Y12 Mathematics Induction 202022

Complete a set of GCSE Higher level questions (showing method as well as answers) relating to:
- Linear Equations
- Simultaneous Equations
- Inequalities
- Function notation
- Kinematics
- Statistics

Work needs to be completed on A4 squared paper, showing a clear and 'vertical' lay out.
Marks are given for method as well as final solution; the answer alone is not sufficient.

All these topics are assumed knowledge at AS level Maths.

- You should use your initiative and consult sources such as **MyMaths,, Mr.Barton** as well as **other Internet sources or books** …your own GCSE books should help

Linear and Quadratic Equations

1 $8(x + 5) + 4(2x + 8) = 8$ (2)

2 $\dfrac{2y + 3}{3} + \dfrac{y + 1}{4} = 4$ (3)

3 $\dfrac{4x + 3}{x - 6} = \dfrac{3x + 4}{x - 2}$ (5)

4 $\dfrac{x + 2}{x + 8} + \dfrac{x - 5}{2x - 9} = 1$ (5)

Simultaneous Equations; by Elimination and by Substitution

1 $5x + 6y = -7$

   $8x - 4y = 16$ (5)

2 $y = x^2 - 4x - 7$

   $y = 3 - x$ (4)

3 $2x^2 + 2y = 4$

   $y = x + 2$ (4)

Linear Inequalities

1    $15 - 2x < 5$ (1)

2    $\dfrac{x+5}{7} > 9-x$ (3)

3    $\dfrac{1}{2} \le \dfrac{4x+5}{2} \le 1$ (3)

4    $\dfrac{3x-1}{5} - \dfrac{x+1}{2} \le 3$ (4)

5    $x^2 + x > 2$ (5)

Function notation

1    $f(x) = x^2 + ax + b$

       (3)

     $f(0) = 7$ and $f(-2) = 17$

     Find the values of a and b.

2   Here are two functions: $f(x) = 2x^3 + x^2 - 2x + 6$

                                  $g(x) = x^3 + x^2 - 4x - 5$

     Solve this equation: $f(x) = 2g(x)$

                                             (3)

Kinematics

The graph shows information about the velocity, v m/s, of a parachutist t seconds after leaving a plane.
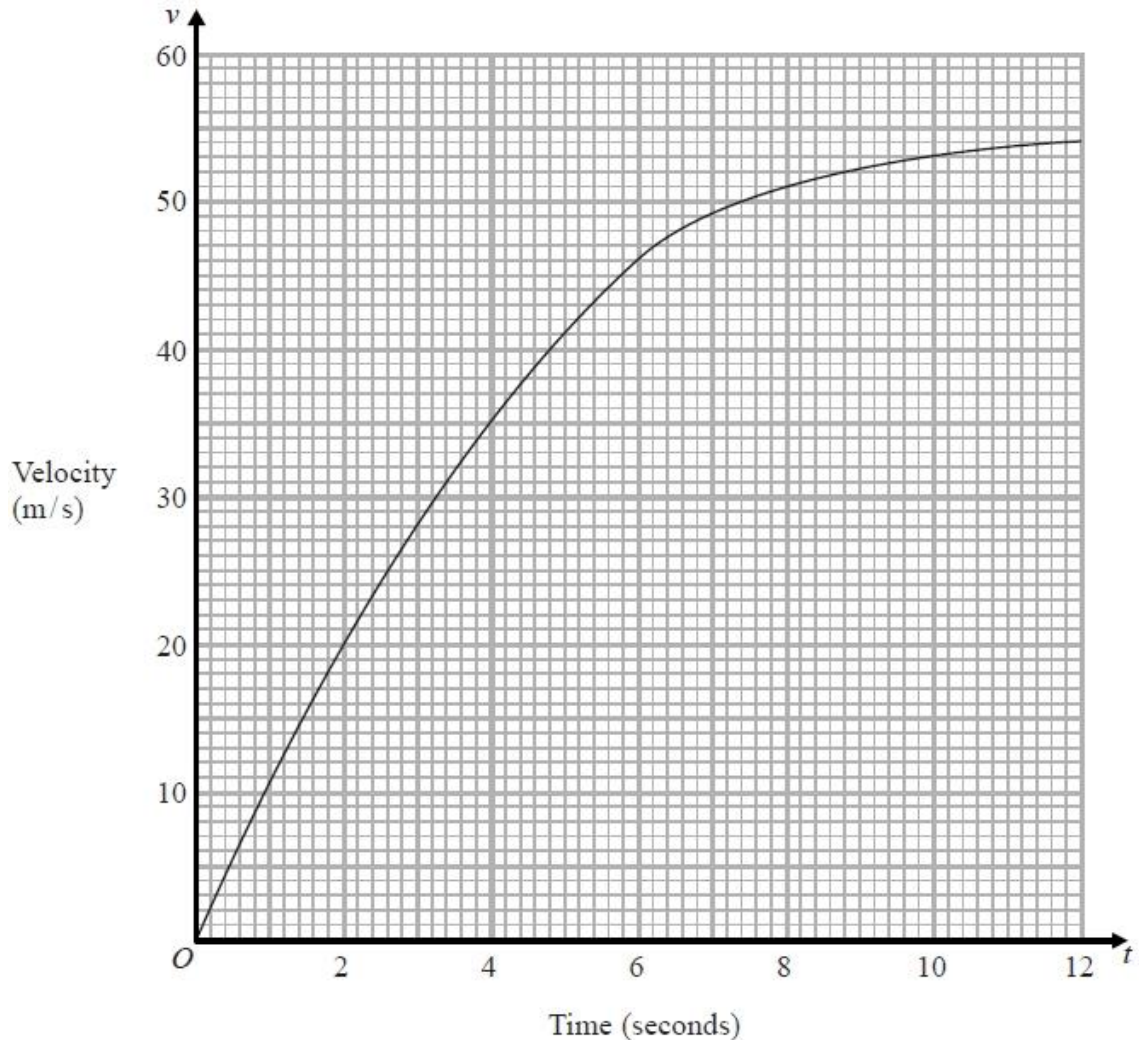
(a)   Work out an estimate for the acceleration of the parachutist at $t = 6$

(2)

(b)   Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane.
Use 3 strips of equal width.

(3)

(c)   Explain and/or show whether your answer is an overestimate or an under estimate

(1)

Statistics

There are 180 employees in a school.

The table shows the number of each type of employee in the school.

Teachers	Teaching Assistants	Admin	Other
94	16	41	29

(a) A stratified sample of size 50 is required.

Calculate the number of each type of employee that should be chosen.

(2)

(b) Describe a method to obtain a stratified sample of size 50 from the employees in the school.

(2)