LESSON MAKER PRO

Force in Motion

Use Newton's second law to connect force, mass, and acceleration.

HIGH SCHOOL · PHS.5

PHS.5 "Students will analyze the scientific principles of motion, force, and work. Research the scientific contributions of Newton and use models to communicate Newton's principles..."

NAME _____ DATE _____

THE BIG IDEA

Net force is the combined force on an object. Use $F_{net} = ma$, where force is measured in newtons (N), mass in kilograms (kg), and acceleration in meters per second squared (m/s^2).

WORKED EXAMPLE

A cart has the values shown. Find the net force.

CART DATA

Mass	Acceleration
7 kg	3 m/s^2

1. Use $F_{net} = ma$.
2. $F_{net} = (7\ kg)(3\ m/s^2) = 21\ N$.

Answer: 21 N

PRACTICE 4 problems

1 A 4 kg object accelerates at 5 m/s^2. Find the net force.

ANSWER _____

2 A 6 kg object accelerates at 2 m/s^2. Find the net force.

ANSWER _____

3 A 36 N net force acts on a 9 kg object. Find its acceleration.

ANSWER _____

4 A 48 N net force produces an acceleration of 8 m/s^2. Find the mass.

ANSWER _____

APPLY IT Show your work

1 A rider and electric scooter have a combined mass of 60 kg. They accelerate at 2 m/s^2. What net force acts on them?

WORK SPACE

ANSWER _____

2 A 96 N net force pushes a 24 kg wheeled stage speaker. What is its acceleration?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A 10 kg cart has the forces shown. Find its net force and acceleration, including direction.

FORCES ON THE CART

Force	Direction
70 N	Forward
30 N	Backward

WORK SPACE AND ANSWER

Force in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A 4 kg object accelerates at 5 m/s^2. Find the net force.	**20 N**
2	A 6 kg object accelerates at 2 m/s^2. Find the net force.	**12 N**
3	A 36 N net force acts on a 9 kg object. Find its acceleration.	**4 m/s^2**
4	A 48 N net force produces an acceleration of 8 m/s^2. Find the mass.	**6 kg**

PART 2 · APPLY IT

1. **120 N** Multiply mass by acceleration: (60 kg)(2 m/s^2) = 120 N.
2. **4 m/s^2** Divide net force by mass: 96 N / 24 kg = 4 m/s^2.

CHALLENGE

Net force: 40 N forward. Acceleration: 4 m/s^2 forward.

For the challenge, subtract the opposing forces before dividing by mass. Accept equivalent notation with correct units and direction.