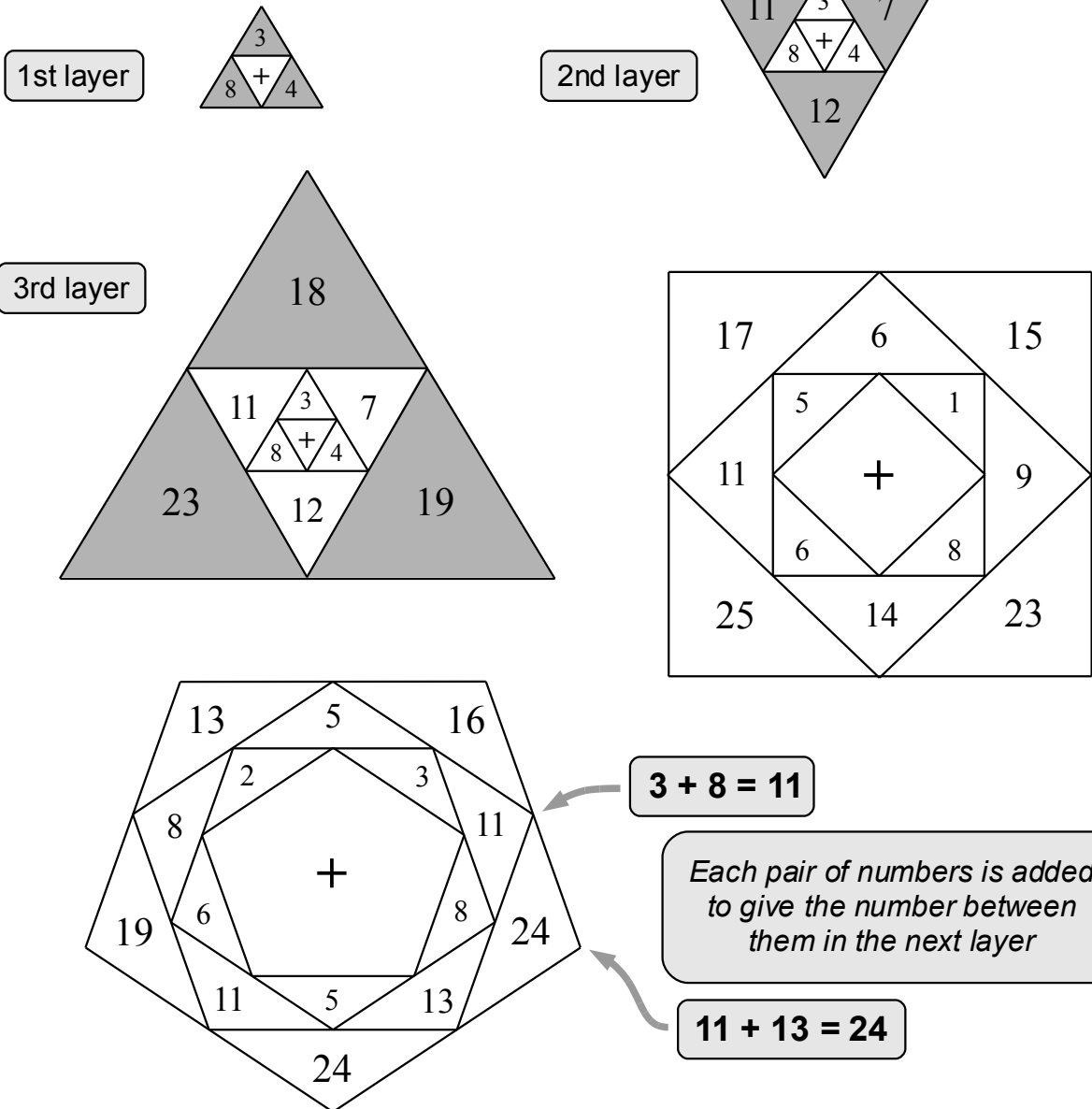


# Adding Outwards

Look at the numbers in these shapes.



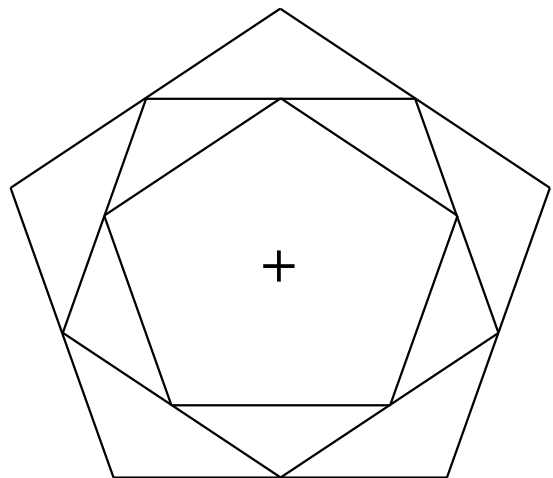
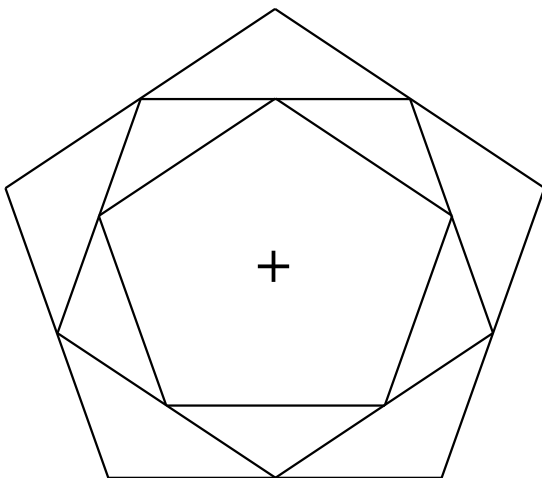
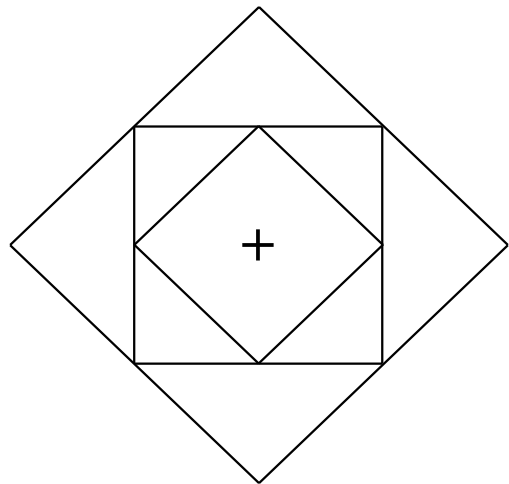
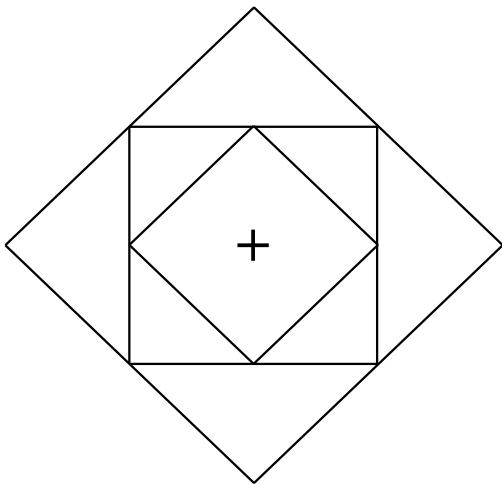
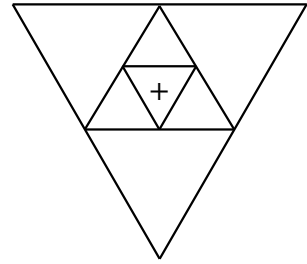
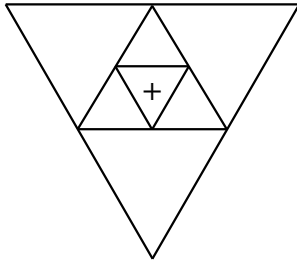
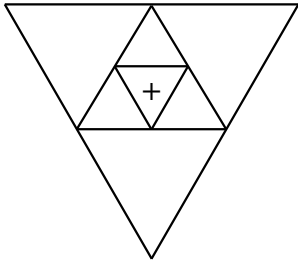
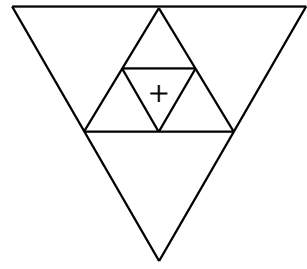
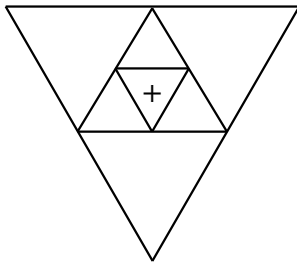
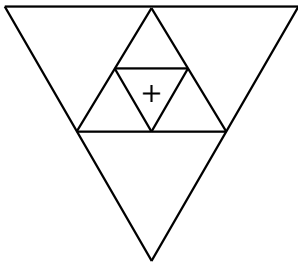
Make your own patterns like these with different numbers in the first layer.

Try to find relationships between the numbers in the different layers.

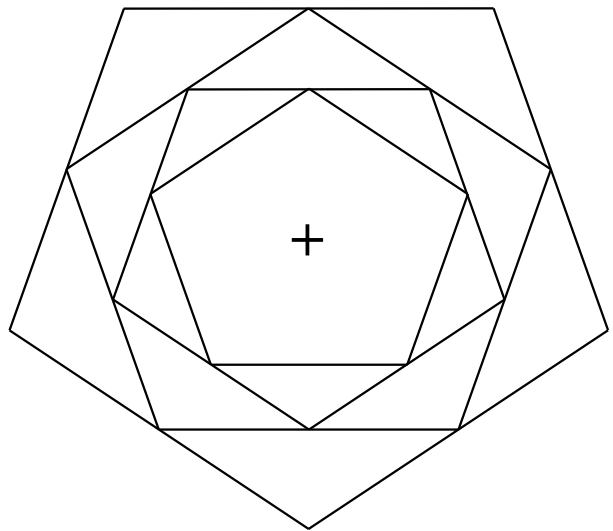
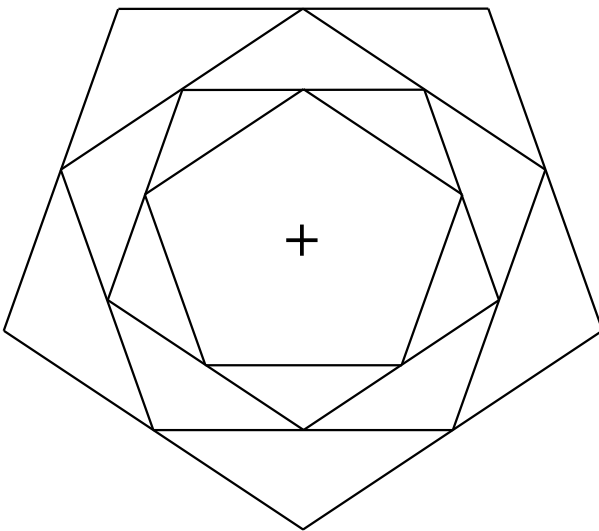
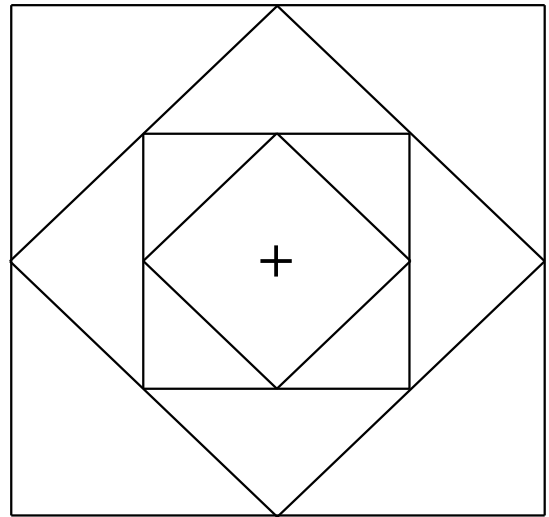
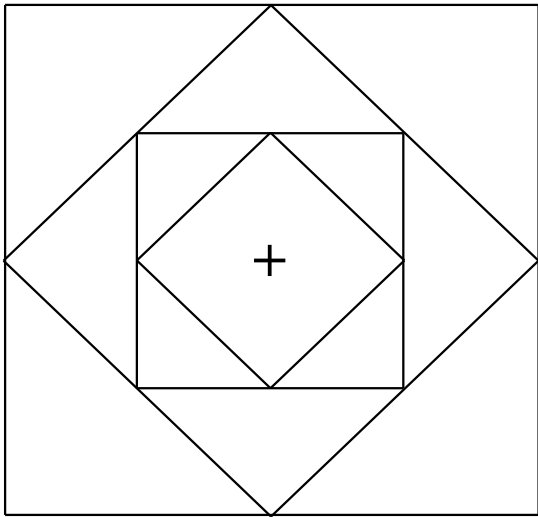
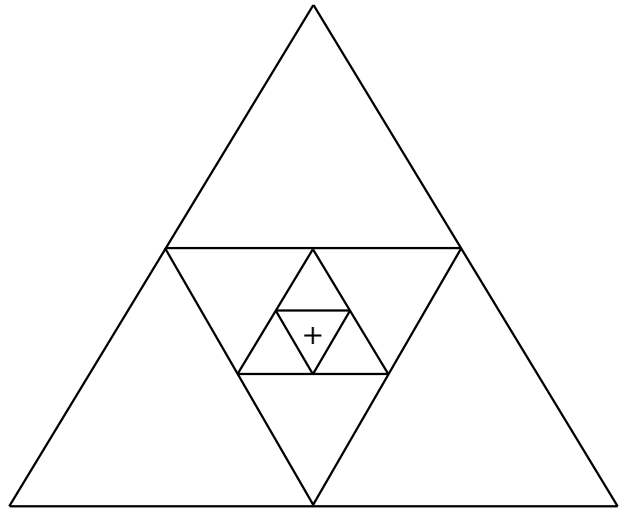
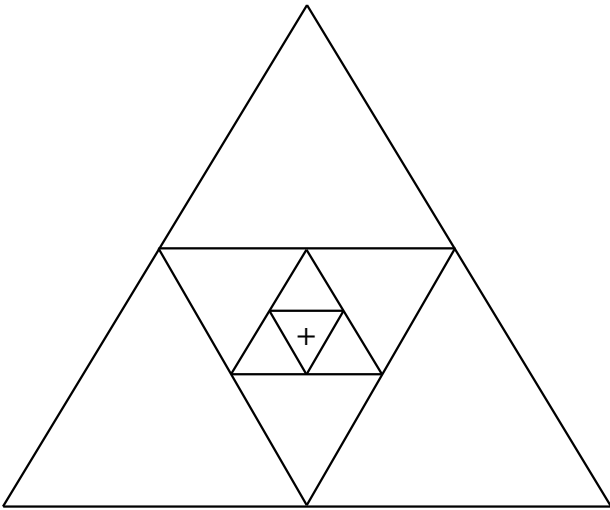
If you know the numbers in the second layer, can you work out the numbers in the first layer? If so, try to prove your result. If not, explain why not.

Try further work like using algebra or finding the difference between each pair of numbers instead of adding them.

# Adding Outwards – Blank Diagrams 1

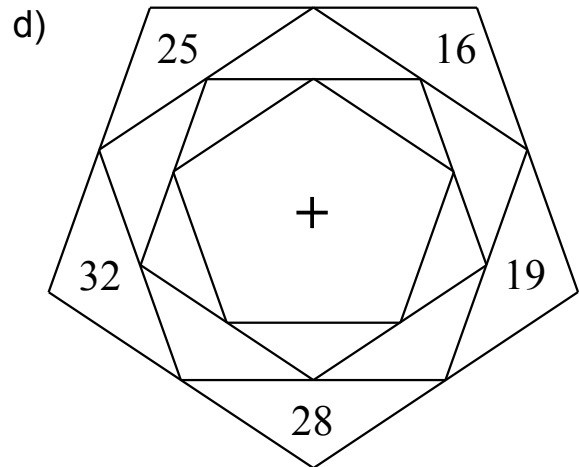
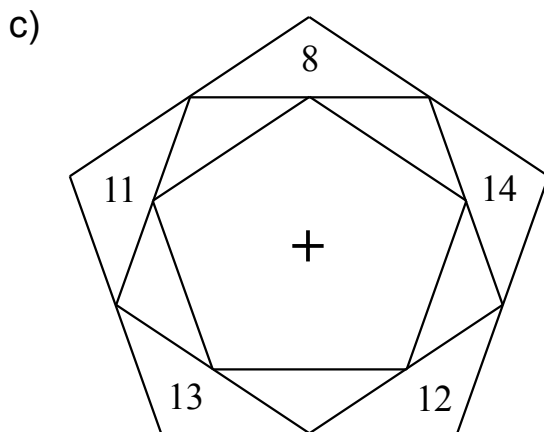
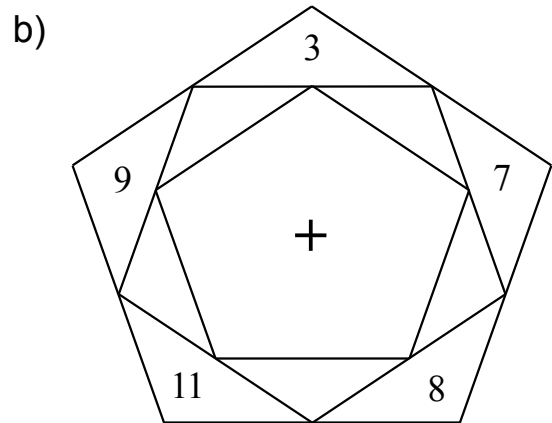
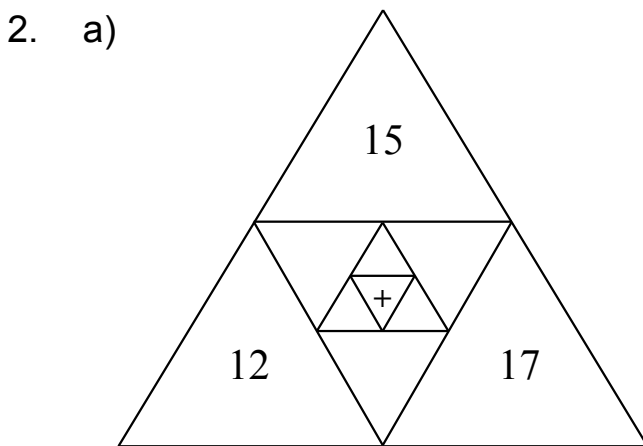
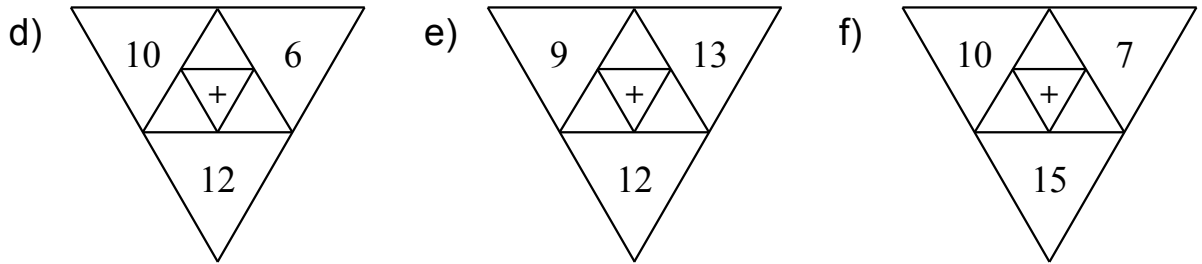
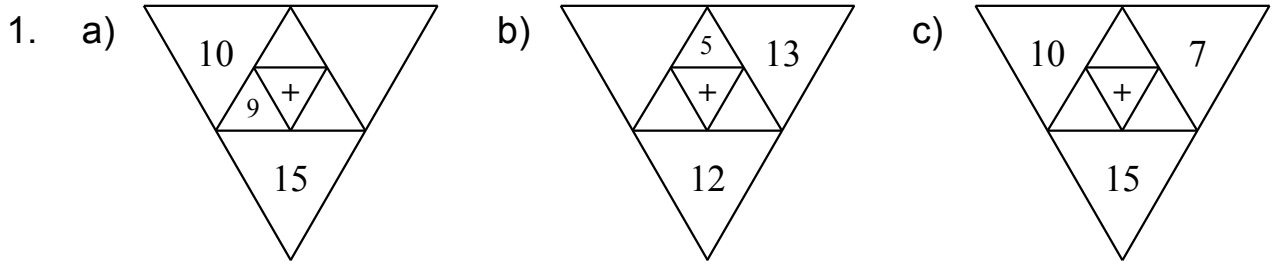


## Adding Outwards – Blank Diagrams 2



## Adding Outwards – Questions

Try to fill in all the numbers in these shapes.



## Adding Outwards – Teachers' Notes

There are sheets of blank diagrams that can be copied and given to pupils to use.

Some ideas for work at different levels are:

Choosing numbers for the 1<sup>st</sup> layer and working out the rest of the numbers.

Finding the sum of the numbers in each layer, seeing the relationship and explaining it, perhaps with algebra.

Finding differences instead of sums outwards – what patterns develop?

### **For triangles:**

*If help is needed, suggest that they try adding / subtracting the three numbers in the 2<sup>nd</sup> layer to make double one of the numbers in the 1<sup>st</sup> layer.*

Developing a method for working out the numbers in the 1<sup>st</sup> layer.

Explaining why their method works.

Using algebra to prove their method will always work.

### **For squares:**

Finding out / explaining why you can't work out the 1<sup>st</sup> layer from the 2<sup>nd</sup> layer.

### **For pentagons:**

Predicting whether or not you can work out the 1<sup>st</sup> layer from the 2<sup>nd</sup> layer.  
Developing a method etc.

### **For other polygons:**

Investigating with which polygons you can work out the 1<sup>st</sup> layer from the 2<sup>nd</sup> layer.  
Explaining why.

Trying the sheet of questions. (Answers are provided.)

Seeing if you can work backwards when finding differences.

Extending the activity in their own ways.

## Adding Outwards – Answers

