MATHS

BOOKS - PSEB

INTRODUCTION TO MATHEMATICAL MODELLING

Exercise

1. In each of the following problems, clearly state what the relevant and irrelevant factors

are while going through Steps 1, 2 and 3 given in this chapter :- Suppose a company needs a computer for some period of time. The company can either hire a computer for Rs 2,000 per month or buy one for Rs 25,000. If the company has to use the computer for a long period, the company will pay such a high rent, that buying a computer will be cheaper. On the other hand, if the company has to use the computer for say, just one month, then hiring a computer will be cheaper. Find the number of months beyond which it will be cheaper to buy a computer.

2. In each of the following problems, clearly state what the relevant and irrelevant factors are while going through Steps 1, 2 and 4 given in this chapter :- Suppose a car starts from a place A and travels at a speed of 40 km/h towards another place B. At the same instance, another car starts from B and travels towards A at a speed of 30 km/h. If the distance between A and B is 100 km, after how much time will the cars meet?

3. The moon is about 3,84,000 km from the earth, and its path around the earth is nearly circular. Find the speed at which it orbits earth, assuming that it orbits the earth in 24 hours.

4. A family pays ? 1000 for electricity on an average in those months in which it does not use a water heater. In the months in which it uses a water heater, the average electricity bill is ? 1240. The cost of using the water heater is ? 8.00 per hour. Find the average number of hours the water heater is used in a day.

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5. We have given the timings of the gold medalists in the 400-metre race from the time the event was included in the Olympics, in table below. Contruct a mathematical model relating years and timings. Use it to estimate the timing in the next Olympics.

Table	
Year	Timing (in seconds)
1964	52.01
1968	52.03

Year	Timing (in seconds)
1972	51.08
1976	49.28
1980	48.88
1984	48.83
1988	48.65
1992	48.83
1996	48.25
2000	49.11
2004	49.41

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6. Suppose you want to minimise the waiting time of vehicles at a traffic junction of four roads. Which of these factors are important and which are not? (i) Price of petrol. (ii) The rate at which the vehicles arrive in the four different roads. (iii) The proportion of slow-moving vehicles like cycles and rickshaws and fast moving vehicles like cars and motorcycles.

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1. I travelled 432 kilometres on 48 litres of petrol in my car. I have to go by my car to a place which is 180 km away. How much petrol do I need?

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2. Let Sudhir invested Rs. 15000 at 8% simple interest. He wants to buy washing machine costing Rs. 19000 with the amount he receives.

Determine the time period for which does he invest Rs. 15000 so that he get sufficient money to buy the washing machine ?

3. A boat can go 20 km upstream and 30 km downstream in 3 hours. It can go 20 km downstream and 10 km .upstream in $1\frac{2}{3}$ hrs. Find the speed of the boat in still water and speed of stream.

4. Suppose you have a room of length 6 m and breadth 5 m. You want to cover the floor of the room with square mosaic tiles of side 50 cm. How many tiles will you need? Solve this by constructing a mathematical model.

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