Vectors

1. Name these vectors two ways.

a)

$\underline{u}$

B

A

b)

S

$\underline{n}$

T

c)

E

$\underline{v}$

F
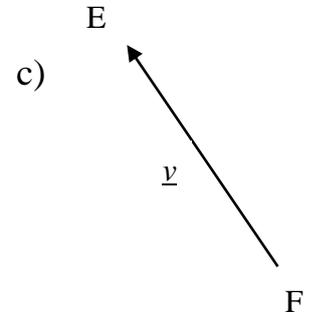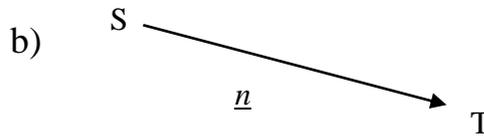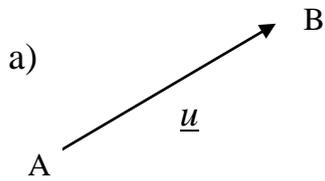
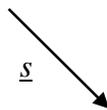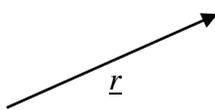2. Using vectors $\underline{r}$ and $\underline{s}$, sketch

a) $2\underline{r}$ b) $3\underline{s}$ c) $3\underline{r} + \underline{s}$ d) $\underline{r} - \underline{s}$ e) $2\underline{s} - \underline{r}$

$\underline{r}$

$\underline{s}$

3. On squared paper, draw and label representatives of the following vectors.

a) $\underline{u} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ b) $\underline{t} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ c) $\overrightarrow{MN} = \begin{pmatrix} -3 \\ -4 \end{pmatrix}$

4. Given $\underline{r} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $\underline{p} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$, find:-

a) $\underline{r} + \underline{s}$ b) $\underline{r} - \underline{s}$ c) $2\underline{r}$ d) $3\underline{s}$ e) $4\underline{r} + 2\underline{s}$

f) $-\underline{r}$ g) $\underline{s} - \underline{s}$ h) $5\underline{r} - \underline{s}$

5. For each of the following sets of points, find the components of the vector joining the first point to the second.

a) A (2,4) B (5,1)   b) C (6,3) D (-2, 2)   c) E (5,-4) F (-4, -3)

6. Calculate the magnitude of the vector between each pair of points. Leave your answer in simplified surd form.

a) G (2,-5) H(-1,3)   b) I (-3,-4) J (6,0)   c) K (-3,-4) L (6,8)

7. Given that $\underline{a} = \begin{pmatrix} 2 \\ -3 \\ 2 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} -1 \\ 2 \\ 4 \end{pmatrix}$, find

a) $4\underline{a}$
b) $3\underline{b}$
c) $2\underline{a} - 3\underline{b}$
d) $|\underline{a}|$

e) $|2\underline{a} + 4\underline{b}|$
f) $|\underline{a} - 3\underline{b}|$

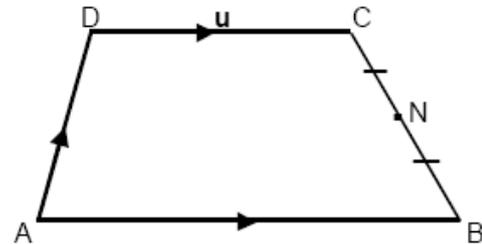8. Solve these vector equations for vector $\underline{x}$

a) $\underline{x} + \begin{pmatrix} 1 \\ -3 \\ 2 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \\ -4 \end{pmatrix}$
b) $\underline{x} - \begin{pmatrix} -2 \\ -3 \\ 5 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix}$
c) $3\underline{x} = \begin{pmatrix} 21 \\ -9 \\ 18 \end{pmatrix}$

d) $2\underline{x} + \begin{pmatrix} 1 \\ 5 \\ -4 \end{pmatrix} = \begin{pmatrix} 7 \\ 9 \\ -6 \end{pmatrix}$

9. In the trapezium AB = 2DC and AB is parallel to DC

In terms of u and v, write down the vectors

(a) $\overrightarrow{AB}$ (b) $\overrightarrow{AC}$ (c) $\overrightarrow{BC}$ (d) $\overrightarrow{AN}$

10. A cuboid crystal is placed relative to the coordinate axes as shown.

a) Write down $\overrightarrow{BC}$ in component form.

b) Caculate $|\overrightarrow{BC}|$