



**AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES  
SCHOOLS ENRICHMENT CENTRE (AIMSSEC)  
AIMING HIGH**

**This INCLUSION AND HOME LEARNING GUIDE  
suggests related learning activities for all ages from 4 to 18  
on the theme of PIE CHARTS**

**Just choose whatever seems suitable for your group of learners**

The original ICE CREAM PIE activity was designed for Years 4 to 9

### ICE CREAM PIE



An ice cream stall sells vanilla, strawberry and chocolate ice creams.

The pie chart illustrates the sales of ice cream for last Saturday.

The number of vanilla and the number of chocolate ice creams sold were the same.

The stall sold 60 strawberry ice creams.

How many chocolate ice creams were sol

### HELP

Read the question carefully. What you have to find out?

Would it help to find the total number of ice creams sold?

What does the square sign in the diagram tell you about the angle in the sector showing the sales of strawberry ice creams?

### NEXT

With a partner, each write a short story about ice cream with some hidden numbers and draw a pie chart for your story. Then swop your story with your partner and see if you can each find the numbers hidden by the other person.

## INCLUSION AND HOME LEARNING GUIDE

### THEME: PIE CHARTS

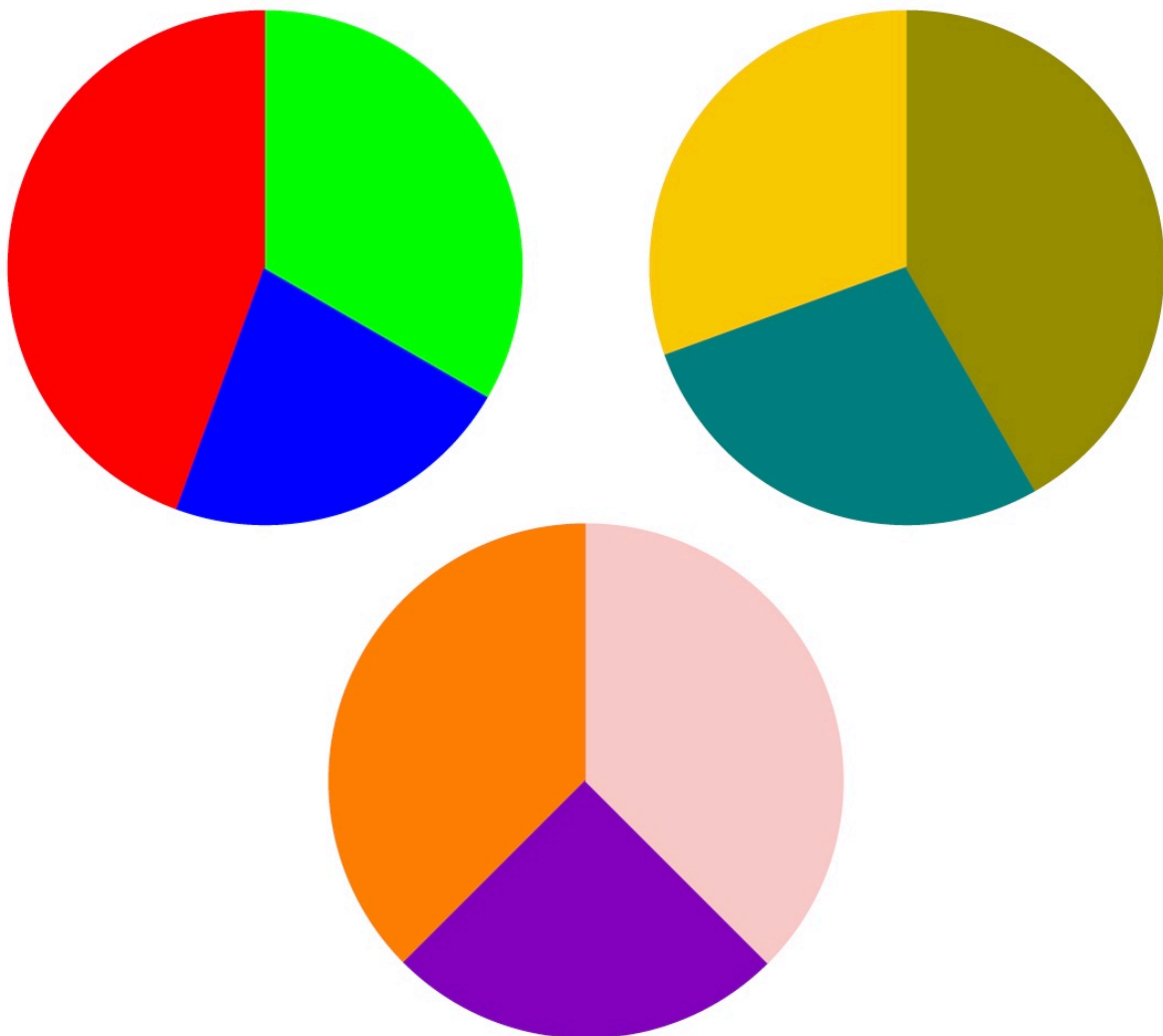
#### Early Years and Lower Primary

Cut out the 3 circles. Then cut out the sectors to make 9 pieces. Let the children watch you do this.

Then give them three pieces at a time so that they can quite easily make the 3 circles again.

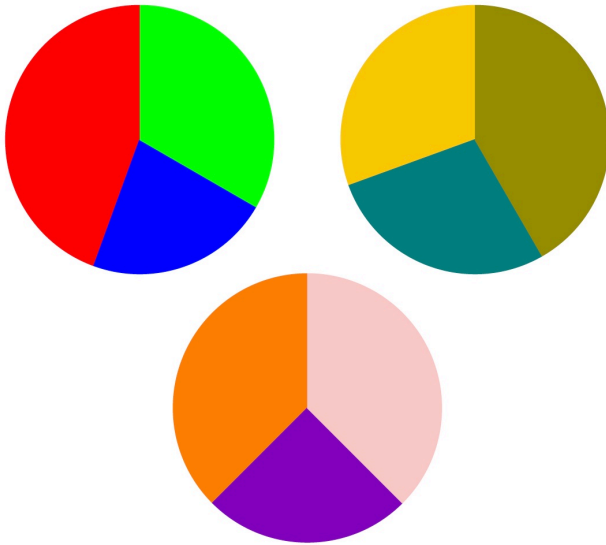
Then mix up all 9 pieces. Ask the children to put them in a line so the angles of the sectors increase from the smallest angle to the biggest angle.

To solve the puzzle, the children must make the 3 circles from the 9 pieces.



## Upper Primary and Lower Secondary

### SECTORS PUZZLE



Cut out the 9 pieces. Mix them up. Put them back together to make the 3 circles.

Measure the angles of the sectors. For each circle add up the 3 angles. What do they add up to?

### DIAGNOSTIC QUIZ

Do this to introduce the idea of ice cream sales and pie charts. This is a good question for learners to discuss so if you are working with 4 or more learners, you might use the **'one, two, four, more strategy'** (not usual for diagnostic quizzes and formative assessment). Using this strategy, two pairs can discuss the problem, find out whether they have used the same method and have the same answer, and learn from each other. Learners who struggle get help quickly and can make good progress and everyone develops communication skills.

First get learners to read the diagnostic quiz question and do it **on their own**. Then after a short time ask them to **work in pairs**. When a few pairs have an answer ask the learners to work in fours. Finally ask the learners to vote in the usual way for their chosen answer (1, 2, 3 or 4 fingers up). Then, ask the learners to explain their reasons for their answers.

Explain that you use the 'one, two, four, more strategy' because (1) they have to read the question for themselves in tests so they need lots of practice and (2) also explain that, in life, it is necessary to be able to work with other people to solve problems.

### ICE CREAM PIE

Then give the Ice Cream Pie question on page 1 and use the 'one, two, four, more strategy' again if you have a big enough group. The Ice Cream Pie question is a good one to give practice in reading and comprehension. Point out that there are different ways to solve this problem and ask learners how many different methods they can find.



It is good to encourage learners to think for themselves. Be open to them finding different methods. Learners may use fractions, particularly if this exercise follows other work on fractions, or alternatively they may use percentages.

Then have a **class discussion** and perhaps get different learners to explain their different methods to the whole group.

### Key questions

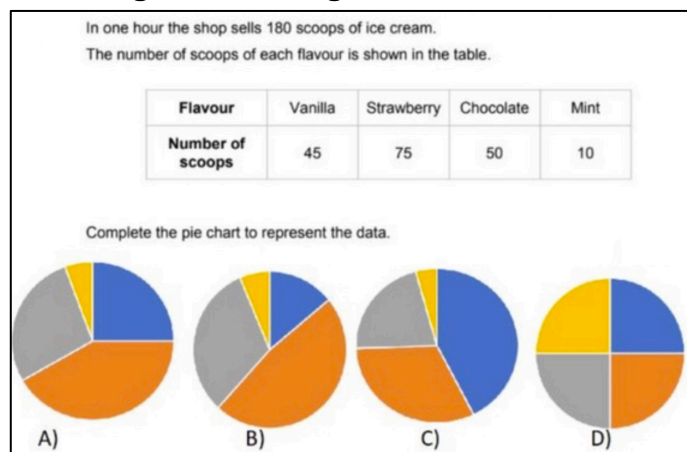
- What does the little mark in the angle in the strawberry ice cream sector mean?
- What fraction (or what percentage) of the whole is that?
- How many ice creams are represented by  $90^\circ$ ?
- How many ice creams were sold in total? How many of these were vanilla or chocolate?

**DIAGNOSTIC ASSESSMENT** This can be done before or after the lesson and as a group as described below, or the question can be answered individually.

Show this question and say:

**“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 for D”.**

1. Notice how the learners respond. Ask them to explain why they gave their answer and **DO NOT** say whether it is right or wrong, simply thank the learner for the answer.
2. It is important for learners to explain the reason for their answer so that, by putting their thinking into words, they develop communication skills and gain a better understanding.
3. With a group, make sure that other learners listen to these reasons and try to decide if their own answer was right or wrong.
4. Ask the learners to vote again for the right answer by putting up 1, 2, 3 or 4 fingers. Look for a change and who gave right and wrong answers.



**The correct answer is A.** Total sold 180

Notice blue represents 45 that is 25% of 180, so the chart is A or D.

The given amounts are different so the answer cannot be D.

Vanilla – blue – 45

Strawberry – brown – 75

Chocolate – grey – 50

Mint – yellow – 10

<https://diagnosticquestions.com>

## Upper Secondary

Use the information in the table and draw pie charts to compare the age distributions in the populations of South Africa and the UK in 2018.

| Age groups  | Percentage of population in 2018 |      | Angle in pie chart |      |
|-------------|----------------------------------|------|--------------------|------|
|             | South Africa                     | UK   | South Africa       | UK   |
| 0 - 14      | 28.2                             | 17.9 |                    |      |
| 15 - 24     | 17.2                             | 11.7 | 62°                |      |
| 25 - 54     | 42.1                             | 39.6 |                    | 143° |
| 55 - 64     | 6.7                              | 12.2 |                    |      |
| 65 and over | 5.8                              | 18.5 |                    |      |

The total populations were: 66.3 million in the UK and 57.8 million in South Africa.  
The land areas are: 242 000 km<sup>2</sup> in the UK and 1 220 000 km<sup>2</sup> in South Africa.  
What are the average population densities in number of people per square km?

What do you notice about the age distribution in the two populations?

### Why do this activity?

Here learners have to interpret a pie chart and think about what it means. This can be much quicker to do than making an accurate drawing, but it requires as much understanding. It can be tackled using an argument based on fractions or one based on percentages, or a mixture, and it can be used to deepen learners' understanding that the two are equivalent.

### Learning objectives

In doing this activity students will have an opportunity to:

- use what they know about pie charts, angles, fractions and percentages and deepen their understanding of these concepts and the connections between them;
- work with others to solve a problem.

### Generic competences

In doing this activity students will have an opportunity to:

- **think mathematically**, reason logically and give explanations;
- **visualize** and develop the skill of interpreting visual images;
- interpret information to **solve a problem**;
- **work in a team**:
  - collaborate and work with a partner or group
  - exchange ideas, criticise, and present information and ideas to others
  - analyze, reason and record ideas effectively.

## SOLUTION

The square sign shows that the angle in the pie chart representing strawberry is  $90^\circ$  and we know this  $90^\circ$  is one quarter of  $360^\circ$ .

So  $\frac{1}{4}$  or 25% of the pie chart represents 60 ice creams

Solution by fractions: Three quarters of the ice creams were not strawberry, that is  $\frac{3}{8}$  vanilla and  $\frac{3}{8}$  chocolate then  $\frac{3}{8}$  represents 3 times  $60/2$  that is 90 ice creams. The solution is 90 chocolate ice creams were sold.

Solution by percentages A: 25% represents strawberry ice cream and 75% represents other flavours so the total number of vanilla and chocolate ice creams sold was  $3 \times 60 = 180$ . Half of these were chocolate so half of 180, that is 90 of the ice creams sold were chocolate.

Solution by percentages B. As 25% represented 60 ice creams,  $4 \times 60 = 240$  ice creams were sold altogether. Chocolate ice creams were half of 75%, that is 37.5%, that is  $60 + 30 = 180$  ice creams. (or  $0.375 \times 240 = 180$ )

### For Upper Secondary:

| Age groups  | Percentage of population in 2018 |      | Angle in pie chart |             |
|-------------|----------------------------------|------|--------------------|-------------|
|             | South Africa                     | UK   | South Africa       | UK          |
| 0 - 14      | 28.2                             | 17.9 | $102^\circ$        | $64^\circ$  |
| 15 - 24     | 17.2                             | 11.7 | $62^\circ$         | $42^\circ$  |
| 25 - 54     | 42.1                             | 39.6 | $152^\circ$        | $143^\circ$ |
| 55 - 64     | 6.7                              | 12.2 | $24^\circ$         | $44^\circ$  |
| 65 and over | 5.8                              | 18.5 | $21^\circ$         | $67^\circ$  |

Population density UK =  $66\,300\,000/242\,000 = 274$  people per square km.

Population density SA =  $57\,800\,000/1\,220\,000 = 47$  people per square km.

## Follow up

Water Crisis 2 <https://aiminghigh.aimssec.ac.za/years-6-8-water-crisis-2/>

Pizza <https://aiminghigh.aimssec.ac.za/years-8-9-pizza/>

Match the Matches <https://aiminghigh.aimssec.ac.za/years-7-12-match-the-matches/>



Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum links: <http://aiminghigh.aimssec.ac.za>

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