

Exercise 10(E)

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1. Two cars start together in the same direction from the same place. The first car goes at uniform speed of 10 km h^{-1} . The second car goes at a speed of 8 km h^{-1} in the first hour and thereafter increasing the speed by 0.5 km h^{-1} each succeeding hour. After how many hours will the two cars meet?

Let's assume the two cars meet after n hours.

Then, this means that two cars travel the same distance in n hours.

So,

Distance travelled by the 1st car in n hours = $10 \times n \text{ km}$

Distance travelled by the 2nd car in n hours = $n/2[2 \times 8 + (n - 1) \times 0.5] \text{ km}$

$$10n = n/2[2 \times 8 + (n - 1) \times 0.5]$$

$$20 = [16 + 0.5n - 0.5]$$

$$20 = 15.5 + 0.5n$$

$$4.5 = 0.5n$$

$$n = 9$$

Hence, the two cars will meet after 9 hours.

2. A sum of Rs. 700 is to be paid to give seven cash prizes to the students of a school for their overall academic performance. If the cost of each prize is Rs. 20 less than its preceding prize; find the value of each of the prizes.

From the question, it's understood that

$$n = 7$$

$$d = -20$$

$$S_7 = 700$$

We know that,

$$S_n = n/2[2a + (n - 1)d]$$

$$700 = 7/2[2a + (7 - 1)(-20)]$$

$$200 = [2a + (7 - 1)(-20)]$$

$$200 = 2a - 120$$

$$2a = 320$$

$$a = 160$$

Hence, the value of each prize will be

1st prize – Rs 160, 2nd prize – Rs 140, 3rd prize – Rs 120, 4th prize – Rs 100, 5th prize – Rs 80, 6th prize – Rs 60 and 7th prize – Rs 40