

RATE OF WORK AND MOTION PROBLEMS

Class work

- 1) It takes Fred 8 hours to prepare the stadium field for a football game. He earns \$10/hour. It takes Sam 12 hours to do the same job and he gets paid \$7/hour.
 - a. How long would it take to prepare the stadium if Fred and Sam worked together?
 - b. What is the “cheapest” way to prepare the field: to hire Fred? to hire Sam? to have them both work together?
- 2) Corporal Jones takes 12 hours to complete a planned maintenance check on an anti-submarine helicopter. Jones had been working on the helicopter for 4 hours when Sergeant Marco arrived to help him finish the job. They completed the check in 2 hours. How long would it have taken Sergeant Marco to do the entire maintenance check alone?
- 3) If you turn on (just) the cold water tap, the bathtub will fill in 20 minutes. If you turn on (just) the hot water tap, the bathtub will fill in 30 minutes. If you pull the plug (and the taps are not on), a full bath tub drains in 36 minutes. If you start with an empty tub, turn on both the cold and the hot water taps and forget to put in the plug, how long does it take to fill the tub?
- 4) Two cyclists leave the same point at the same time and travel in the same direction. One cyclist travels at 18 km/hr and the other at 12 km/hr. In how many hours will the cyclists be 27 km apart?
- 5) A jet flew from Toronto to Phoenix at 900 km/hr. Due to strong headwind, the return trip was made at 600 km/hr. If the round trip took 7.5 hours, determine how far it is from Toronto to Phoenix. Can you find the speed of the wind? What assumptions do you make?
- 6) Anna averaged 90 km/hr on the highway and 50 km/hr driving in the city. She traveled a total of 160 km and spent three times longer on the highway than in city driving. How much time did she spend on the highway?

Answers: 1) a) 4 hours, 48 minutes b) Fred 2) 4 h 3) 18 minutes 4) 4.5 hours
5) 2700 km 6) 135 km, 1.5 hours

Please turn over for homework

Homework:

- 1) It takes spillway A 6 hours to lower the water level in a reservoir by one metre. It takes spillway B 12 hours and it takes spillway C 24 hours to do the same thing. How long would it take to lower the water level by one metre if all three spillways work together?
- 2) Dean, Paul and Brenda work for a decorator installing wall-to-wall carpet in the apartments of a new high-rise building. It takes Dean 10 hours to install the carpet in an apartment. Paul takes 15 hours and Brenda 12 hours to do the same job. If Dean works for 2.5 hours alone, then Paul comes along and they work together for another 3 hours. Then Brenda comes to help them finish installing the carpet. For how long do they work together?
- 3) Three big boys and ten small boys can move all the books from the old library room to the new room in one hour. If it would take a big boy 9 hours to do this job alone, how long would it take a small boy to do this job alone?
- 4) A secret agent left Washington for Montreal, a distance of 950 km driving at 100km/hr. At the same time another agent left Montreal for Washington driving at 90 km/hr. How far from Montreal were they when they met to exchange information.
- 5) A freight train left Thunder Bay for Vancouver traveling at 90 km/hr. Ninety minutes later a passenger train also left Thunder Bay for Vancouver but traveling at 110 km/hr. How long after the passenger train left did it catch up to the freight train.
- 6) Two trains started at the same station, at the same time, but traveled in opposite directions. If one train traveled 11 km/hr faster than the other one, determine the speed of each train if they were 635 km apart after five hours.
- 7) A jet flew from Toronto to Paris at 800 km/hr and returned at 700 km/hr. If the total trip, not including stopover, took 15 hours, determine how far it is from Toronto to Paris.
- 8) A submarine can cruise underwater at 10 km/hr and on the surface at 16 km/hr. If the sub traveled a total of 180 km in 16.5 hours, determine how long it was submerged.

Answers: 1) about 3 hours, 26 minutes 2) 1 hour 3) 15 hours. 4) 450 km
5) 6.75 hours 6) 58km/h; 69 km/h 7) 5600 km 8) 14 hours