Open Interactive Physics

Draw long rectangle for shapes to run over.
Anchor it.

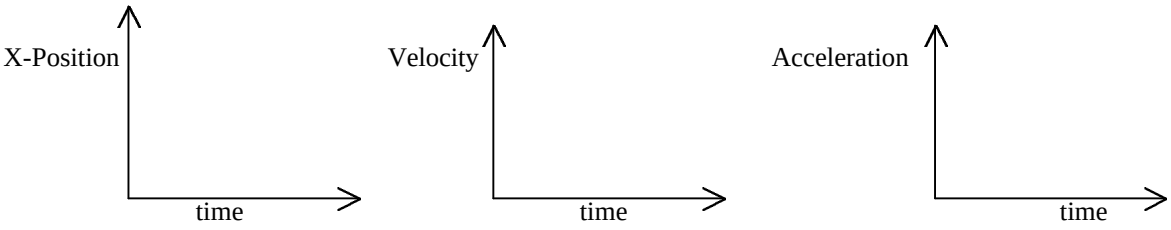
Draw square object.
Open Window Appearance. Colour in object. Close window.

Click Run. Click Stop. Click Reset.
Click square. Place mouse pointer on dot in centre of square. Drag to the right. A blue arrow showing a **V** (for velocity) appears.
Click Run. Click Stop. Click Reset.
Change length of arrow.
Click Run. Click Stop. Click Reset.

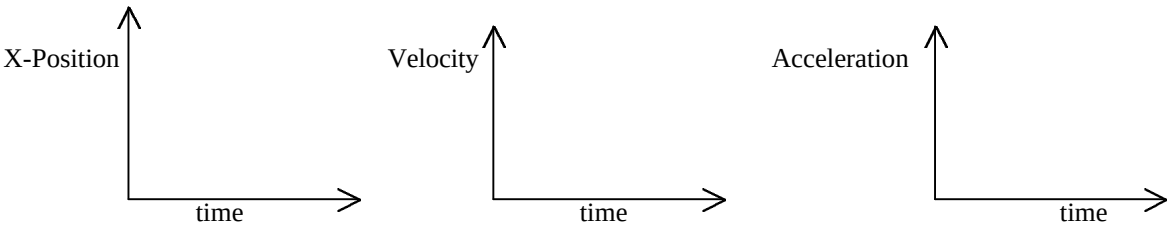
Click on square. Open Object. Friction. Reduce friction to zero.
Click Run. Click Stop. Click Reset.
If object runs off screen to quickly, reduce length of **V** arrow.
Click Run. Click Stop. Click Reset.

Now we can produce graphs of the motion.
Click on object. Open Measure. Position. X Graph. Open Measure. Velocity. X Graph. Open Measure. Acceleration. X Graph. Arrange 3 graphs across top of screen.

Reduce V to nothing.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.

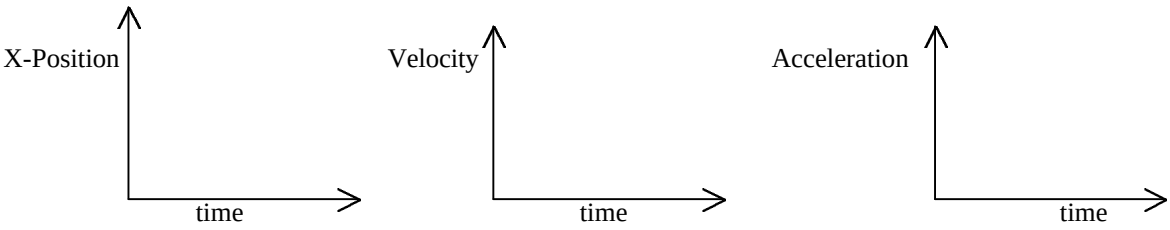


Give the object a horizontal velocity.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.

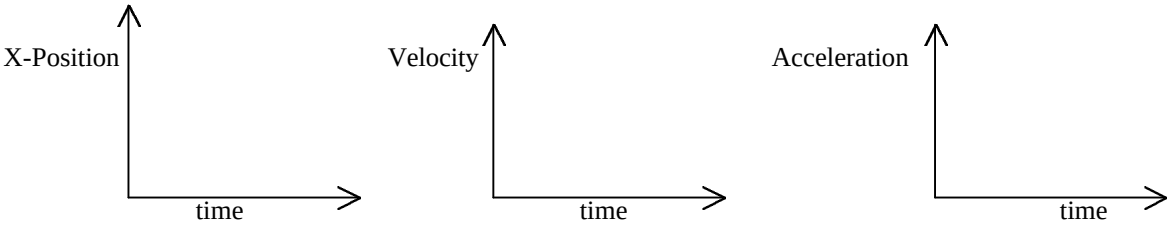


Clicking on arrow in top left can change representation of motion on graphs. Try it. See what happens.
Return to original display.

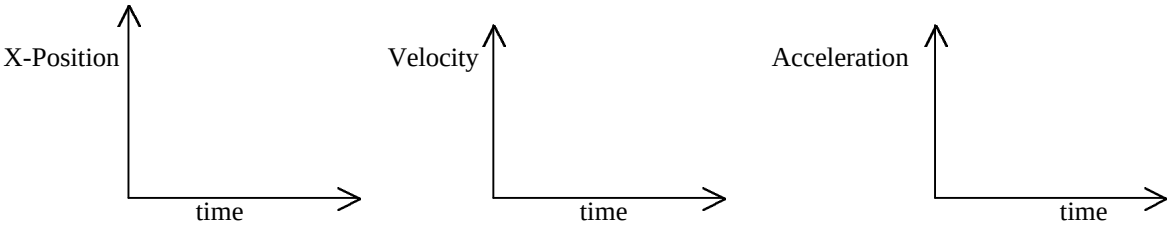
Give the object a new horizontal velocity.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



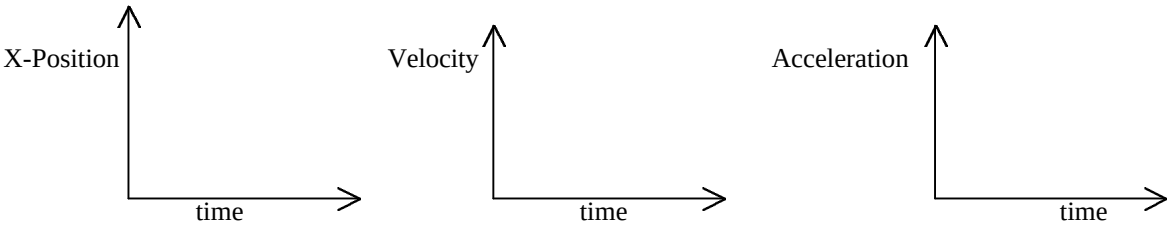
Sketch on axes below sketch **graphs of a higher velocity**.



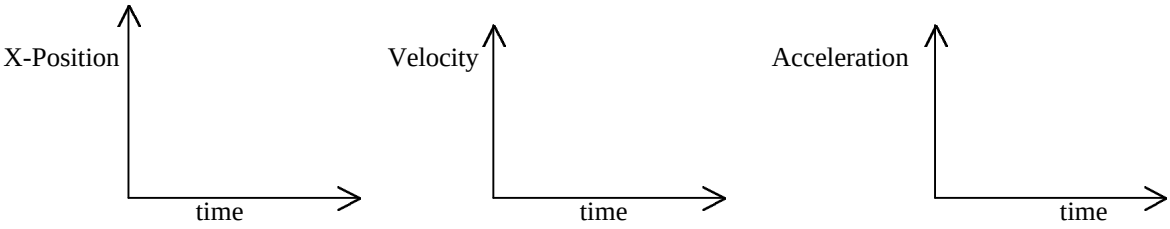
Sketch on axes below sketch **graphs of a lower velocity**.



Drag object to right hand end of surface. Give it a velocity to the left.
Click Run. Click Stop. Click Reset.
Look at graphs. Particularly the zero position.
Sketch on axes below.

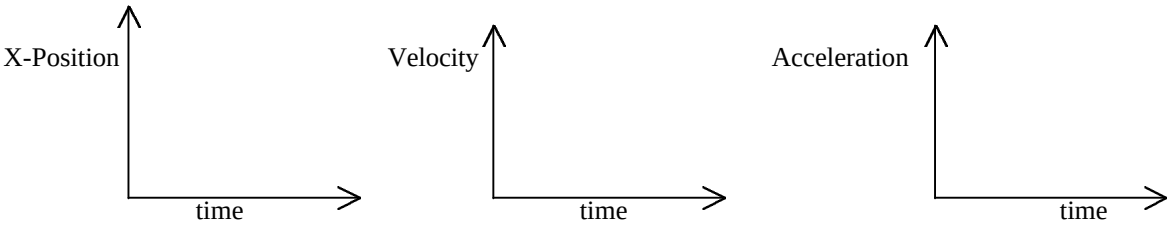


Return object to left hand end of surface. Give the object a friction value of 0.050. (Click on square. Open Object. Friction. Move slide until 0.050 shows at top). Give the object a horizontal velocity.
Click Run. Click Stop. Click Reset. Adjust **V** so that the object stops just before the end of the surface.
Look at graphs.
Sketch on axes below. Show point at which object stopped.

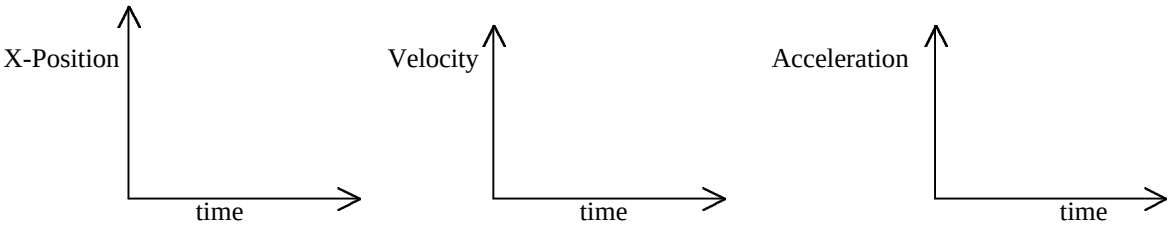


Increase friction. Note the effect it has on the graphs. Draw a second line on the above axes.

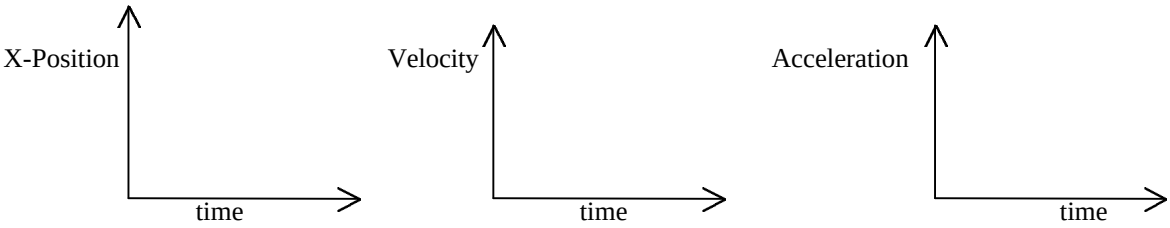
Turn off friction.
Arrow in bottom left box can be used to apply a force to the square.
Click on arrow. Move to left hand side of box. Press button, and drag to left. Make a short arrow (a small force).
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



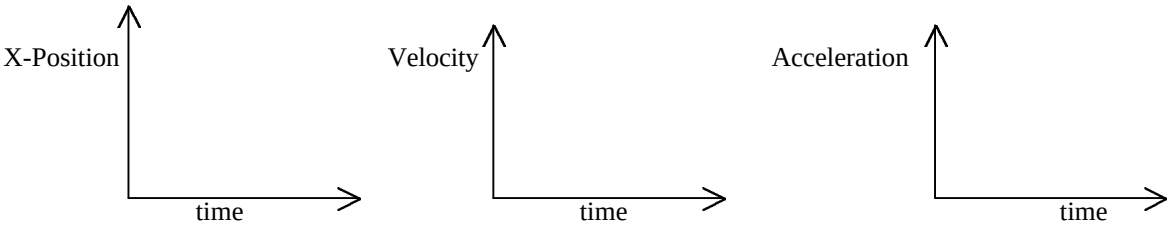
Increase force. Drag left end of arrow.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



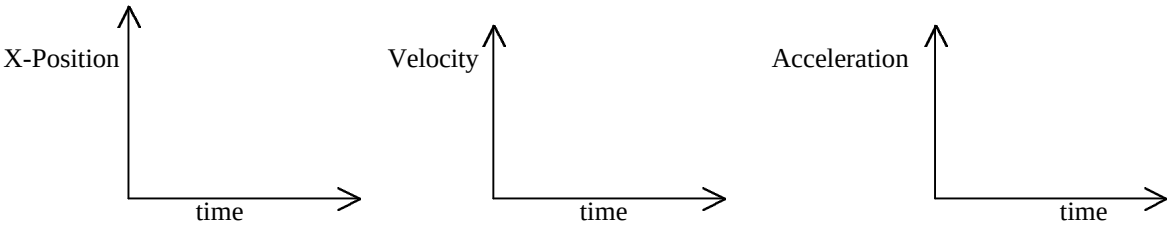
On axes below sketch two lines to show (i) larger force; (ii) smaller force.



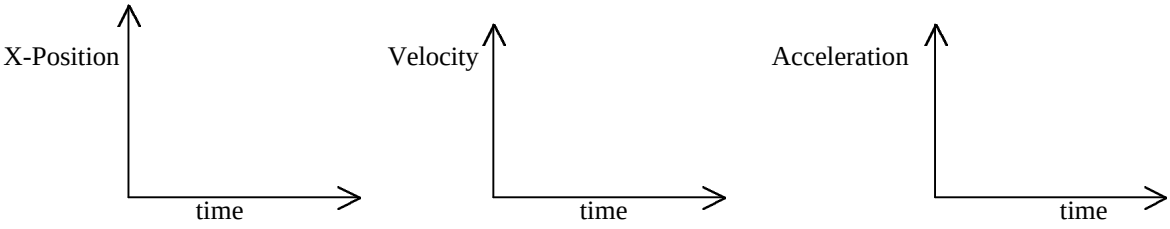
Open; Go up a level to IP Physics on NT server; then, Physics Experiments; Motion in One Direction; P-V-A graphs: Play.
When the values for force and mass are changed (i) What is different about the graphs?
(ii) What is the same about the graphs?
Ope new file. Draw platform and oject.
Give object an initial velocity to left. Also a force to left. Reduce friction to zero.
How do you expect the graphs to look?
Sketch on axes below.



Try it. Change graph if necessary. Give higher initial velocity to confirm idea.
Sketch on axes below.

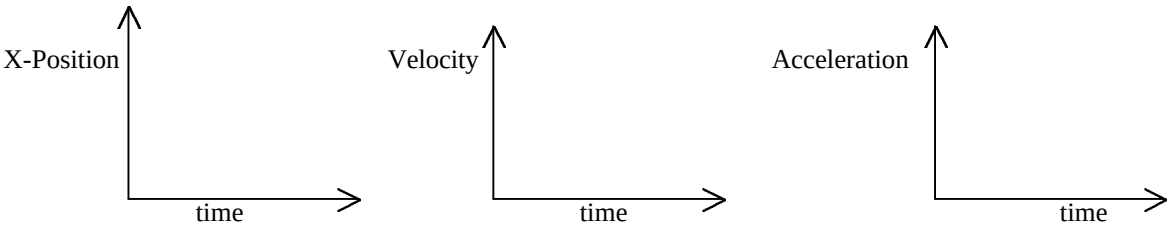


Increase friction to 0.500.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.

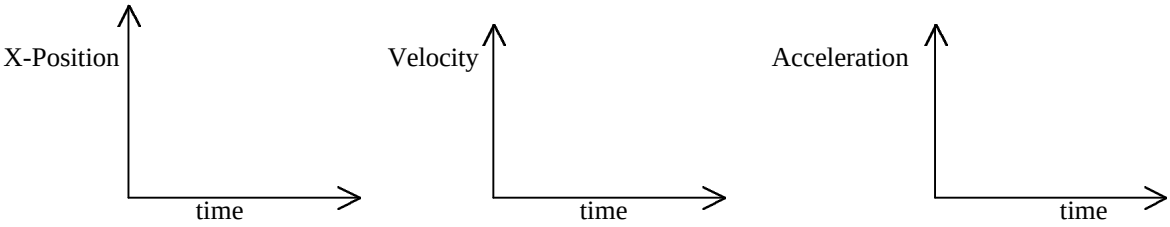


Explain, particularly shape of velocity-time and acceleration-time graphs.

Reduce friction to zero.
Connect force to right hand side of object so that it opposes the motion.
What do you think the graphs will look like?
Sketch on axes below.

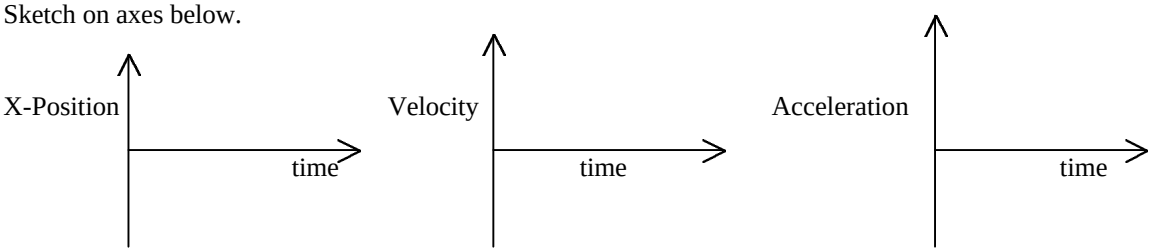


Run it. Alter so that object moves to the end of the surface.
Sketch on axes below.

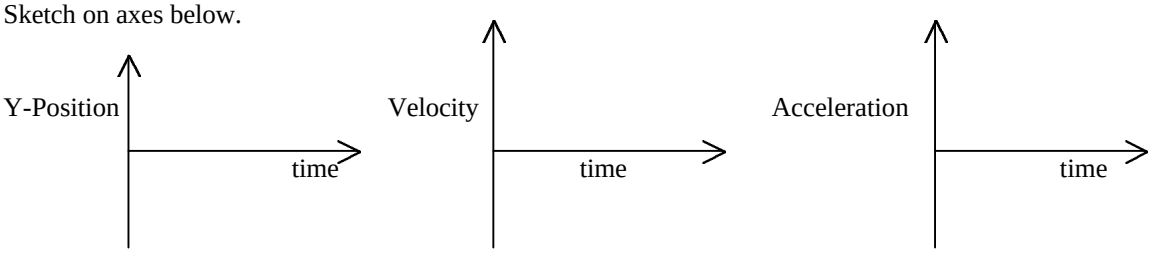


Explain.

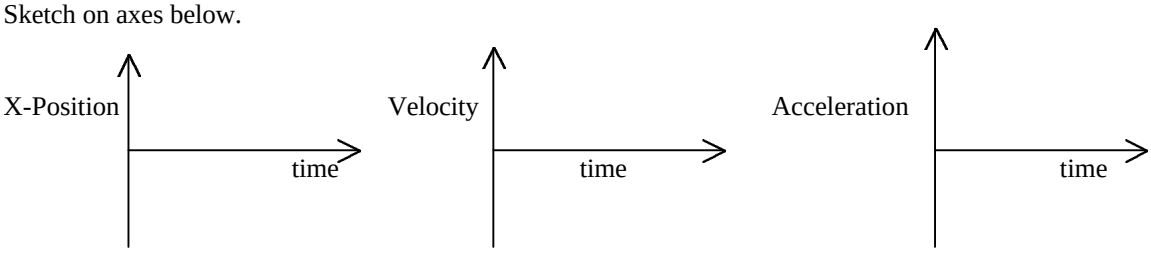
Open new simulation.
Draw circle near top of screen. Click Run. Click Stop. Click Reset.
What happens?
What do you think the graphs of this motion will look like?
Sketch on axes below.



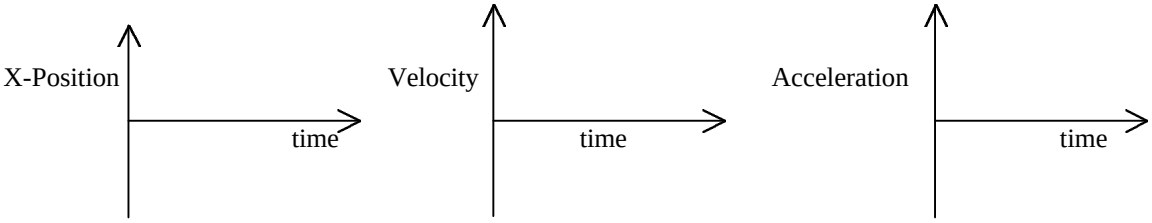
Place three graphs on screen. This time we want Y-graphs because the circle is moving in the y direction.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



Explain.
Give the ball an upwards velocity. What do you think the graphs will look like?
Sketch on axes below.

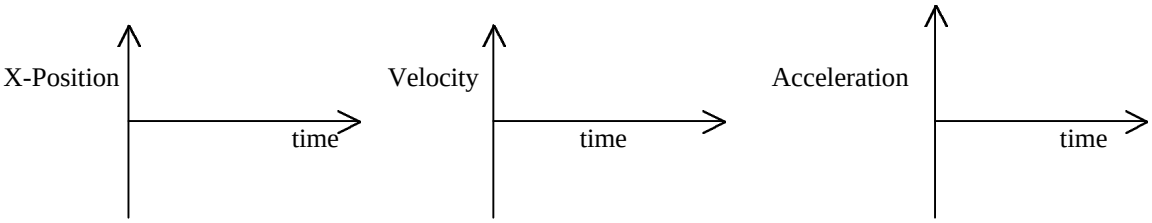


Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



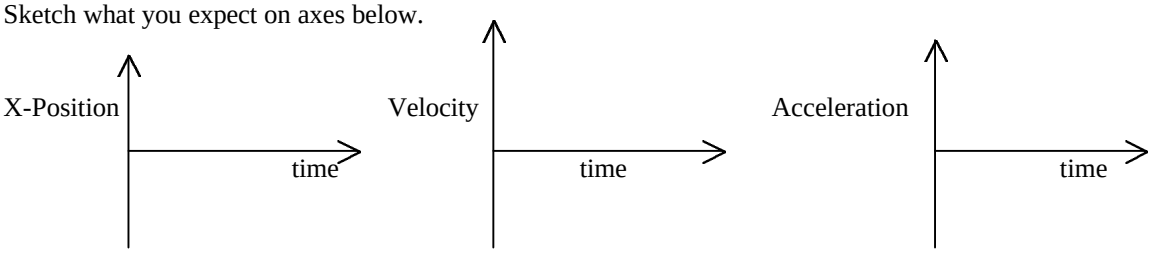
Explain.

If it is all happening to quickly for you let us do it on the moon. Open World. Gravity. Click on moon arrow. Click OK
Click Run. Wait. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.

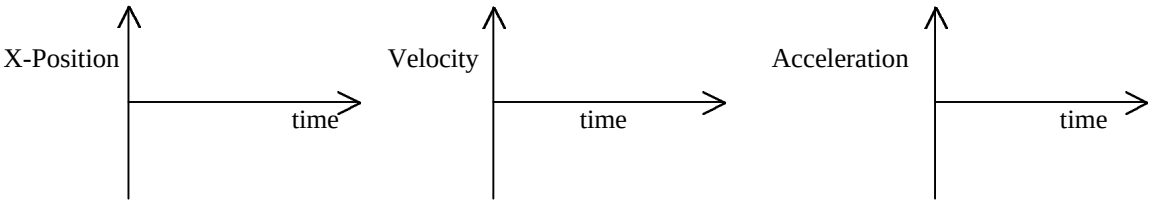


Explain.

Return to the Earth
What will happen if the ball bounces?
Sketch what you expect on axes below.



Draw surface for ball to bounce off. Anchor it. Reduce upwards velocity to zero.
Click Run. Click Stop. Click Reset.
Look at graphs.
Sketch on axes below.



Explain.

Make the surface and the ball perfectly elastic. Try again. Explain.