

A							
	B						
		C					
24			D				
	25			E			
37		22			F		
			19			G	
		35		21			H

HOW FAR?

The Towns A, B, C, D, E, F, G, H all lie one road.

The table shows the distances between pairs of towns. For example, D is 19km from G.

Fill in the distances between all the other towns in the table.

Explain how you found your answers.

HELP

First reading distances from this chart big chart.

Copy this diagram.

A							
	B						
		C					
24			D				
	25			E			
37		22			F		
			19			G	
		35		21			H

Start by answering these questions:

- What information do you have about the distance between towns A and D and between A and F?
- From this information fill in the distance from D to F in the empty square on the chart below D and across from F.
- Use similar methods to fill in the other empty squares in the chart.

NEXT

DISTANCE TABLE (KM)

Cape Point															
62	Cape Town														
56	18	Constantia													
67	19	26	Cape Town Airport												
32	30	24	35	Fish Hoek											
29	33	27	38	3	Glencairn										
51	21	5	31	20	22	Hout Bay									
34	28	22	33	2	5	22	Kalk Bay								
59	13	5	21	21	24	10	19	Kirstenbosch							
33	41	28	46	11	13	23	13	33	Kommetjie						
68	4	22	23	37	40	17	35	17	40	Table Mountain					
37	25	19	30	5	8	24	3	16	16	30	Muizenberg				
25	37	31	42	7	4	26	9	28	17	43	12	Simon's Town			

The distance from Cape Town to Muizenberg is 25 km.

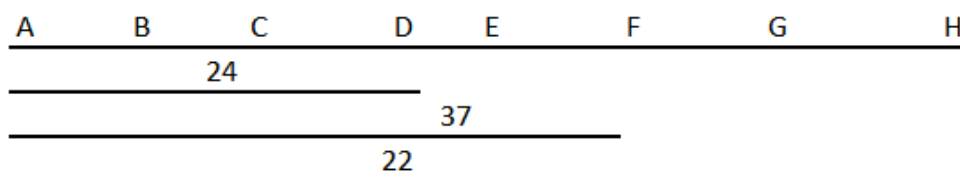
Plan a cycle trip from Cape Town around the Cape Peninsula visiting (in this order) Table Mountain, Hout Bay, Kommetjie, Cape Point, Simon's Town, Fish Hoek, Muizenberg and back to Cape Town.

Find the distances between each place and the total distance.

NOTES FOR TEACHERS

SOLUTION

A							
4	B						
15	11	C					
24	20	9	D				
29	25	14	5	E			
37	33	22	13	8	F		
43	39	28	19	14	6	G	
50	46	35	26	21	13	7	H



You could start by drawing a long straight line to represent the road with A at one end, marking off B to G in order along the line, and finishing with H.

Next to the line draw on the distances you know. You should then have a picture to help you start calculating the missing distances.

You might start by thinking logically about the table. For instance, given that A to D is 24 and A to F is 37 then D to F is 37 minus 24, that is 13 km.

Similarly given that C to F is 22 and C to H is 35 then F to H must be 35 - 22 = 13 km.

The diagram gives all the solutions.

Diagnostic Assessment

This should take about 5–10 minutes.

Write the question on the board, say to the class:

1. "Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D".
2. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers. It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.
5. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

The correct answer is C.

$$1800 \text{ m} + 3.78 \text{ km} = 1.8 \text{ km} + 3.78 \text{ km} \\ = 5.58 \text{ km}$$

A. Students giving this answer have ignored the units and treated 3.78 km as 3.78 m.

B. Students giving this answer having mistakenly treated 1800m as 0.18 km which is actually 180m not 1800m.

D. Students giving this answer are putting 3.78km as 378m when it is actually 3780m.

<https://diagnosticquestions.com>

Why do this activity?

The ability to read a distance chart is a useful skill that will be developed through doing this problem.

It requires learners to think mathematically about the distance chart and to work out and fill in the distances themselves. The very first problem situation given above is simplified because the places are all on one straight line.

However similar principles apply to the real charts such as the one on this page and the one that accompanies this problem that you can download from the AIMING HIGHER website. It gives distances between most of the major towns and cities in South Africa.

Learning objectives

In doing this activity students will have an opportunity to:

- review their knowledge of distance measurements (millimetres, centimetres, metres and kilometres);
- learn to read distance charts
- improve their problem solving skills in a real world application.

Generic competences

In doing this activity students will have an opportunity to:

- think mathematically, reason logically and give explanations and proofs;
- visualize - develop the skill of interpreting and creating visual images to represent concepts and situations;
- interpret and solve problems in real life applications;
- work in a team:
 - a. co-operate - to collaborate/work with a partner or group
 - b. have empathy with others, listen to different points of view
 - c. develop leadership qualities.

Suggestions for teaching

Start with the Diagnostic Quiz as a warm up for this question and to carry out formative assessment on how well your students understand the metric system. Ask some questions along the lines of “which units would you use to measure the length and breadth of this room?”

... the distance from here to the nearest city?

... the length and breadth of this piece of paper?

... the diameter of a one cent coin?

You might then use this distance chart of South African towns and help the learners to look up distances on the chart.

Then you might like to use the ‘One-Two-Four-More’ strategy getting the learners to work individually on the problem until they have filled in most or all of the table, then to work in pairs to check their answers and complete the table, then in fours to check that they agree all the answers and correct if they have different answers. As the teacher all you will need to do is go around the class asking key questions and encouraging learners who need a bit of extra help.

Key questions

- What information are you given about the distances between towns A, D and F?
- Can you use this to fill in any empty squares on the chart?
- Is there information in the same row that you can use to find the distance for one of the empty squares?
- Is there information in the same column that you can use to find the distance for one of the empty squares?

Follow-up ideas

Metre Measures <https://aiminghigh.aimssec.ac.za/metre-measures/>

Thousands and Millions <https://aiminghigh.aimssec.ac.za/thousands-and-millions/>

Square fence <https://aiminghigh.aimssec.ac.za/square-fence/>

Not So Square Fence <https://aiminghigh.aimssec.ac.za/not-so-square-fence/>

Belt Around The Earth <https://aiminghigh.aimssec.ac.za/belt-around-the-earth/>

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa. New material will be added for Secondary 6.

For resources for teaching A level mathematics see <https://nrich.maths.org/12339>

Note: The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **beyond** the school curriculum for Grade 12 SA.

	Lower Primary or Foundation Phase Age 5 to 9	Upper Primary Age 9 to 11	Lower Secondary Age 11 to 14	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6