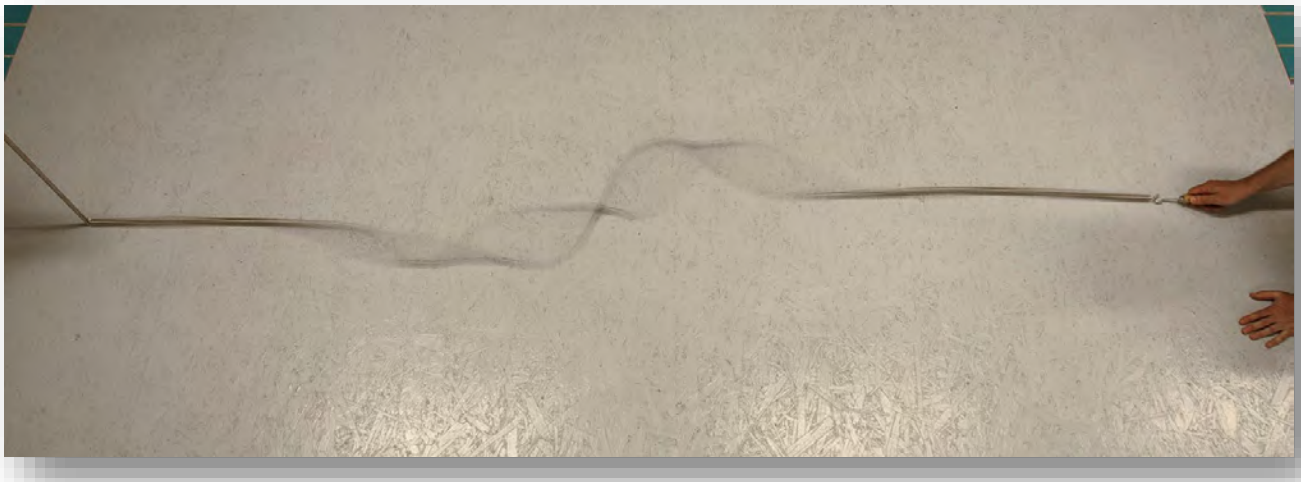
SUPERPOSITION OF WAVES - SIMPLE

SWD 02.05e



Material:

Item Code	Qty	Description
DW171-1S	1	Wave motion demonstrator, 180 cm
DG205-1G	1	Hook metal, with handle

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Goal:

A transversal wave is used to investigate what happens when two waves collide.

Setup:

The wave motion demonstrator is placed on a surface that is as long and smooth as possible. A smooth floor or several tables lined up at the same height are suitable for this purpose.

One of the spring ends should be a "fixed end". To do this, the ring can be held by hand, but better by pressing a tripod rod through the ring to the ground.

The hook on the handle is hooked into the ring on the other end of the spring, extending it to about 300 - 350 cm.

Experiment 1a:

The hook with handle is used to set the spring in motion by deflecting it about 30 - 40 cm wide, forcefully and as quickly as possible. This sends out a wave crest.
When the emitted wave arrives at the other end, another wave crest is sent after it.
The movement of the spring is observed.

Experiment 1b:

Two successive wave troughs are now created and the course of the wave motion is again observed.

Results:

The wave crest is reflected as a wave trough and overlaps with the wave crest sent after it. When the wave crest and wave trough meet, the crest and trough cancel each other out - with the same amplitude and wavelength - but then continue to travel undisturbed.
This phenomenon is called "destructive interference".

Experiment 2:

A wave trough and a wave crest are generated one after the other. The course of the wave movements can be observed again.

Result:

If one has sent a wave valley behind the wave crest, the returning valley and the valley sent behind add up to a larger one, but then run on again as "normal valleys".
This phenomenon is called "constructive interference".

Conclusion:

If two waves meet, their deflections add up. Afterwards, each wave continues as if the other one had not been present. The principle of undisturbed superposition (interference).

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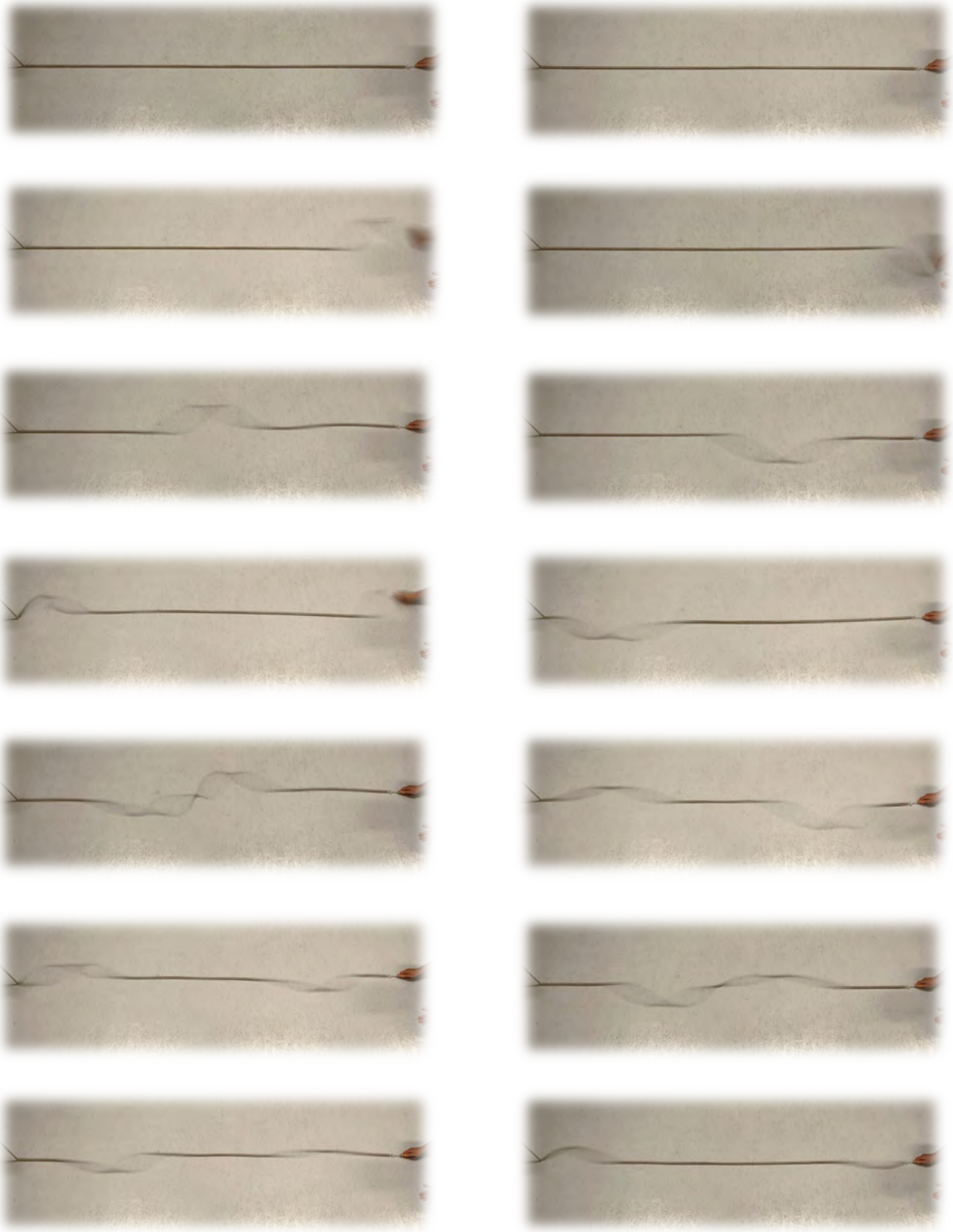
Wave crest and trough - destructive interference



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Two wave crests - constructive interference