C15-2905-W0

G-Gauge ME-K

(Gravitational Acceleration)

with S77-1321-W0 BeeSpi v x 2pcs

[PRECAUTIONS]

- Do not expose the product to a strong impact or excessive force. Otherwise, the product may break.
- Do not store the product in a hot, humid or dusty place.
- Be careful not to splash water onto the product.
- Do not use or leave the product in a place exposed to strong direct sunlight, a car under the burning sun, or hot place. Otherwise, it may deform or become defective.
- Do not make an experiment on an unstable table or on an inclined surface.
- Be sure to support the product by your hands and loosen the fixing screw before folding it.
- Do not use any steel ball larger or smaller than the steel ball supplied with the product. Experiments may not go well if a different steel ball is used.
- The angle adjusting plate may get in the way when folding the product or during storage. If that is the case, detach it and store it separately.

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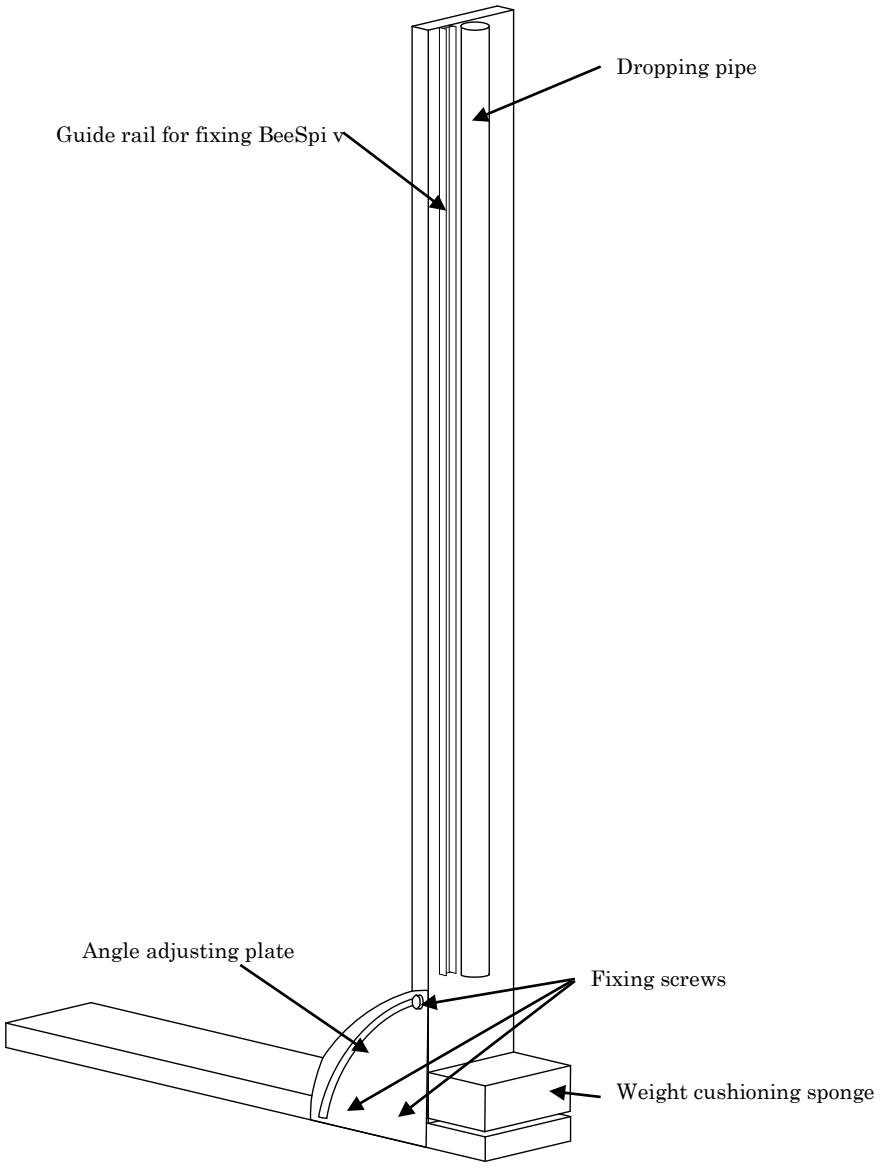
This product is designed for experiments involving speeds and acceleration in a free fall and movement on slopes with different angle. Set the dropping pipe at the intended angle and set the included two (2) speed measurement photogates BeeSpi v on the pipe using the guide rail. Put the steel ball supplied with the product on the top edge of the pipe, release it and measure its speed with the two (2) BeeSpi v.

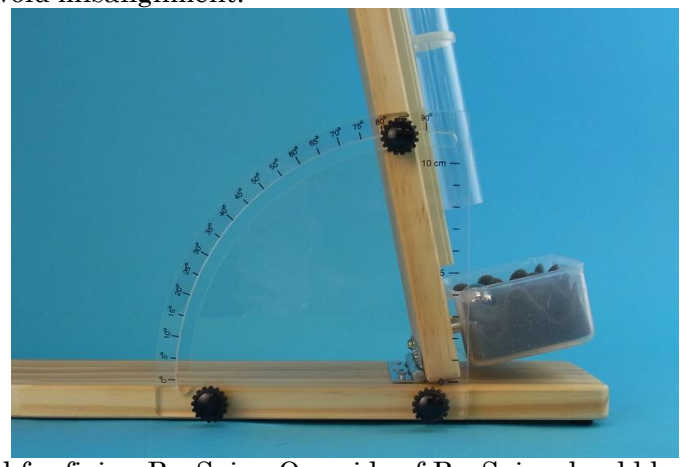
[SPECIFICATIONS]



Size:	1,100 x 100 x 143 mm (when housed)
	600 x 100 x 1,025 mm (when erected)
	Φ 25 (inside diameter: 21.5) x 840 mm (dropping pipe)
Angle adjustment:	0° to 90°
Scale:	960 mm (effective scale)
Accessories:	φ 20 mm steel ball, BeeSpi v (2pcs), 3 screws

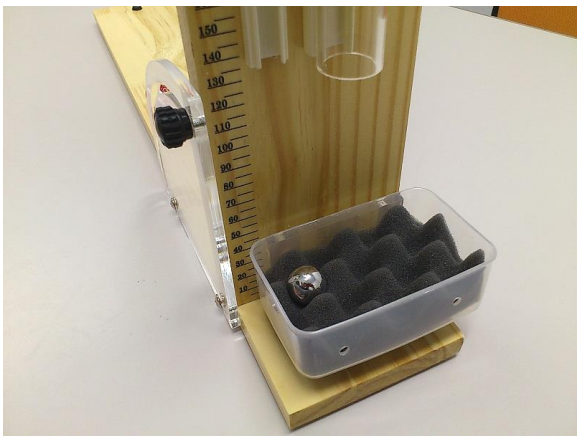
[PREPARATION]

(i) Attach the angle adjusting plate to the body with the 3 screws included in the accessories. Fit the bottom and secure the plate firmly to avoid misalignment.



(ii) Install both BeeSpi v units to the guide rail for fixing BeeSpi v. One side of BeeSpi v should be inside the guide rail for fixing and supported by it.

(iii) Detach the cover from the case under the dropping pipe before starting an experiment. The sponge inside cushions the impact of the dropped steel ball.



[EXPERIMENT]

The dropping pipe of this product can be set at the intended angle when the angle adjusting plate fixing screw is loosened. The speed of the steel ball, which falls vertically or rolls down on a slope, can be measured.

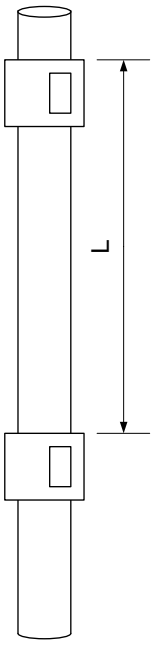
(i) Loosen the fixing screw of the angle adjusting plate and move the dropping pipe to the intended angle. Fix the angle adjusting plate firmly with the fixing screw.

(ii) Turn on the switch of the BeeSpi v to put it in standby for the speed measurement (For details, refer to the manual of the BeeSpi v). Both BeeSpi v should be fixed to the dropping pipe by the guide rail with distance between them as you like.

(iii) Drop the steel ball in the dropping pipe.

(iv) Record the speeds with the BeeSpi v at two points and substitute the values in the formula below to find the acceleration.

[MEASURING GRAVITATIONAL ACCELERATION]



Acceleration can be found using the formulas shown below when the speeds at two points are obtained with the experiment. Assume that the distance between BeeSpi v (i) and (ii) is L, the value of the upper BeeSpi v on the dropping pipe is v_1 (m/s), and the value of the lower BeeSpi v is v_2 (m/s).

$$v^2-v_0^2=2gL \qquad g=\frac{v_2^2-v_1^2}{2L}$$

Gravitational acceleration g can be found by substituting the measured values for the expressions in the formula. If the distance between the pair of BeeSpi v units is set to 0.5 meter in advance, calculation becomes easier.

*Do not block the exit of the dropping pipe. The influence of air resistance may deteriorate the measurement data.

[ACCELERATION OF BALL ROLLING ON SLOPE]

If the dropping pipe is inclined and fixed, acceleration can be measured by measuring the speed between two points. Set the pair of BeeSpi v units at two points fixed to the dropping pipe by the guide rail, referring to the scale, and measure the difference in the acceleration at several angles.

The steel ball moves forward while rolling in the pipe. The theoretical acceleration can be found using the following formula since the ball rolls in the pipe.

$$\boldsymbol{a}=\frac{5}{7}g\sin\theta$$

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