**Core Pure 1**

**Vectors**

Chapter Overview

**1**: Equations of straight lines in 3D

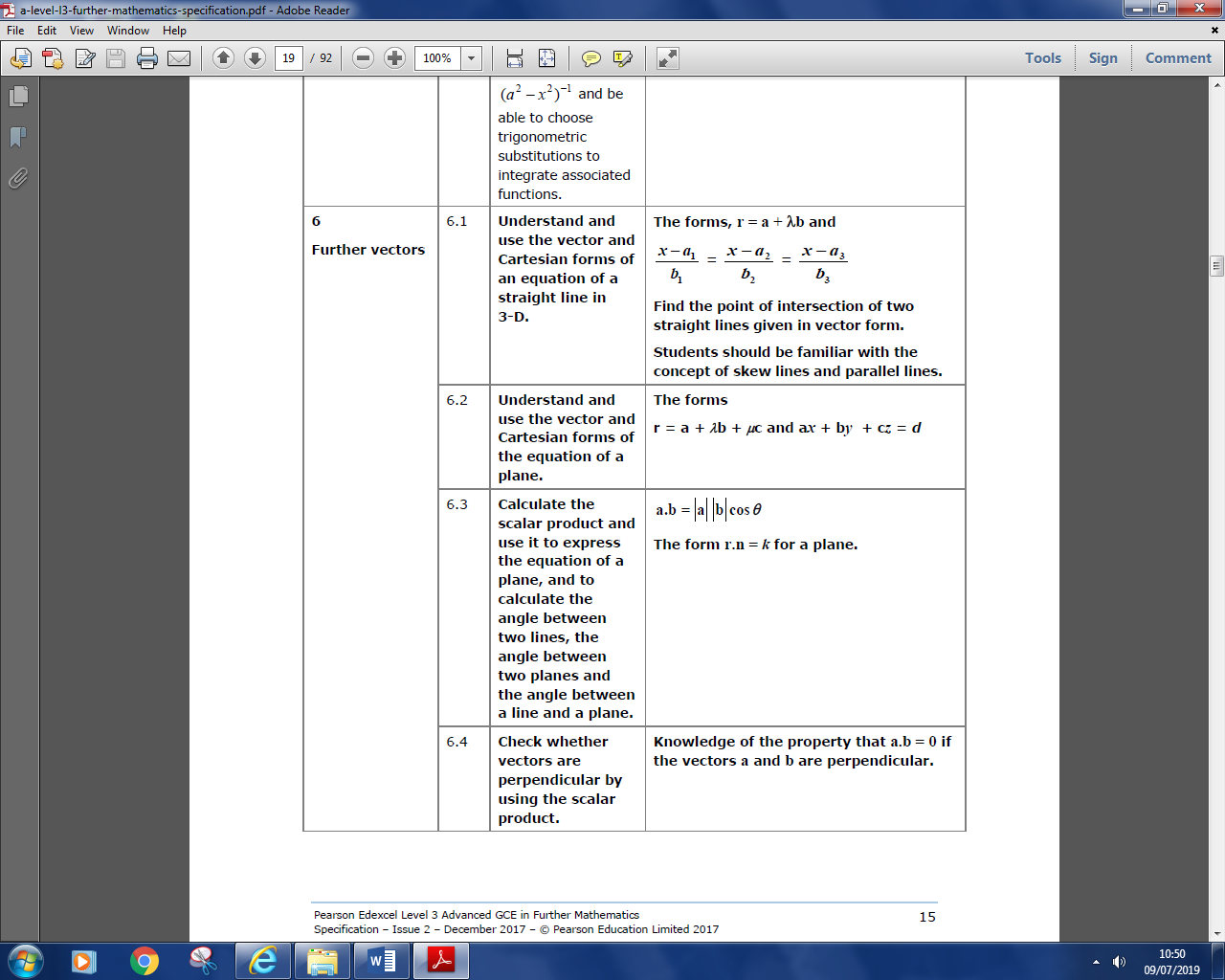
**2**: Equations of planes

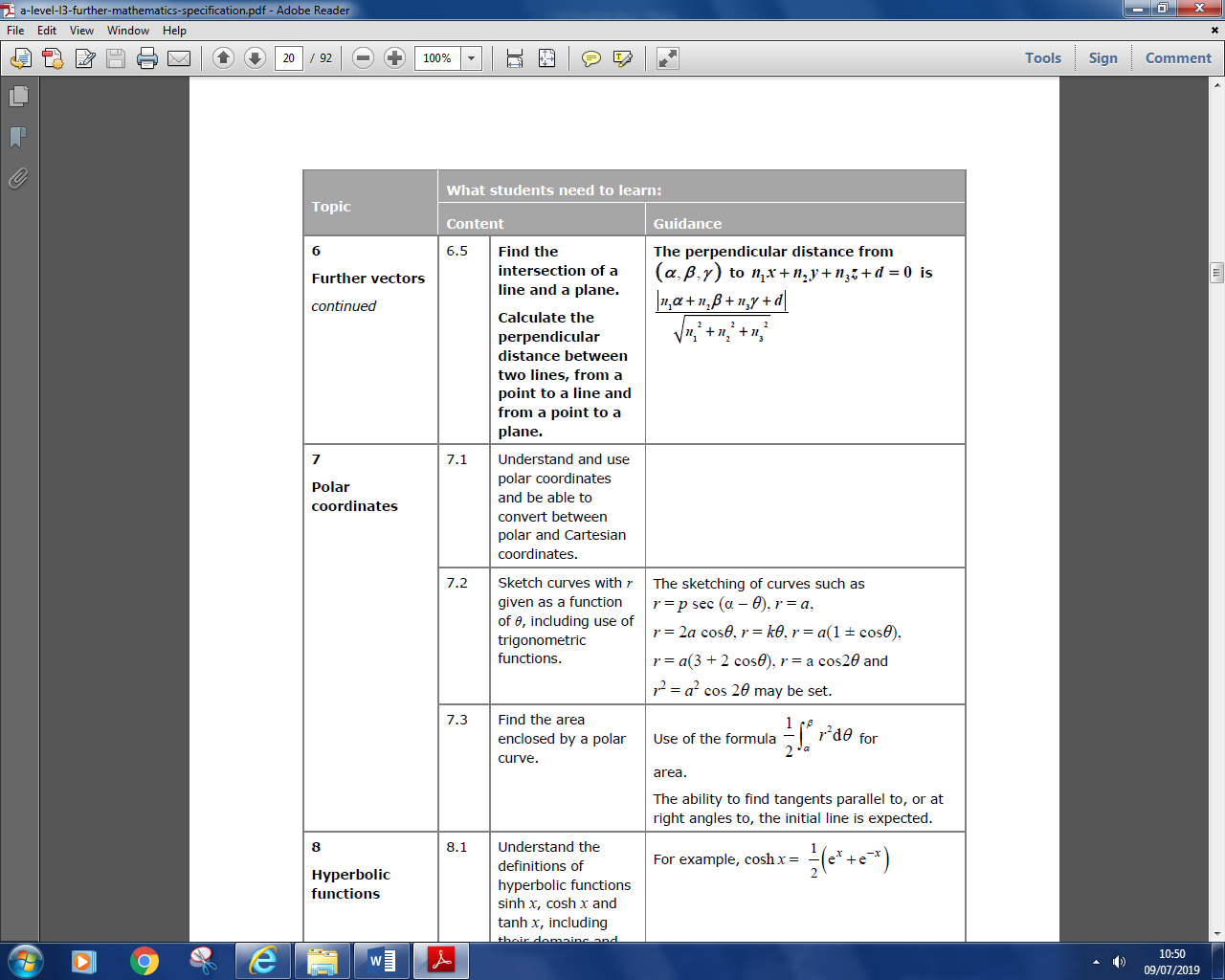
**3:** Scalar product and angles between line + line or plane + line or plane + plane.

**4:** Scalar product form of equation of plane

**5**: Point of intersection of two planes

**6**: Perpendicular distance between line + line or point + line or point + plane





The Vector Equation of a Line

**Important understanding points:**

* and are constants (i.e. fixed for a given line) while is a variable.
* It is often helpful to write as a single vector, e.g:
* It is very important the you can distinguish between the **position vector**  of a **point on the line**, and the **direction**  of the line

Examples

1. The equation of line is

Find the vector equation of a line parallel to which passes through the point .

1. The equation of line is

Find the coordinates of the points on which are a distance of 3 away from .

1. Find a vector equation of the straight line which passes through the point , with position vector and is parallel to the vector .
2. Find a vector equation of the straight line which passes through the points and , with coordinates and respectively.
3. The straight line has vector equation . Given that the point lines on , find the value of and the value of .
4. The straight line has vector equation .   
   Show that another vector equation of is

Test Your Understanding

Find a vector equation of the straight line which passes through the points and , with coordinates and respectively.

Final Example

The line has equation , and the point has position vector .

1. Show that does not lie on .

Given that a circle, centre , intersects at points and , and that has position vector ,

(b) find the position vector of .