Vectors

(Sorry Cayden – I have used Comic Sans!)

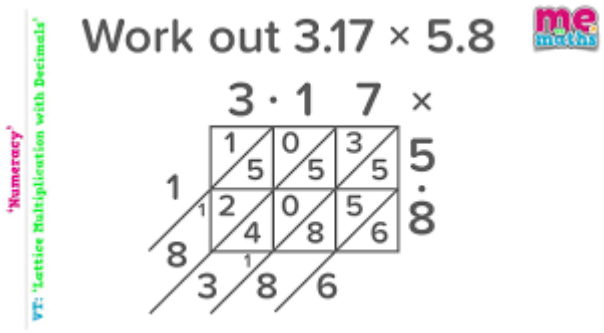
Please work through this work sheet. I suggest that you review the topic on mathswatch first (clip 174) or you could look the topic up on-line in the CGP book on pages 225 – 229.

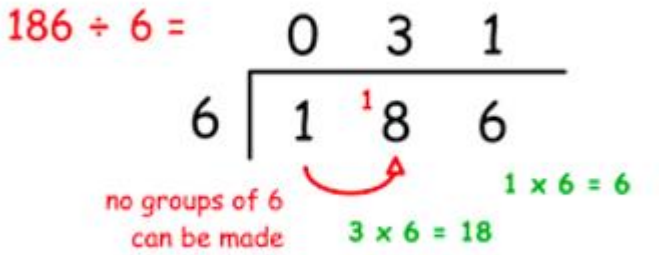
If you able to print it out, then you could keep and put in a folder, if not, write key notes in your book along with your answers. (I will send the answers out next week!)

Once you have done this, I have set up an assignment for you to complete by Friday 24th April on Vectors.

For the rest of the week, assuming you have finished the topics on the revision list for end of year exam…which will not be on April 30th… I recommend that you make time to

- learn any tables you are not comfortable with (or at least start learning them)
- Practice your favoured technique for long multiplication and division (set yourself some questions and then check them on the calculator). Use the Chinese method (Napiers bones) for multiplication, unless your method works all the time and the 'bus stop' for division. (Page 5 & 6)
- You can also use the time to review calculations with fractions. (Pages 42 – 56)



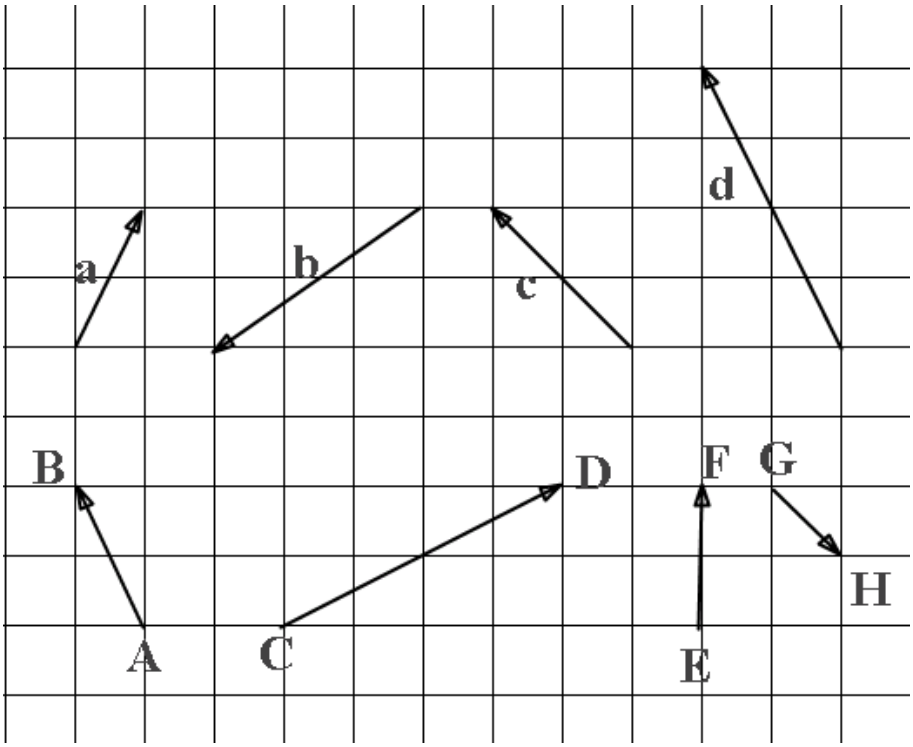


To draw and write vectors

A vector can be written in 3 ways:

e.g. $\underline{a}$ or $\overrightarrow{AB}$ or a column vector $\begin{pmatrix}1\\3\end{pmatrix}$

1. Write each vector as a column vector e.g. **a** = $\begin{pmatrix}1\\3\end{pmatrix}$ or $\overrightarrow{AB} = \begin{pmatrix}-1\\2\end{pmatrix}$



---

2. In your books or on the grid below make a drawing of each vector (a line with an arrow)

$\underline{a} = \begin{pmatrix}3\\-4\end{pmatrix}$ b = $\begin{pmatrix}1\\3\end{pmatrix}$ $\overrightarrow{EF} = \begin{pmatrix}3\\-2\end{pmatrix}$ d = $\begin{pmatrix}0\\-4\end{pmatrix}$ $\overrightarrow{AB} = \begin{pmatrix}2\\-3\end{pmatrix}$ f = $\begin{pmatrix}-2\\3\end{pmatrix}$ g = $\begin{pmatrix}4\\1\end{pmatrix}$ $\overrightarrow{PQ} = \begin{pmatrix}-4\\-3\end{pmatrix}$

To find the resultant by adding vectors

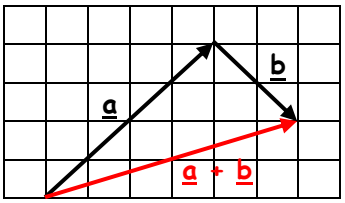
- **The resultant** is the vector that 'results' from adding two or more vectors together e.g. **a** + **b**

e.g. if **a** = $\begin{pmatrix}4\\4\end{pmatrix}$ and **b** = $\begin{pmatrix}2\\-2\end{pmatrix}$

then **a** + **b** = $\begin{pmatrix}4\\4\end{pmatrix} + \begin{pmatrix}2\\-2\end{pmatrix} = \begin{pmatrix}6\\2\end{pmatrix}$

- **The resultant** can also be shown by lining up the head of the one vector with the tail of the other.

e.g. **a** + **b**



The directional arrows are really important ..I tend to put mine in the middle of the line!

Show **a** + **b** (i) as an addition of column vectors
(ii) using the triangle law of vector addition

1. If **a** = $\begin{pmatrix}4\\2\end{pmatrix}$ and **b** = $\begin{pmatrix}1\\3\end{pmatrix}$

1. $\begin{pmatrix}4\\2\end{pmatrix} + \begin{pmatrix}1\\3\end{pmatrix} =$ ☐

2. If **a** = $\begin{pmatrix}6\\3\end{pmatrix}$ and **b** = $\begin{pmatrix}-2\\2\end{pmatrix}$

2. $\begin{pmatrix}6\\3\end{pmatrix} + \begin{pmatrix}-2\\2\end{pmatrix} =$ ☐

3. If **a** = $\begin{pmatrix}3\\-5\end{pmatrix}$ and **b** = $\begin{pmatrix}2\\3\end{pmatrix}$

3. $\begin{pmatrix}3\\-5\end{pmatrix} + \begin{pmatrix}2\\3\end{pmatrix} =$ ☐

4. If **a** = $\begin{pmatrix}2\\5\end{pmatrix}$ and **b** = $\begin{pmatrix}4\\-2\end{pmatrix}$

4. $\begin{pmatrix}2\\5\end{pmatrix} + \begin{pmatrix}4\\-2\end{pmatrix} =$ ☐

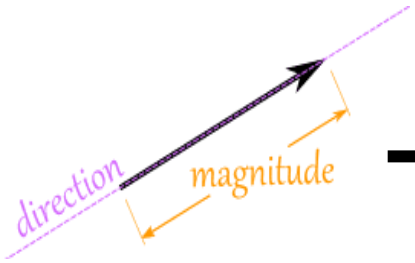
5. If **a** = $\begin{pmatrix}1\\-4\end{pmatrix}$ and **b** = $\begin{pmatrix}3\\0\end{pmatrix}$

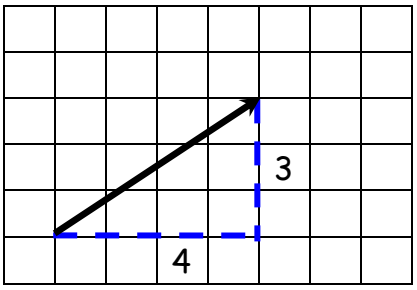
5. $\begin{pmatrix}1\\-4\end{pmatrix} + \begin{pmatrix}3\\0\end{pmatrix} =$ ☐

Make up some of your own to test on someone or yourself!

To calculate the magnitude of a vector

Magnitude is defined as the <u>length</u> of a vector





<u>Magnitude</u> (length) can be calculated using Pythagoras Theorem:
$3^2 + 4^2 = 25$
$\sqrt{25} = 5$

For each of the following column vectors:

(i) Find its magnitude (correct to 2dp if applicable)

(ii) Draw a diagram to show its direction

(a) $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

(b) $\begin{pmatrix} -4 \\ 1 \end{pmatrix}$

(c) $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$

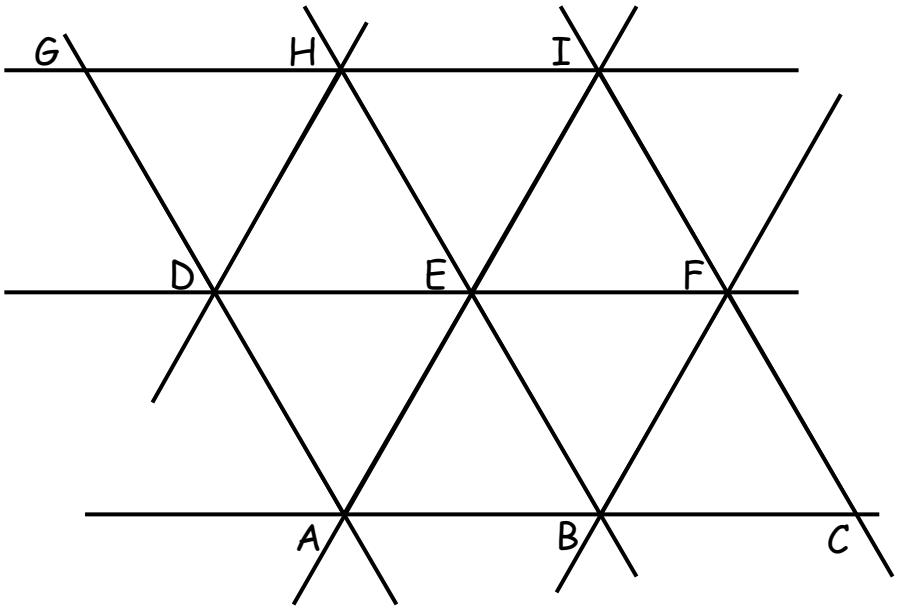
(d) $\begin{pmatrix} -6 \\ -6 \end{pmatrix}$

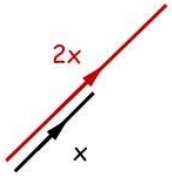
(e) $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(f) $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$

Parallel Vectors

TASK 1





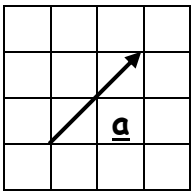
The diagram shows 3 sets of equally spaced parallel lines

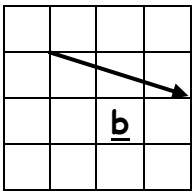
If $\overrightarrow{AC}$ = **p** and $\overrightarrow{AD}$ = **q** , express the following vectors in terms of **p** and **q**

(Remember any line segment that is parallel to AC and is the same length as AC will also be **p**, if it is parallel to $\overrightarrow{AC}$ but is twice as long it will be **2p**, if it goes the other way i.e. CA= **- p** *)*

(a) $\overrightarrow{CA}$=	(b) $\overrightarrow{AG}$=	(c) $\overrightarrow{AB}$=	(d) $\overrightarrow{DF}$=
(e) $\overrightarrow{HE}$=	(f) $\overrightarrow{AF}$=	(g) $\overrightarrow{AH}$=	(h) $\overrightarrow{DC}$=
(i) $\overrightarrow{CG}$=	(j) $\overrightarrow{IA}$=	(k) $\overrightarrow{EC}$=	(l) $\overrightarrow{IB}$=

TASK 2





On the grid below (or in your books) draw the following vectors:

1. **2a**
2. **-a**
3. **2b**
4. **-b**
5. **a + b**
6. **a - b**
7. **b - a**
8. **2a + b**