

# Teaching Pack

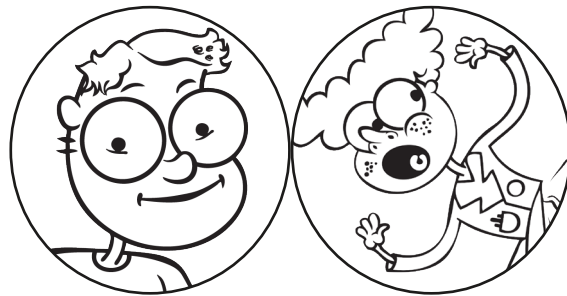


## The Jet of Justice



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**What is this activity book for?** We're glad you asked! Danny Dingle is all about **INVENTIONS!** We want your pupils to engage with the book's laugh-out-loud story and hilarious illustrations by joining in with the adventures of Danny, Percy and Superdog! This activity pack will give your pupils the opportunity to get creative and become tip-top inventors!

This activity pack will engage with your pupils' curious minds and help them explore the world of science. The activities in this pack have all been made in line with the school curriculum with the aim of teaching essential aspects of the knowledge, methods, processes and uses of science.

They will design and create their own "Jet of Justice" and test how they are able to get it to travel the furthest distance in the quickest time while keeping their object intact and safe. They will explore and develop an understanding of air resistance and aerodynamic design.

Join the world of Danny Dingle and follow the fun experiments and activities found within. You can use some or all of the activities in this pack and plan your lessons around them. We would love to see what you come up with; why don't you send us a tweet or an email with pictures of your wacky inventions and your class completing the activities.

**Have fun exploring the fart-tastic, experimental and totally nauseous world of Danny Dingle!**

# Keywords

## Forces

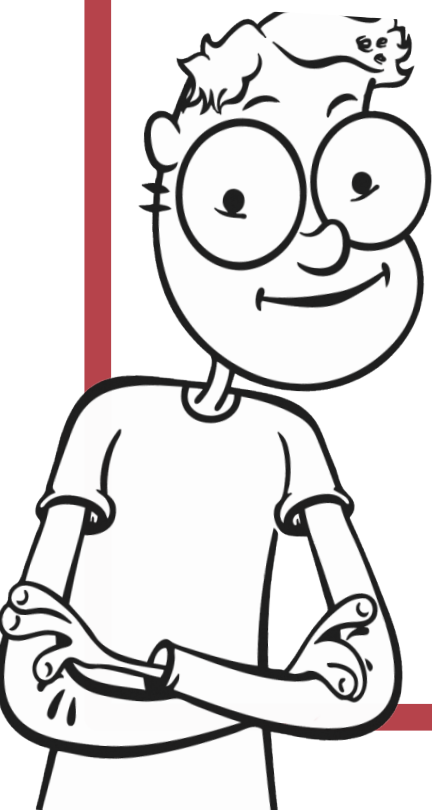
Forces are pushes or pulls. They are measured in newtons. When a force is unbalanced, it changes the way something moves. The mass of an object is how much matter it contains. The weight of an object is the force caused by gravity pulling down on the mass.

## Friction

Friction is a force between two surfaces that are sliding across each other. Friction always slows a moving object down. Air resistance is a type of friction. Friction always works in the opposite direction the object is moving, or trying to move.

## Air Resistance

Air resistance is a friction force between air and another material. Some shapes are more aerodynamic because of their streamlined shape; these shapes create less air resistance.



## Aerodynamics

Aerodynamics is the study of forces and the effects of movement through air. Studying the movement of air around an object allows us to measure the forces of lift, allowing an object to overcome gravity and drag.

Can you remember the definition of these words?

**Friction**

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**Gravity**

**Mass**

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Teacher notes: Refer to the The Super-Sonic Submarine activity pack.

# Air Resistance Experiment

Danny and Percy need your help if they are to beat twit-faced Gareth Trumpshaw. Can you help them build a super invention for the flying machine competition?

Remember that if you are to win it needs to travel the furthest possible distance. Take into consideration what we have learnt about the forces, the effects of air resistance, friction and aerodynamic design!

Design your amazing flying machine, label all your science super-invention components and explain why you think your design will win.

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## Teacher's Guide:

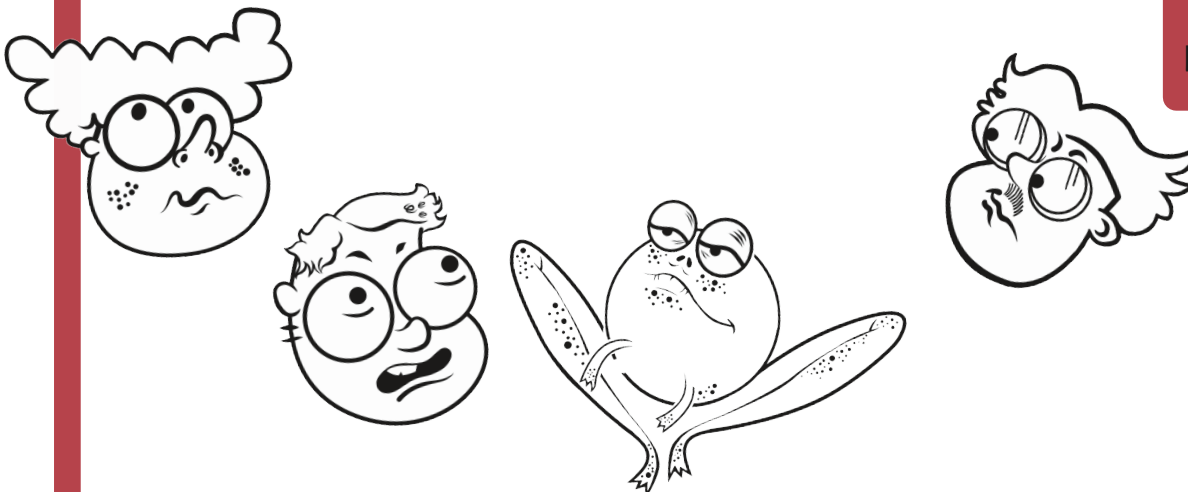
Ask the children to design their very own flying machine using the equipment provided. They don't need to use all of the materials.

Ask how they are going to ensure their flying machine reaches the furthest distance using their scientific knowledge. Get the pupils to label the forces that will be acting against their flying machine, include a cross to show the direction of the forces.

This investigation will ask the pupils to consider changes to their flying machine and think about ways in which the force pushing against the flying machine can be manipulated to make their flying machine travel the furthest distance.

## COOL STUFF Equipment

- Cardboard
- Balloons (varying shapes)
- Sticky tape
- Straws
- Balloon Pump





## Design and create your flying machine



How are you going to make your flying machine as aerodynamic as possible and counter the effects of air resistance?



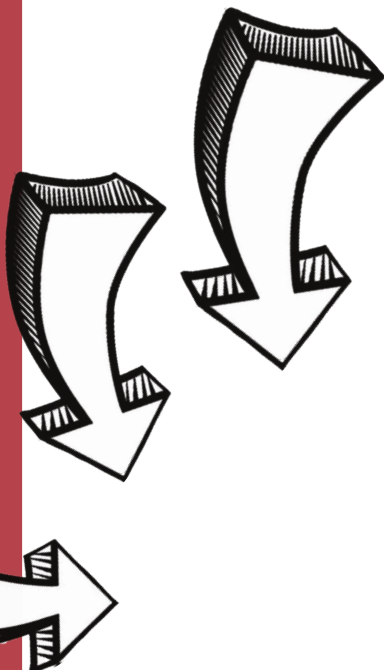
# The Jet of Justice Competition

It's now time to test your flying machines and see who will win! As a class you will carry out a variety of fair tests to determine which flying machine is the winner! This will be the one that travels the furthest in the shortest amount of time. The pupils will have to question changes made to type of balloon, the shape of the balloon, how much the balloon is blown up and the weight of the flying machine.

You should think about ways in which the force pushing the flying machine can be increased and how the force of air resistance can be changed.

## Fair test

To ensure that this is a fair test, pupils will need to be familiar with using measuring tapes and stop watches. Assign this role to the pupils who are not testing their flying machines; they will need to measure the length the flying machine travels and the time it took. To ensure that this is a fair test, more than one pupils should be taking these measurements. Fill your results in the fair test table.



# Fair test table

Name of jet	Distance (metre)	Time (seconds)	Speed



Can you measure the speed the flying machines were travelling at?

**HINT**

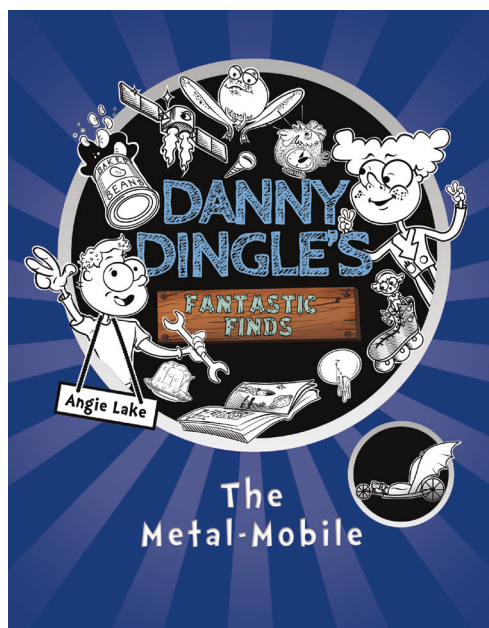
**SPEED = Distance / Time**



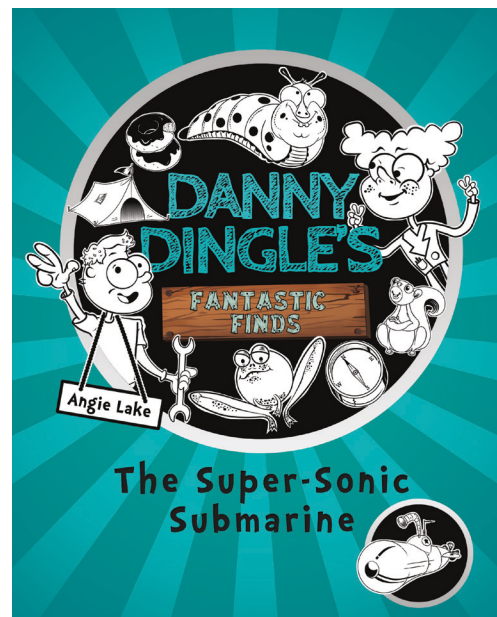
# Danny Dingle Teaching Pack

## extra activities

This is the fun part! We have suggested some activities for your class, but you are more than welcome to create your own! We would love to see what else your class gets up to! Send us an email or contact us via social media.



**BOOK 1**  
**Danny Dingle's Fantastic Finds: The Metal-Mobile**  
**ISBN: 9781782262084**



**BOOK 2**  
**Danny Dingle's Fantastic Finds: The Super-Sonic Submarine**  
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