LESSON MAKER PRO

Rates in Motion

Connect the rates of two changing quantities.

HIGH SCHOOL · C.A.18

C.A.18 "Model rates of change to solve related rate problems."

NAME _____ DATE _____

THE RATE CONNECTION

For y = mx + b, each 1-unit change in x changes y by m units. Multiply the rate of x by m to find the rate of y. A negative rate means the quantity is falling.

WORKED EXAMPLE

The table shows x over time. If y = 11x + 17, how fast does y change?

CHANGES IN X

Time (min)	x (units)
30	41
33	56

1. Rate of x = (56 - 41)/(33 - 30) = 5 units/min.
2. Rate of y = 11(5) = 55 units/min.

Answer: 55 units/min

PRACTICE 4 problems

1 x rises at 3 units/min. If y = 7x + 6, what is the rate of y?

ANSWER _____

2 x falls at 18 units/hr. If y = x/3 + 8, what is the rate of y?

ANSWER _____

3 x rises at 6 units/sec. If y = -3x + 10, what is the rate of y?

ANSWER _____

4 y rises at 24 units/min. If y = 8x - 7, what is the rate of x?

ANSWER _____

APPLY IT Show your work

1 For a school show, 18 tickets sell each hour. Each ticket costs $7, and a sponsor gives $40 once. Write total money M in terms of tickets x. How fast does M grow?

WORK SPACE

ANSWER _____

2 You save 3/4 hour of video each hour. Your free phone storage is S = 64 - 2v GB, where v is hours of saved video. How fast is free storage changing?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Team A trails Team B by 12 points. A earns 7 points per minute, and B earns 4 points per minute. Write A's lead L after t minutes. How fast does the lead change, and when does A catch B?

WORK SPACE AND ANSWER

Rates in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	x rises at 3 units/min. If y = 7x + 6, what is the rate of y?	**21 units/min**
2	x falls at 18 units/hr. If y = x/3 + 8, what is the rate of y?	**-6 units/hr**
3	x rises at 6 units/sec. If y = -3x + 10, what is the rate of y?	**-18 units/sec**
4	y rises at 24 units/min. If y = 8x - 7, what is the rate of x?	**3 units/min**

PART 2 · APPLY IT

1. **M = 7x + 40; $126/hr** Each ticket adds $7, while the donation stays fixed. Multiply 18 tickets/hr by $7 per ticket to get $126/hr.
2. **-3/2 GB/hr** Each hour of saved video uses 2 GB. Multiply -2 GB per hour of video by 3/4 hour of video per hour to get -3/2 GB/hr.

CHALLENGE

L = -12 + 3t; the lead rises at 3 points/min; A catches B after 4 min.

Accept equivalent fractions and decimal rates with correct units. For falling quantities, accept a positive rate only if the student clearly says the quantity decreases.