STXM

1. Moving Vehicles











- Make several vehicles of different weights and sizes.
- Now try and move the vehicles on a flat surface with an equal force.
- ▶ How far do the vehicles travel?
- Does one design work better than the other ones? Are some designs more stable?
- Try and see if the weight and size influence the distance travelled.
- Next try and move your vehicles on different flat surfaces such as carpet, tiles, work surfaces, gravel etc. – do they move on one surface better than another?
- Try and explore why this happens and explore friction and the resistance it gives to a vehicle's movement.

STCM

2. Moving Vehicles





- Next make a simple ramp this could be a book against an object, a plank of wood, a sheet of sturdy card or whatever materials you have available.
- Try and use the flat surface where the vehicles travelled the further distance.
- With each vehicle, hold the vehicle at the top of the ramp and let go.
- See how far each vehicle travels is this the same as when you pushed the vehicles on a flat surface without a ramp?
- Try and work out again if the weight or size of the vehicles influences how far the vehicles travel.
- Try and alter the height of the ramp. There will be a height where the vehicles struggle to move onto the road and fall apart.
- Discuss why this happens, and try to work out which is the biggest influence – the ramp height, the road surface, the vehicle weight or the vehicle design.
- You may find it useful to record your results on paper or a drywipe board.

STCM 3. Bridges & Tensile Strength

Start by building a variety of bridges such as

▶ Now, let's see which of these is the strongest when weight is added to the top.

the ones shown or your own creations.

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4. Bridges & Tensile Strength

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Handy Hint

You will probably see the bridge starting to buckle before it collapses.





- Add items to the top of the bridge these can be anything which you have in your classroom such as glue sticks, counters, weights or another similar small item.
- How many items can you add to your bridge before it collapses?
- Does it make a difference to the amount of items on the bridge if you place your items in the middle or the side of the bridge?
- Consider any ways you could alter the bridge to make it weaker or stronger?
- Alter your bridge and see if your hypothesis was correct or not?
- Do you think that having a bridge made in a different material would alter the strength of the bridge?
- If you have another construction product, try making the same bridge designs and see if there are any differences between the two construction products?
- Discuss whether having magnetic cubes makes a stronger or weaker bridge for each of the bridge types?
- Discuss the forces being exerted on all your bridges and consider real life bridges.

5. Movement Using Magnetic Forces





With the magnetic cubes, yellow cubes attract blue cubes and like colours repel.

Experiment 1:

- First of all, put a ruler or tape measure on a flat surface.
- > Put a cube of a different colour 2cm away from it.
- Tightly grip the yellow cube, and slowly move the yellow cube towards the blue cube 1mm at a time.

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- Once the cubes are close enough, the blue cube will be pulled towards it. You need to record this distance.
- If we keep the yellow cube but build a much larger cube and repeat the same experiment, do you think that the cubes will join together at the same distance?
- Or will they join together when closer together or further apart?
- > You will now have 2 measurements. Are these the same or different?
- ▶ Try and work out why they are the same or different?
- ▶ If you build a bigger cube, will the result be similar?
- Experiment with different size cubes and record your results. In this experiment, we are not investigating magnetic forces this experiment is about pulling a lighter or heavier load.

5TECM 6. Movement Using Magnetic Forces

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Experiment 2:

We have examined magnetic cubes attracting each other but what happens when cubes of the same colour are placed next to each other? We can examine how they repel each other. Do you think that they will repel each other in a straight line?

- First of all, place a cube on a piece of paper and draw around it.
- Place the cube on this drawing and put another cube of the same colour near it.
- Then push the cube which you have not drawn around towards the other cube – which direction do you think it will go; straight away from the cube or to one side?
- > Draw around where the cube finishes.
- Then keep doing this several times until a pattern has developed.
- Try and work out why this pattern has developed.

5TECM 7. Movement Using Magnetic Forces





Experiment 3:

- First of all create a simple car such as the one shown to the left.
- Put a cube behind and in front of it. The cube at the rear should be the same colour as the rear cube colour, and the cube at the front should be a different colour to the front cube colour.
- Then watch the vehicle move forward as you move the cubes (especially the rear cube) closer to the vehicle. Can you explain why this occurs?
- If using one cube, is it more effective to use just the front or the rear cube?
- Try making different sized vehicles and see if the vehicles move slower, quicker or at the same speed.



It is easier to have 2 people holding the yellow and blue cubes at the front and rear of the vehicle.