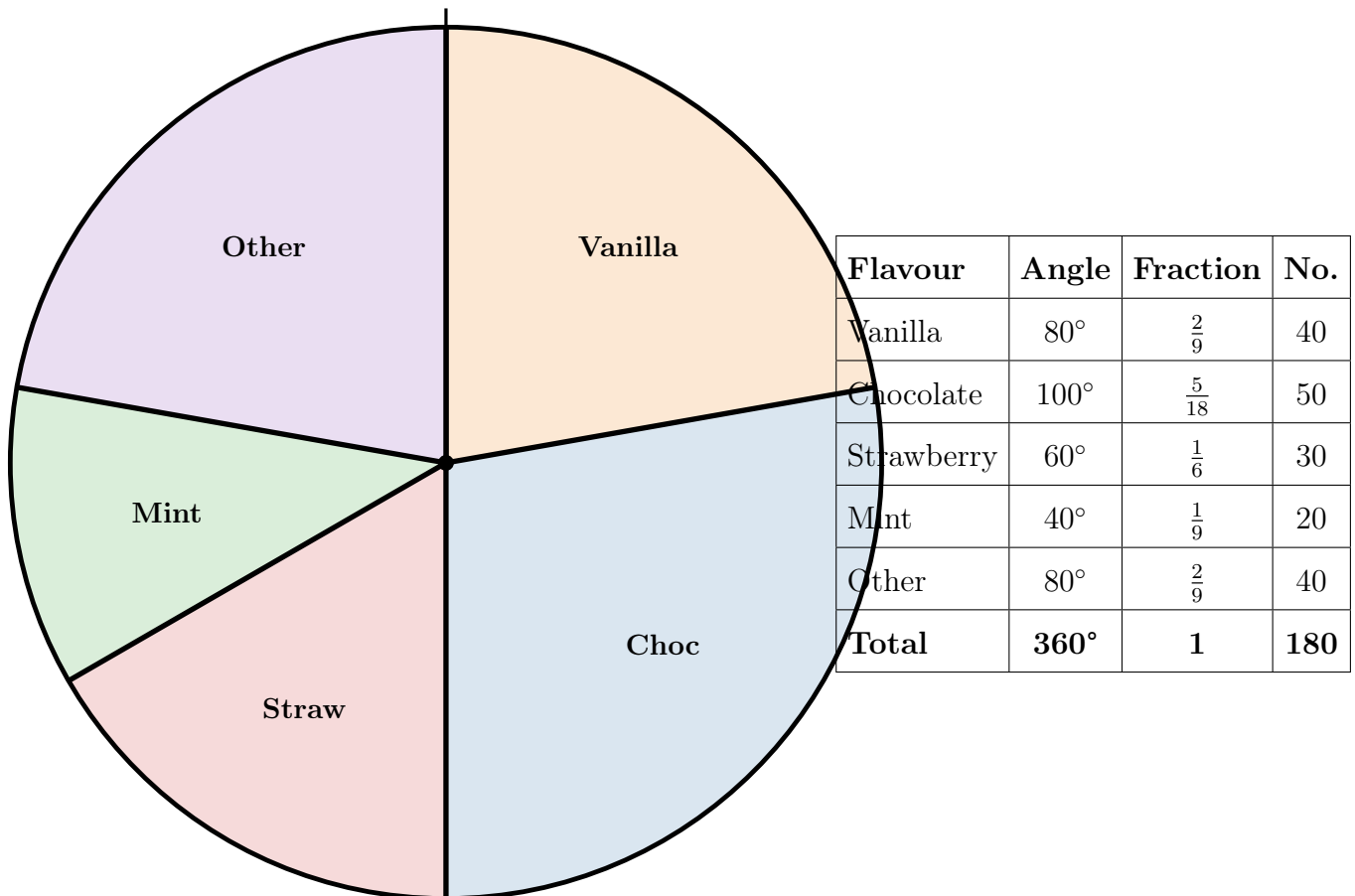
$$45^\circ \text{ and } 45^\circ,$$

so the two methods are **Cycle and Other**.

- Bus minus Car:

$$20 - 10 = \boxed{10 \text{ more students}}.$$

Pie Chart 3 – Ice Cream Flavours Sold in One Day (180 sold)



Worked Solutions – Pie Chart 3:

1. The sector angles are:

$$80^\circ, 100^\circ, 60^\circ, 40^\circ, 80^\circ,$$

and

$$80 + 100 + 60 + 40 + 80 = 360^\circ.$$

2. Chocolate ice creams sold:

$$\frac{100}{360} \times 180 = \frac{5}{18} \times 180 = \boxed{50 \text{ ice creams}}.$$

3. Mint ice creams sold:

$$\frac{40}{360} \times 180 = \frac{1}{9} \times 180 = \boxed{20 \text{ ice creams}}.$$

4. Vanilla and Other both have angle 80°. Each represents:

$$\frac{80}{360} \times 180 = \frac{2}{9} \times 180 = \boxed{40 \text{ ice creams each}}.$$

5. A flavour that is exactly $\frac{1}{6}$ of all sales has angle

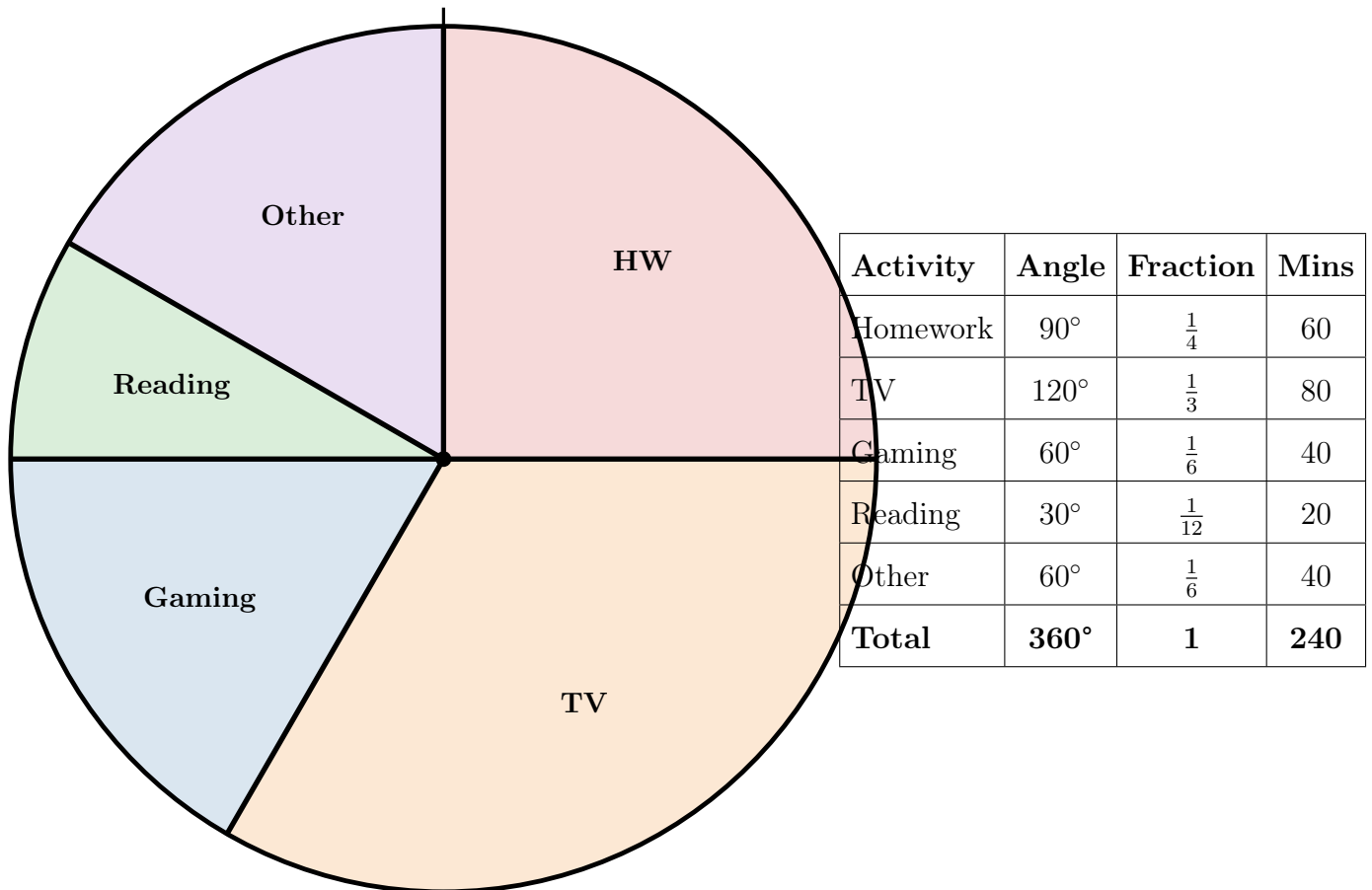
$$\frac{1}{6} \times 360 = 60^\circ.$$

The 60° sector is Strawberry.

$$\frac{60}{360} \times 180 = 30, \quad \frac{1}{6} \times 180 = 30.$$

So the flavour is **Strawberry**.

Pie Chart 4 – One Evening’s Activities (4 hours = 240 minutes)



Worked Solutions – Pie Chart 4:

1. The measured angles are:

$$90^\circ, 120^\circ, 60^\circ, 30^\circ, 60^\circ,$$

and

$$90 + 120 + 60 + 30 + 60 = 360^\circ.$$

Since 4 hours = $4 \times 60 = 240$ minutes, each fraction is multiplied by 240.

2. Time spent watching TV:

$$\frac{120}{360} \times 240 = \frac{1}{3} \times 240 = \boxed{80 \text{ mins}}.$$

3. Time spent on Homework:

$$\frac{90}{360} \times 240 = \frac{1}{4} \times 240 = \boxed{60 \text{ mins}}.$$

4. Fraction of the evening spent Gaming:

$$\frac{60}{360} = \boxed{\frac{1}{6}}.$$

5. **Challenge:** Homework is $\frac{1}{4}$ of the evening. For another student with 5 hours = 300 minutes:

$$\frac{1}{4} \times 300 = \boxed{75 \text{ mins}}.$$