Test Revision C1

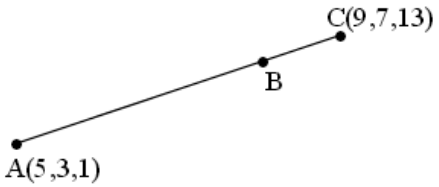
1. The points W, X and Y have coordinates (-2, 3, 1), (-1, 5, 2) and (3, 13, 6) respectively.

   (a) Write down the components of $\overrightarrow{WY}$.

   (b) Hence show that the points W, X and Y are collinear.

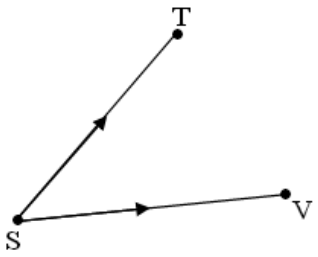
2. The point B divides AC in the ratio 3:1, as shown in the diagram.

   Find the coordinates of B.



3. The diagram, opposite, shows vectors $\overrightarrow{ST}$ and $\overrightarrow{SV}$ where

$$\overrightarrow{ST} = \begin{pmatrix} -2 \\ 3 \\ 0 \end{pmatrix} \quad \text{and} \quad \overrightarrow{SV} = \begin{pmatrix} 1 \\ 1 \\ 3 \end{pmatrix}$$



   (a) Find $\overrightarrow{ST}.\overrightarrow{SV}$

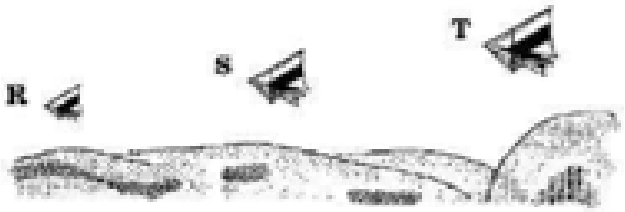
   (b) Hence find the size of angle TSV.

4. The point Q divides the line joining $P(-1,-1,0)$ to $R(5,2,-3)$ in the ratio 2 : 1.

   Find the coordinates of Q.

5. Relative to the top of a hill, three gliders have positions given by R(–1, –8, –2), S(2, –5, 4) and T(3, –4, 6).

   Prove that R, S and T are collinear.



6. ABCD is a quadrilateral with vertices $A(4,-1,3)$, $B(8,3,-1)$, $C(0,4,4)$ and $D(-4,0,8)$.

   (a) Find the coordinates of M, the midpoint of AB. 1

   (b) Find the coordinates of the point T, which divides CM in the ratio 2 : 1. 3

   (c) Show that B, T and D are collinear and find the ratio in which T divides BD. 4

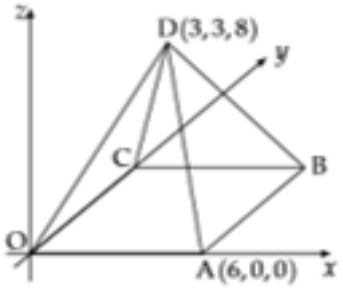
7. An aircraft flying at a constant speed on a straight flight path takes 2 minutes to fly from A to B and 1 minute to fly from B to C. Relative to a suitable set of axes, A is the point (–1, 3, 4) and B is the point (3, 1, –2). Find the co-ordinates of the point C. 3

8. The diagram shows a square-based pyramid of height 8 units.

Square OABC has a side length of 6 units.

The coordinates of A and D are (6,0,0) and (3,3,8).

C lies on the y-axis.



(a) Write down the coordinates of B. 1

(b) Determine the components of $\overrightarrow{DA}$ and $\overrightarrow{DB}$. 2

(c) Calculate the size of angle ADB. 4

9 (a) Simplify $\log_a 40 - \log_a 5$

(b) Simplify $\log_{12} 3 + 2\log_{12} 2$

10 Solve $e^x = 1.9$

11 Solve $\log_3(x-5) = 2$

12. (a) Simplify $\log_5 6a + \log_5 7b$.

(b) Express $\log_b x^7 - \log_b x^4$ in the form $k\log_b x$

[3]

13. Solve. $\log_4(x-1) = 3$

14. (a) Simplify $\log_4 3p - \log_4 2q$.

(b) Express $\log_a x^2 + \log_a x^3$ in the form $k\log_a x$

[3]

15. Explain why $x = 0{\cdot}399$ is a solution of the following equation to 3 significant figures:

$e^{5x+1} = 20$

[2 + #2.2]