INCONSISTENT EQUATIONS

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| Solutions do not existEquations are INCONSISTENT | 3 planes parallel | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var10.gif |
|  | 2 planes parallel | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var7.gif |
|  | Lines of intersection parallel | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var8.gif |

3 planes, 3 inconsistent equations

Equations cannot be solved

ALL 3 PLANES ARE PARALLEL

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| **x + 2y +  3z = 10    (1)3x + 6y +  9z =  4    (2)4x + 8y + 12z = 7    (3)****Equations coefficients are multiples of each others (constant term does not)**3 x Eqn(1) = Eqn(2)4 x Eqn(1) = Eqn(3)Constants don't multiplyhttp://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var10.gif | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var4.gif |

2 PLANES ARE PARALLEL

|  |  |
| --- | --- |
| **x + 2y +  3z = 10    (1) 3x + 6y +  9z =  4    (2) 3x +  y + 2z = 6    (3)****Two equations have coefficients are multiples of each others (constant term does not)**3 x Eqn (1) = Eqn (2) so they are parallelConstants don't multiplyhttp://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var7.gif | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var11.gif  |

PARALLEL LINES OF INTERSECTION

###  x + 2y +  3z = 10    (1) 2x + 3y +  2z =  4    (2) 4x + 7y + 8z = 7    (3)

### Two Equations have coefficients which can be scaled and combined to produce the third equation (constant term does not)

2 x Eqn (1) + Eqn (2) = Eqn(3)

Constants don't multiply



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| Note the similarity between these two situations |
| http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var9.gif | http://maths.nayland.school.nz/Year_13_Maths/3.2_Linear_Programming/equations_images/2_3var8.gif |
| **Equations can be solved****A LINE of solutions****Dependent Equations****Solving the equation results in something like 0 = 0 which is always true so there is infinite solutions****x + 2y +  3z = 10    (1) 2x + 3y +  2z =  4    (2) 4x + 7y + 8z = 24    (3)****Two Equations can be scaled and combined to produce the third equation**2 x Eqn (1) + Eqn (2) = Eqn(3)Constants DO multiply | **Equations can NOT be solved****No solutions****Inconsistent Equations****Solving the equation results in something like 0 = 3 which is never true so there is no solutions****x + 2y +  3z = 10    (1) 2x + 3y +  2z =  4    (2) 4x + 7y + 8z = 7    (3)****Two Equations have coefficients which can be scaled and combined to produce the third equation (constant term does not)**2 x Eqn (1) + Eqn (2) = Eqn(3)Constants don't multiply |
| Changing the constant term in equation (3) changes the planes position (still being parallel) |