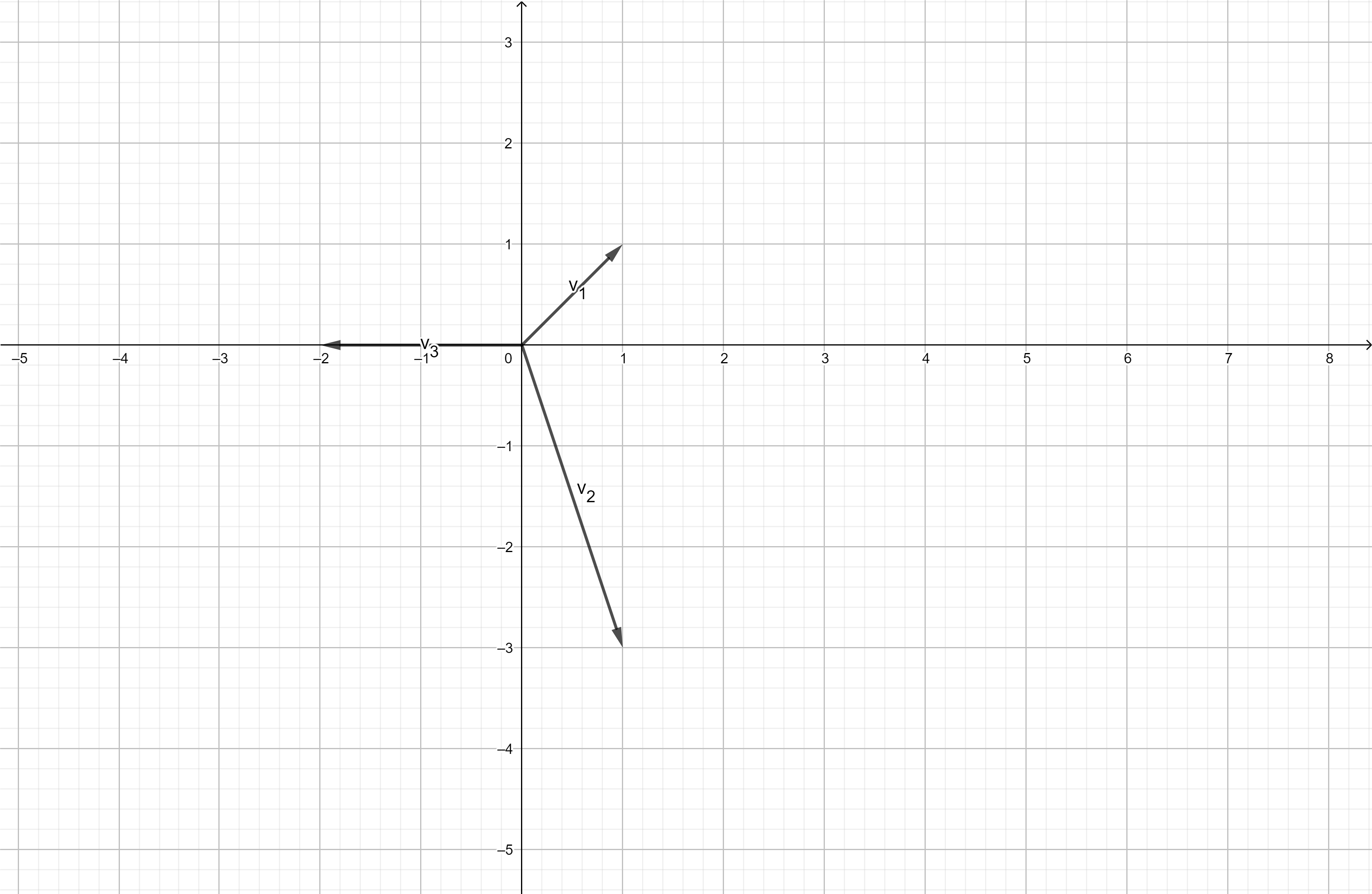
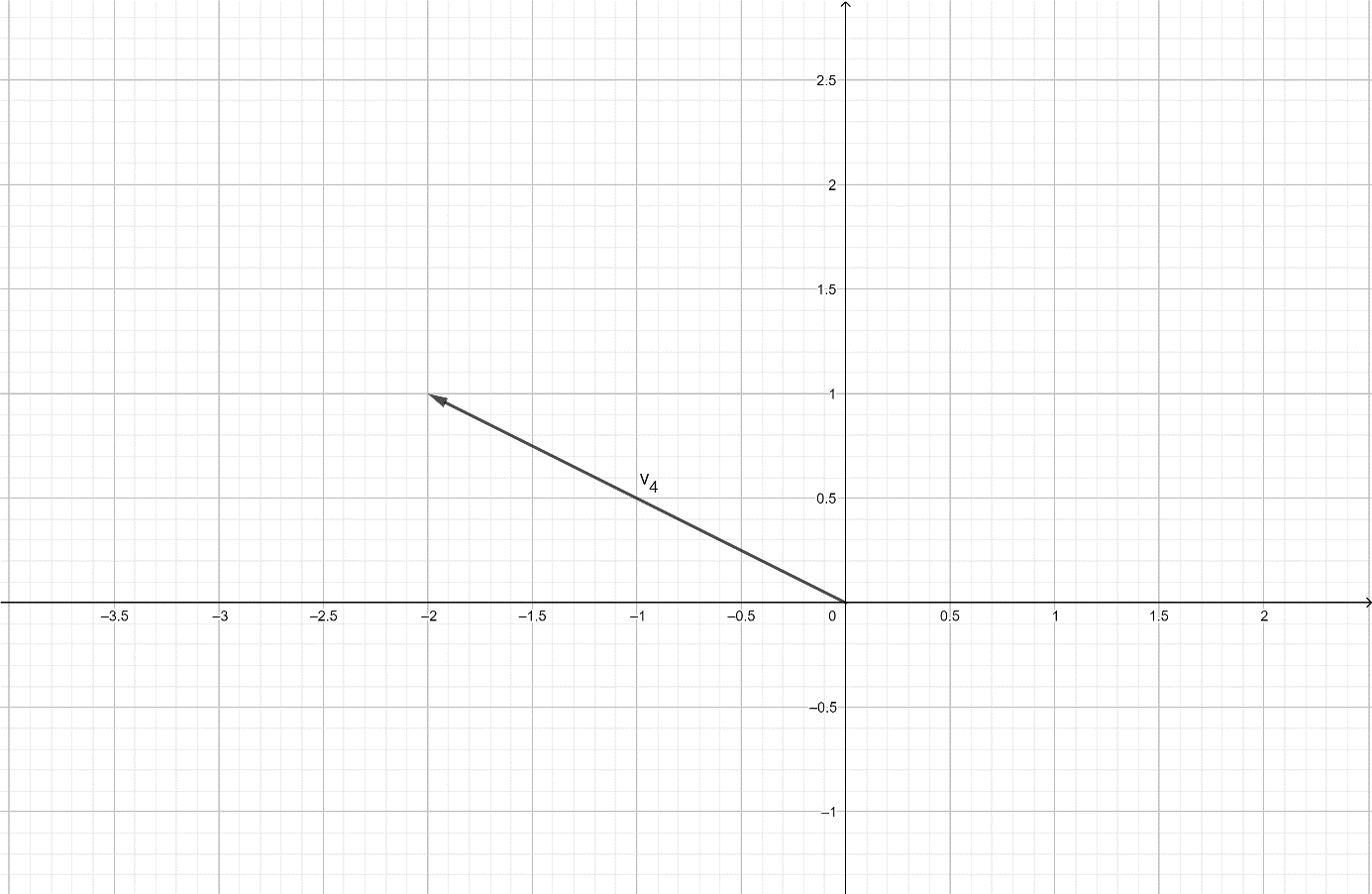
# Theme 3: Linear combinations of vectors

Consider three vectors in the plane og :



Now consider a fourth vector :

1. Would it be possible to express as a linear combination of and ? What about og ? And og ? (PS: it is not necessary to find the numbers to express these combinations)
2. Could we express as a linear combination of **all three** vectors og ? How could we write that? Try to find such a linear combination.
3. In general: What is the chance that we may express a fourth vector as a combination of the three others?

Suppose we now move to 3d. And suppose we have the vectors , , and . Also consider a vector .

1. Is it possible to express as a linear combination of , and ? What about , and ?
2. Is it possible to express as a linear combination of all the vectors , , and ? How would you express that?
3. Is it possible to express as a linear combination of only two of the vectors?
   1. and
   2. What about and
   3. and ?
   4. and ?
   5. and ?
4. Now have a look at the vector ? Is it possible to express this vector as a linear combination of
   1. and
   2. and
   3. and ?
   4. and ?
5. Now you can try to guess: What is the chance that we may express a 3d vector as a linear combination of two other 3d vectors og ? Is there a “hint” that we may use from geometry that could come to our aid here?