# Projectile Motion 2

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15 March 2011

# Lesson Objectives

1. To recognize projectile-like problems
2. To check understanding via motion graphs
3. To complete exam-style problems in time!

*Textbook pp. 122–123; 128–129*

# Specification Requirement

*Independence of vertical and horizontal motion; problems will be soluble from first principles. The memorizing of projectile equations is not required.*

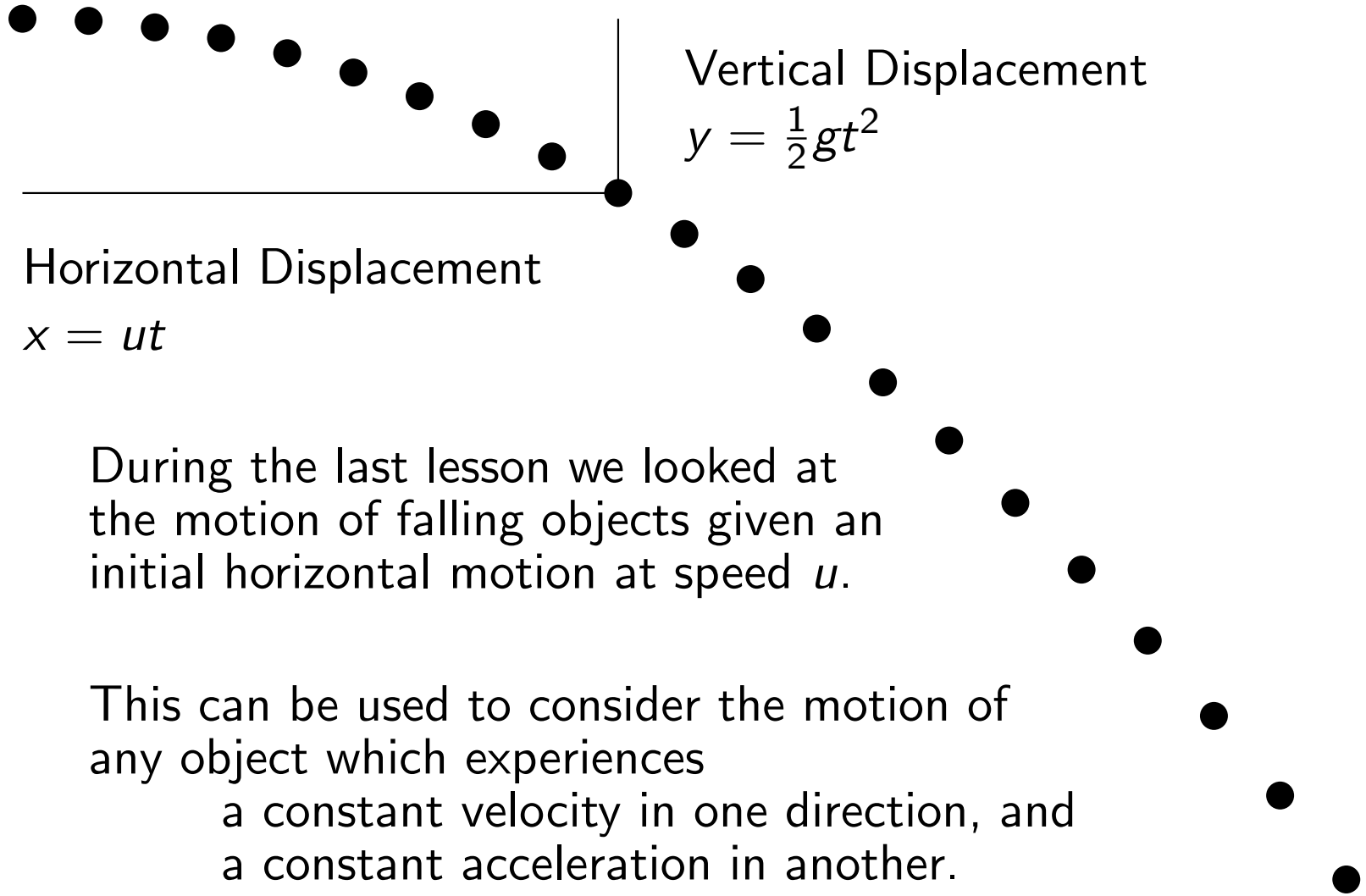
[AQA GCE AS and A Level Specification Physics A, 2009/10 onwards]

# First Problem...

This problem is taken from a real exam question [Jan 2009]. You have 6 minutes to complete it.
We shall go through it together and mark our own answers.

*Before I forget...*
Homework – "Projectiles assessed homework" from E:HEBER
Have people looked at E:HEBER since last week? The slides and questions from last lesson are there!

# Recognizing projectile-like problems



Vertical Displacement

$y = \frac{1}{2}gt^2$

Horizontal Displacement

$x = ut$

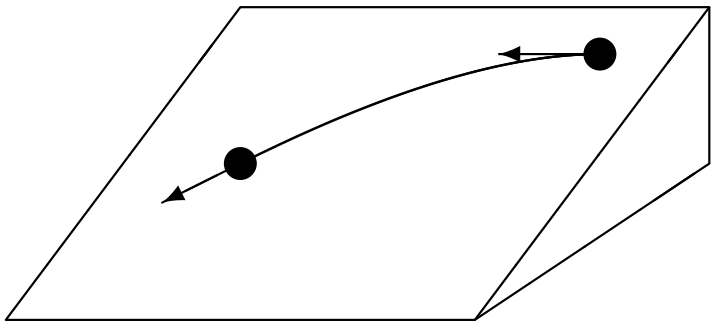
During the last lesson we looked at the motion of falling objects given an initial horizontal motion at speed $u$.

This can be used to consider the motion of any object which experiences

- a constant velocity in one direction, and
- a constant acceleration in another.

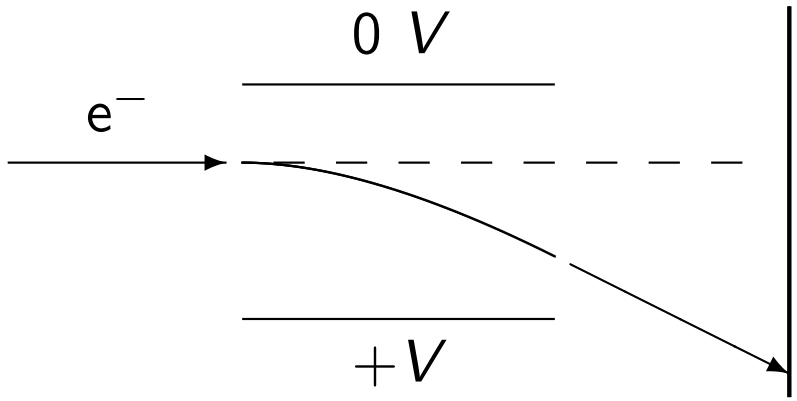
# Projectile-like motion

**Example 1** A ball rolling across an inclined plane



# Projectile-like motion

**Example 2** Electron beam between charged plates

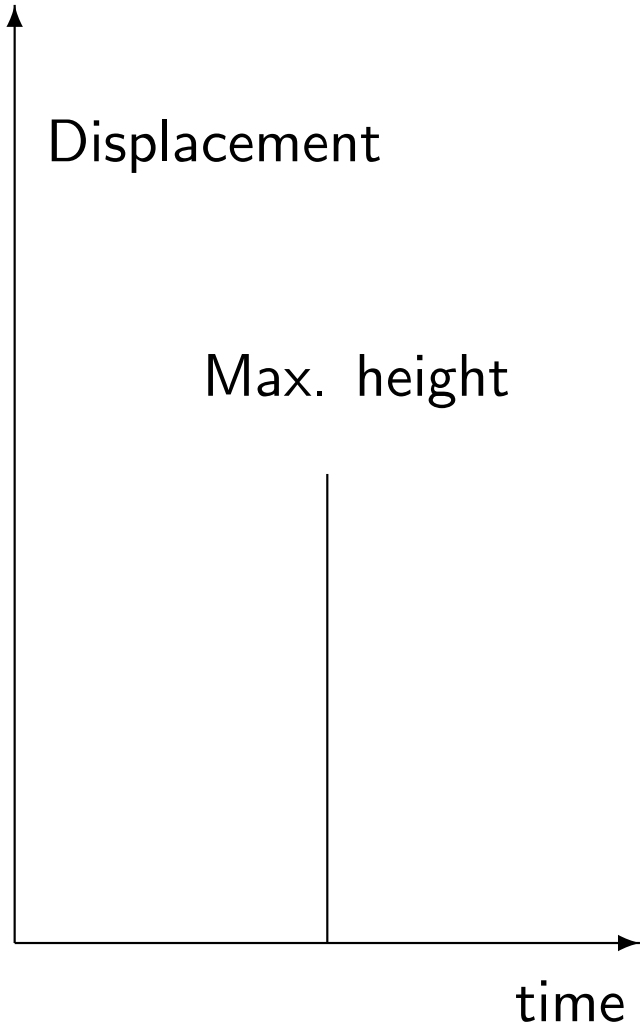


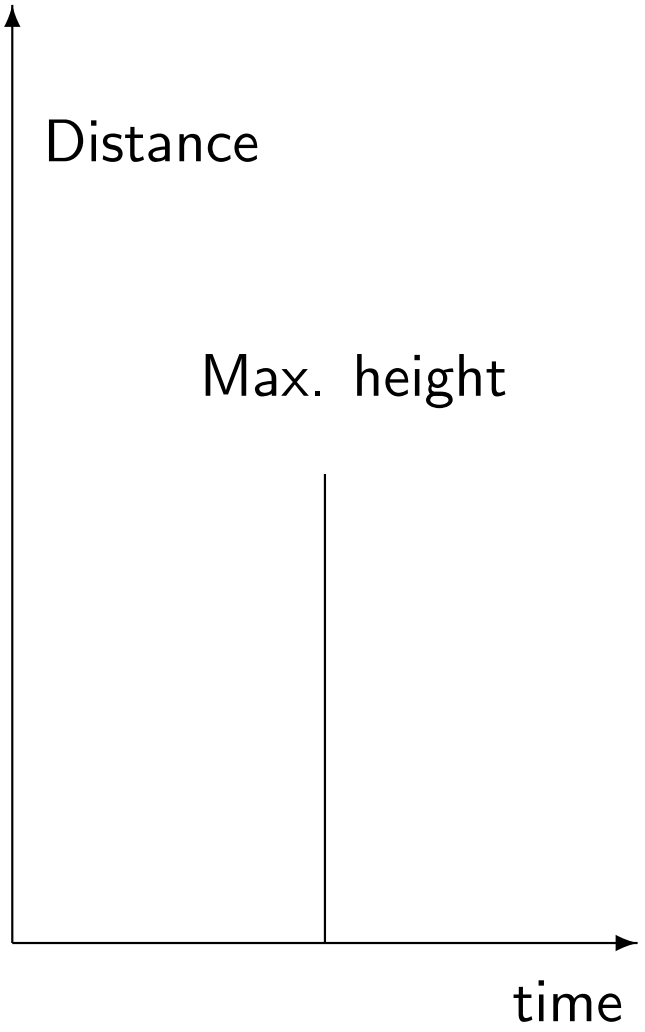
# A Question for you to do:

A ball is projected horizontally at 0.52 m $s^{-1}$ across the top of an inclined board which is 60 cm wide (horizontally) and 120 cm high (vertically in the direction of the incline). The ball reaches the bottom of the board in 0.9 s. Calculate the following:

- the distance travelled across the board,
- its acceleration on the board,
- its speed at the bottom of the board,
- the angle the board makes with the horizontal.

# Projectile motion graphs (object thrown upwards)



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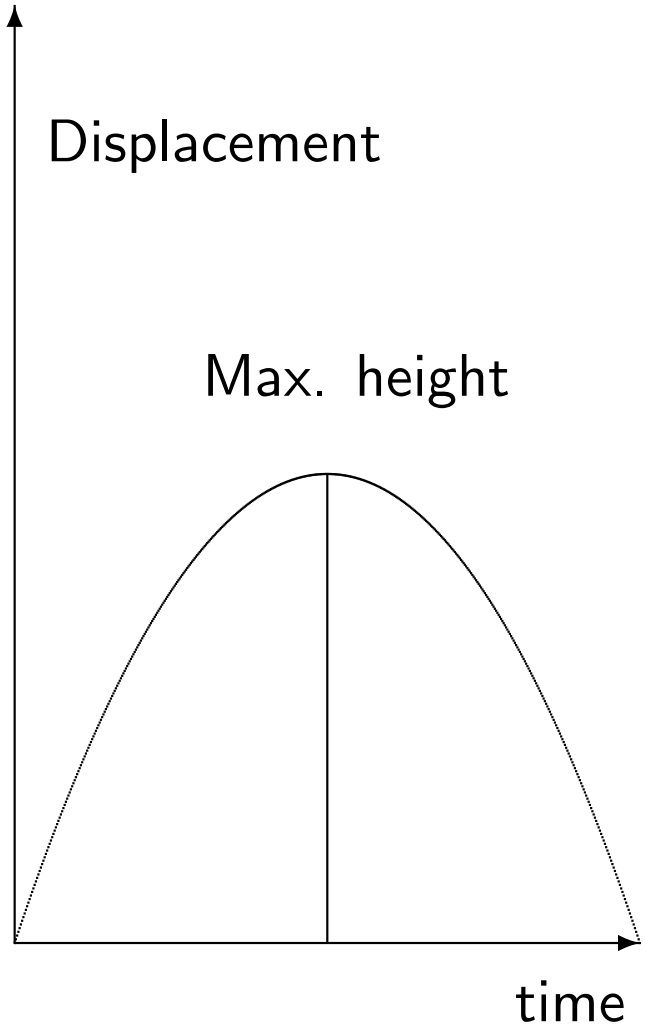


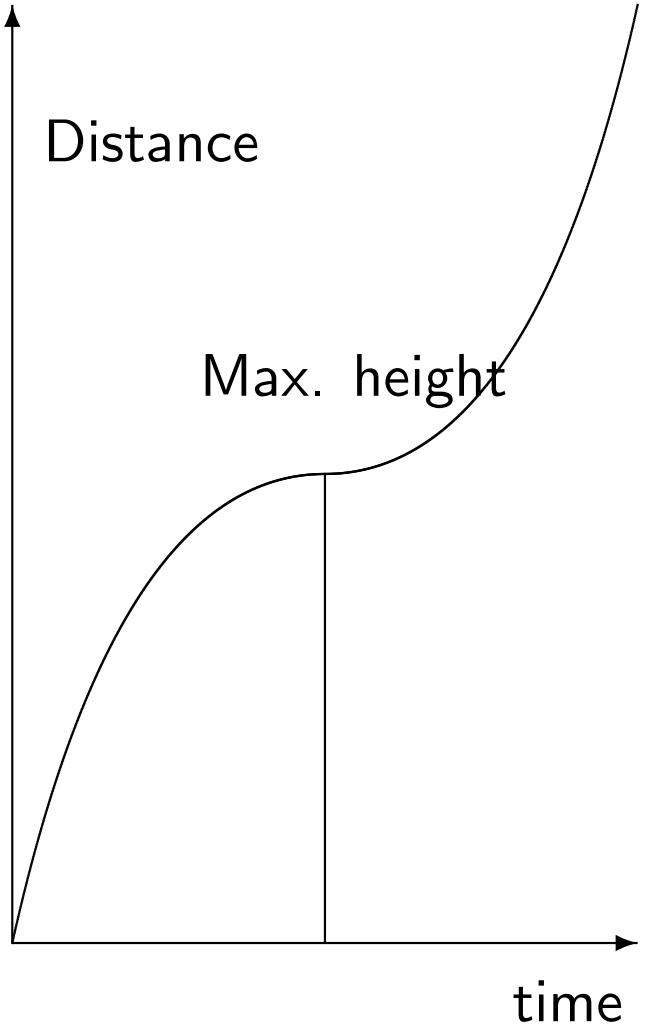

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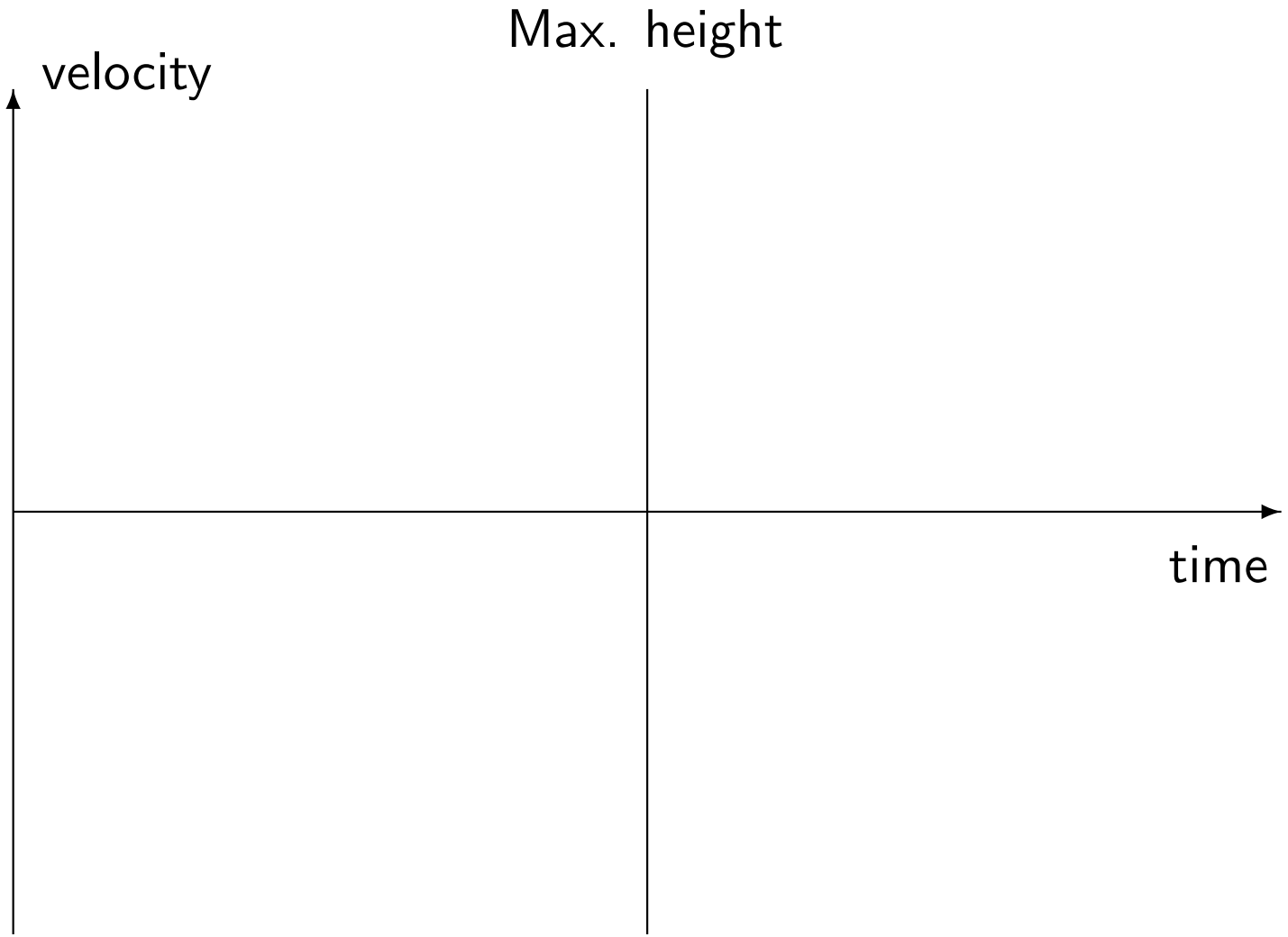

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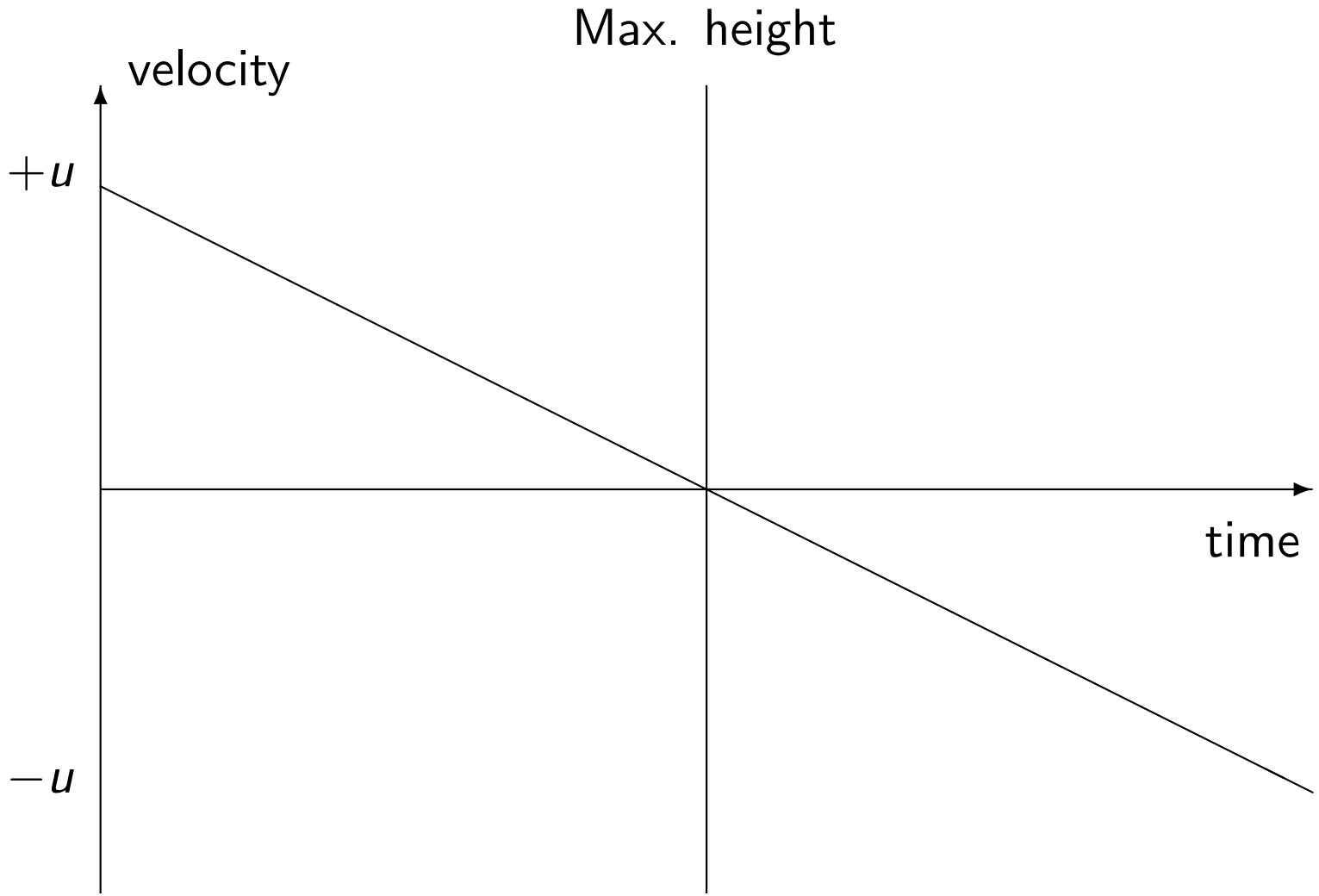

# Summary

1. Only simple vertical only and/or horizontal only initial motion is considered by our AS specification
2. Motion graphs can be asked and aid understanding
3. We've touched on how to deal with the general case of being launched with a projection at an angle

Which leads you nicely to the next topic [MTa]...