Euclidiad Olympiad Training LEVEL 1
Day 7 - Notes

Many problems involving work can be solved by considering the amount of work each worker does per some unit of time.

(Rate of work) × (Time worked) = Amount of work done.

Examples given in class

Example 1. Pippin and Sam are painting a fence. Sam could paint the whole fence alone in 12 hours. Pippin could paint the whole fence alone in 8 hours. Sam starts painting at 1p.m. and Pippin joins him at 3 p.m.

(a) What portion of the fence does Sam paint in an hour? How about Pippin?

(b) At what time do they finish?

Example 2. A man can do a job in 9 days and his son can do the same job in 16 days. They start working together. After 4 days the son leaves and the father finishes the job alone. How many days does the man take to finish the job?

Example 3. Carl and Bob can demolish a building in 6 days, Anne and Bob can do it in 3, Anne and Carl in 5. How many days does it take all of them working together if Carl gets injured at the end of the first day and can't come back?

Example 4. Tom and Huck paint a fence for four hours, after which Jim helps them and they finish two hours later. If Jim had not helped them, it would have taken them 5 more hours to paint the fence. How long would it take for Jim to paint the fence alone?

Example 5. Twenty-five women did 1/5 of a job in 8 days. Then, because of an emergency, it became necessary to complete the job in the next 20 days. How many additional women needed to be added to the crew of 25 to accomplish this?

Example 6. The grass on a ranch grows at a constant rate every week. 240 sheep will eat up the grass in 6 weeks. 200 sheep will eat up the grass in 10 weeks. For how many weeks can the pasture sustain a herd of 190 sheep?

Example 7. A queue is building up at a constant rate at the museum before its opening at 10:30 am. If 3 entrances are opened, the queue clears at 10:39 am. If 5 entrances are opened, the queue clears at 10:35 am. What time did the first visitor start queuing?

Example 8. Andy's lawn has twice as much area as Beth's lawn and three times as much area as Carlos' lawn. Carlos' lawn mower cuts half as fast as Beth's mower and one third as fast as Andy's mower. If they all start to mow their lawns at the same time, who will finish first?

Euclidiad Olympiad Training LEVEL 1
Day 7 – Homework

Homework code : **HWA103**
Issued on : 8th February 2021
Due date : 22nd February 2021

Submit the solutions to at least 6 of the homework problems before due date.
Problems 1-10 each worth 5 points. Challenge problems worth 10 points each.

1. Homer began peeling a pile of 44 potatoes at the rate of 3 potatoes per minute. Four minutes later Christen joined him and peeled at the rate of 5 potatoes per minute. When they finished, how many potatoes had Christen peeled?

2. Pipe A can fill a pool in 5 hours, while pipe B can fill it in four. How long will it take for the two to fill the pool if both are operating at the same time?

3. It takes Randy and Sam 12 hours to complete a science project. If Randy works alone on the same project for 16 hours and let Sam take over, Sam needs another 7 hours to complete it. How long does it take Sam to complete the science project alone?

4. It takes Kyaw and Zaw 12 days to complete a project. If Kyaw works on it alone for the first 3 days, Zaw needs another 8 days to complete 5/12 of the project. How many days will Kyaw take to complete the project all by himself? How long will Zaw take to complete the project?

5. Randy and Steve can finish painting a farmhouse in 6 days. It takes Steve and Tim 9 days to do the same task. Randy and Tim take 12 days to do the same task. How many days will it take if the three boys do the painting together?

6. Each good worker can paint my new house alone in 12 hours. Each bad worker can paint my house alone in 36 hours. I need my house painted in 3 hours. If I can only find 3 good workers, how many bad workers must I also find in order to have my house painted on time?

7. Joe and Renee are building a fence. Joe can build the fence alone in 4 hours. If Renee starts helping Joe after he has already worked on the fence for 2 hours, they will finish the fence 90 minutes after she joins him. How long would it take Renee to build the fence alone?

8. A piece of pasture is growing at a constant rate every day. It is able to sustain a herd of 100 cows for 20 days. It is able to feed a herd of 150 cows for 10 days. For how many days is the piece of pasture able to feed 250 cows?

9. A piece of pasture grows at a constant rate every week. 120 cows will eat up the grass in 12 weeks. 150 cows will eat up the grass in 8 weeks. How many cows can the pasture sustain for 6 weeks?

10. Two furniture factories produce the same kind of beds and bed frames, which are sold as a set. Factory A produces the beds and bed frames for 18 days and 12 days respectively. The number of sets produced by Factory A in 30 days is 432. Factory B produces beds for 13 days and bed frames for 17 days. It produces 442 sets of beds and bed frames in 30 days. If the two factories are in joint venture, what is the maximum number of such sets they can produce in 30 days?

Challenge Problems

11. Water flowing into a pond at a constant rate from a hose. The pond has several drainage pipes. If 3 drainage pipes are activated, the water will be drained in 45 minutes. If 5 drainage pipes are activated, the water will be drained in 25 minutes. How many pipes are needed to turn on if the pond must be dried in 15 minute's time?

12. A company sells detergent in three different sized boxes: small (S), medium (M) and large (L). The medium size costs 50% more than the small size and contains 20% less detergent than the large size. The large size contains twice as much detergent as the small size and costs 30% more than the medium size. Rank the three sizes from best to worst buy. Give reasons for your answer.

13. Two pipes can be used to fill a swimming pool. The first can fill the pool in three hours, the second can fill the pool in four hours. There is also a drain that can empty the pool in six hours. Both pipes were being used to fill the pool. After an hour, a careless maintenance man accidentally opened the drain. How long more will it take for the pool to fill?