UNIVERSITY OF
WATERLOO

# Grade 7/8 Math Circles
November 18, 2020
Introduction to Vectors - Problem Set

1. What is the difference between a scalar and a vector? What two things will a vector tell you? Give an example of each.

2. For each of the following, state whether the quantity given is a scalar or a vector.

    (a) That car was going 40 km/h over the speed limit!.

    (b) Jason moved his desk 5 m.

    (c) Toronto is about 120 km East from Waterloo.

    (d) The line is 7 cm long.

3. Find $\vec{w} + \vec{z}$ and $\vec{u} + \vec{v}$. Use the GeoGebra activity linked at the end of the lesson to create each vector and find the sum. State the length of each sum, in this case each square is one unit in length. State the direction of each sum in terms of North, East, South, or West.
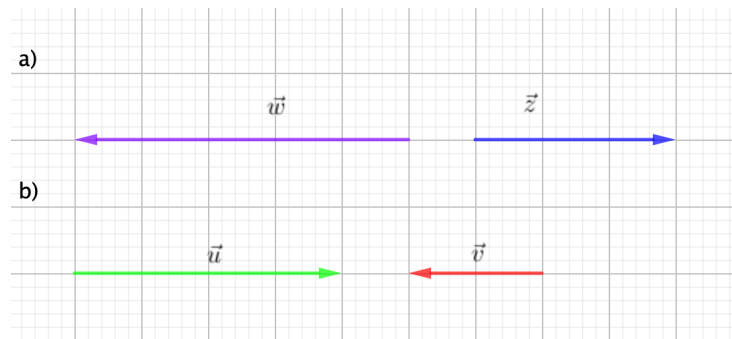
4. Using the same vectors in 3a) and 3b) above:

    (i) Find $\vec{w} - \vec{z}$ and $\vec{z} - \vec{w}$. State the length of the each difference, each square is one unit in length. State the direction of each difference in terms of North, East, South, or West.

(ii) Find $\vec{u} - \vec{v}$ and $\vec{v} - \vec{u}$. State the length of the each difference, each square is one unit in length. State the direction of each difference in terms of North, East, South, or West.

5. Use the GeoGebra activity to draw the following vectors in standard form: $\vec{u} = (2, 7)$, $\vec{v} = (3, -3)$, and $\vec{w} = (6, 0)$.

6. Use the GeoGebra activity to draw the following vectors **not** in standard form: $\vec{u} = (2, 7)$, $\vec{v} = (3, -3)$, and $\vec{w} = (6, 0)$.

7. Use the GeoGebra activity to create the following vectors to solve the following:
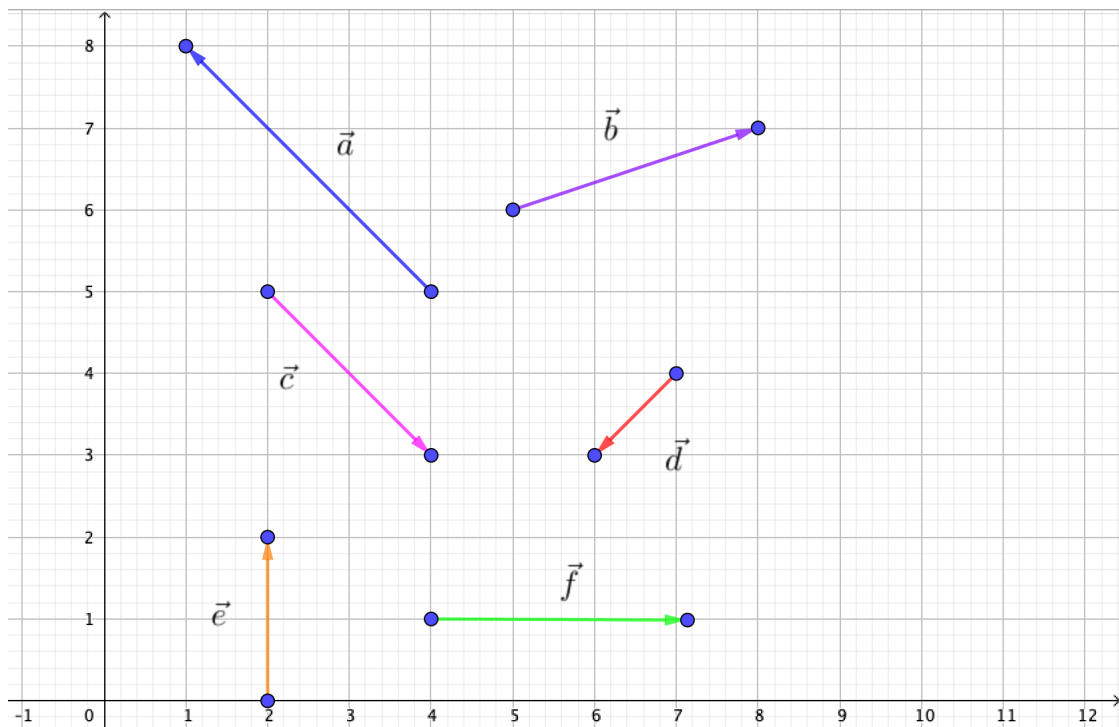
(i) $\vec{a} - \vec{b}$

(ii) $\vec{d} + \vec{c}$

(iii) $\vec{d} - \vec{f}$

(iv) $\vec{e} + \vec{f}$

State each result as a vector. For example if $\vec{a} + \vec{b} = \vec{r}$, then $\vec{r} = (x, y)$.

8. Calculate the size of each of the following vectors: $\vec{u} = (2, 7)$, $\vec{v} = (3, -3)$, and $\vec{w} = (6, 0)$. Use a calculator to show the size up to 2 decimal places.

9. Calculate the size of each of the following vectors. Use a calculator to show the size up to 2 decimal places.