

# National 5 Assignment

## Projectile Guide Sheet: C

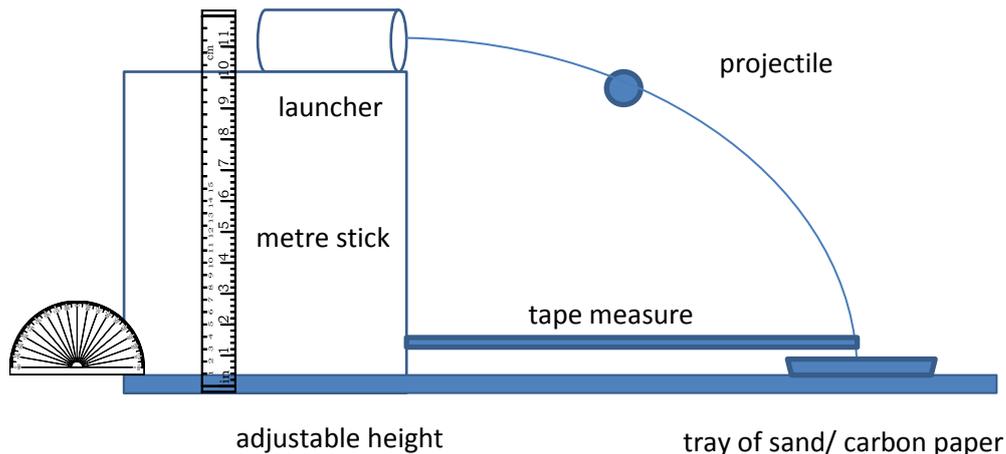
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### Variations in range of a projectile with launch height

#### Equipment

Ball, projectile launcher, protractor, metre stick or tape measure, sand, tray, carbon paper,



#### Instructions

- Set up the apparatus as shown in the diagram above.
- Set the projectile launcher to an angle of  $0^\circ$  to the horizontal.
- Measure the height of the launcher from the landing height.
- Fire the ball from the launcher.
- Adjust the position of the sand tray or carbon paper so that the ball lands in the sand or on the carbon paper and leaves a clear mark
- Fire the ball a second time from  $0^\circ$  and repeat the measurement.
- Set the projectile launcher to larger height and measure the range of the ball for each height.
- Repeat the experiment several times
- Plot a graph of your results to show how the range of the ball is affected by the launch height.

#### Risk Assessment

- Check that the launch area is free of people who could get hit.
- Ensure no projectile is left unattended where it could become a trip hazard.
- Wear safety goggles as the projectiles are likely to be smaller than the eye socket, and may not always be very well aimed!

## Background

1. <http://www.healthype.com/projectile-vomiting-causes-in-babies-children-and-adults.html>
2. [http://www.studyphysics.ca/2007/20/01\\_kinematics/17\\_horizontal\\_projectile.pdf](http://www.studyphysics.ca/2007/20/01_kinematics/17_horizontal_projectile.pdf)
3. <https://www.bbc.co.uk/education/guides/zq2csrd/revision>
4. <http://www.physicsclassroom.com/class/vectors/Lesson-2/Horizontally-Launched-Projectiles-Problem-Solving>
5. <http://researchthetopic.wikispaces.com/What+is+projectile+motion%3F+-+R>
6. <http://slideplayer.com/slide/235777/1/images/26/Projectile+Motion+at+Various+Initial+Angles.jpg>
7. <https://www.physics.utoronto.ca/~jharlow/teaching/phy151f13/exp2.pdf>
8. <https://www.wired.com/2015/03/determining-maximum-projectile-range-numerical-model/>
9. <https://www.khanacademy.org/science/physics/two-dimensional-motion/two-dimensional-projectile-mot/v/projectile-at-an-angle>
10. [http://images.motorcycle-usa.com/PhotoGalleries/1000px-Ideal\\_projectile\\_motion\\_for\\_different\\_angles-svg.jpg](http://images.motorcycle-usa.com/PhotoGalleries/1000px-Ideal_projectile_motion_for_different_angles-svg.jpg)
11. <http://www.mrsciguy.com/Physics/projectiles.html>
12. [http://www.bbc.co.uk/schools/gcsebitesize/science/triple\\_ocr\\_gateway/space\\_for\\_reflection/projectile\\_motion/revision/2/](http://www.bbc.co.uk/schools/gcsebitesize/science/triple_ocr_gateway/space_for_reflection/projectile_motion/revision/2/)
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14. <https://honorsphysicsrocks.wikispaces.com/Jimmy%2C+Erica%2C+Steve%2C+Elena+Projectile+Project>
15. [http://www.batesville.k12.in.us/physics/phynet/mechanics/Projectiles/Labs/horizontal\\_projectiles.htm](http://www.batesville.k12.in.us/physics/phynet/mechanics/Projectiles/Labs/horizontal_projectiles.htm)
16. <http://hyperphysics.phy-astr.gsu.edu/hbase/traj.html#tra4>
17. <http://galileo.phys.virginia.edu/classes/581/AirRes1.gif>
18. <https://phet.colorado.edu/en/simulation/projectile-motion>