**Vectors Exam Questions**

1.



$OPQ$ is a triangle.
$T$ is the point on $PQ$ for which $PT:TQ=2:1$

$\vec{OP}=a$ and $\vec{OQ}=b$.

(a) Write down, in terms of $a$ and $b$, an expression for $\vec{PQ}$

$\vec{PQ}=$……………………

(1)

(b) Express $\vec{OT}$ in terms of $a$ and $b$.
Give your answer in its simplest form.

$\vec{OT}=$……………………

(2)

(Total 3 marks)

2. $ABCD$ is a straight line.



$O$ is a point so that $\vec{OA}=a$ and $\vec{OB}=b$

$B$ is the midpoint of $AC$.
$C$ is the midpoint of $AD$.

 Express, in terms of $a$ and $b$, the vectors

(i) $\vec{AC}$

.....................................

(ii) $\vec{OD}$

.....................................

(Total 3 marks)

3. Diagram NOT accurately drawn



$ABCD$is a parallelogram. $AB$is parallel to $DC$*.*$AD$is parallel to $BC$*.*

$\vec{AB}=p$$\vec{AD}=q$

(a) Express, in terms of $p$ and $q$

(i) $\vec{AC}$

.....................................

(ii) $\vec{BD}$

.....................................

(2)



$AC$and $BD$are diagonals of parallelogram $ABCD$*.*$AC$and $BD$intersect at $T$*.*

(b) Express $\vec{AT}$ in terms of $p$ and $q$.

.....................................

(1)

(Total 3 marks)

4.



$OABC$ is a parallelogram.

 $P$ is the point on $AC$ such that $AP=\frac{2}{3}AC$

 $\vec{OA}=6a$ $\vec{OC}=6c$

(a) Find the vector $\vec{OP}$
Give your answer in terms of $a$ and $c$

..............................

(3)

 The midpoint of $CB$ is $M$.

(b) Prove that $OPM$ is a straight line.

(2)

(Total 5 marks)

5.



$OPQ$ is a triangle.
$R$ is the midpoint of $OP$.
$S$ is the midpoint of $PQ$.
$\vec{OP}=p$ and $\vec{OQ}=q$

(i) Find $\vec{OS}$ in terms of $p$ and $q$.

$\vec{OS}=$..........................

(ii) Show that $RS$ is parallel to $OQ$.

(Total 5 marks)

6.



$OPQR$ is a trapezium with $PQ$ parallel to $OR$.

 $\vec{OP}=2b$$\vec{PQ}=2a$ $\vec{OR}=6a$

 $M$ is the midpoint of $PQ$ and $N$ is the midpoint of $OR$.

(a) Find the vector $\vec{MN}$ in terms of $a$ and $b$.

$\vec{MN}=$...................................

(2)

$X$ is the midpoint of $MN$ and $Y$is the midpoint of $QR$*.*

(b) Prove that $XY$ is parallel to $OR$*.*

(2)

(Total 4 marks)

7.



Diagram NOT accurately drawn

$OAB$ is a triangle. $B$ is the midpoint of $OR$.
$Q$ is the midpoint of $AB$.

 $\vec{OP}=2a$ $\vec{PA}=a$$\vec{OB}=b$

(a) Find, in terms of $a$ and $b$, the vectors

(i) $\vec{AB}$

..........................................

(ii) $\vec{PR}$

..........................................

(iii) $\vec{PQ}$

..........................................

(4)

(b) Hence explain why $PQR$ is a straight line.

(2)

The length of $PQ$ is 3 cm.

(c) Find the length of $PR$.

.................................... cm

(1)

(Total 7 marks)

8.



The diagram shows a regular hexagon $ABCDEF$with centre $O$.

$\vec{OA}=6a$$\vec{OB}=6b$

(a) Express in terms of $a$ and/or $b$

(i) $\vec{AB}$

.....................................

(ii) $\vec{EF}$

.....................................

(2)

 $X$is the midpoint of $BC$.

(b) Express $\vec{EX}$in terms of $a$ and/or $b$

 .....................................

(2)

 $Y$is the point on $AB$extended, such that $AB:BY=3:2$

(c) Prove that $E$, $X$and $Y$lie on the same straight line.

(3)

(Total 7 marks)