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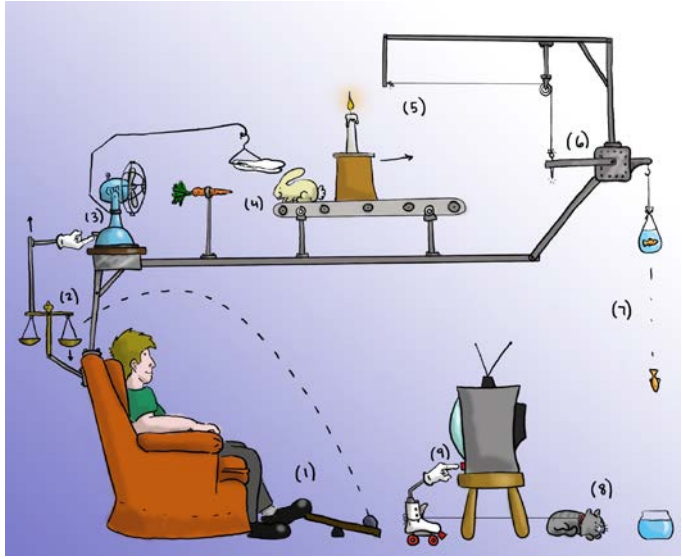

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Marvellous Machines

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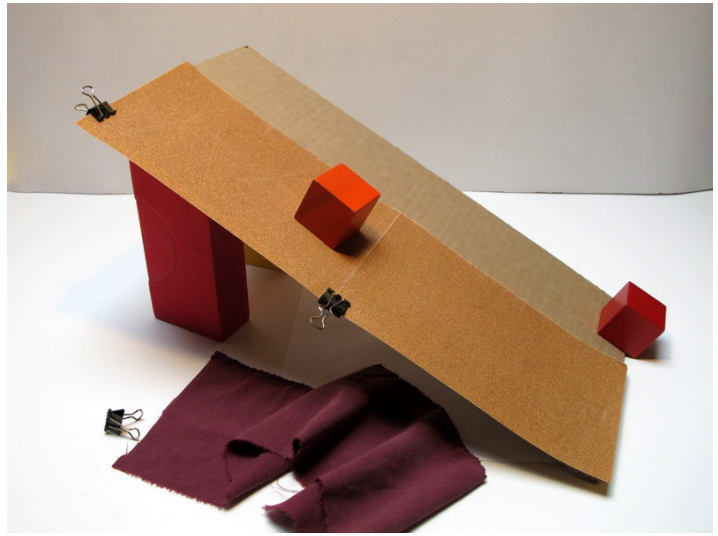

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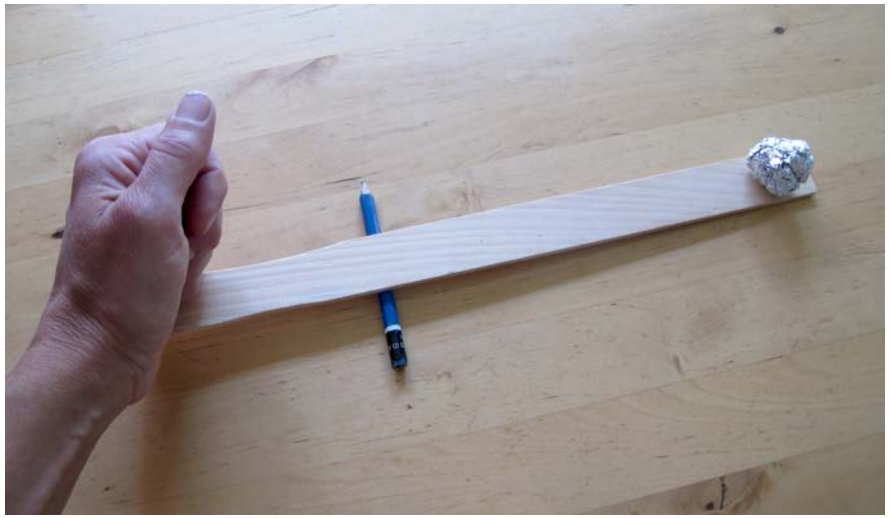

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PHYSICAL SCIENCE

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ENGAGE

Lesson One: Talking about toys!

YOU WILL NEED

3 DIFFERENT TOYS WITH MOVING PARTS

WHY NOT GET YOUR FAVOURITE TOYS?

PAPER

PENS AND PENCILS

A DEVICE FOR TAKING PHOTOS AND/OR VIDEO (OPTIONAL)

See slide notes for lesson objectives

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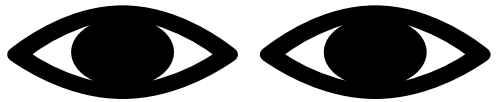
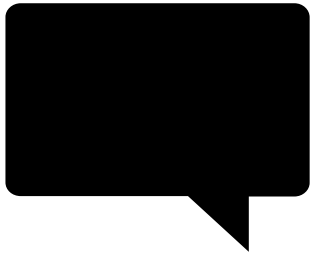
Observe

Play with each toy for a few minutes.



What can you notice?

How does the toy move?



What do you need to do to make each part of the toy move?

See slide notes for question prompts

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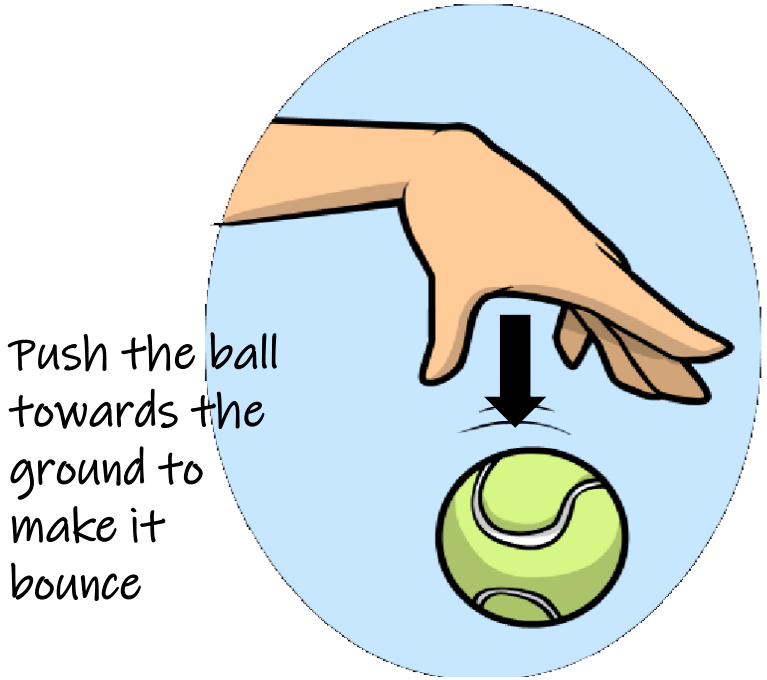
After observing

Draw/photograph at least one of the toys.

Add arrows and words like 'push' and 'pull' to your drawing or photo showing how the toy moved.

(*Optional*)

Record a video of yourself playing with the toys and talking about how they move.



See slide notes for vocabulary prompts

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Wondering about how toys move

Make a list of words to describe how the toys moved and what you did to help them move.	
Complete the sentence	What I think I know about pushes and pulls is…
Complete the sentence	What I'm interested in finding out about is…

Share drawings of your toys and your 'Wondering about how toys move' with your teacher, classmates and family.

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EXPLORE

Lesson Two: Let's go!

YOU WILL NEED

1 TOY WITH WHEELS.

FOR EXAMPLE: A TOY CAR OR TRAIN

MATERIALS TO HELP MOVE A TOY ON WHEELS.

FOR EXAMPLE: STRING, TAPE, RUBBER BANDS, BALLOONS, MAGNETS, CARDBOARD.

PAPER

PENS AND PENCILS

A DEVICE FOR TAKING PHOTOS (OPTIONAL)

See slide notes for lesson objectives

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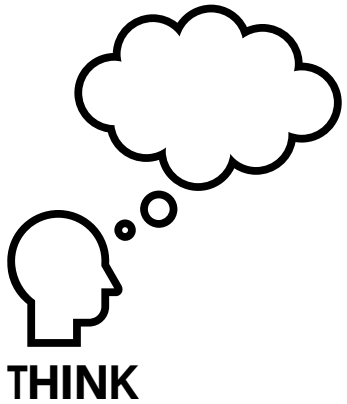
Lesson Two: Let's go!

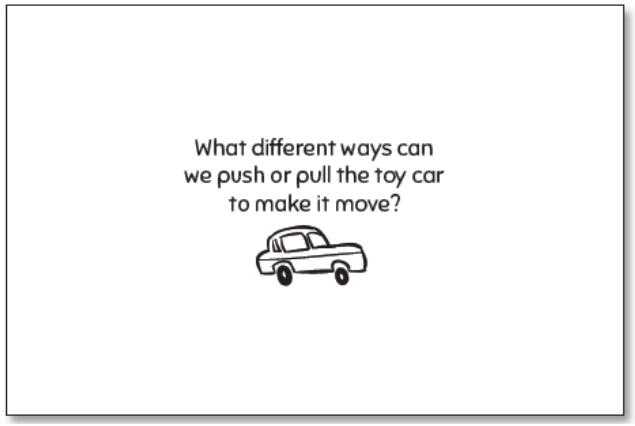
Before the investigation



Using the materials you collected, think about the many ways to make a toy car move.

Create an ideas map

Record your ideas by writing or drawing around the question.



See slide notes for lesson prompts

EXPLORE

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Lesson Two: Let's go!

Doing the investigation

1. Choose one of the ideas you had for making the car move. Make sure you have the materials you need to test your idea.

2. Predict what you think might happen and record it.

(Will the car move fast or slow? Will it move a short distance or a long distance?)

3. Test your idea. Record what you did and what happened to the toy car.

4. Repeat these steps and test two more ideas.

Write, draw, or take photographs of your investigation. Describe how you made the car move from one place to another.

What I think will happen	What I did	What happened to the toy car

EXPLORE

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Lesson Two: Let's go!

After the investigation

Did what you predict would happen to the toy car happen? Why do you think that?

- Write and/or draw to show your answer

What do you think now about how pushes and pulls help things move?

Think about:

- What made the car move fast or slow? Why do you think that happened?

- Did the car zig-zag, flip over, leave the floor or move in any other unusual way? Why do you think that happened?

- Write and/or draw to show your answer

Share your information about what happened when doing your investigation with your teacher, parents/carers or classmates.

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Lesson Three: Down the ramp

EXPLORE

YOU WILL NEED

1 TOY WITH WHEELS.

FOR EXAMPLE: A TOY CAR OR TRAIN

5 BLOCKS OR BOOKS OF EQUAL SIZE

1 GOLF BALL (OR BALL OF SIMILAR SIZE)

SOMETHING TO MEASURE DISTANCE

FOR EXAMPLE: POP-STICKS, BLOCKS, A RULER*

A SHEET OF CARDBOARD TO MAKE A TUBE, OR TUNNEL.

SCISSORS

TAPE

A DEVICE FOR TAKING PHOTOS (OPTIONAL)

See slide notes for lesson objectives*

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Before the investigation

EXPLORE

A *ramp* is a slope that connects two different levels

THINK

What is a ramp?

Where do you find ramps in the community?

What are ramps used for?

Are ramps helpful? Why or why not?

Are all ramps the same height? Why or why not?

PREDICT

Predict **what happens to how far a toy car is pushed by a ball when you change the height of the ramp?**

Record your predictions using the template on the next slide.

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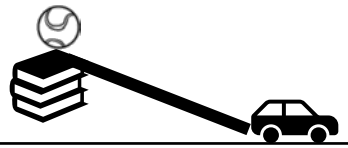
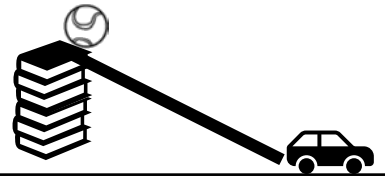
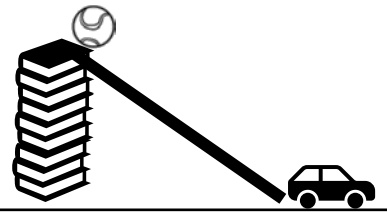
Lesson Three: Down the ramp

My predictions

What happens to how far a toy car is pushed by a ball when you change the height of the ramp?

What might happen if the height of the ramp was low? 	
What might happen if the height of the ramp was medium? 	
What might happen if the height of the ramp was high? 	

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Lesson Three: Down the ramp

Doing the investigation

1. Make a tube or tunnel using the cardboard you collected.
2. Make your tube or tunnel into a ramp by placing a block/book under one end to raise it.
3. Place the toy car at bottom of the ramp.
4. Roll the ball down the ramp so that it hits the car and pushes it along.
5. Measure the distance the car moves using popsticks or a ruler. Record the distance in the table on the next slide.
6. Repeat steps 2 – 5 using 2,3,4 and 5 blocks/books under the ramp.

Example set up of the investigation

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Recording your data

Use the table below to record the data you gathered during your investigation.

Number of blocks or books under the ramp	How far the toy car travelled (in popsticks, blocks, or centimeters)

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Lesson Three: Down the ramp

After the investigation

EXPLORE

Did what you predict would happen happen? Did the car move as far as you thought it would?

Now that you have completed the investigation, what can you claim about ramps and how they affect pushes and pulls and how far things can move?

To help you think about this consider your responses to these questions:

- Which height ramp helped the car move the furthest?

-Which height ramp made the car move the least?

- Why do you think that happened?

Name some examples of ramps that are different heights and what they are used for.

How does the height of the ramp suit its purpose?

Share your information about what happened when doing your investigation with your teacher, parents/carers or classmates.

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Lesson Four: Clever lever

EXPLORE

YOU WILL NEED

1 TOY WITH WHEELS.

FOR EXAMPLE: A TOY CAR OR TRAIN

2 BLOCKS OR BOOKS OF EQUAL SIZE

3 DIFFERENT, SMALL SIZED BALLS

SOMETHING TO MEASURE DISTANCE

FOR EXAMPLE: POP-STICKS, BLOCKS, A RULER*

A SHEET OF CARDBOARD TO MAKE A TUBE, OR TUNNEL.

SCISSORS

TAPE

RULER X 2

PEN WITH A LID

A DEVICE FOR TAKING PHOTOS (OPTIONAL)

See slide notes for lesson objectives*

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Lesson Four: Clever lever

Before the investigation

EXPLORE

THINK

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What are these objects and how do they work?
What do they all have in common?
What kind of simple machine do you think they all are?

They are all levers.

A *lever* is a simple machine used to lift things or pry things open.

What happens when you push down on one side of a lever?
How could you make a lever that could push a toy car without anyone touching it?

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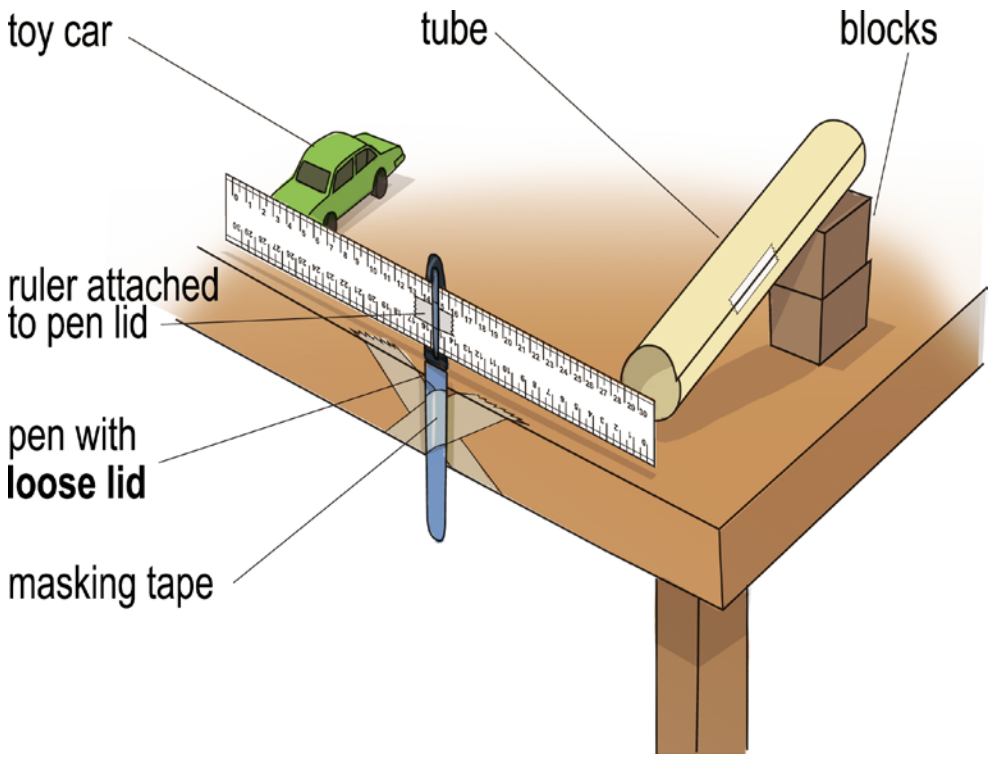
Lesson Four: Clever lever

Before the investigation

You are going to build and use a 'clever lever' to move a toy on wheels.

Look at the picture and use it to help you set up your investigation.

You might need an older person to help you.



PREDICT

Predict **what happens to how far a toy car is pushed by a lever when you change the type of ball pushing the lever?**
Record your predictions using the template on the next slide.

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My predictions

What happens to how far a toy car is pushed by a lever when you change the type of ball pushing the lever?

Type of ball	Describe the ball (size, weight, hardness etc.)	Predict what will happen to the toy car when you roll the ball down the ramp and it hits the lever, making the lever hit the car.

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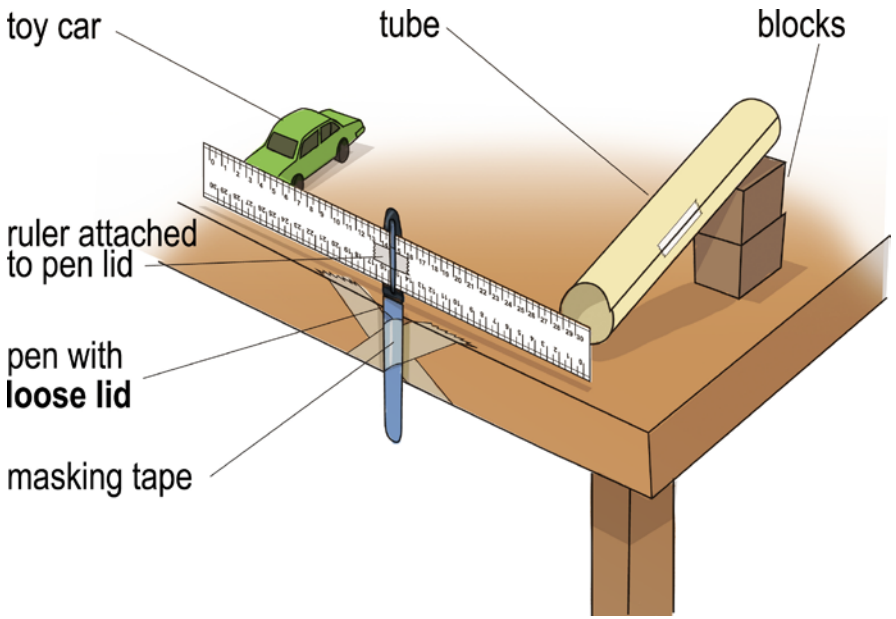
Doing the investigation – My clever lever

1. Build your mini-machine if you haven't already.
2. Hold a ball at the top of the ramp.
3. Release your ball so that it rolls down the ramp and hits the lever.
4. Measure the distance the car moves using popsticks or a ruler
5. Record the distance the card moved in the table on the next slide.
6. Repeat steps 2 – 5 using other 2 different balls.



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Recording your data

Use the table below to record the data you gathered during your investigation.

Ball (name)	How far did the lever push the toy car? (in popsticks, blocks or centimeters)

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Lesson Four: Clever lever

After the investigation

Did what you predict would happen? Did the ball you thought would make the car move the furthest, actually move it the furthest?	
Which ball made the car move the furthest? Why do you think that happened?	
Which ball made the car move the shortest distance? Why do you think that happened?	

Share your information about what happened when doing your investigation with your teacher, parents/carers or classmates.

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EXPLAIN

Lesson Five: What's the problem?

YOU WILL NEED

PAPER

PENS AND PENCILS

A DEVICE FOR TAKING PHOTOS AND VIEWING A WEBSITE (OPTIONAL)

EQUIPMENT TO BUILD SIMPLE MACHINES;

TOY CAR, RAMP,

DOMINOES, RULER

TAPE, BUCKET,

ROPE

(OPTIONAL)

See slide notes for lesson objectives and preparation advice

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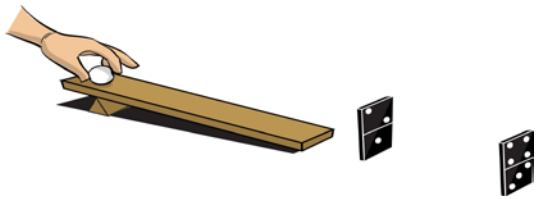
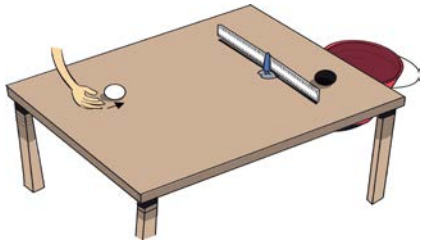
Lesson Five: What's the problem?

Let's work it out

Draw or write on each diagram to explain why the machine is not working.

	Why won't the dominoes fall over?
	Why won't the toy car move?
	Why won't the black ball roll into the bucket?

See slide notes for discussion prompts.

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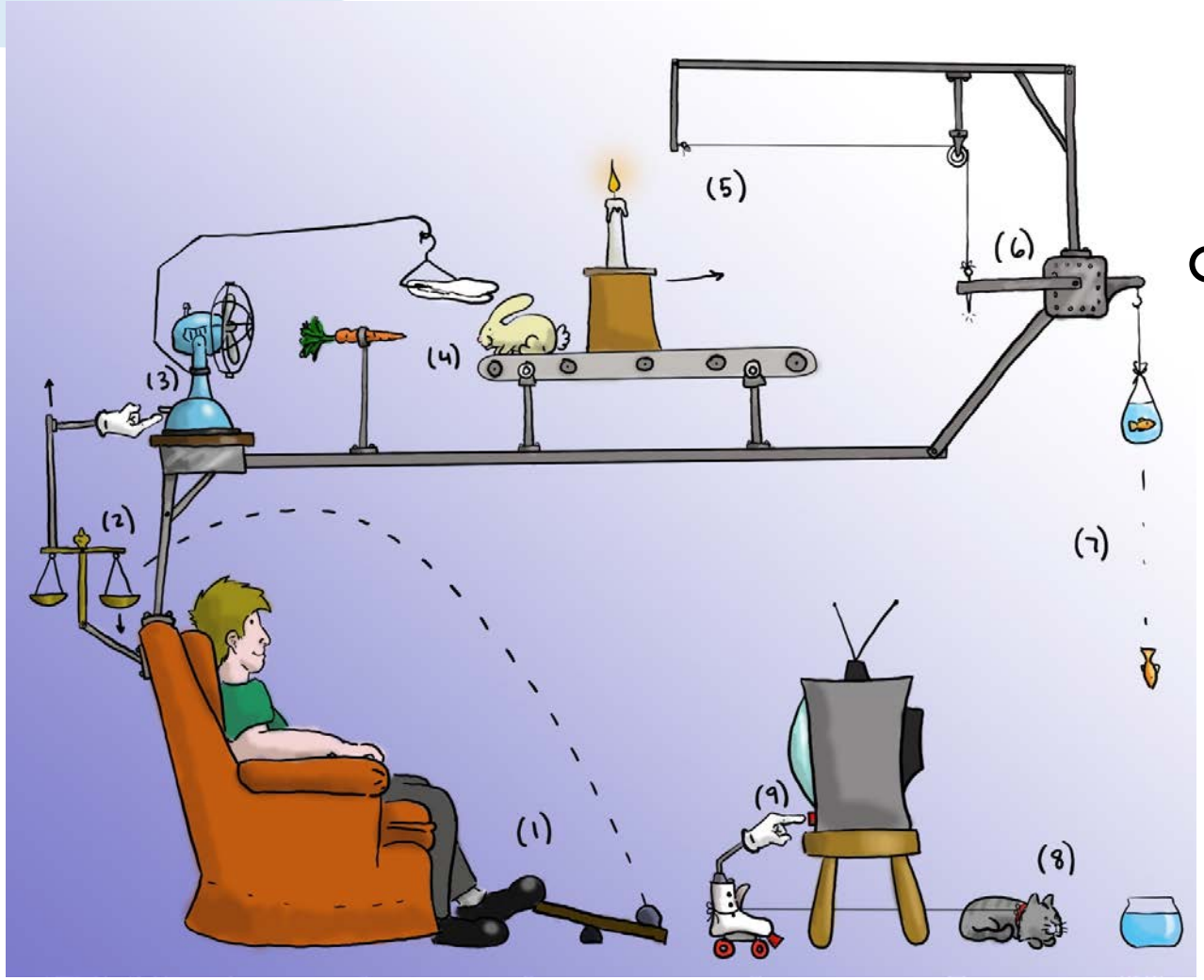
Lesson Five: What's the problem?

Rube Goldberg Machines



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A Rube Goldberg Machine is a machine that does a very simple thing in a complicated way.

Write and/or draw to show the pushes and pulls used in this Rube Goldberg machine.

Can you show where a ramp and a lever have been used?

Optional:

1. Watch these video clips showing Rube Goldberg machines.
   - https://www.digitaltrends.com/cool-tech/best-rube-goldberg-machines/
   - https://www.youtube.com/watch?v=IIGyVa5Xftw
2. Design and/or build your own simple Rube Goldberg machine.

EXPLAIN