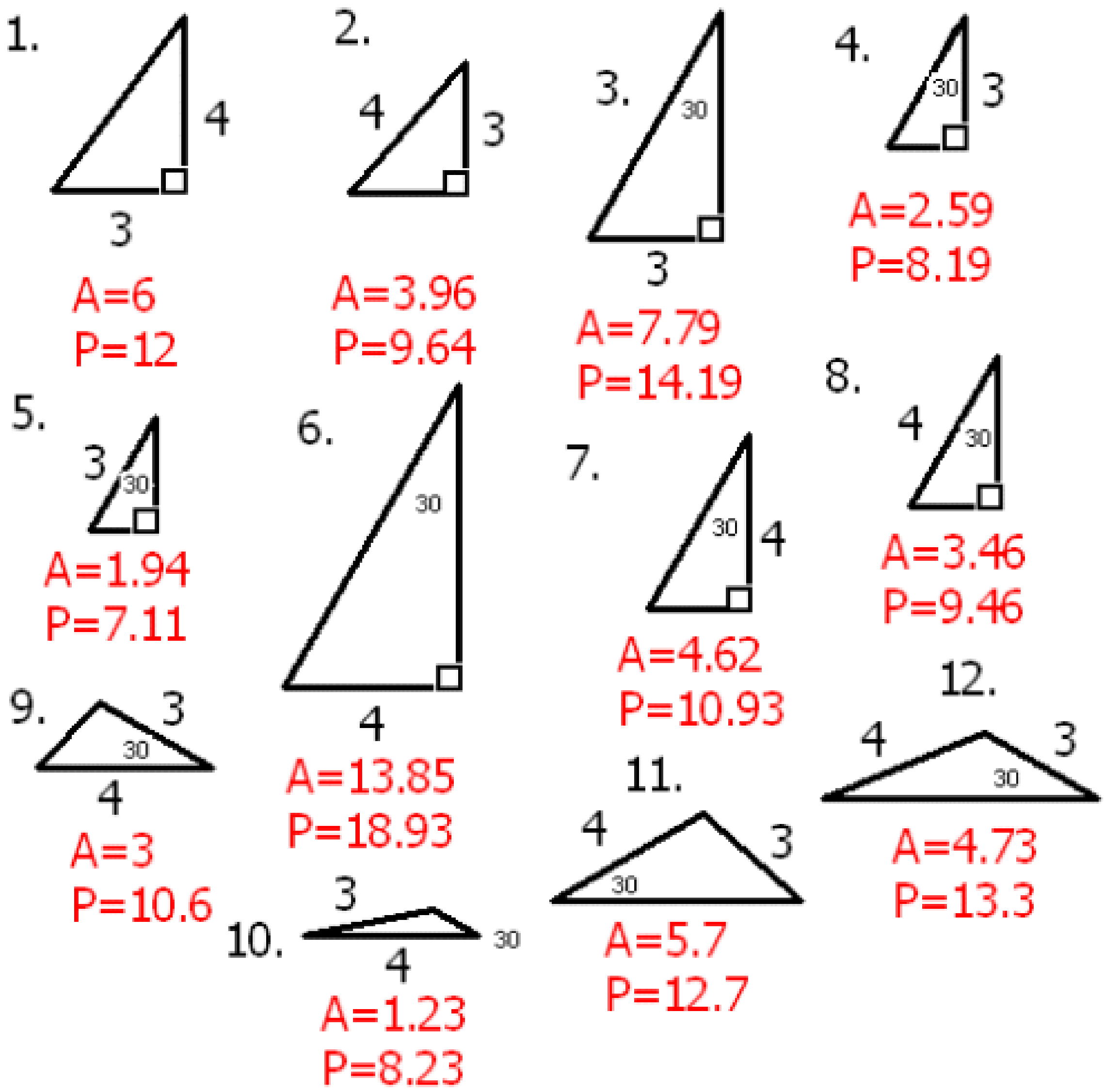
Risp 24: Teacher Notes

Suggested Use: to consolidate/revise Sin Rule/Cos Rule/Area formula

I will be honest, the Sin Rule and the Cos Rule are topics that I often approach with a sinking heart. They could be seen as the sledgehammers in a mathematician's toolkit, useful, for sure, indispensible even, but not noted for elegance in their application. There is often too a great variety in prior learning here, bringing a risk that the higher flyers may be left twiddling their thumbs.

This risp attempts to address these problems. To get right to the end, the Sin Rule is required, and helpfully the ambiguous case arises naturally too. The Cos Rule is utilised, and so is the area formula $\frac{1}{2}ab\sin C$. Alongside the need to put the rules into practice, this risp requests a generous amount of logic. When I tried the task with a group, my students seemed to be much more engrossed than if I'd chosen to plough through standard consolidation using unlinked examples.

There are twelve 3-Fact Triangles, shown here to scale:



Of these, the hardest to find are the 10./11. pair. Using the Sin Rule for these two triangles is excellent practice. It is also good to discuss why there is not a similar pair for triangle 12.

The Area List from large to small is:

6, 3, 1, 11, 12, 7, 2, 8, 9, 4, 5, and 10.

The Perimeter List from large to small is:

6, 3, 12, 11, 1, 7, 9, 2, 8, 10, 4 and 5.

You may wish to examine the ratio Area/Perimeter for each triangle.

The whole notion of choosing n facts that may be individually true about an object, but which cannot all be simultaneously true, and then examining the possible number of objects where n – 1 facts are true is fruitful. In this case one could ask, if one gives two facts that specify sides and two facts that specify angles, will there always be twelve 3-Fact Triangles? What is the maximum number of possibilities? The minimum?

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