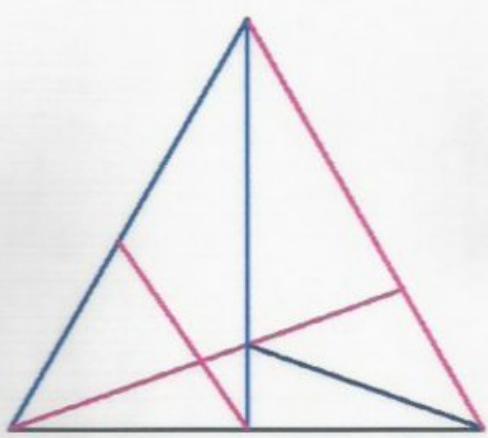
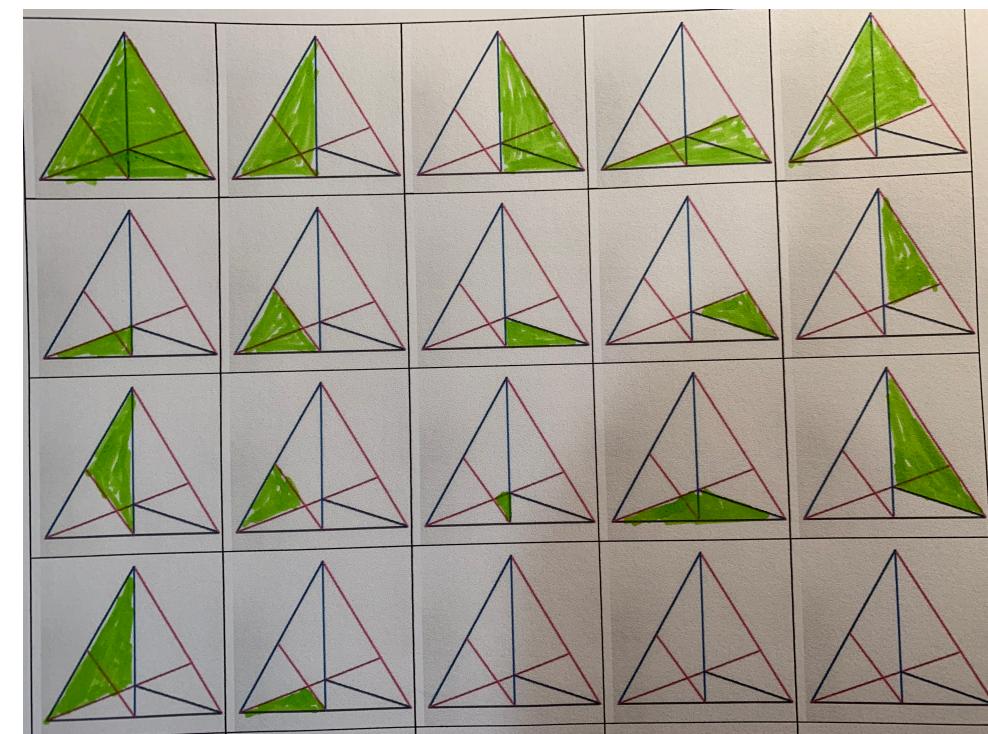


## HOW MANY TRIANGLES



How many triangles can you find? Look carefully, there may be more than you think!

## SOLUTION



There are 17 solutions here.

Can you find any other solutions?

## NOTES FOR TEACHERS

### Why do this activity?

This is an excellent activity because everyone in the class can be successful. Some learners may not find all the answers but the most able will do so if they are careful and persistent, and if they check their answers until they are sure that they have not missed any solutions. It is quite likely that a learner who struggles with number work will do particularly well on a task like this.

### Learning objectives

To develop visualisation and mathematical thinking.

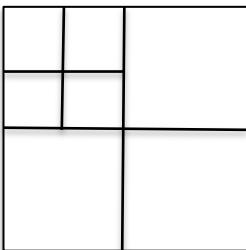
## Diagnostic Assessment

This should take about 5–10 minutes.

1. Write the question on the board, say to the class:  
**“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.

How many squares are there in this diagram?

- A. 7    B. 8    C. 6    D. 9



D. Correct answer 9

### Possible misconceptions

- Maybe just counted the smaller squares and not the squares split into four parts.
- Maybe counted 4 small squares and 4 medium sized squares, missing the big one.
- Maybe a guess.

<https://diagnosticquestions.com>

## Generic competences

This activity is designed to develop skills such as perseverance, concentration and team working.

## Suggestions for teaching

First use the diagnostic test. This will alert the learners to the possibility of shapes within shapes. The ‘Count the Squares’ activity is much easier than the ‘Count the Triangles’ activity but it is a good ‘warm up’ as well as a good question for formative assessment.

You might let the learners start counting and, when they tell you the number they have found, you might then give them the grid to make it easier to count the triangles by colouring each triangle on a separate copy of the diagram. In this way they can check for themselves whether they have found all the solutions.

Don’t tell the learners what the answer is.

Finish the lesson by putting up the grid and asking different learners each to colour in a different triangle. Make sure that, before they start colouring, that triangle has not already been coloured in. Keep asking “Has anyone found a different solution that we have not coloured in yet? If the class has not found all the solutions tell them that there are more and you’ll leave the grid up on the classroom wall so that when learners find new solutions they can colour them in. At this stage the new solutions can be coloured in a new colour and a key can be used on the poster naming the learner who found a solution nobody else had been able to find.

## Key questions

Are you counting them in any special order?

How do you know that you have found all the solutions?

Are you sure that you have not coloured the same triangle in twice?

Do you think you might have missed any solutions?

Have you checked your answer?

Can you see any really small triangles that you might have missed?

## Possible extension

If some learners find all the solutions and you want the rest of the class to continue working on the problem then you could ask them to make up puzzles like this of their own, and then exchange their puzzle with another learner so that they solve each other's puzzles. The class might even make a set of these puzzles that could be used with other classes.

## Possible support

Use the 1 - 2 - 4 – more teaching strategy.

- **ONE** When you give out the sheets for colouring tell the learners to work **ON THEIR OWN**.
- **TWO** After 5 minutes tell the learners to work in pairs and help each other to find all the solutions.
- **FOUR** After another 10 minutes tell the learners to work in fours (pairs of pairs) and to check that maybe one pair has found some solutions that the other pair missed. They must also check that they have not counted the same triangle twice.
- **MORE** After another 10 minutes share answers between the whole class.

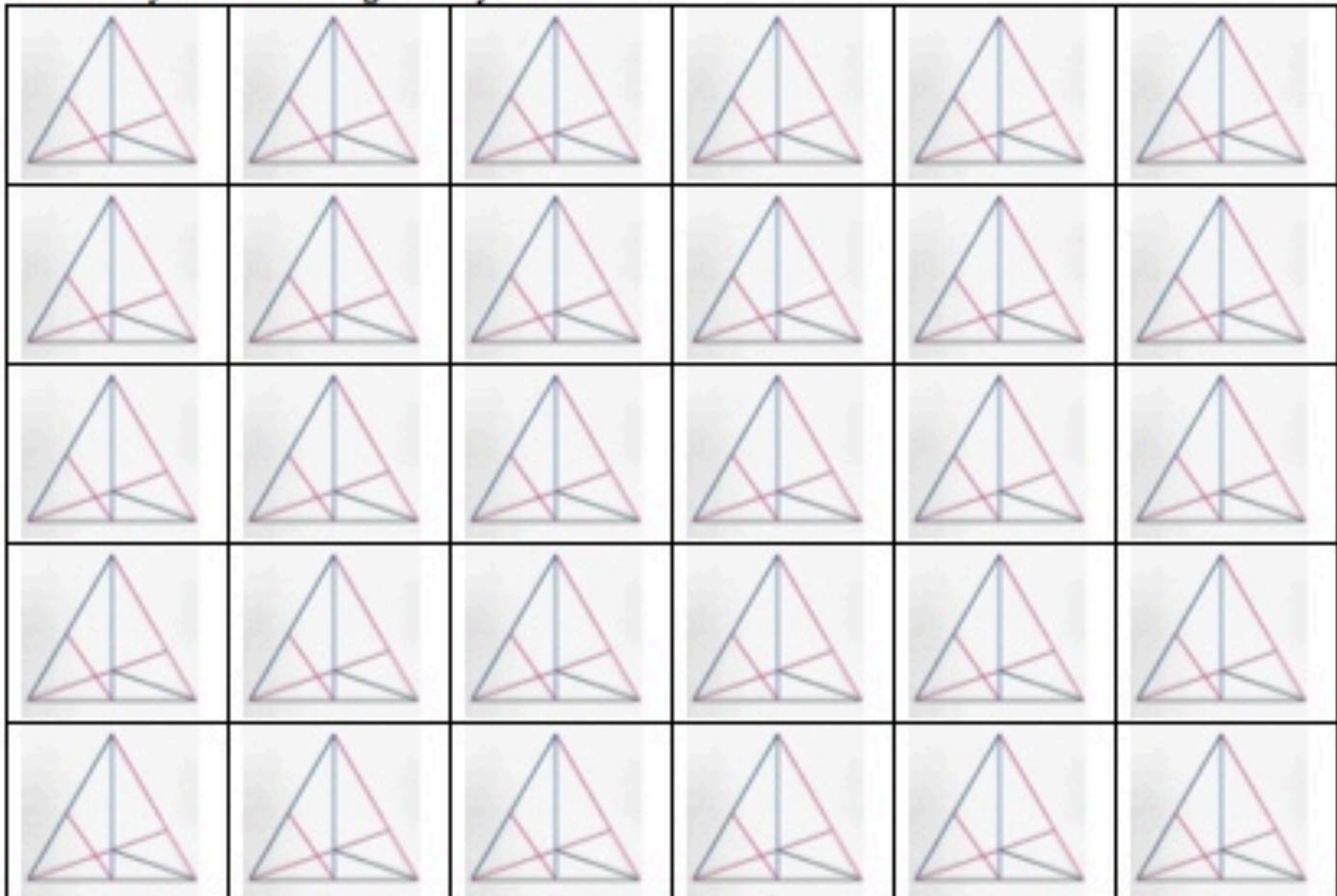
**Note:** The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa. New material will be added for Secondary 6.

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

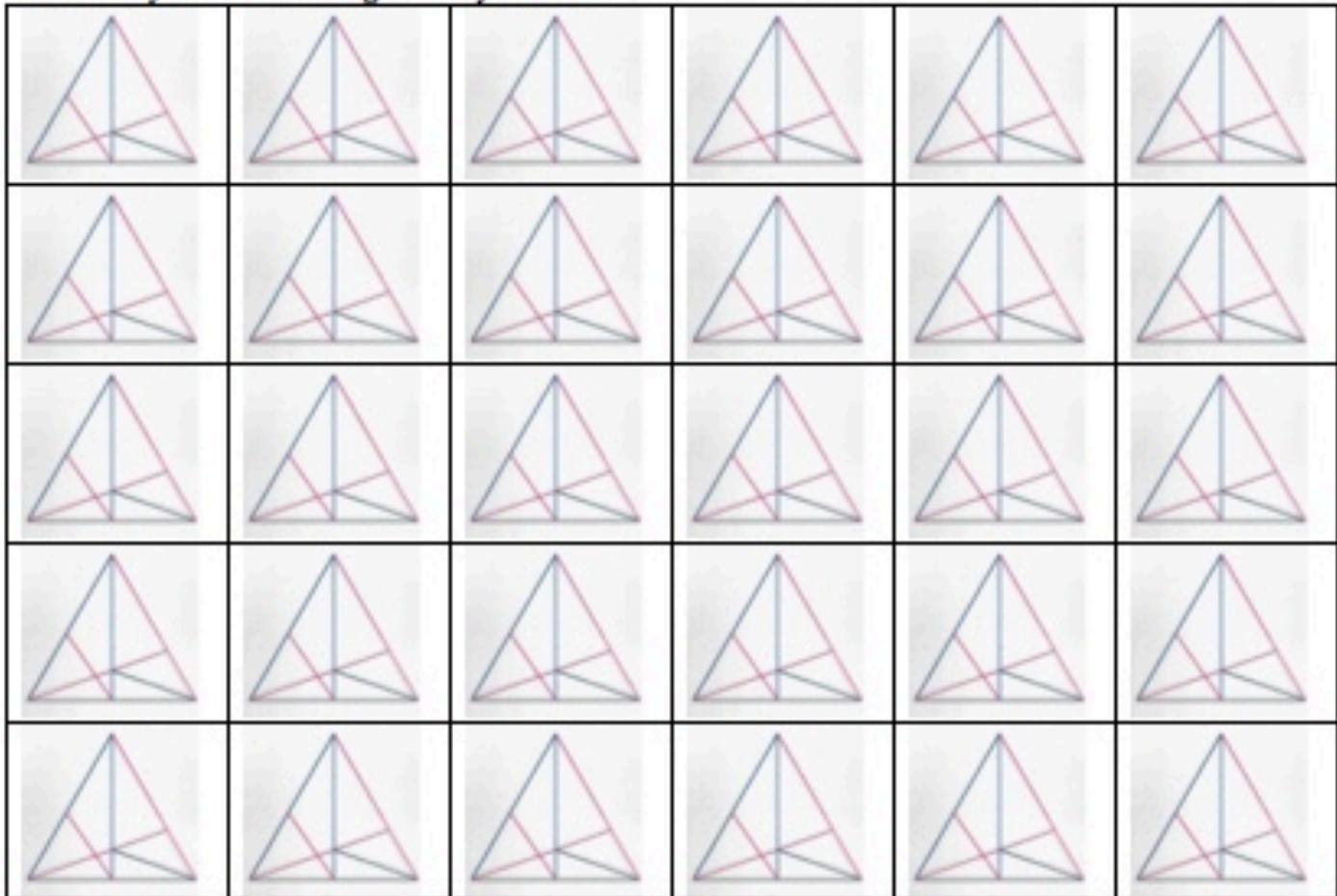
**Note:** The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **beyond** the school curriculum for Grade 12 SA.

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

How many different triangles can you find?



How many different triangles can you find?



**How many different triangles can you find?**

