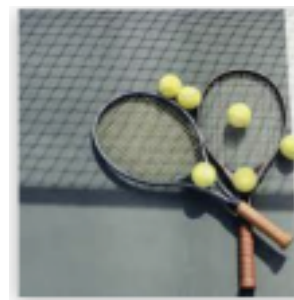


## Year 10 Maths Assessment 2: Tennis



### Linear and non-linear patterns and graphs

#### ***Introduction***

This assessment is based on mathematical modeling of tennis shots. In science you used linear graphs to find the relationship between the height from which a ball is bounced and the rebound height.

In Maths you will use your skills of patterns and linear/ non-linear relationships to model the path of a tennis ball as it is hit.

You must show full working in all parts of this assessment.

#### **Part A: Linear pattern**

A mechanical tennis ball has been released and its distance and time has been recorded in the table below.

Time (t) sec	1	2	3	4	5	6	7	t
Distance (D) m	1	?	5	?	9	?	?	D

1. Complete this table by filling the ?.
2. Work out the rule using algebra for this pattern.  $D =$

3. Use your rule to calculate the distance the ball would travel in 20 seconds.

4. How long will it take the ball to travel a distance of 21.5m?

NOTE: You can use your own graph paper to plot and then insert the image.

5. Plot these points on the graph below.



### **Part B Tennis shots**

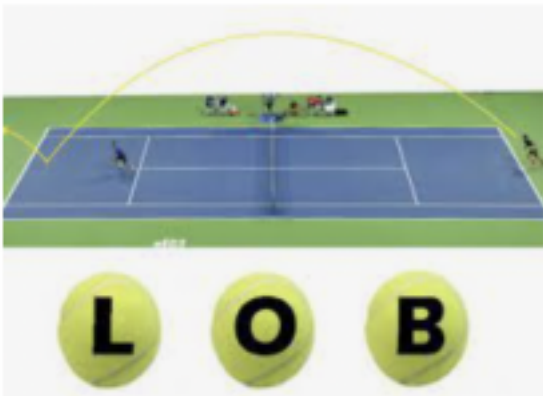
1. Rafa hits a tennis ball at location (2,-4) and it lands at location (-4,5).

- a) Plot these coordinates on the graph below.
- b) Join the coordinates to draw a straight line.
- c) Model the path of the ball using the linear equation  $y=mx+c$ .

d) Explain what  $m$  means in the context of the tennis shot.

a) e) Explain what  $c$  means in the context of the tennis shot.

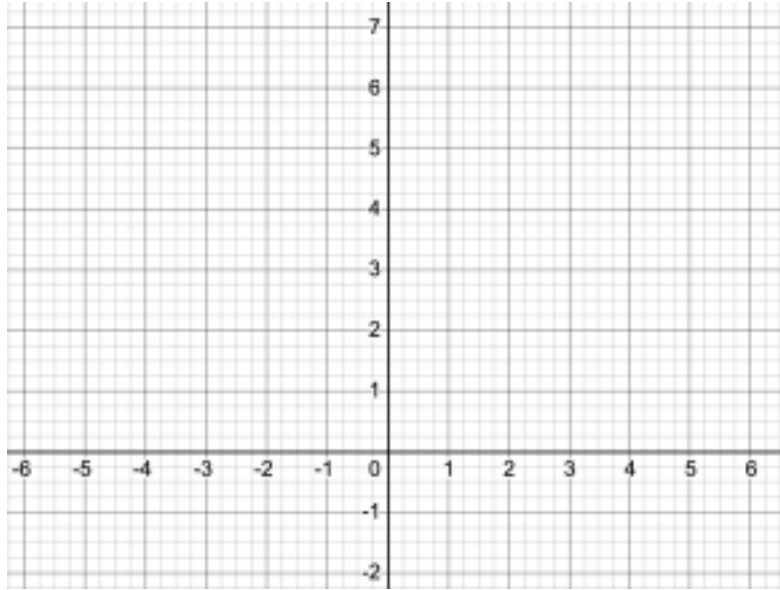
### **Part C: Nonlinear path. Lob tennis shot**



This shot can be modeled by a quadratic equation.

$$y=A(x-b)(x+c)$$

1. A ball was lobbed. Its locations are shown below.  
 $(-5,0)$ ,  $(0,5)$ ,  $(5,0)$ . Plot these points on the graph with a free hand below.
2. What's the name of this type of graph?
3. Model the path of this ball with a nonlinear equation.
4. Explain in terms of this lob shot what these three locations of the ball mean.



*The quality of your working and how well you link this to the context will determine your overall grade.*

TAAB

<b>Patterns and Relationships</b>	You have attempted to plot the coordinates and predict the path of the tennis ball	You have plotted the coordinates and formed an equation or represented a path using a linear graph.	You have calculated the rule, formed a linear graph and graphed the path of the tennis balls.	You have applied the skills of linear and non-linear graphical relationships to model the path of a tennis shot.
<b>Time Management</b>	You have not submitted your assessment on time	You have submitted the assessment .	You have submitted the assessment by the due date	You have submitted the assessment by the due date
<b>Overall</b>	Working Towards curriculum level	Working AT curriculum level	Working ABOVE curriculum level	Working BEYOND curriculum level

Patterns and graphs

You have attempted to plot the coordinates and represent the path of a tennis ball.

You have plotted the coordinates and formed an equation or represented a path using a linear graph.

You have calculated the rule, formed a linear equation and graphed the path of the tennis balls.

You have applied the skills of linear and nonlinear graphical relationships to model the path of a tennis shot.

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