

# The Handcart



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The railroad handcar was a tool workers used to help maintain the tracks. In the mid-1800s, a four- to six-man section gang patrolled a ten- to 15-mile territory daily. They made repairs that kept the line open for trains to pass safely. The handcar carried the section crew and their tools on inspection trips.

Today, railroads still inspect the tracks on a regular basis. Now they use trucks fitted with rubber tires and small rail wheels to transport track workers.

The handcar is a good example of how railroads use science. The handcar works because of simple and compound machines. Your energy makes the handcar do work. As you eat, chemical energy is stored in your body. By pumping the car's handlebar, the energy is transferred to the handcar. This force ultimately turns the wheels sending you down the track. You've done work!

## Name the Simple Machines

There are three simple machines on the handcar.

Can you name them? Place the correct number for each machine next to its position on the handcar.

1. Lever
2. Screw
3. Wheel and Axle

# Handcart Science



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Sure, working the **handcar** looks easy, but there is a lot of science going on that you might not realize. Let's see what's really happening.

When you eat, **chemical energy** from the food is stored in your muscles. This is **potential energy**—energy that could be used to do **work**. Work is applying **force** to an object to set it in motion. When you pump the handcar, your chemical energy is transferred through the simple and compound machines causing you

to move along the **railroad**. Your energy has been changed from potential energy to **kinetic energy**—the energy an object has due to its motion. If you have enough kinetic energy you can go up hills with little effort. The energy in your handcar will also encounter resistance—a force working against your energy. Resistance could be gravity as you go up a hill or the handcar's brakes. The resistance can also be called **friction**.

## Find the Science

There is a great deal of science in operating a handcar.

The **BOLD** science terms in our story are hidden in the word search. Also, look for the Simple Machines from the other side. Can you find them?

S	Q	R	U	B	E	E	A	P	V	E	D	G	Q	R	J	G	U	H	K	E	D
I	W	E	D	K	F	V	S	F	P	F	S	H	A	D	U	T	R	S	U	W	Q
M	F	E	L	X	A	D	N	A	L	E	E	H	W	F	Y	R	V	Q	F	H	W
P	B	Q	C	D	B	G	F	N	A	J	J	K	W	K	A	D	S	A	B	A	F
L	N	B	H	C	I	S	K	M	F	F	T	G	G	L	Q	F	A	D	N	N	B
E	J	G	E	B	G	P	I	E	X	S	A	W	I	T	W	K	C	F	S	D	N
M	U	T	M	G	D	Y	O	R	A	I	L	R	O	A	D	L	H	G	Q	C	J
A	Y	R	I	T	O	W	V	T	D	G	E	A	P	V	I	T	G	H	A	A	U
C	A	D	C	E	G	V	B	X	E	J	V	L	E	V	E	R	T	N	Q	R	Y
H	Q	F	A	Q	S	Y	S	R	U	N	D	D	V	Q	P	V	E	K	W	F	A
I	W	K	L	Q	R	H	K	E	D	K	I	F	N	A	F	P	F	G	G	S	Q
N	G	L	E	D	U	S	U	W	V	E	S	A	M	F	V	Q	B	W	I	H	W
E	I	T	N	G	L	Q	F	Q	W	D	J	I	L	X	N	A	J	I	O	T	G
W	O	D	E	B	E	A	B	B	K	C	N	O	W	E	R	C	S	A	P	V	I
B	P	V	R	D	A	D	N	K	R	O	W	V	G	D	N	X	S	S	F	P	O
I	F	P	G	S	S	F	S	T	I	G	V	B	X	H	R	E	E	D	V	Q	P
A	V	Q	Y	E	C	G	Q	T	V	T	Y	S	R	U	G	D	R	F	N	A	F
H	N	A	Z	J	F	H	C	D	S	E	H	K	E	D	X	Y	J	G	M	F	V
K	M	F	U	T	E	I	Q	F	A	Q	S	U	W	Q	R	U	G	I	Y	X	N
E	E	X	M	T	R	A	I	N	S	R	O	L	L	W	E	D	Y	R	R	E	M
V	R	E	K	F	Y	G	G	L	H	D	A	B	B	F	W	V	W	V	E	D	E
Y	G	D	E	D	A	W	I	F	O	R	C	E	G	B	Q	W	V	B	X	N	A
T	X	H	K	I	N	E	T	I	C	E	N	E	R	G	Y	Y	G	R	E	N	E

