3CD Mathematics Specialist WACE Revision

**3D Vectors**

Questions are taken from VCE Secondary Papers

**2009**

Machine generated alternative text: Question 3
Resolve the vector 5i + j + 3 into two vector components, one which is parallel to the vector —2j — 2j + k and
one which is perpendicular to it.

**Answers**

**Machine generated alternative text: parallel: 21 + 2j — k perpendicular: 31 — j + 4k**3.

**2008**

Machine generated alternative text: Question 8
The coordinates of three points aieA(1. 0.5), B(—1. 2.4) and C(3. 5.2).
-4
a. Express the vector AB in the fozm xi + yj + zk

Machine generated alternative text: b. Find the coodiiiates of the point D such that .4BCD is a parallelogram.

Machine generated alternative text: e. Prove that AB CD is a rectangle.

**Answers**

Machine generated alternative text: —2i+2j—k8. a.

Machine generated alternative text: (5. 3.3)  b.

c. Show ONE pair of adjacent sides are at right angles OR show that diagonals have the same length.

**2007**

Machine generated alternative text: Question 4
nauEc1ait approacbing an auport with velocity y = 301— 40j — 4k is observed on the control tower radar seen
at time t = O seconds. Ten seconds later it passes over a naviation beacon with position vector —5001 + 2500j
relative to the base of the control tower, at an altitude of 200 metres.
Let i and j be hotizontal othogonal iuut vectors and let k be a unit vector in the vertical direction. Displacement
components are meastuied in metres
a. Show that the position vector of the aircraft relative to the base of the control tower at time tis given by
r(t) =(30t—800)i+(2900—40t)j+(240—4t)k.

Machine generated alternative text: b. When doe’. the aircraft land and how far (coirect to the nearest metre) from the base of the control tower
is the point of landing?

Machine generated alternative text: e. At tat angle from the nmway couect to the neet tenth of a degree. does the airciafi land’

Machine generated alternative text: d. At ‘iat time. correct to the nearest second. is the aircraft closest to the base of the control tower?

Machine generated alternative text: e. What distance does the aircraft travel from the time it is observed on the radar screen to the time it lands?
Give yow answer coniect to the nearest metre.

**Answers**

Machine generated alternative text: r(t)=3Oti—4Otj—4rk±c. —500i+2500j±200k=300i—400j—40k+c.

4. a.

Machine generated alternative text: 

b.



c.

Machine generated alternative text: rv=O z3O(3Ot—8OO)—4O(29OO—4Of)—4(24O—4t)=O,whichgivest56seconds

d.

Machine generated alternative text: D=.J302 +402 +42 x60. or other method, gives D = 3010m

e.