LESSON MAKER PRO

Work in Motion

Calculate work and connect it to kinetic energy.

HIGH SCHOOL · PHS.5.7

PHS.5.7 "Use mathematical and computational representations to create graphs and formulas that describe the relationships between force, work, and energy (i.e., W=F*d, KE=½ mv2, PE=mgh, W=ΔKE)."

NAME _____ DATE _____

FORCE, DISTANCE, ENERGY

When a steady force acts in the direction of motion, work is W = F*d. Work changes kinetic energy: $W = KE_{final} - KE_{initial}$. On a force-versus-distance graph with a steady force, work is the rectangular area under the line.

WORKED EXAMPLE

Use the table to find the work done.

STEADY FORWARD PUSH

Force	Distance
7 N	4 m

1. W = F*d
2. W = (7 N)(4 m)
3. W = 28 J

Answer: 28 J

PRACTICE 4 problems

1 A 5 N forward force acts over 2 m. Find the work.

ANSWER _____

2 An 8 N forward force does 40 J of work. Find the distance.

ANSWER _____

3 Kinetic energy rises from 15 J to 35 J. Find the work done.

ANSWER _____

4 A 12 N forward force does 36 J of work. Find the distance.

ANSWER _____

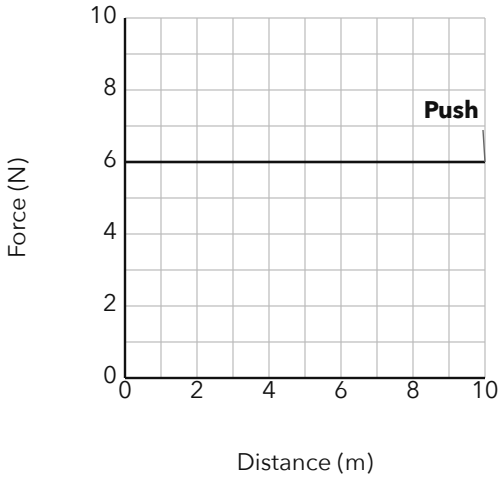
APPLY IT Show your work

1 An electric scooter has 60 J of kinetic energy. Its motor pushes forward with 50 N over 8 m. Find the motor's work and the scooter's final kinetic energy.

WORK SPACE

ANSWER _____

2 At the school gym, a student pushes a sled 5 m. The graph shows the steady forward force. How much work does the student do?



ANSWER _____

CHALLENGE One step up

A go-kart gains 150 J of kinetic energy while a steady forward force acts over 5 m. Find the force. Then write a formula for its work W, in joules, after any distance d, in meters.

WORK SPACE AND ANSWER

Work in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A 5 N forward force acts over 2 m. Find the work.	**10 J**
2	An 8 N forward force does 40 J of work. Find the distance.	**5 m**
3	Kinetic energy rises from 15 J to 35 J. Find the work done.	**20 J**
4	A 12 N forward force does 36 J of work. Find the distance.	**3 m**

PART 2 · APPLY IT

1. **400 J of work; 460 J of final kinetic energy** W = (50 N)(8 m) = 400 J. Add the work to the initial kinetic energy: 60 J + 400 J = 460 J.
2. **30 J** The graph shows a 6 N force. W = (6 N)(5 m) = 30 J.

CHALLENGE

30 N; W = 30d

Accept N*m as equivalent to J. In the challenge, d represents distance in meters.