

Year 6 Problem Solving Part 2

Student Name: _____ Date: _____	Grade: _____ Score: _____
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3 Problem Solving Part 3

3.1 Work Problems

Example 3.1.1 If 3 men can paint 9 rooms in 2 days, how many men would be required to paint 36 rooms in 3 days?

*Solution: 3 men can paint 9 rooms in 2 days, \Rightarrow 3 men can paint 36 rooms in 8 days,
So for one man to paint 36 rooms will require $3 \times 8 = 24$ days,
Now if these rooms need to be painted within 3 days it will require $24 \div 3 = 8$ men.*

Exercise 3.1.1

1. Eight of us could do a piece of work in 12 days. Working at the same rate, how many days would 6 people take?

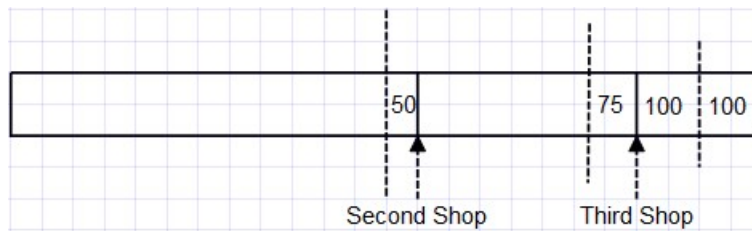
2. A group of 5 men on a desert have enough food for 4 weeks. How many days should the same food last 7 men?

3. One man can paint a room in 200 minutes. Another would take 300 minutes. How many minutes would they take if they worked together?

3.2 Working Backward

Example 3.2.1 David decides to go on a shopping centre. In the first shop, he spends \$50 more than half his money. In the second shop he spent \$75 more than half the money he had upon entering the shop. In the third shop he spent \$100 more than half the money he had upon entering the shop. If he leaves the third shop without any money. How much money did he have at the beginning?

Solution:



$\$100 = \text{half of half the money he had upon entering the third shop,}$
 $\Rightarrow \text{he has } 2 \times 100 = \$200 \text{ when he enter the third shop,}$
 $200 + 75 = \$275 = \text{half of half the money he had upon entering the second shop,}$
 $\Rightarrow \text{he has } 2 \times 275 = \$550 \text{ when he enter the second shop,}$
 $550 + 50 = \$600 = \text{half of half the money he had upon entering the first shop,}$
 $\Rightarrow \text{He has } 2 \times 600 = \$1200 \text{ at the beginning.}$

Exercise 3.2.1

1. I spent $\frac{1}{3}$ money on an exercise book and $\frac{1}{2}$ of what remained on pens. That left me with \$18. How much did I start shopping with?

2. Jeffrey spent half his money at a concert. He then went to have a snack and spent a quarter of what was left. After that he had only \$24 in his pocket. What fraction of his money did he spend?

Exercise 3.2.2

1. Carol spent three-quarters of her money and saved half of what was left. She then had \$102 in her pocket. How much money did Carol originally have?

2. Each morning William takes 12 minutes to shower and get dressed, 15 minutes to have breakfast, 8 minutes to clean up and pack his bag and 7 minutes to walk to bus stop. His bus leaves at 8:30 a.m At what time should he set his alarm clock to be sure he has 3 minutes to spare at the bus stop?

3. Adam is 4 years older than Bob and Bob is two years older than Chris. If Chris will be 12 next year, what is total age of the three boys?

4. Alex started counting at 17 and goes up by 2 each time, i.e. he counts 17, 19, 21, 23 and so on. How many numbers will he have counted if he stops counting after saying 125?

Exercise 3.2.3

1. Alice's weight is 40% greater than Bonnie's weight but 30% less than Cathy's weight. What is the ratio of Bonnie to Cathy's weight?

2. Emma starts counting at 10 and goes up by 2 each time. How many numbers will she have counted if she stops counting after saying 128?

3. Tony and John played a game of marbles with their friends. They started with the same number of marbles. When Tony lost 36 marbles and John lost 14 marbles, John had twice as many marbles as Tony. How many marbles did they have altogether?

4. I am thinking of a number. Multiply the number by itself, and then three times the number again, and you get 588. What is the number?

5. If 30 is added to one-third of a number, the result is the double of the number. What is the number?

3.3 Motion Problems

Definition: Distance = Speed \times Time , $\Rightarrow D = S \times T$
 Speed = Distance \div Time, $\Rightarrow S = D \div T$
 Time = Distance \div Speed, $\Rightarrow T = D \div S$.

Example 3.3.1 Suppose two trains leave from the same station at the same time, but travel in the opposite directions. One train average 72 km/h and other average 78 km/h.

1. How far apart will the trains be at the end of two and a half hours?

Solution: After one hour the trains will be $72 + 78 = 150$ km apart,
 Therefore at the end of two and a half hours the trains will be:
 $150 \times 2.5 = 375$ km apart.

2. How much time will it take for the two trains to be 600 km apart?

Solution: For the trains to be 600 km apart, the amount of time needed will be:
 $600 \div 150 = 4$ hours.

Exercise 3.3.1 Two trains leave the same station at 7:30 a.m. and travel in the same direction along parallel tracks. One train average 56 km/h and other average 64 km/h.

1. How far apart will the trains be at 11:45 a.m of the same day a.m.

2. At what time will the trains be 60 km apart?

Example 3.3.2 Jack walks to a train station to meet his friends. If he walks at a speed of 40 m/min he will be 5 minutes late. If he speeds up to 50 m/min instead he will reach the train station 4 minutes before the appointment.

1. How far is the train station from his place?

Solution: Let the distance between his home to station be D .

If he walks at a speed of 40 m/min he will be late 5 minutes: $\frac{D}{40} - 5$,

If he walks at a speed of 50 m/min he will be 4 minutes early: $\frac{D}{50} + 4$,

They all refer to the same appointment time: So $\frac{D}{40} - 5 = \frac{D}{50} + 4$,

$\therefore 5D - 1000 = 4D + 800, \Rightarrow D = 1800 \text{ metres}$.

2. If he leaves home at 7:30 a.m. What time is his appointment?

Solution: The time taken from home to station will be $t = \frac{D}{40} - 5 = \frac{1800}{40} - 5 = 40 \text{ minutes}$

So his appointment should be $7 : 30 + 0 : 40 = 8 : 10 \text{ a.m.}$

Exercise 3.3.2

1. A man travelled part of a 178 km trip at 50 km/h and 55 km/h . Find the distance he covered at 50 km/h if he travelled 3 hours and 30 minutes?

2. Lee can row a boat at the rate of 3 km/h in still water. However, the river he is rowing has a current that flows at the rate of 0.5 km/h . Lee rows 14 km down stream, then turns and rows back upstream to his starting point. How much time does he entire trip take?

3.4 Quiz

Question 1 (5 marks)

I spent half my money on tickets and one third of what I had left on food. That left me with \$38. How much did I start out with?

Question 2 (5 marks)

Jane went to a store, spent two-thirds of her money and then \$20 more. She went to a second store, spent half of her remaining and then \$20 more. but she then had no money left. How much money did she start shopping with?

Question 3 (5 marks)

Six men can complete a task in six weeks (five working days a week). If they worked at the same rate, how long would 15 men take?

Question 4 (5 marks)

Two cars are travelling towards each other. One is travelling at 75 km/h and the other at 95 km/h. How far apart are they 15 minutes before they meet?

Question 5 (5 marks)

28 workers are needed for 15 days to complete a job. If the job must be completed in 12 days, how many more workers are needed?

Question 6 (5 marks)

Jessica is 18 and her father is 42. How long ago was her father's age 4 times of than Jessica's?

Question 7 (5 marks)

Two cash registers of a store had a combined total of \$750. When the manager transferred \$36 from one register to the other, each register then had the same amount. How much did the register with the larger amount have before the transfer was made?

Question 8 (5 marks)

At school we have 3 lessons of maths each week. Each week a total of 20 lessons and each lesson is 45 minutes long. What percentage of the time do we spend on maths?

Question 9 (5 marks)

14 men on a desert island have enough food for 30 days. How many days should the same food last 20 men?

Question 10 (5 marks)

I'm smaller than 33 lots of 33, but larger than 300×3 , My digits when added are divisible by nine. I am a three digit number divisible by thirty three. One of my digits is zero. What is my number?

Question 11 (5 marks)

Stan had a stand-in job setting up the stand at the 'Stand-Up-Knockem-Down' stall. He wanted to stand his 55 cans in a triangular shape. How many would he put in the bottom row of the stand?

Question 12 (5 marks)

Rodney 'Rower' Reed is attempting to row around the island of Zete against a current. His pattern of rowing is day one - 30 kilometres, day two - 28 kilometres, day three - 26 kilometres . . . less each day as he tries. Additionally, each night the current takes him back eight kilometres. How many days would it take to row the 120 kilometres around the island?

Question 13 (10 marks)

A girl spent $\frac{2}{5}$ of her money. She lost $\frac{2}{5}$ of the remainder and then had \$45 left. How much money did she have at the start?

Question 14 (10 marks)

A motorist covered $\frac{2}{5}$ of a journey in 5 hours at an average speed of 90 km/h. He completed the whole journey at an average speed of 75 km/h. What was the average speed of the last $\frac{3}{5}$ of the journey?

Question 15 (10 marks)

To buy a gift, \$2.50 was collected from each person but they were \$12 short. When \$3.00 was collected from each person, they had \$4 extra. How much were they planning to collect?

Question 16 (10 marks)

Philip drives for 100 km at an average speed of 80 km/h and then he drives for 45 km at 60 km/h. What was Philip's average speed for the entire trip?
