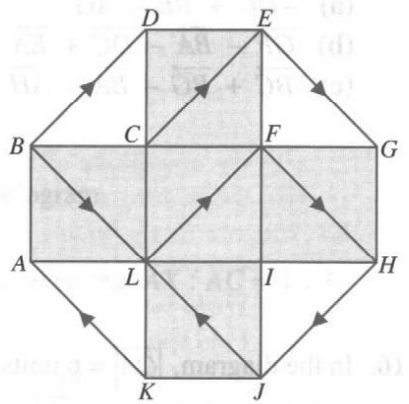
Further Practice

12. In the diagram, *ABCDEFGHIJKL* is formed by five squares and the area of each square is 8 cm^2.



(a) Name all the vectors which are indicated in the diagram that are equal to

(i) $\overrightarrow{BD}$,

(ii) $\overrightarrow{BL}$.

(b) Find

(i) $\left|\overrightarrow{LF}\right|$,

(ii) $\left|\overrightarrow{LF}\right| + \left|\overrightarrow{FH}\right| + \left|\overrightarrow{HJ}\right| + \left|\overrightarrow{JL}\right|$.

(c) Is $\left|\overrightarrow{LF}\right| + \left|\overrightarrow{FH}\right| + \left|\overrightarrow{HJ}\right| + \left|\overrightarrow{JL}\right| = \left|\overrightarrow{LF} + \overrightarrow{FH} + \overrightarrow{HJ} + \overrightarrow{JL}\right|$? Explain your answer.

13. It is given that $\overrightarrow{AB} = \begin{pmatrix} 15 \\ 8 \end{pmatrix}$, $\overrightarrow{CB} = \begin{pmatrix} -16 \\ p \end{pmatrix}$, where p is negative and $\left|\overrightarrow{CB}\right| = 2\left|\overrightarrow{AB}\right|$.

(a) Find $\left|\overrightarrow{AB}\right|$.

(b) Find the value of p.

(c) Hence, find

(i) $\overrightarrow{AC}$,

(ii) $\left|\overrightarrow{AC}\right|$.

14. The diagram on the right shows the vectors **a** and **b**. Using the same scale, draw each of the following on graph papers.

(a) $\mathbf{a} - 2\mathbf{b}$

(b) $2\mathbf{a} + \mathbf{b}$

(c) $-2\mathbf{a} + \mathbf{b}$

(d) $\mathbf{a} + 3\mathbf{b}$

(e) $-\mathbf{a} - 2\mathbf{b}$

(f) $3\mathbf{a} + 2\mathbf{b}$

(g) $\frac{1}{2}\mathbf{a} - \mathbf{b}$

(h) $-\frac{3}{2}\mathbf{a} - 2\mathbf{b}$