

# Science F-2

## Chapter 5 — Physical sciences: movement, forces and sound

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## Why objects move as they do: size, shape and material

**Read aloud.** A grown-up reads this topic to the children. Children answer by pointing, saying, circling, matching or drawing. There is no long writing.

**VC2S2U10** — the way objects move depends on a variety of factors including their size, shape and material

*Victorian Curriculum 2.0 — Science F–2, Physical sciences*

**Evidences:** They identify factors that influence the movement of objects.

In this topic we will:

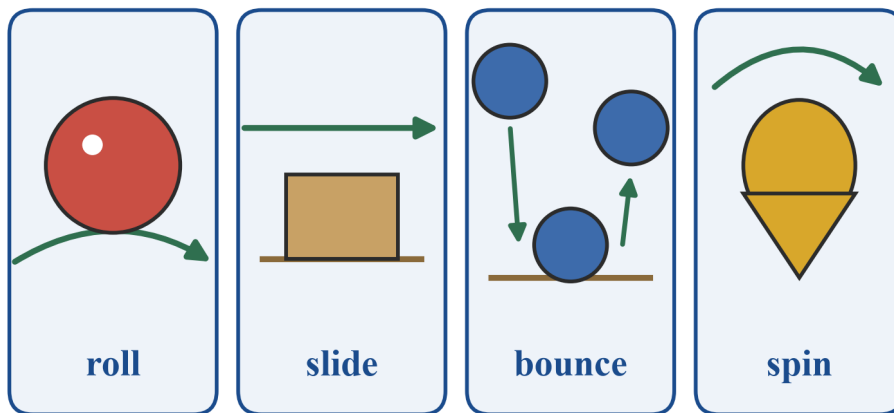
- watch how toys move, and put them in groups by how they move (E01)
- roll blocks, tubes and eggs down a slope, and say how they move (E02)
- see how balls of different sizes roll and bounce (E03)
- see how the material of a ball changes the way it moves (E04)

### Theory

#### ***Ways things move***

Things can move in different ways.

- A ball **rolls**. It turns over and over as it goes.
- A block **slides**. It stays flat and moves along.
- A ball **bounces** when it hits the floor and jumps back up.
- A top **spins**. It turns round and round on the spot.



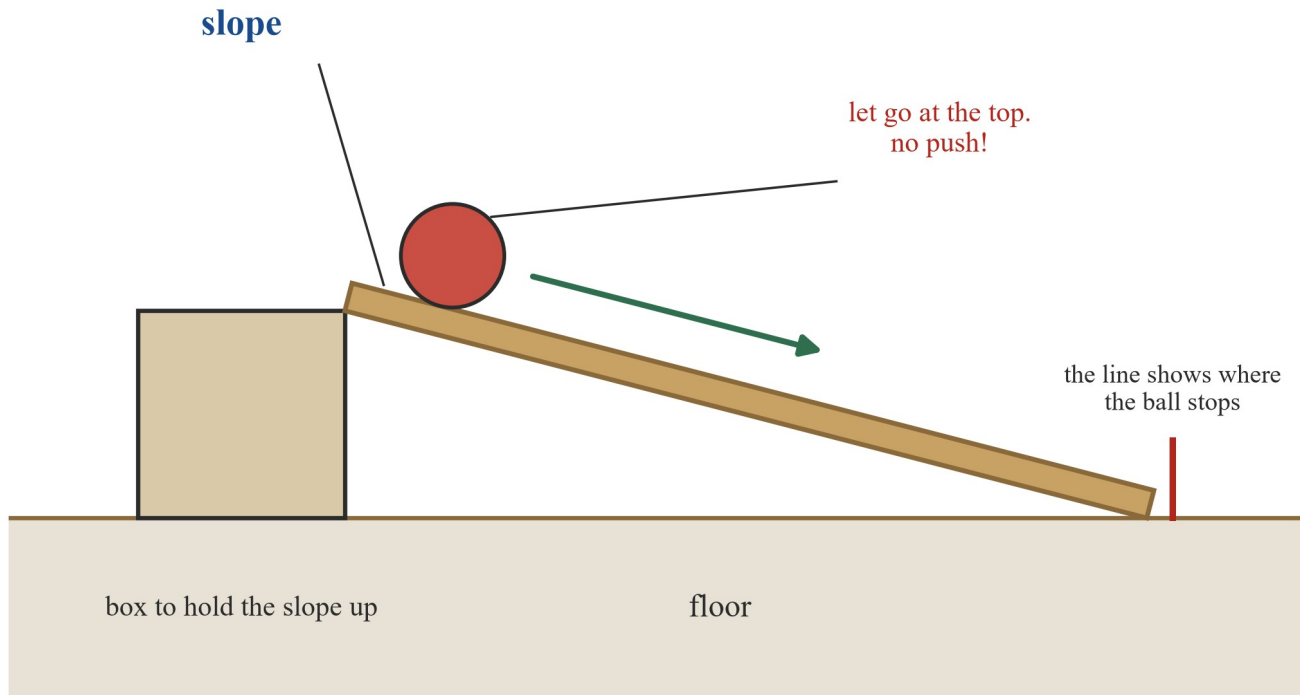
*Four cards show the movement words: a red ball rolls, a wood block slides, a blue ball bounces down and back up, a yellow top spins.*

Say each word and do it with your hand: roll, slide, bounce, spin.

#### ***The slope***

A **slope** is like a slide. One end is high. One end is low.

We make a slope with a board and a box. We let things go at the top. We watch how they move. The line on the floor shows where each thing stops.



*A board rests on a box to make a slope. A red ball waits at the top. A green arrow points down the slope. A red line on the floor shows where the ball stops. Labels name the slope, the box and the floor.*

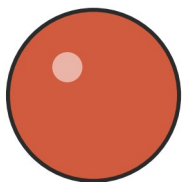
**Safety.** Let go — do not push. Keep the floor clear so no one slips.

### **What is a material?**

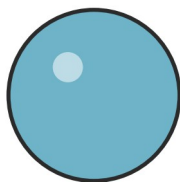
The **material** is what a thing is made of.

A ball can be made of rubber, plastic, foam or cloth. These four balls are the same size and the same shape. Only the material is different.

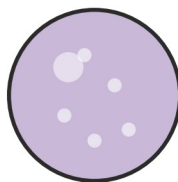
**four balls. same size. four materials.**



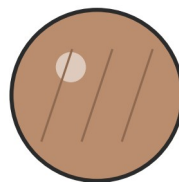
rubber



plastic



foam



cloth

*what a thing is made of is its material*

*Four balls of the same size in a row: rubber, plastic, foam and cloth. Each ball is a different colour.*

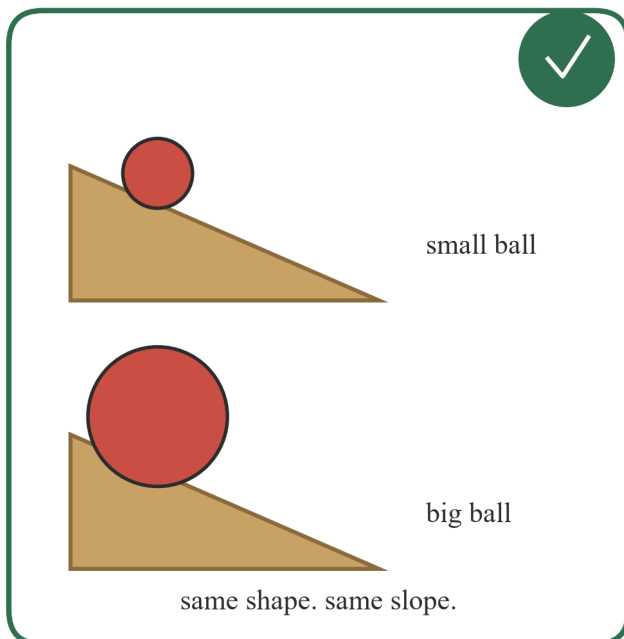
### **What is a factor?**

A **factor** is one thing that can change how a thing moves.

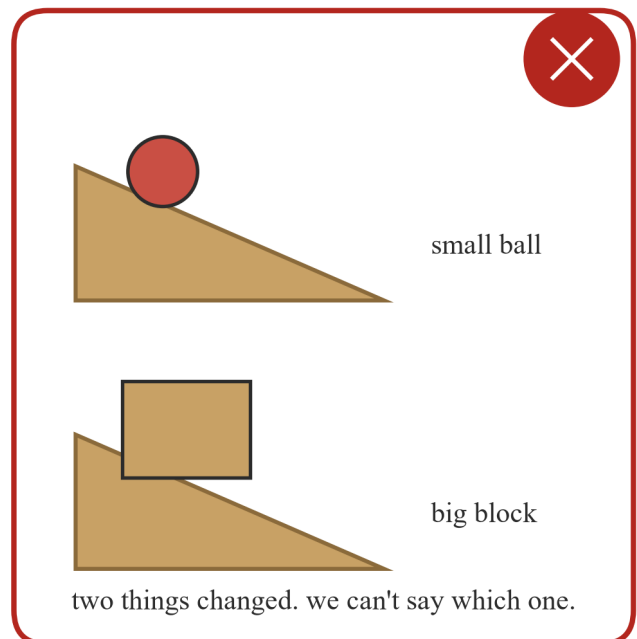
The size is a factor. The shape is a factor. The material is a factor.

We change **one** factor at a time. Then we know what made the change. If two things change, we cannot say which one made the change.

### one change: the size



### two changes: shape and size

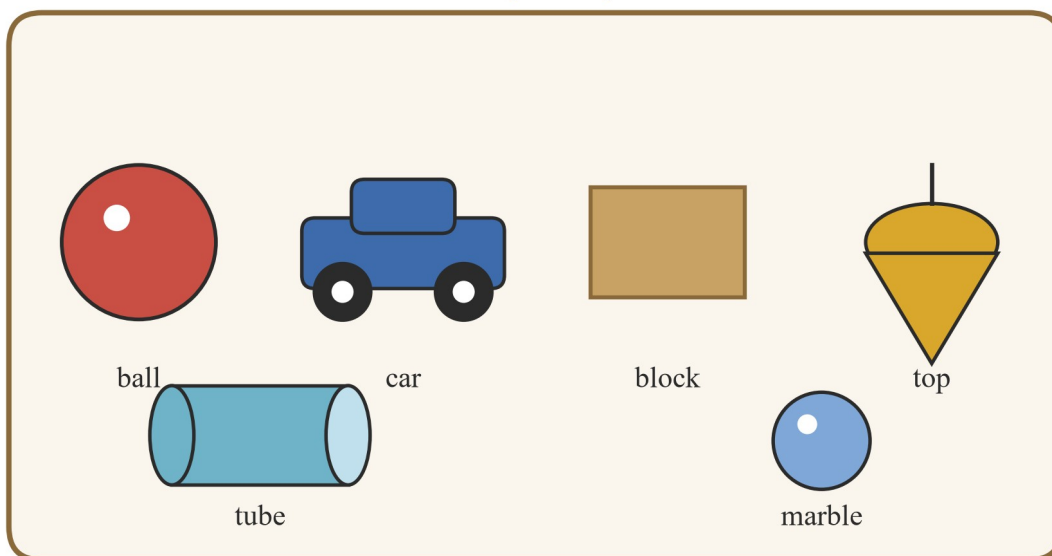


*Two pictures. The left picture has a tick: a small ball and a big ball on the same slope — one change, the size. The right picture has a cross: a small ball and a big block on the same slope — two changes, shape and size, so we cannot say which one made the change.*

### Group the toys

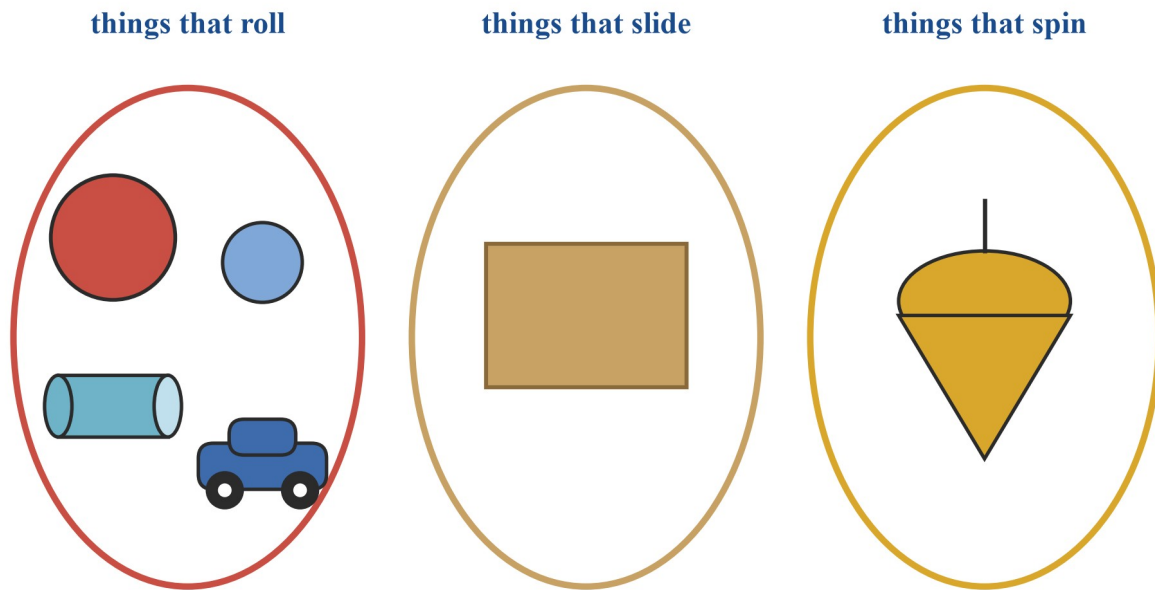
Here is a tray of toys.

### a tray of toys



*A tray of six toys with labels: a red ball, a blue car, a wooden block, a yellow top, a blue tube and a blue marble.*

We can put the toys in groups by how they move: things that roll, things that slide, and things that spin.



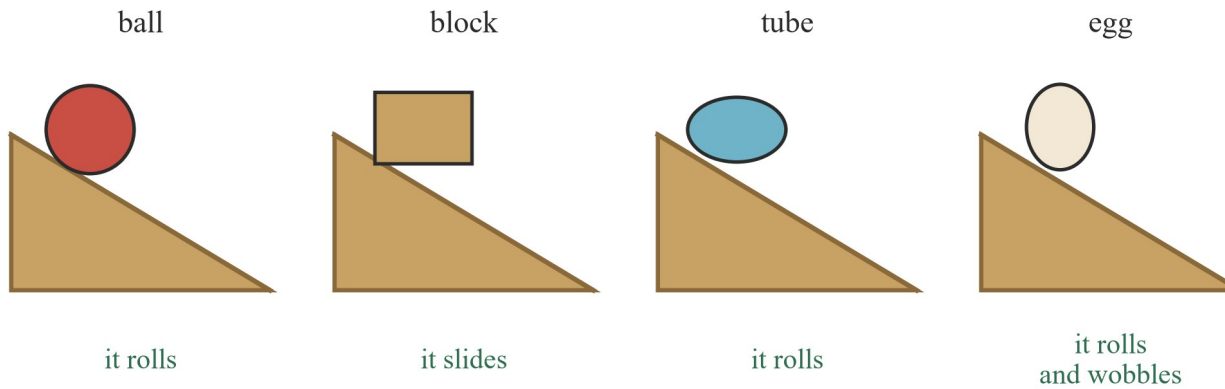
*Three hoops. The roll hoop holds the ball, the marble, the tube and the car. The slide hoop holds the block. The spin hoop holds the top.*

The ball rolls. The marble rolls. The tube rolls. The car rolls too, because its wheels roll. The block slides. The top spins.

### **Shapes on the slope**

Same slope. Same wood. Different shapes.

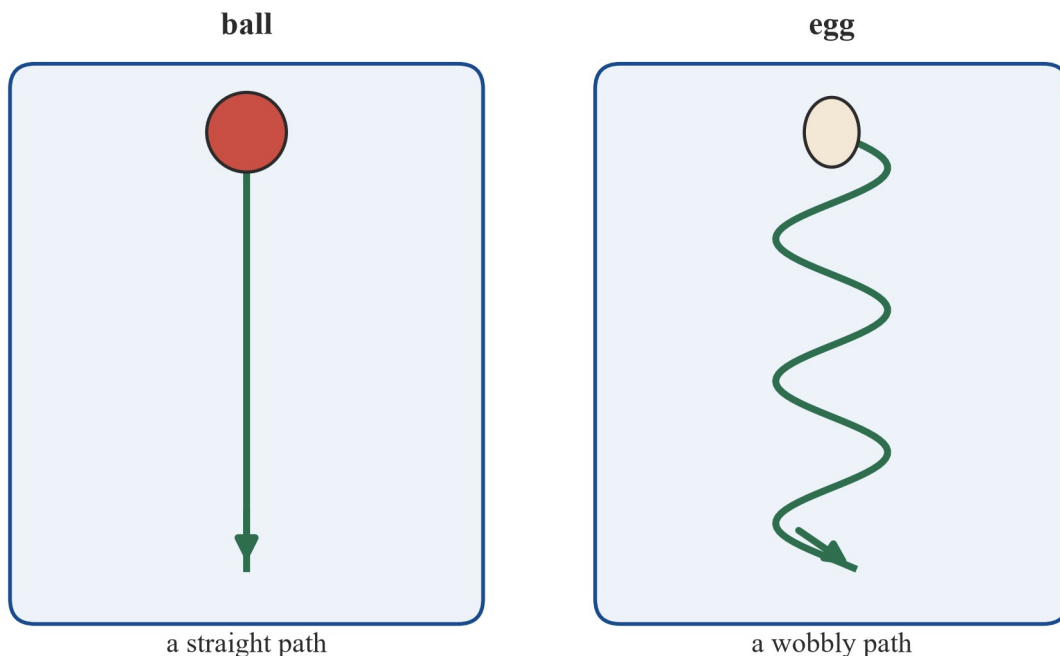
same slope. same wood. different shapes.



*Four small slopes, each with a different shape at the top: a ball rolls, a block slides, a tube rolls, an egg rolls and wobbles.*

The ball rolls down in a straight path. The egg is not round like a ball. It rolls and wobbles, so its path is wobbly.

### the paths we saw



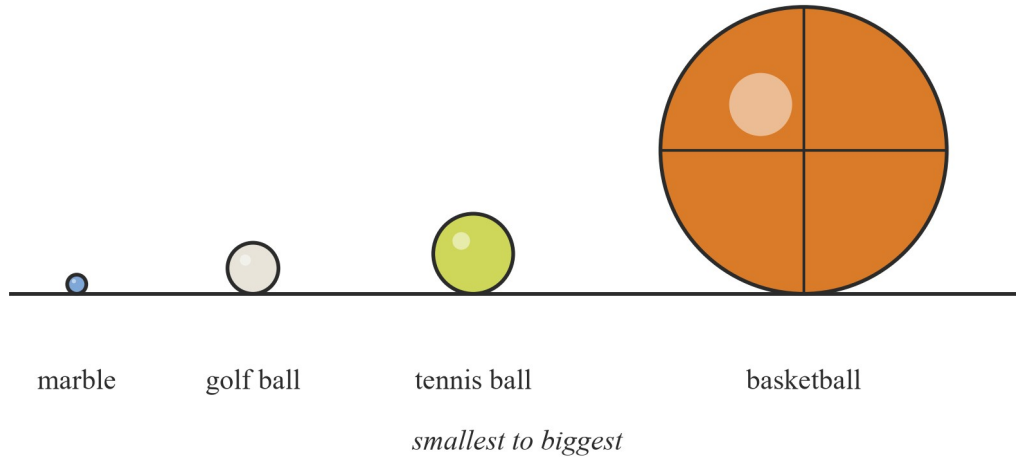
*Two paths seen from above: the ball makes a straight path down the slope, the egg makes a wobbly path.*

**Safety.** The egg is boiled. It is for rolling, not eating. We never taste the things we test.

### Sizes on the slope

Same shape — all balls. Different sizes.

**same shape: all balls. different sizes.**



*Four balls at their real sizes, smallest to biggest: marble, golf ball, tennis ball, basketball.*

We let each ball go at the top of the same slope. We see how far each one goes. Some balls go a long way. Some do not go as far. Size is a factor.

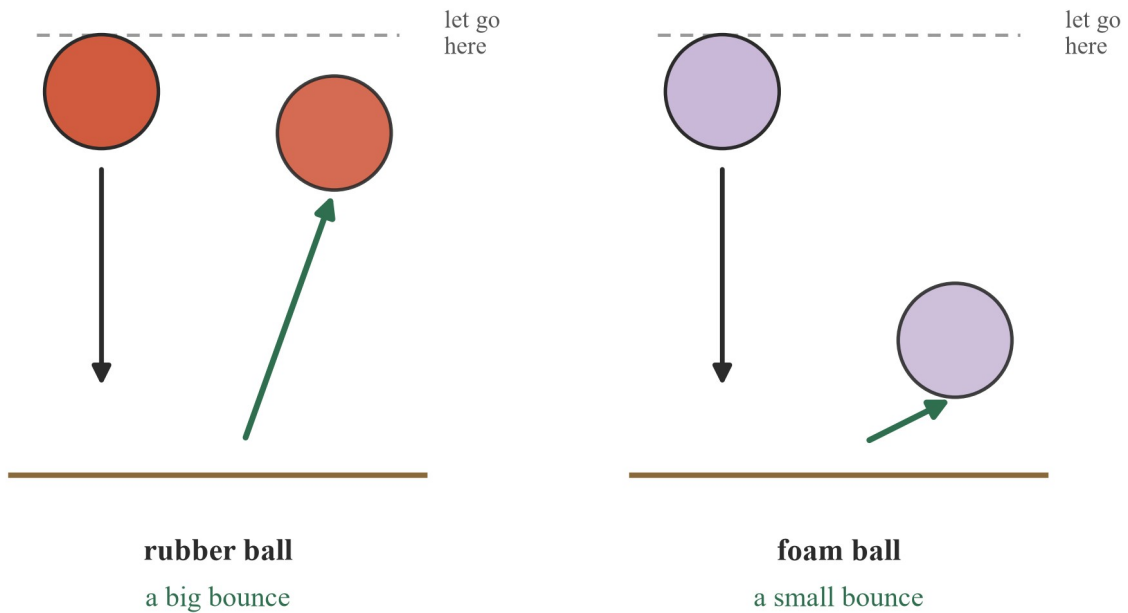
**Safety.** Marbles are small. They must never go in your mouth. Pick them up when we finish.

### ***The drop test***

Same size. Same shape. Only the material changes.

We let go at the same line. The rubber ball bounces a big bounce. The foam ball bounces a small bounce. The material is a factor.

## drop test: same size, same shape — only the material changes



*Drop test: a rubber ball and a foam ball of the same size are let go at the same line. The rubber ball bounces back up high; the foam ball bounces only a little.*

### Our class record

The teacher draws our record. We try each thing on the slope. The teacher ticks what it does.

### our class record

the teacher writes the ticks as we try each thing

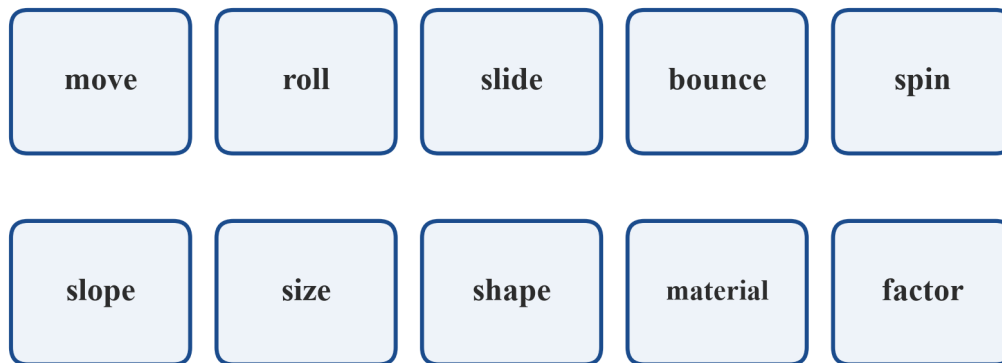
| thing | rolls | slides | stays |
|-------|-------|--------|-------|
| ball  |       |        |       |
| block |       |        |       |
| tube  |       |        |       |
| egg   |       |        |       |

*A blank class record table. Across the top it says: thing, rolls, slides, stays. Down the side: ball, block, tube, egg. The boxes are empty for the teacher to tick as we try each thing.*

If a thing does not move at all, we tick **stays**.



## words for this topic



Ten word cards in two rows: move, roll, slide, bounce, spin, slope, size, shape, material, factor.

- **move** — to go from one place to another
- **roll** — to turn over and over as you go
- **slide** — to move along and stay flat
- **bounce** — to jump back up when you hit the floor
- **spin** — to turn round and round on the spot
- **slope** — like a slide: one end high, one end low
- **size** — how big or small a thing is
- **shape** — what a thing looks like: round, square, long
- **material** — what a thing is made of: rubber, plastic, foam, cloth
- **factor** — one thing that can change how a thing moves

### Worked examples

#### Example 1 — group the toys by how they move (E01)

Put the six toys from the tray into groups.

| Working                                                   | Say why                  |
|-----------------------------------------------------------|--------------------------|
| The toys are: ball, car, block, top, tube, marble.        | name them all            |
| The ball turns over and over as it goes. It rolls.        | roll group               |
| The marble and the tube roll too.                         | roll group               |
| The car's wheels roll, so the car rolls.                  | roll group               |
| The block stays flat and moves along. It slides.          | slide group              |
| The top turns round and round on the spot. It spins.      | spin group               |
| ∴ roll: ball, marble, tube, car. slide: block. spin: top. | all six toys are grouped |

#### Example 2 — shapes on the same slope (E02)

A ball, a block, a tube and an egg go down the same slope. Say how each one moves.

| Working                                         | Say why              |
|-------------------------------------------------|----------------------|
| Same slope, same wood. Only the shape changes.  | one change at a time |
| The ball is round. It rolls in a straight path. | rolls                |

|                                                         |                 |
|---------------------------------------------------------|-----------------|
| The block is flat. It slides.                           | slides          |
| The tube is round along its side. It rolls.             | rolls           |
| The egg is not round like a ball. It rolls and wobbles. | wobbly path     |
| ∴ the shape is a factor: it changes how a thing moves.  | say it together |

### Example 3 — one change at a time (E03)

Which test is fair: Test A or Test B?

|                                                                |                               |
|----------------------------------------------------------------|-------------------------------|
| Test A: a small ball, then a big ball. Same shape, same slope. | one change: the size          |
| Test B: a small ball, then a big block.                        | two changes: size and shape   |
| In Test B, if the block does not go as far, we cannot say why. | was it the size or the shape? |
| ∴ Test A is the fair test. It changes one factor at a time.    | one change at a time          |

### Example 4 — the drop test (E04)

A rubber ball and a foam ball are the same size and the same shape. We let go at the same line. Say what we see.

|                                                           |                      |
|-----------------------------------------------------------|----------------------|
| Same size. Same shape. Same line.                         | one change at a time |
| Only the material is different: rubber and foam.          | the factor we test   |
| The rubber ball bounces a big bounce.                     | watch it             |
| The foam ball bounces a small bounce.                     | watch it             |
| ∴ the material is a factor: it changes how a thing moves. | say it together      |

### Practice questions

**Teacher — predict and check.** For the questions marked *try it*, the children first say what they think will happen, then try the test, then say what they saw. Use the same slope and the same start line every time. Let go — no push. Things to have ready: a board and a box for the slope, balls of different sizes and materials, a block, a tube, a boiled egg, a tray and some marbles.

**Q1 [F]** Look at the movement words picture. Point to the card that shows *bounce*. Say the word.

**Q2 [F]** Point to the slope in the slope picture.

**Q3 [F]** Say: does a block slide, or does it bounce?

**Q4 [F]** Circle the things that roll: ball · block · marble · tube

**Q5 [F]** What does a top do? Say the word.

**Q6 [L1]** Look at the tray picture. Match each toy to its group with a line: ball, block, top → things that roll, things that slide, things that spin.

**Q7 [L1]** Circle the one that slides: ball / block / marble

**Q8 [L1]** The egg goes down the slope. Circle its path: straight / wobbly

**Q9 [L1]** Circle the word that fits: The ball ( rolls / spins ) down the slope.

**Q10 [L1]** Circle the safe thing to do with marbles: keep them on the tray / put them in your mouth

**Q11** [L2] Look at the one-change picture. Put a tick under the fair test. Say how you know.

**Q12** [L2] We test a big ball and a small ball on the slope. What must stay the same? Circle one: the slope / the colour of the ball

**Q13** [L2] *Try it.* A rubber ball and a foam ball, the same size. Say which one will bounce a big bounce. Then drop them and check. Were you right?

**Q14** [L2] *Try it.* Same slope. A golf ball and a tennis ball. Say which one will go a long way. Then try it and check. Say why.

**Q15** [L2] Draw a thing that spins.

**Q16** [L2] Say two factors that can change how a thing moves.

## Answers

1. The third card (the blue ball). *bounce*
2. The board that rests on the box.
3. A block slides.
4. ball, marble, tube
5. spin
6. ball → things that roll. block → things that slide. top → things that spin.
7. block
8. wobbly
9. rolls
10. keep them on the tray
11. The left picture (one change: the size). Only one factor changes, so we know what made the change.
12. the slope
13. The rubber ball bounces a big bounce.
14. The golf ball goes a long way. It is hard and smooth.
15. Any drawing of a thing that spins (a top, a windmill, a fan).
16. Any two of: the size, the shape, the material.

## Fully-worked solutions

**Q1** The bounce card shows a ball going down and jumping back up. ∴ point to the third card and say *bounce*.

**Q2** The slope is the board that rests on the box. One end is high, one end is low. ∴ point to the board.

**Q3** A block is flat. It does not turn over and over, and it does not jump back up. ∴ a block slides.

**Q4** Things that are round roll. A ball is round. A marble is round. A tube is round along its side. A block is flat, so it slides. ∴ circle ball, marble, tube.

**Q5** A top turns round and round on the spot. ∴ it spins.

**Q6** The ball turns over and over, so it rolls. The block stays flat and moves along, so it slides. The top turns round and round, so it spins. ∴ ball → roll, block → slide, top → spin.

**Q7** The ball and the marble are round, so they roll. The block is flat. ∴ the block slides.

**Q8** The egg is not round like a ball, so it wobbles as it rolls. ∴ its path is wobbly.

**Q9** The ball turns over and over as it goes down the slope. ∴ the ball *rolls* down the slope.

**Q10** Marbles are small. They must never go in your mouth. ∴ keep them on the tray.

**Q11** The left picture changes one factor (the size). The right picture changes two factors (the shape and the size), so we cannot say which one made the change. ∴ the left picture is the fair test.

**Q12** We test the size, so only the size may change. The slope must stay the same. The colour of the ball is not a factor here. ∴ circle *the slope*.

**Q13** Say your idea first. In the drop test, the rubber ball jumps back up a lot and the foam ball jumps back up a little. ∴ the rubber ball bounces a big bounce. The material is a factor.

**Q14** Say your idea first, then try it on the same slope with the same start line. The golf ball is hard and smooth, so it rolls a long way. The tennis ball is not smooth, so it does not go as far. ∴ the golf ball goes a long way.

**Q15** A thing that spins turns round and round on the spot. ∴ a top, a windmill or a fan is right.

**Q16** The factors in this topic are the size, the shape and the material. ∴ name any two of these.

## Pushes and pulls: changing movement and shape, by strength and direction

**Read aloud.** A grown-up reads this topic to the children. Children answer by pointing, saying, circling, matching or drawing. There is no long writing.

**VC2S2U11** — pushes and pulls are forces that can change an object's movement or shape and can be represented in terms of strength and direction

*Victorian Curriculum 2.0 — Science F–2, Physical sciences*

**Evidences:** They describe and predict how different strengths and directions of pushes and pulls change the motion and shape of objects.

In this topic we will:

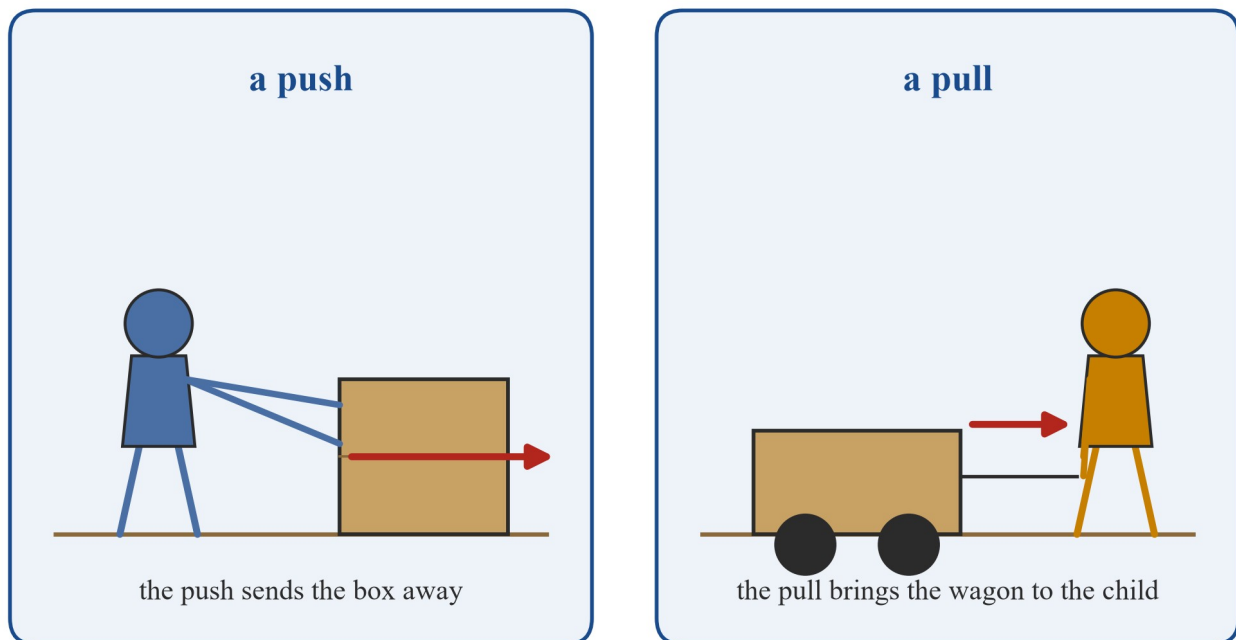
- find pushes and pulls at the playground, and on doors, windows and drawers (E01)
- use paddles, plastic bats and racquets to give a ball a strong push (E02)
- see a force start and stop a ball, and make it turn (E03)
- push and pull modelling dough to change its shape (E04)
- make a game and draw arrows to show the pushes and pulls (E05)
- meet traditional Asian games: kendama, Daruma Otoshi and hanetsuki (E06)

### Theory

#### ***A push and a pull***

A **force** is a push or a pull.

A push makes a thing go away from you. A pull brings a thing to you.



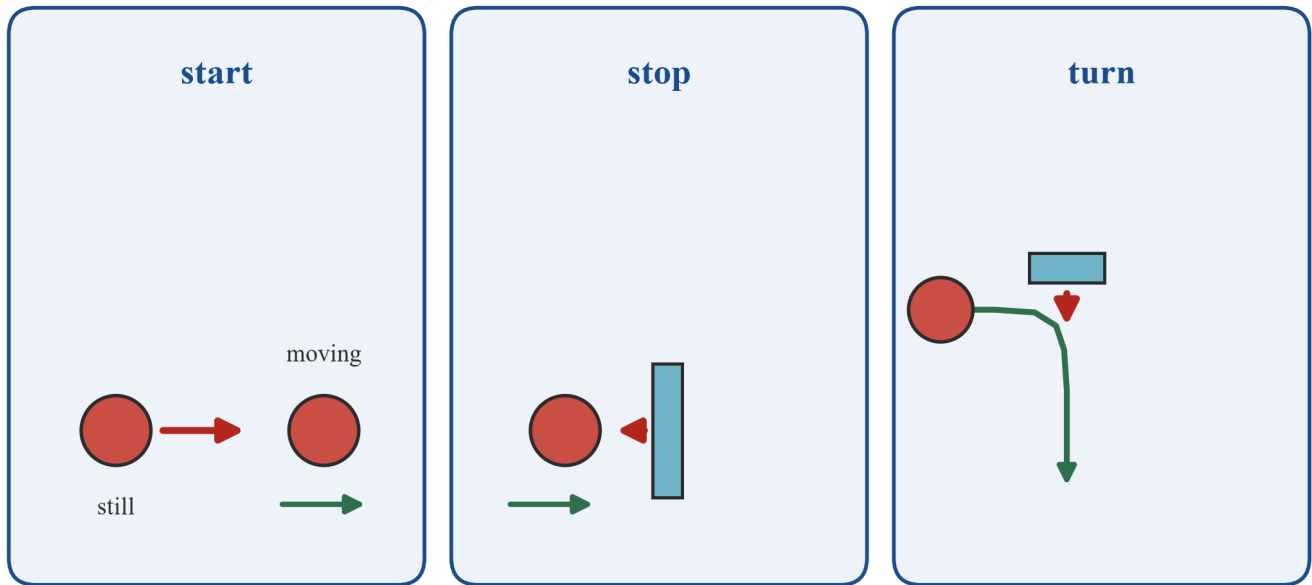
*Two cards. Left card: a child pushes a box, and a red arrow points away from the child to show the push. Right card: a child pulls a wagon on a string, and a red arrow points to the child to show the pull.*

Pushes and pulls are forces. Every push is a force. Every pull is a force.

#### ***A force can change movement***

A force can start a still ball. A force can stop a moving ball. A push from the side can make a moving ball turn.

## a force can change the way a thing moves



a push makes a still ball move

a push can stop a moving ball

a push from the side makes it turn

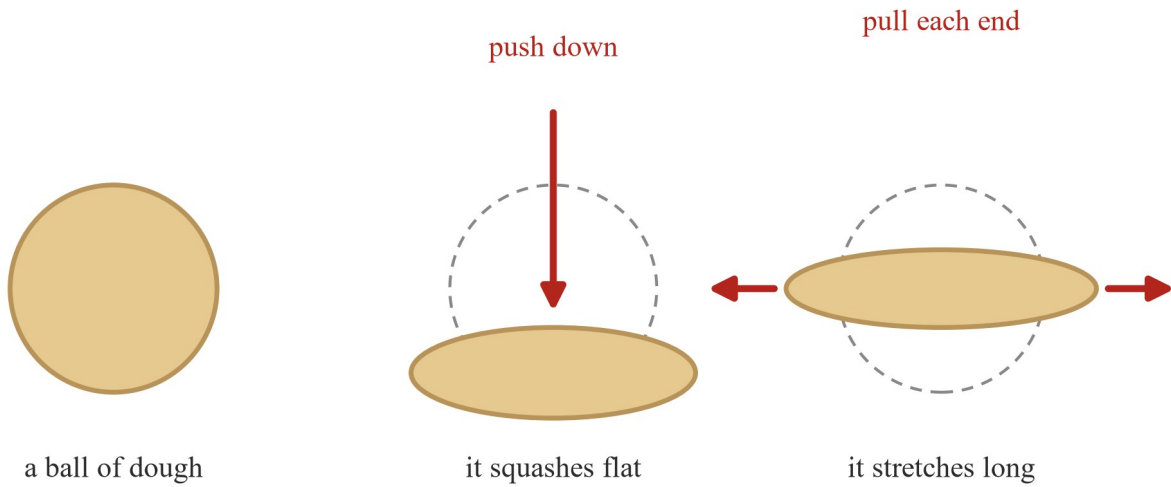
*Three cards. Start: a red arrow pushes a still ball and it moves, and a green arrow shows the movement. Stop: a moving ball meets a paddle that pushes back, and it stops. Turn: a push from the side makes the moving ball turn.*

Start, stop, turn — a force can change the way a thing moves.

### **A force can change shape**

Push the dough down and it squashes flat. Pull each end and it stretches long. The force changes the shape of the dough.

## forces change the shape of the dough



*Three pictures of dough. A ball of dough. Push down: a red arrow pushes the ball and it squashes flat. Pull each end: two red arrows pull and it stretches long.*

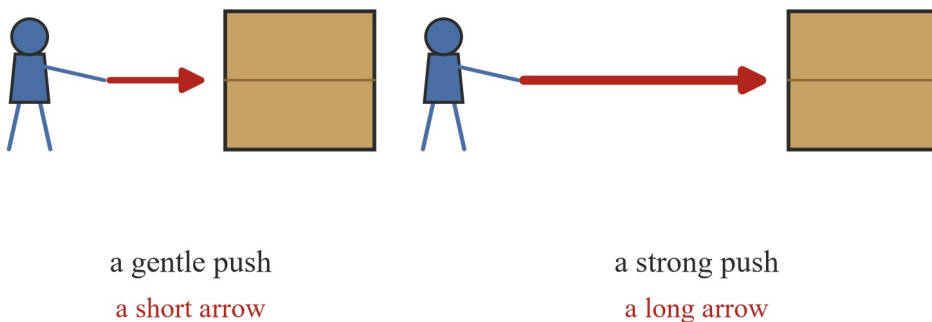
**Safety.** Dough is for pushing and pulling, not for eating. We never taste the things we test.

### **How strong? — strength**

**Strength** is how strong a force is.

We draw a red arrow to show a force. A gentle push gets a short arrow. A strong push gets a long arrow.

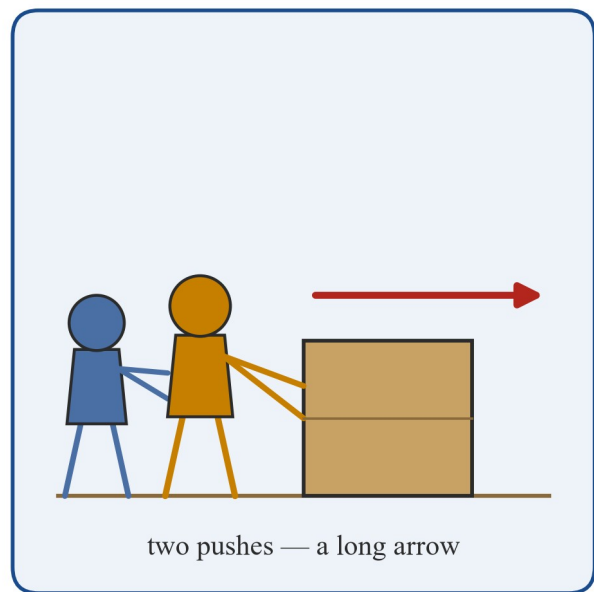
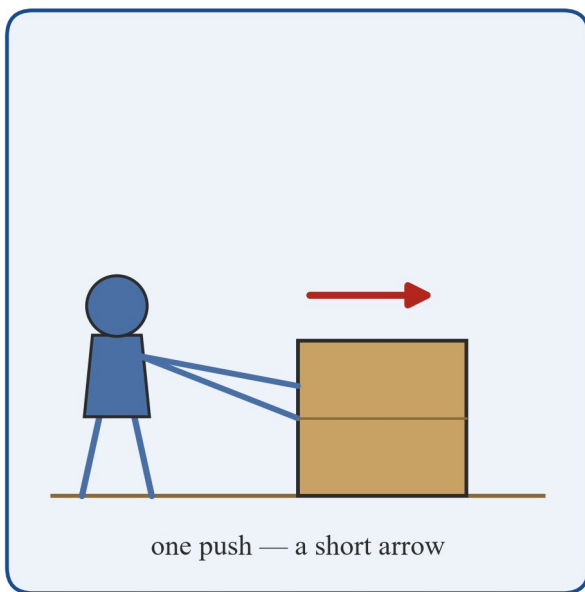
### the arrow shows how strong the push is



*Two children push a box. A gentle push gets a short red arrow. A strong push gets a long red arrow.*

Two pushes the same way are stronger than one push. We draw a longer arrow.

## two pushes together are stronger than one



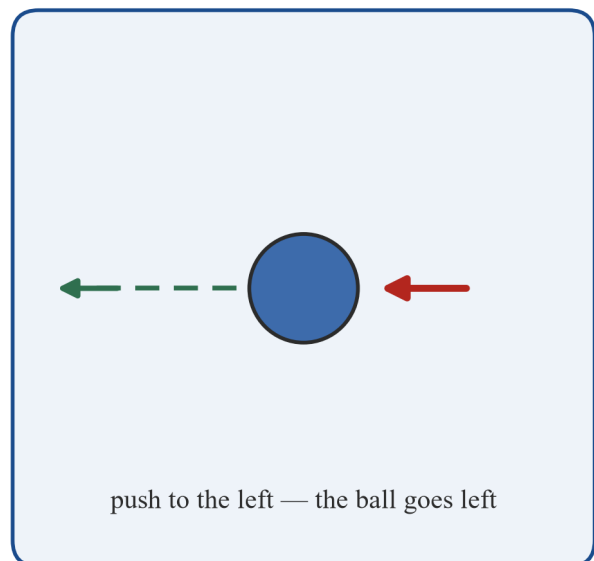
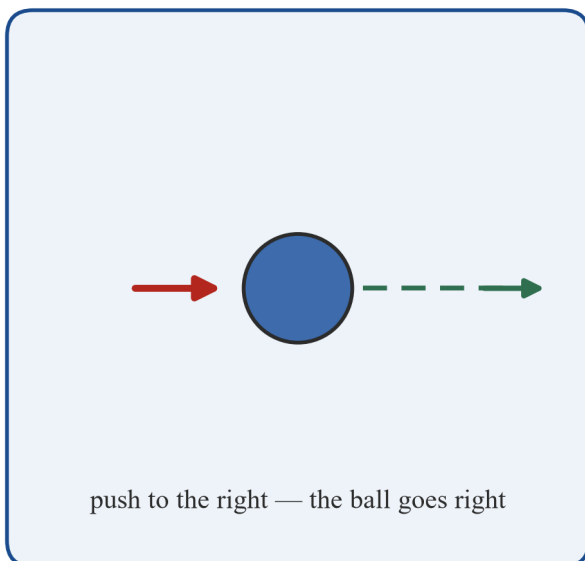
Two cards. Left: one child pushes a box — a short red arrow. Right: two children push the same box together — a long red arrow.

### Which way? — direction

**Direction** is which way a force goes.

The pointy end of the arrow shows the direction.

## the pointy end shows the direction



Two cards. Left: a red arrow pushes a blue ball to the right, and a green arrow shows the ball going right. Right: a red arrow pushes the ball to the left, and the ball goes left.

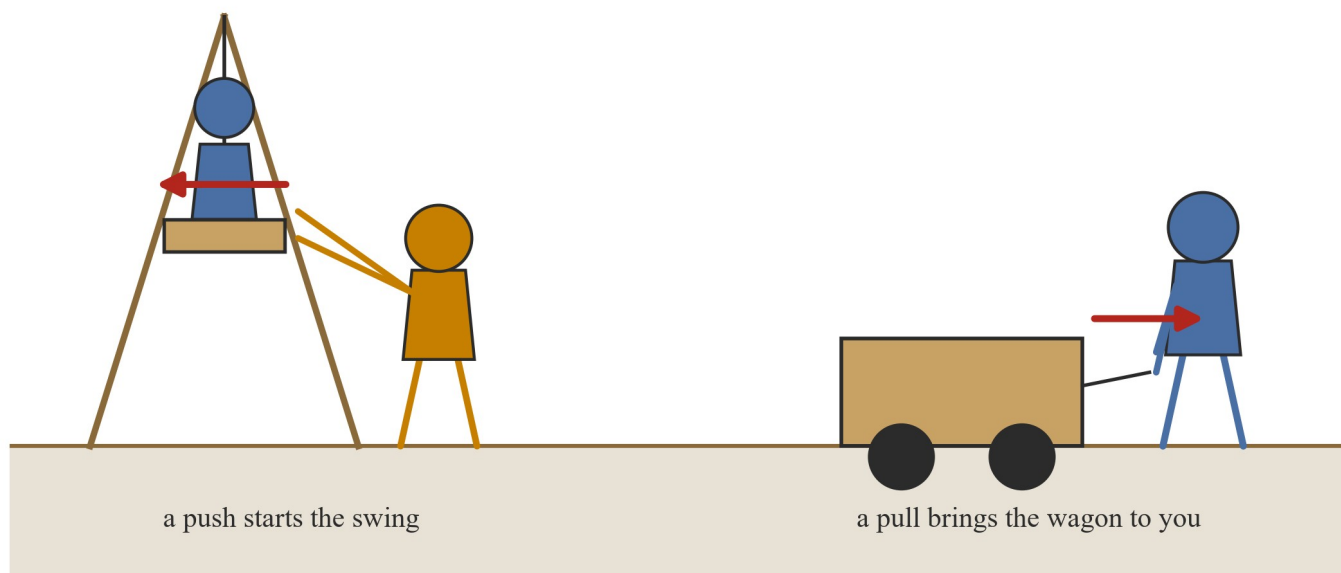


Push to the right — the ball goes right. Push to the left — the ball goes left.

### ***Pushes and pulls at the playground***

A push starts the swing. A pull brings the wagon to you.

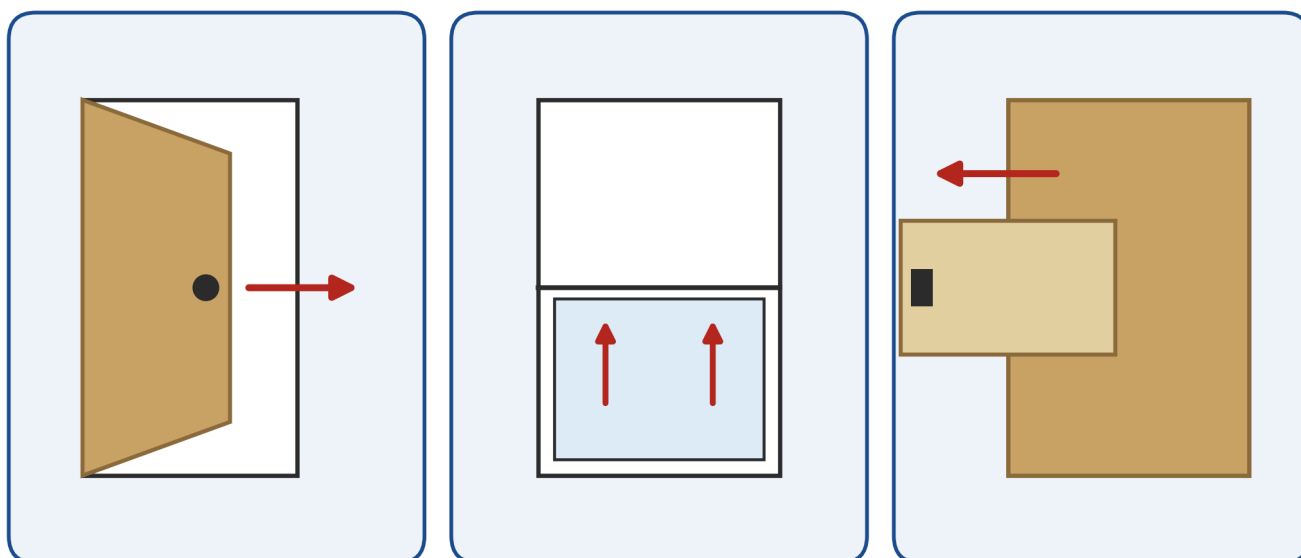
#### **pushes and pulls at the playground**



*A playground. A child pushes a swing, and a red arrow shows the push. A child pulls a wagon on a string, and a red arrow shows the pull.*

Doors, windows and drawers use pushes and pulls too.

## pushes and pulls on doors, windows and drawers



push the door

pull the window up

pull the drawer

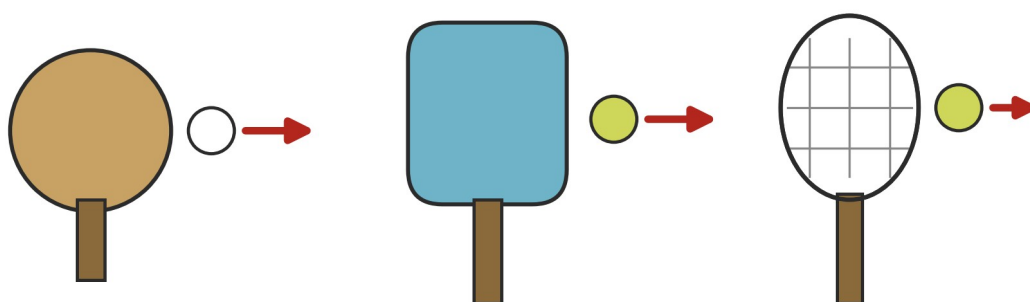
*Three cards. Push the door: a red arrow points away from the door. Pull the window up: two red arrows point up. Pull the drawer: a red arrow points out of the drawer.*

**Safety.** Wait for your turn. Do not walk in front of a moving swing.

## Bats and paddles

A paddle, a plastic bat and a racquet help us push a ball. A **racquet** is a bat with strings. The big, flat face gives the ball a strong push.

## bats and paddles help us push the ball



paddle

plastic bat

racquet

*the big, flat face gives the ball a strong push*

*A paddle, a plastic bat and a racquet in a row. Each one has a ball at its face, and a red arrow shows the push on the ball.*

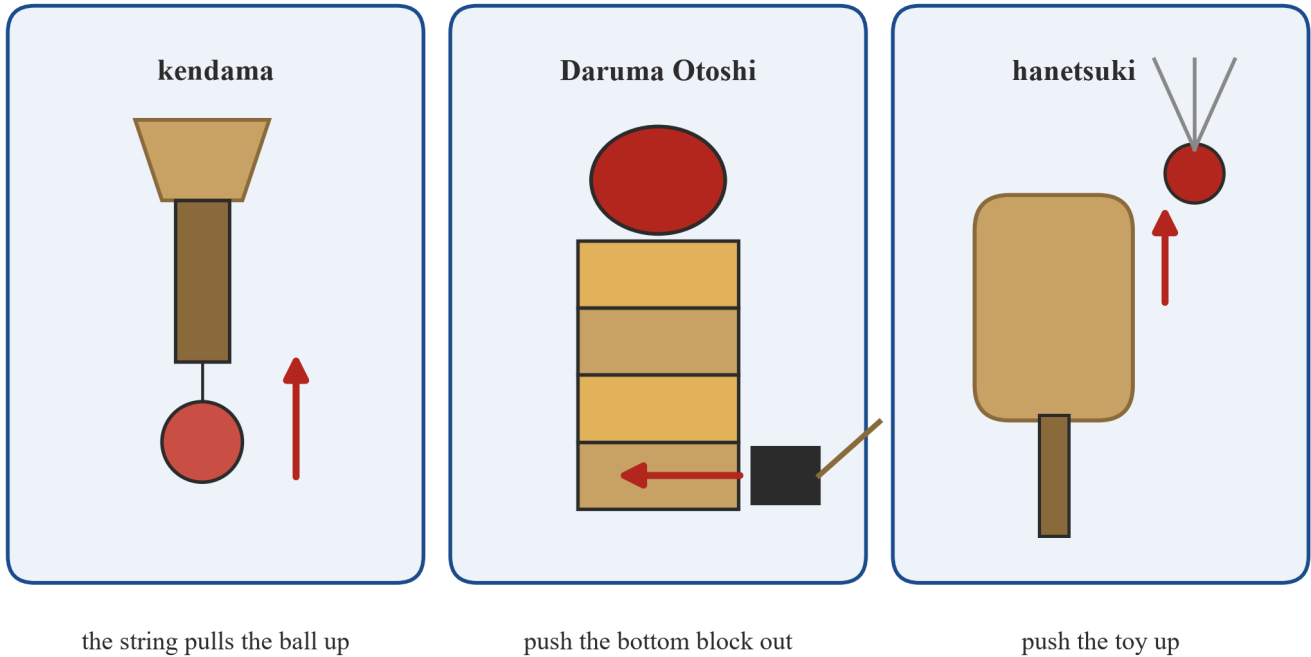
**Safety.** Stand back from the child with the bat. Watch the ball.

## Games from Japan

Some traditional games from Japan use pushes and pulls.

- **kendama** — the string pulls the ball up
- **Daruma Otoshi** — a small hammer pushes the bottom block out
- **hanetsuki** — a paddle pushes the toy up

### games from Japan — pushes and pulls

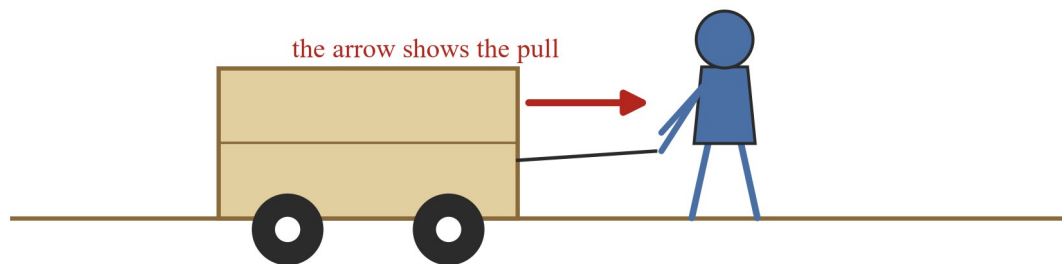


Three cards of games from Japan. Kendama: the ball is on a string below the toy, and a red arrow shows the pull up. Daruma Otoshi: a red arrow pushes the bottom block out. Hanetsuki: a red arrow pushes the toy up.

### Make a game and show the forces

We make a box car on a string. We pull the string, and the car moves. We draw a red arrow to show the pull.

## we show the forces on our game



our game: a box car on a string

*A child pulls a box car on a string. A red arrow on the car points to the child to show the pull.*

Our arrow rules:

- red arrow = the force (a push or a pull)
- green arrow = the movement
- a long arrow = a strong force
- the pointy end = the direction

### ***Our class record***

We try each thing. The teacher writes push or pull, and what happens.

## our class record

the teacher writes what we find

| thing  | push or pull | what happens |
|--------|--------------|--------------|
| door   |              |              |
| drawer |              |              |
| swing  |              |              |
| dough  |              |              |
| ball   |              |              |

*A blank class record table. Across the top: thing, push or pull, what happens. Down the side: door, drawer, swing, dough, ball. The boxes are empty for the teacher to write in.*

### Words for this topic

#### words for this topic

push

pull

force

strength

direction

arrow

start

stop

turn

shape

*Ten word cards in two rows: push, pull, force, strength, direction, arrow, start, stop, turn, shape.*

- **push** — a force that makes a thing go away from you
- **pull** — a force that brings a thing to you
- **force** — a push or a pull
- **strength** — how strong a force is
- **direction** — which way a force goes
- **arrow** — a line with a pointy end; we draw it to show a force
- **start** — to make a still thing move
- **stop** — to make a moving thing still

- **turn** — to change the way a thing moves
- **shape** — what a thing looks like: round, flat, long

### **Say what will happen first**

To **predict** is to say what will happen, before it happens.

We predict. We try. We check.

### **Worked examples**

#### **Example 1 — push or pull? (E01)**

Look at the playground things. Say push or pull for each one.

| Working                                               | Say why                           |
|-------------------------------------------------------|-----------------------------------|
| The swing goes away from your friend.                 | a push sends a thing away         |
| The wagon comes to you on the string.                 | a pull brings a thing to you      |
| The door goes away from you.                          | push                              |
| The drawer comes out to you.                          | pull                              |
| ∴ swing: push. wagon: pull. door: push. drawer: pull. | pushes go away; pulls come to you |

#### **Example 2 — start, stop, turn (E03)**

A ball and a force. Say what the force does.

| Working                                                | Say why                       |
|--------------------------------------------------------|-------------------------------|
| The ball is still. A push makes it move.               | start                         |
| The ball moves. A paddle pushes the other way.         | stop                          |
| The ball moves. A push comes from the side.            | turn                          |
| ∴ a force can start a thing, stop it, or make it turn. | three ways to change movement |

#### **Example 3 — change the shape (E04)**

Dough. Say what each force does to the shape.

| Working                                    | Say why                    |
|--------------------------------------------|----------------------------|
| Push down. The dough squashes flat.        | the push changes the shape |
| Pull each end. The dough stretches long.   | the pull changes the shape |
| ∴ a force can change the shape of a thing. | squash and stretch         |

#### **Example 4 — read the arrows (strength and direction)**

Two pictures of the same box. Picture A has a short red arrow to the right. Picture B has a long red arrow to the right. Say which push is stronger, and which way the box goes.

| Working                                                       | Say why                                     |
|---------------------------------------------------------------|---------------------------------------------|
| Picture A: a short arrow.                                     | a gentle push                               |
| Picture B: a long arrow.                                      | a strong push                               |
| Both arrows point to the right.                               | same direction                              |
| ∴ Picture B is the stronger push. The box goes right in both. | long arrow = strong; pointy end = direction |

### **Practice questions**

**Teacher — predict and check.** For the questions marked *try it*, the children first say what they think will happen, then try it, then say what they saw. Things to have ready: a soft ball, a paddle or plastic bat, modelling dough, a box on a string, and the record sheet. Use the word cards for revision.

- Q1 [F]** Look at the push and pull picture. Point to the push. Point to the pull.
- Q2 [F]** Say the word: a force is a push or a \_\_\_\_ .
- Q3 [F]** Look at the strength picture. Point to the long arrow. Say: strong push or gentle push?
- Q4 [F]** Circle: push / pull — the wagon comes to you on the string.
- Q5 [F]** Say the word: a push from the side makes a moving ball \_\_\_\_ .
- Q6 [L1]** Match each thing with push or pull using a line: door · drawer · wagon
- Q7 [L1]** Circle: start / stop / turn — a paddle pushes a moving ball the other way.
- Q8 [L1]** Circle: push / pull — you push down on the dough and it squashes flat.
- Q9 [L1]** A red arrow on a ball points to the left. Circle: the ball goes left / the ball goes right.
- Q10 [L1]** Draw a short arrow and a long arrow. Circle the one that is a strong push.
- Q11 [L2]** *Try it.* A still ball and a soft push. Say what will happen. Then try it. Were you right?
- Q12 [L2]** *Try it.* Push the dough down. Say the shape before you push. Check. Then pull each end. Say the shape. Check.
- Q13 [L2]** Draw a ball and a red arrow for a strong push to the right.
- Q14 [L2]** Draw a wagon and a red arrow for a pull to the left.
- Q15 [L2]** Two children push a box the same way. Draw the arrow. Is it longer than the arrow for one push?
- Q16 [L2]** Say two things a force can do to the movement of a thing, and one thing it can do to the shape.

## Answers

1. The left card is the push. The right card is the pull.
2. pull
3. The long arrow. A strong push.
4. pull
5. turn
6. door → push. drawer → pull. wagon → pull.
7. stop
8. push
9. the ball goes left
10. the long arrow
11. The ball starts to move.
12. Push down: flat. Pull each end: long.
13. A long red arrow pointing right, at the ball.
14. A red arrow pointing left, at the wagon.
15. Yes — two pushes are stronger, so the arrow is longer.
16. Movement: any two of start, stop, turn. Shape: squash or stretch.

## Fully-worked solutions

**Q1** In the push card, the box goes away from the child. In the pull card, the wagon comes to the child. ∴ left: push, right: pull.

**Q2** A force is a push or a pull. ∴ the word is *pull*.

**Q3** A long arrow is a strong push. ∴ point to the long arrow and say *strong push*.

**Q4** The wagon comes to you. A pull brings a thing to you. ∴ circle *pull*.

**Q5** A push from the side changes the way the ball goes. ∴ the ball turns.

**Q6** The door goes away from you: push. The drawer comes out to you: pull. The wagon comes to you on the string: pull. ∴ door → push, drawer → pull, wagon → pull.

**Q7** The paddle pushes the moving ball the other way, so it stops. ∴ circle *stop*.

**Q8** A push down makes the dough flat. ∴ circle *push*.

**Q9** The pointy end shows the direction. The arrow points left. ∴ the ball goes left.

**Q10** A long arrow is a strong push. ∴ circle the long arrow.

**Q11** Say your idea first. A push makes a still ball move. ∴ the ball starts to move. Check: yes.

**Q12** Say your idea first. A push down squashes the dough flat. A pull stretches it long. ∴ flat, then long. Check both.

**Q13** A strong push gets a long arrow. To the right means the pointy end is on the right. ∴ draw a long red arrow pointing right at the ball.

**Q14** A pull to the left points the arrow to the left. ∴ draw a red arrow pointing left at the wagon.

**Q15** Two pushes the same way are stronger than one push. A stronger push gets a longer arrow. ∴ yes, the arrow is longer.

**Q16** A force can change movement: it can start, stop or turn a thing. A force can change shape: it can squash or stretch a thing. ∴ name any two of start, stop, turn, and one of squash, stretch.



## Sound and vibration; producing sounds of different pitch and volume

**Read aloud.** A grown-up reads this topic to the children. Children answer by pointing, saying, circling, matching or drawing. There is no long writing.

**VC2S2U12** — sound can make materials vibrate and vibrating materials can make sound; different actions can be used to produce sounds of varying pitch and volume

*Victorian Curriculum 2.0 — Science F–2, Physical sciences*

**Evidences:** They describe the effect of sound energy on objects and demonstrate how different sounds can be produced.

In this topic we will:

- feel the tiny, fast moves that make every sound (E01)
- make sounds in five ways: strike, blow, scrape, pluck and shake (E03)
- see how high and low sounds come from different things (E05)
- make loud and soft sounds and watch the rice jump (E05)
- make a box guitar and a rain stick (E02)
- test which things keep a sound soft (E04)
- hear a sound come back as an echo (E06)

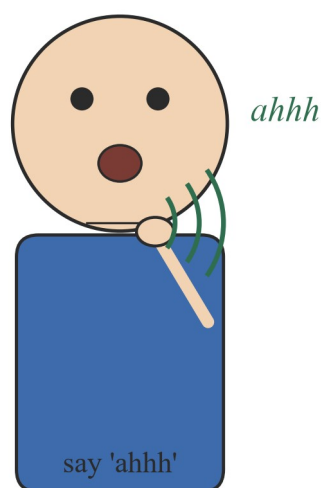
### Theory

#### **Feel the tiny, fast moves**

Say a long *ahhh*. Now put your fingers on your throat and say it again. You can feel tiny, fast moves under your fingers. A thing that moves like this is **vibrating**. To **vibrate** is to move up and down very fast, again and again.

A tuning fork makes a sound when we strike it. Touch it with a finger — it is vibrating too!

#### **feel the tiny, fast moves**



put your fingers on your throat

you can feel the tiny, fast moves

**these moves are called vibrations**

**every sound comes from  
something that vibrates**

*A child says 'ahhh' with fingers on the throat; green curved lines show the tiny, fast moves at the throat. A word box says: put your fingers on your throat, you can feel the tiny, fast moves, a vibrating thing makes these moves, every sound comes from a vibrating thing.*

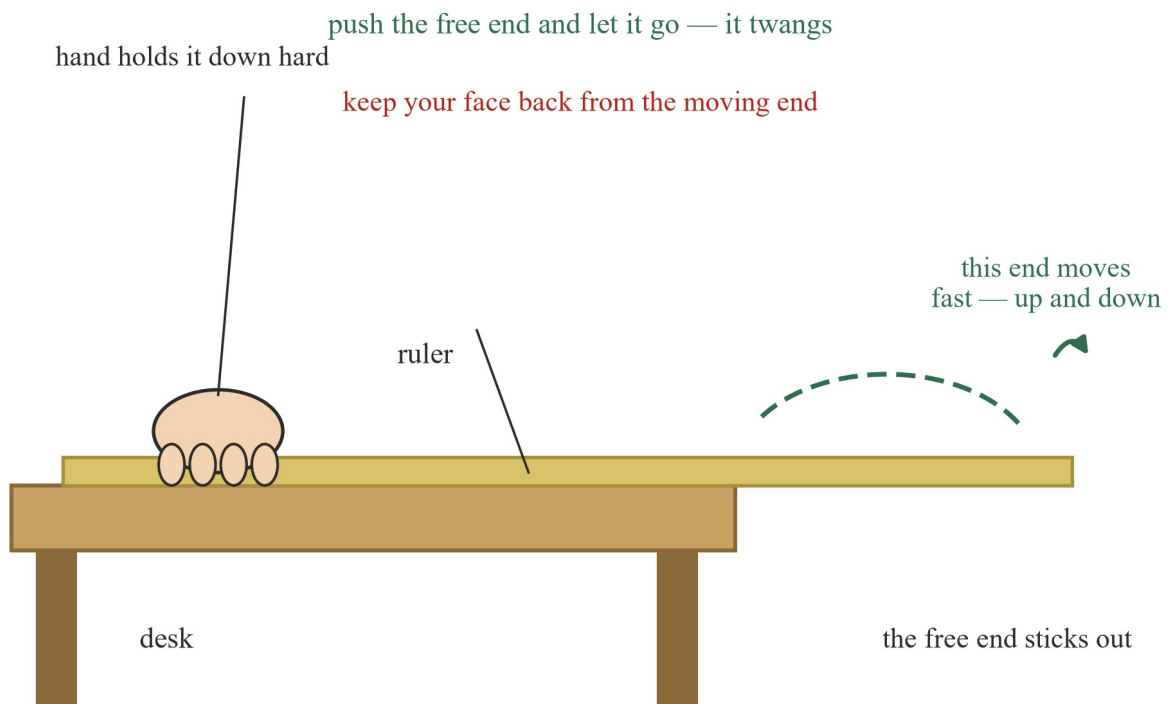
Every sound comes from a vibrating thing. And a sound can make things vibrate.

## The ruler on the desk (E01)

We put a ruler on the desk. One hand holds it down hard. The free end sticks out. Push the free end and let it go — we **twang** the ruler, and it makes a sound.

Look at the free end. It moves up and down very fast. It is vibrating. When it stops, the sound stops.

### the twanged ruler



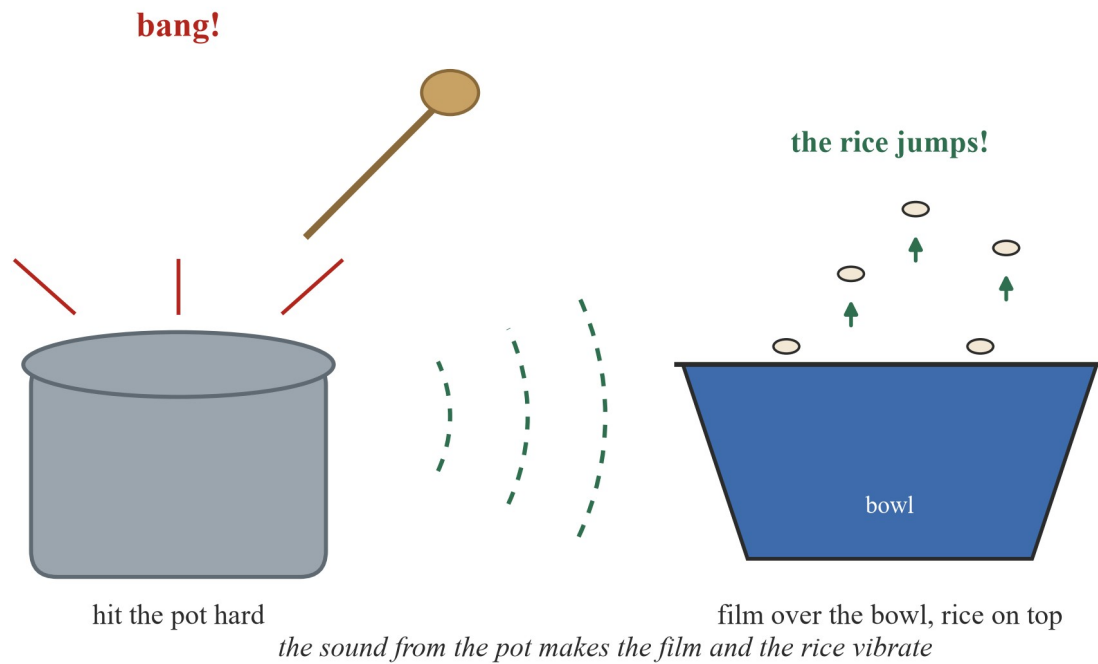
*A ruler on a desk with a hand holding it down hard. The free end sticks out past the desk, and a curved line shows it moving up and down fast. Labels say: hand holds it down hard; push the free end and let it go — we twang the ruler; keep your face back from the moving end; the free end sticks out.*

**Safety.** Hold the ruler down hard. Keep your face back from the moving end.

### A big sound can make things move

Hit a pot hard — **bang!** The pot starts to vibrate and makes a big sound. The sound goes to a bowl. The bowl has a film on top, and rice sits on the film. The rice jumps! The sound makes the film and the rice vibrate.

## a big sound can make things move



*A stick hits a pot hard — bang! Curved lines show the sound going to a bowl. The bowl has a film on top with rice on it, and the rice jumps up. Labels say: hit the pot hard; film over the bowl, rice on top; the rice jumps!*

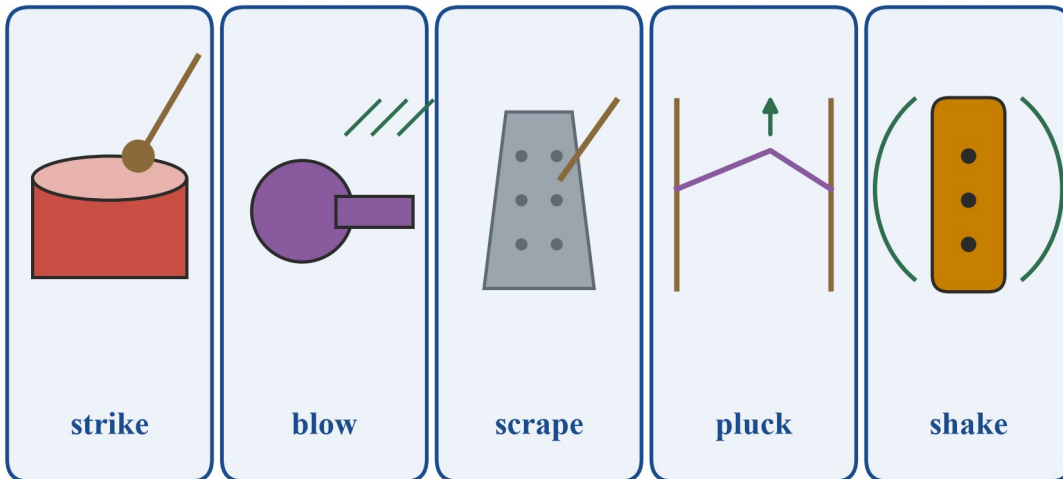
**Safety.** Rice is small. It must never go in your mouth. Pick up any rice on the floor.

### **Five ways to make a sound (E03)**

We can make a sound in five ways.

- **strike** — hit it: a stick on a drum
- **blow** — like a whistle
- **scrape** — a stick along a grater
- **pluck** — pull it and let it go fast: a band on a box
- **shake** — like a rain stick

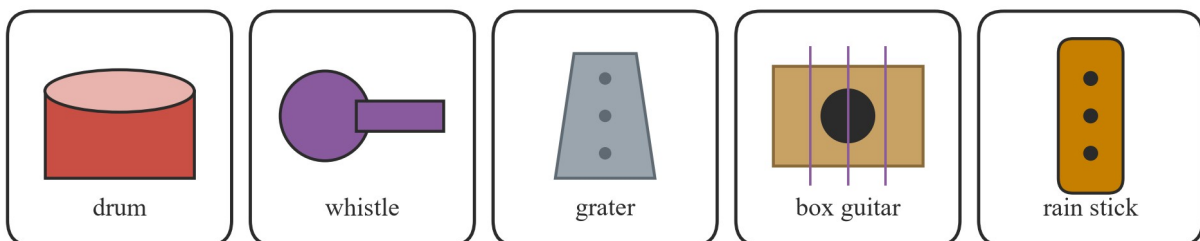
## five ways to make a sound



Five cards show the five actions: *strike* — a stick on a drum; *blow* — a whistle with air going out; *scrape* — a stick along a grater; *pluck* — a band pulled up between two posts; *shake* — a rain stick with curved lines that show it moving.

Now match each thing to the action that makes it sound.

## match the thing to the action that makes it sound



draw a line from each thing to its action

Five thing cards in a row — drum, whistle, grater, box guitar, rain stick — and five action cards under them: strike, blow, scrape, pluck, shake. The caption says: draw a line from each thing to its action.

The drum → strike. The whistle → blow. The grater → scrape. The box guitar → pluck. The rain stick → shake.

Our class record — the teacher ticks the action we used.

## our class record

the teacher ticks the action we used

| thing      | strike | blow | scrape | pluck | shake |
|------------|--------|------|--------|-------|-------|
| drum       |        |      |        |       |       |
| whistle    |        |      |        |       |       |
| grater     |        |      |        |       |       |
| box guitar |        |      |        |       |       |
| rain stick |        |      |        |       |       |

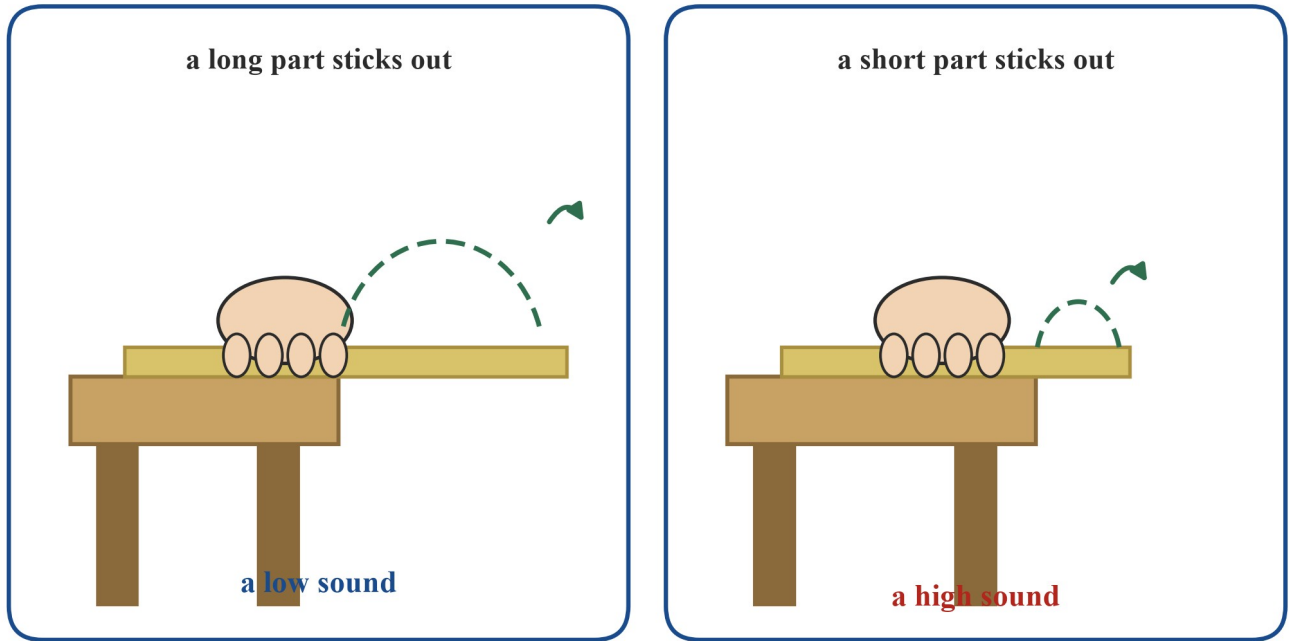
*A blank class record table. Across the top: thing, strike, blow, scrape, pluck, shake. Down the side: drum, whistle, grater, box guitar, rain stick. The boxes are empty for the teacher to tick as we try each thing.*

### High and low — pitch

The **pitch** of a sound is how high or low it is. A little bird makes high sounds. A big drum makes low sounds.

With the ruler: how much sticks out? A long part sticks out — a low sound. A short part sticks out — a high sound.

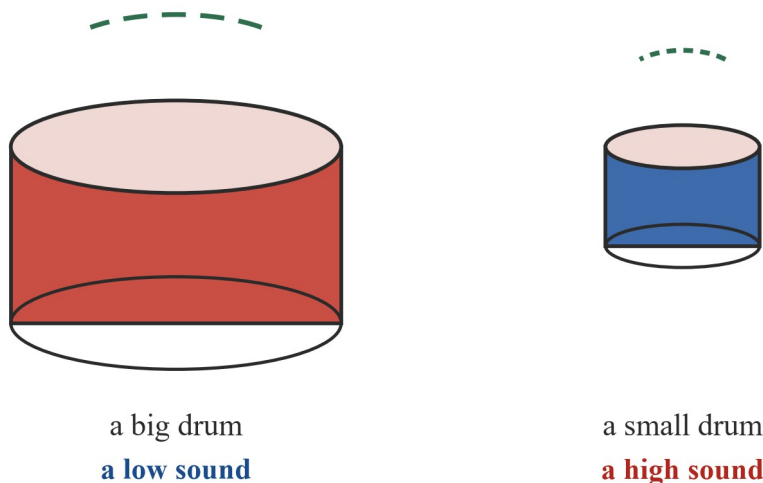
### the ruler: how much sticks out?



Two pictures. Left: a hand holds a ruler on a desk with a long part sticking out; a big curved line shows the moving end; the label says a low sound. Right: a short part sticks out; a small curved line shows the moving end; the label says a high sound.

With drums: a big drum — a low sound. A small drum — a high sound.

### the size of the drum changes the pitch



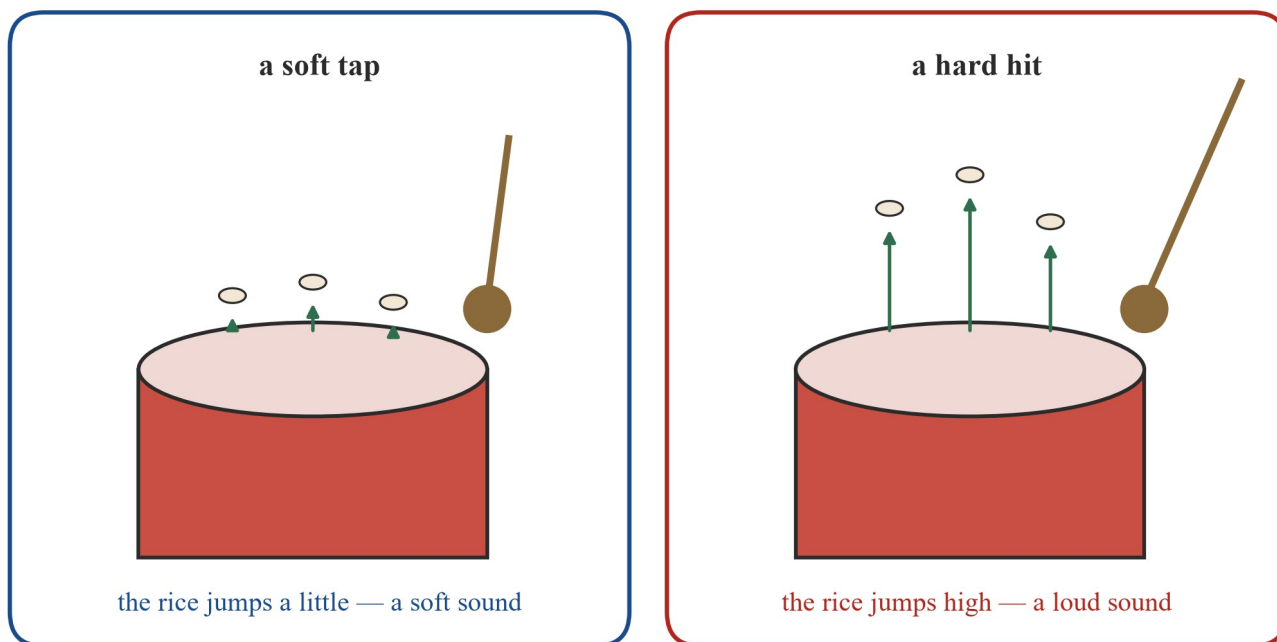
A big drum and a small drum, each with a curved line over the drum skin. The big drum makes a low sound. The small drum makes a high sound.

### Loud and soft — volume

The **volume** of a sound is how loud or soft it is.

A soft tap — the rice on the drum jumps a little — a soft sound. A hard hit — the rice jumps high — a loud sound. A hard hit makes the drum skin move more. That is a loud sound.

### soft and loud — the strength of the hit



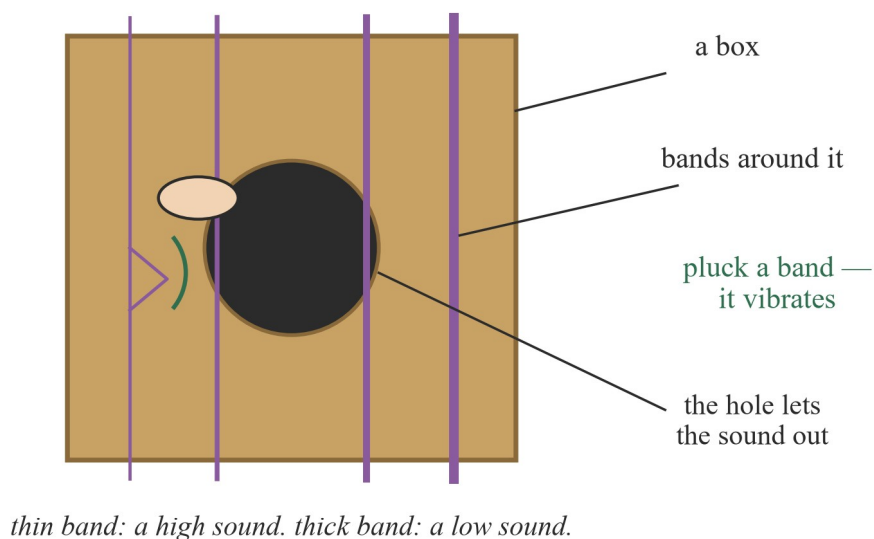
*Two pictures. Left: a soft tap on a drum; the rice jumps a little; a soft sound. Right: a hard hit on the same drum; the rice jumps high; a loud sound.*

**Safety.** Loud sounds can hurt your ears. Do not make a loud sound near a friend's ear.

### ***Make an instrument (E02)***

A box guitar: a box with bands around it. Pluck a band — the band starts to vibrate and makes a sound. A thin band makes a high sound. A thick band makes a low sound.

## make a box guitar

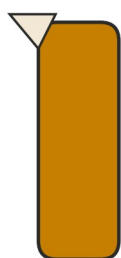


*A box with a hole in the top and four bands, some thick and some thin, around it. A finger pulls the thin band up and lets it go, and a curved line shows the band moving. Labels say: a box; bands around it; pluck a band — it starts to vibrate; the hole lets the sound out. The caption says: thin band: a high sound; thick band: a low sound.*

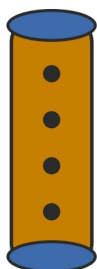
A rain stick: put some rice in a tube and close both ends. Turn it and shake it. The rice hits the walls of the tube and makes a soft rain sound.

## make a rain stick

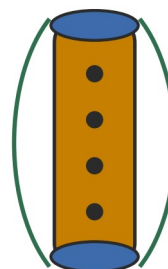
1. put some rice in the tube



2. close both ends



3. turn it and shake it



*the rice hits the walls of the tube and makes a sound*

**the rice stays inside the tube**

*Three steps. 1: put some rice in the tube. 2: close both ends. 3: turn it and shake it. The caption says: the rice hits the walls of the tube and makes a sound; the rice stays inside the tube.*

**Safety.** The rice stays inside the tube. Small things must never go in your mouth.



### Keep a sound soft (E04)

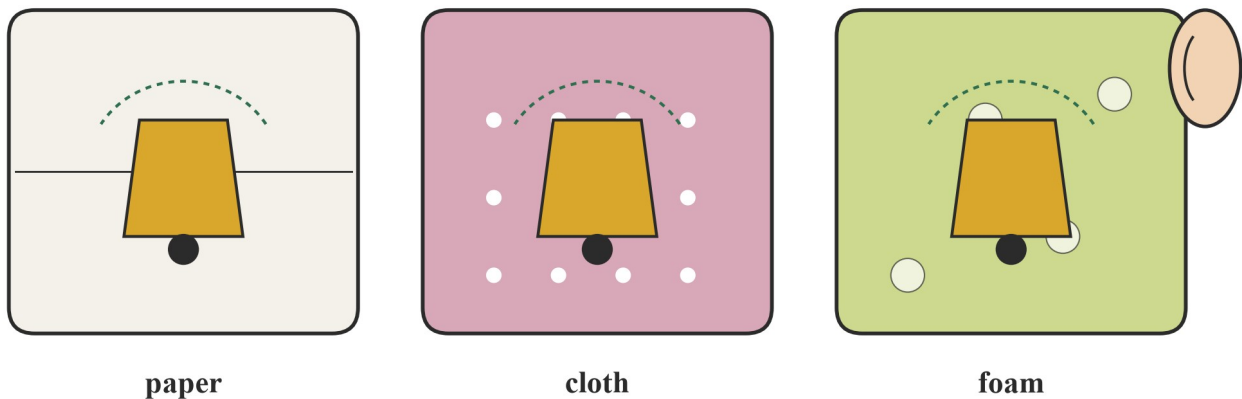
The same bell rings in each box: a paper box, a cloth box and a foam box. Listen! The foam box keeps the sound softest. Soft things like foam keep a sound soft.

When a sound is too loud, we can wear earmuffs to keep our ears safe.

#### the soft-sound test

the same bell rings in each box

listen: which box makes the bell sound softest?



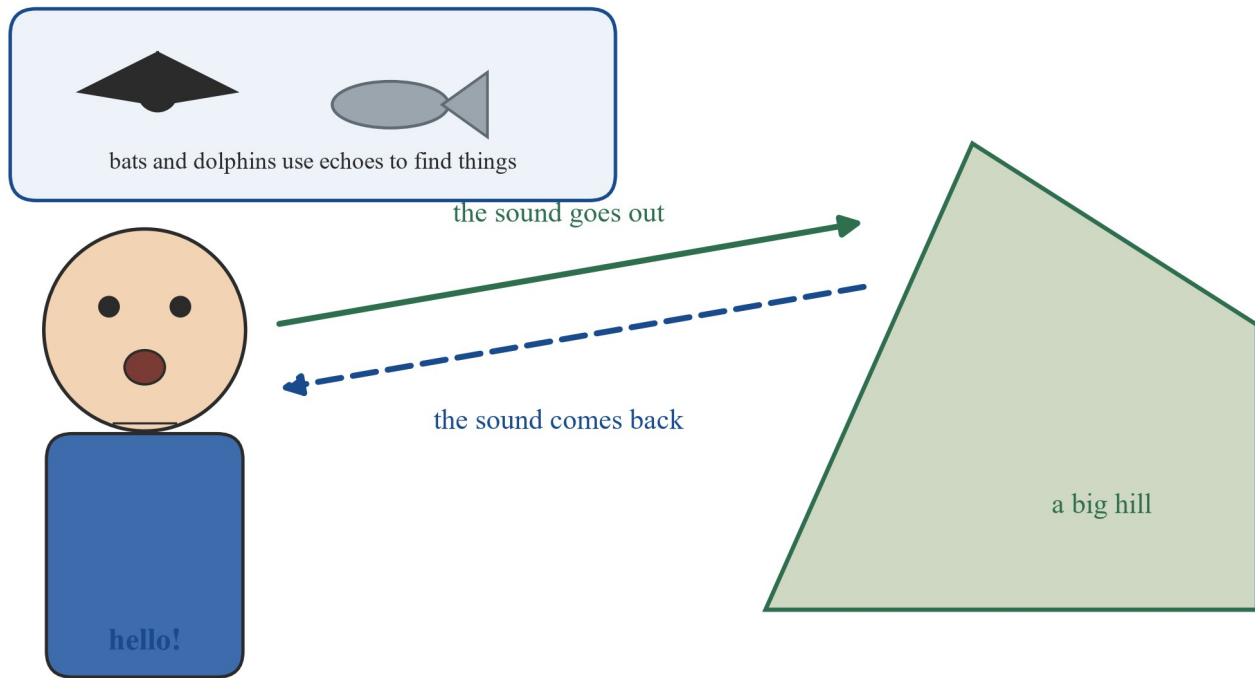
Three boxes — paper, cloth and foam — each with the same bell ringing inside, shown with a curved line. An ear listens at the foam box. The caption asks: which box makes the bell sound softest?

### The sound comes back — an echo (E06)

Stand far from a big hill and call out *hello!* The sound goes out. It hits the hill and comes back. You hear your call again. That sound coming back is an **echo**.

Bats and dolphins use echoes to find things.

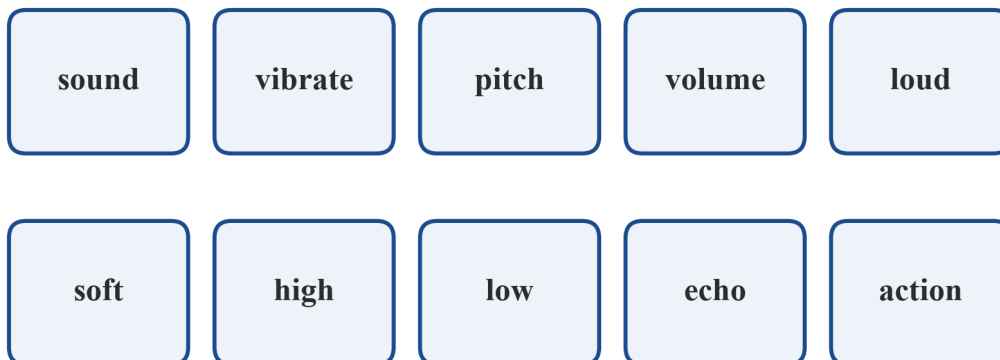
## an echo — the sound comes back



*A child calls hello! toward a big hill. A green arrow shows the sound going out, and a blue arrow shows the sound coming back. A word box shows a bat and a dolphin: bats and dolphins use echoes to find things.*

### Words for this topic

#### words for this topic



*Ten word cards in two rows: sound, vibrate, pitch, volume, loud, soft, high, low, echo, action.*

- **sound** — what we hear when a thing is vibrating
- **vibrate** — to move up and down very fast, again and again
- **pitch** — how high or low a sound is
- **volume** — how loud or soft a sound is
- **loud** — a big sound, like *bang!*
- **soft** — a little sound, like a whisper
- **high** — like a little bird's song

- **low** — like a big drum
- **echo** — a sound that goes out and comes back
- **action** — what we do to make a sound: strike, blow, scrape, pluck or shake

## Worked examples

### Example 1 — match each thing to its action (E03)

Match the drum, whistle, grater, box guitar and rain stick to strike, blow, scrape, pluck and shake.

| Working                                                                                   | Say why          |
|-------------------------------------------------------------------------------------------|------------------|
| The drum makes a sound when we hit it with a stick.                                       | strike = hit     |
| The whistle makes a sound when we blow air through it.                                    | blow             |
| The grater makes a sound when a stick moves along it.                                     | scrape           |
| The band on the box guitar makes a sound when we pull it and let it go fast.              | pluck            |
| The rain stick makes a sound when we turn it and shake it.                                | shake            |
| ∴ drum → strike, whistle → blow, grater → scrape, box guitar → pluck, rain stick → shake. | all five matched |

### Example 2 — the ruler: high or low? (E01, E05)

Ruler A has a long part sticking out. Ruler B has a short part sticking out. Which ruler makes a high sound, and which makes a low sound?

| Working                                                  | Say why                 |
|----------------------------------------------------------|-------------------------|
| Ruler A: a long part sticks out.                         | long part → low sound   |
| Ruler B: a short part sticks out.                        | short part → high sound |
| ∴ Ruler A makes a low sound. Ruler B makes a high sound. | say it together         |

### Example 3 — soft tap, hard hit (E05)

We put a little rice on a drum. First a soft tap, then a hard hit. Say what the rice does, and what the sound is like.

| Working                                       | Say why                      |
|-----------------------------------------------|------------------------------|
| A soft tap: the rice jumps a little.          | the drum skin moves a little |
| The sound is soft.                            | soft tap → soft sound        |
| A hard hit: the rice jumps high.              | the drum skin moves a lot    |
| The sound is loud.                            | hard hit → loud sound        |
| ∴ the strength of the hit changes the volume. | say it together              |

### Example 4 — which box keeps the sound soft? (E04)

The same bell rings in a paper box, a cloth box and a foam box. Which box keeps the sound softest?

| Working                                                                | Say why                            |
|------------------------------------------------------------------------|------------------------------------|
| The same bell in each box.                                             | one change at a time: the material |
| Paper: we hear the bell well.                                          | paper is thin and hard             |
| Cloth: the bell sounds softer.                                         | cloth is soft                      |
| Foam: the bell sounds softest.                                         | foam is softest                    |
| ∴ the foam box keeps the sound softest. Soft things keep a sound soft. | say it together                    |

## Practice questions

**Teacher — predict and check.** For the questions marked *try it*, the children first say what they think they will hear, then try it, then say what they heard. Things to have ready: a ruler and a desk, a pot and a stick, a bowl with a film and some rice, a drum, a box with bands, a rain stick, a whistle, a grater, a tuning fork, a bell and three small boxes (paper, cloth, foam).

**Q1 [F]** Look at the picture with the five action cards. Point to the card that shows *blow*. Do *blow*. Say the word.

**Q2 [F]** Look at the ruler picture. Point to the part that moves up and down fast.

**Q3 [F]** Circle: a big drum makes a ( low / high ) sound.

**Q4 [F]** The rice on the bowl jumps when the pot goes *bang!* Circle: the film is vibrating / the film is not moving.

**Q5 [F]** A sound goes out, hits a big hill and comes back. Say the word for the sound that comes back.

**Q6 [L1]** Match each thing to its action with a line: drum · whistle · grater · box guitar · rain stick → strike · blow · scrape · pluck · shake

**Q7 [L1]** Circle the action that makes a sound on a box guitar: pluck / blow

**Q8 [L1]** Look at the ruler pitch picture. Circle: a long part sticks out → ( low / high ) sound.

**Q9 [L1]** The same bell rings in a paper box, a cloth box and a foam box. Circle the box that keeps the sound softest: paper / cloth / foam

**Q10 [L1]** Circle the safe thing: make a loud sound far from ears / make a loud sound at a friend's ear

**Q11 [L2]** *Try it.* A ruler on the desk. Say: will a long part sticking out make a high sound or a low sound? Twang it and check. Now try a short part. Say what you hear.

**Q12 [L2]** *Try it.* Put a little rice on the drum. Say what the rice will do for a soft tap and for a hard hit. Then try it and check.

**Q13 [L2]** Look at the soft-sound test picture. Which box keeps the bell softest? Say why.

**Q14 [L2]** *Try it.* The box guitar. Say how to make a loud sound. Then try it and check.

**Q15 [L2]** Draw a thing that makes a sound when you shake it.

**Q16 [L2]** Say two actions that make a sound. Say a thing for each action.

## Answers

1. The second card (the whistle). *blow*
2. The free end that sticks out past the desk.
3. low
4. the film is vibrating
5. echo
6. drum → strike. whistle → blow. grater → scrape. box guitar → pluck. rain stick → shake.
7. pluck
8. low
9. foam
10. make a loud sound far from ears
11. A long part makes a low sound. A short part makes a high sound.
12. A soft tap: the rice jumps a little. A hard hit: the rice jumps high.
13. The foam box. Foam is soft, and soft things keep a sound soft.
14. Pluck a band hard. The band moves more, and the sound is loud.
15. Any drawing of a thing that makes a sound when we shake it (a rain stick, a bottle with a little rice in it).
16. Any two, with a thing for each: strike — a drum; blow — a whistle; scrape — a grater; pluck — a box guitar; shake — a rain stick.

## Fully-worked solutions

**Q1** The blow card shows a whistle with air going out. ∴ point to the whistle card, do *blow* and say the word.

**Q2** The free end of the ruler sticks out past the desk. When we twang the ruler, that end moves up and down fast. ∴ point to the free end.

**Q3** A big drum makes a low sound, like the big drum in the drum picture. ∴ circle *low*.

**Q4** The sound from the pot makes the film and the rice vibrate. The rice jumps because the film is vibrating. ∴ circle *the film is vibrating*.

**Q5** A sound that goes out and comes back is an echo. ∴ say *echo*.

**Q6** We strike the drum. We blow the whistle. We scrape the grater. We pluck the box guitar. We shake the rain stick. ∴ drum → strike, whistle → blow, grater → scrape, box guitar → pluck, rain stick → shake.

**Q7** A band on the box guitar makes a sound when we pull it and let it go fast. ∴ circle *pluck*.

**Q8** A long part sticking out makes a low sound. ∴ circle *low*.

**Q9** Foam is the softest of the three boxes. Soft things keep a sound soft. ∴ circle *foam*.

**Q10** Loud sounds can hurt ears. ∴ circle *make a loud sound far from ears*.

**Q11** Say your idea first. A long part sticking out makes a low sound, and a short part makes a high sound. ∴ check with the ruler: long → low, short → high.

**Q12** Say your idea first. A soft tap makes the drum skin move a little, so the rice jumps a little. A hard hit makes the drum skin move a lot, so the rice jumps high. ∴ check on the drum.

**Q13** The same bell rings in each box; only the box changes. The foam box sounds softest. ∴ the foam box; soft things keep a sound soft.

**Q14** A hard hit makes a loud sound on a drum. It is the same on the box guitar: pluck a band hard, and the sound is loud. ∴ pluck a band hard.

**Q15** A thing that makes a sound when we shake it has something that can move: a rain stick has rice inside, and a bottle can hold a little rice. ∴ a rain stick or a bottle with rice in it is right.

**Q16** The five actions are strike, blow, scrape, pluck and shake.  $\therefore$  say any two with a thing for each: strike — a drum, blow — a whistle, and so on.