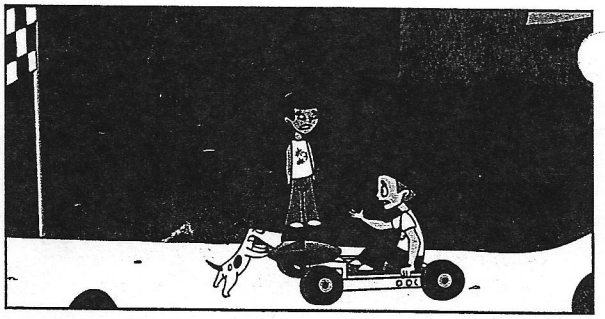
Freewheeling

p1

Name(s): _____

_____

Which will roll furthest? Heavier or lighter carts, with bigger or smaller wheels? Let's find out!

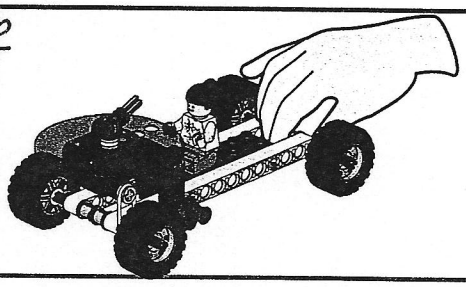


Build the Freewheeler

(All of book 3A and book 3B to page 6, step 12.)

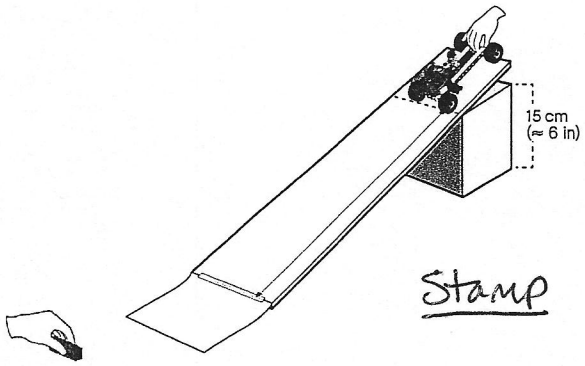
- Check all axles and bushings to make sure the wheels turn smoothly
- Let your freewheeler run down the ramp

Stamp



Which will roll further ... heavy or light loads?

- Tip: Place a marker brick next to the track where you predict the cart will stop
- Reset the pointer on the dial after each test run

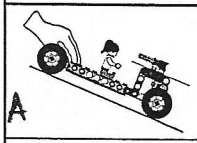
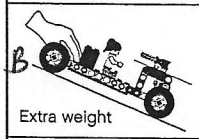
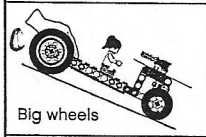
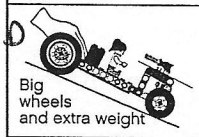


Are big wheels better than small?

- Try using big wheels on the back axle

Did you know?
The empty cart weighs about 58 g (≈ 2 oz). And the weight brick weighs 53 g (≈ 1.9 oz)... almost the same!
The big wheels weigh 16 g (≈ 0.5 oz) each and the small ones only 6 g (≈ 0.2 oz) each.

Test accordingly, following the challenges below:

	My prediction	My measurements
 A		
 B Extra weight		
 C Big wheels		
 D Big wheels and extra weight		
?		

Stamp

Contemplate

P2

Measure how far the empty cart rolls. Measure with a meter stick (or a yard stick) and compare with the pointer and dial. Record the distance and use a LEGO® brick as a marker of where it stopped. Test at least three times to be sure you have made a scientifically correct answer.

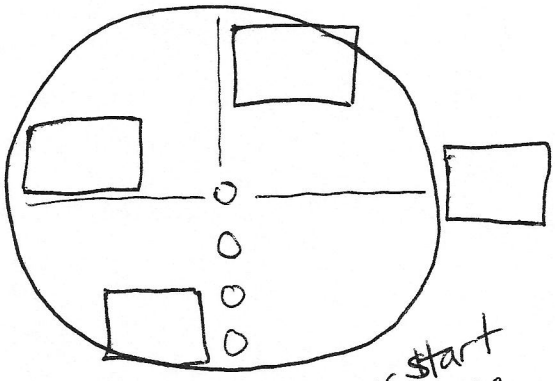
	T1	T2	T3	Ave
CAR A				
CAR B				
CAR C				
CAR D				

Use a whiteboard marker to divide your dial into Quarters. Record on diagram at right.

Carry out several tests. There is no need to use rulers or measuring tapes – just use the readings on the dial.

One rotation of the dial = _____ cm of car movement.

Stamp



CAR B

Add a weight brick to the cart (book 3B, page 7, step 13). Predict how far it will roll this time by placing another marker brick along the track. Then test.

Jack's Big Wheel Deal

Will big wheels help the cart to roll further than the smaller wheels? Fit them onto the rear axle and test on the ramp (book 3B, page 7, step 14).

First test unloaded (book 3B page 7, step 14), then test loaded (book 3B, page 8, step 15).

Car C

Car D

Pick a car type to retest. Use only the dial for distance measurements.

Car___ went _____ rotations or ~_____ cm

Stamp

Names _____

Gear preview: pg 3

Continue

Super Scale
Build book 3B to page 12, step 12.
Replace the 8-tooth gear wheel with the 24 tooth gear. Predict and then test how far the cart will roll before the pointer completes one revolution.

Stamp

One turn of the dial with the 24 tooth gear will be a _____ distance for the car.
longer or shorter

1 rotation with 8 tooth = _____ cm

1 rotation with 24 tooth = _____ cm

(see p. 2)

So, A bigger (more toothed) gear causes _____

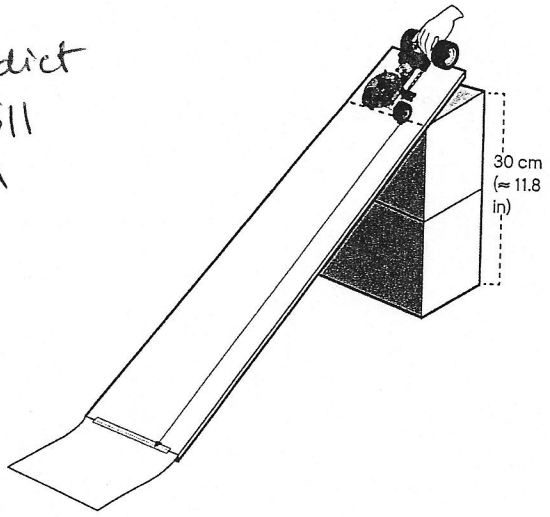
Super Slope
Predict first and then test what will happen if you double the height of the hill.

For car ___ we predict doubling ramp height will give _____ cm roll distance, because

_____

_____

_____



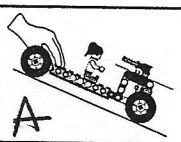
Stamp

Larger scales ... and steeper hills

P.4

Build book 3B to page 12, step 12
Change the ramp position to be 30 cm (≈ 12in) high.
Test your different types of freewheelers.

What I found out when making the slope steeper:

	My prediction	My measurements
 A		
choose B, C, D		
your design		

STAMP

My Amazing Downhill Racer!

Draw your favourite freewheeler design. + LABEL
Explain how the three best parts work.

STAMP