Collinearity

1. In each question below show whether the given points are collinear or not.
   Where the points are collinear, state the ratio in which B divides AC.

   (a) A(1,2,-3) B(3,4,-1) C(4,5,0) (b) A(4,2,-1) B(5,3,0) C(8,6,3)

   (c) A(2,0,-1) B(2,1,-1) C(2,7,2) (d) A(1,2,-2) B(2,1,-2) C(6,-3,-2)

   (e) A(-1,0,4) B(1,4,2) C(4,10,-1) (f) A(6,-3,0) B(4,-1,2) C(1,2,5)

2. In each question below show whether the given points are collinear or not.
   Where the points are collinear state the ratio AB:BC.

   (a) A(1,-2,3) B(3,0,1) C(8,5,-4) (b) A(-8,-6,5) B(-3,4,0) C(0,10,-3)

   (c) A(3,1,-4) B(5,4,0) C(9,10,8) (d) A(-4,-3,6) B(0,-1,16) C(6,2,31)

3. The points A(3,-1,2), B(5,3,1) and C(11,3p,-2) are collinear.
   Find the value of p.

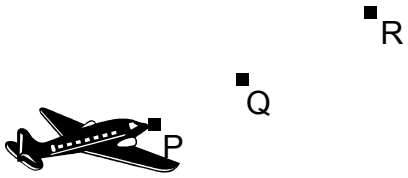
4. The points P(1,-4,2), Q(a,-6,8) and R(10,-10,b) are collinear.
   Find the values of a and b.

5. Given that M(2,0,-1), Q(4,6,3) and P(5,c,5d) are collinear, find c and d.

6. An aeroplane is flying over the North Sea.
   The plane is at position P and can see two oil-rigs Q and R.
   In relation to a given origin the 3 points have coordinates

   P(3,1,4) Q(5,3,6) R(8,6,9)

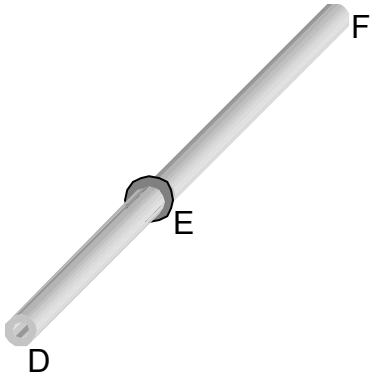
   If the plane continues flying in a straight line,
   will it pass over both Q and R?



7. Two pieces of pipe are joined at E, as shown opposite.
   In relation to a given origin the coordinates of
   points D, E and F are

   D(3,1,4) E(6,5,10) F(12,13,22)

   Are the two pieces of pipe joined in a straight line?



8. In relation to a given origin a tanker is located
   at a point with coordinates (-4,-8,8). Two
   hours later the tanker has moved to a position
   with coordinates (1,2,3).
   If the ship continues on its current course
   will it collide with a stationary submarine
   sitting on the surface at a position of
   (3,6,2)?