

As Alberta's reserves of light crude oil began to deplete, so did the production. Alberta's light crude oil production totaled 37.3 million cubic meters from 1997-2005

This production has continued to decline each year from 1990 and only 21.7 million cubic meters were produced in 2005 use the above scenario to define a sequence or a series to predict possible initial production in year 1990 and the trends in the use or production of the resource over 1990-2005 year period.

Hence, predict the production of year 1990. Assume that the production of light crude oil declines at the rate of 30% of its total production of the previous year from 1990. Define a sequence or a series to predict possible initial production in year 1990.

### Solution

Let  $x$  cubic meters were produced in 1990. As that the production of light crude oil declines at the rate of 30% of its total production of the previous year from 1990, we can make a table of production in each year.

|      |   |
|------|---|
| 1990 | $x$   |
| 1991 | $x - 0.3x = 0.7x$   |
| 1992 | $0.7x - 0.3 \cdot 0.7x = 0.7x(1 - 0.3) = 0.7 \cdot 0.7x$                                      |
| 1993 | $(0.7 \cdot 0.7x) - 0.3(0.7 \cdot 0.7x) = 0.7 \cdot 0.7x(1 - 0.3) = 0.7 \cdot 0.7 \cdot 0.7x$ |

Using this information we can define the following series (let  $n=0$  corresponds to the year 1990, then  $n=15$  is year 2005).

$$\sum_{n=0}^{15} 0.7^n x$$

If 21.7 million cubic meters were produced in 2005 then  $0.7^{15}x = 21.7$ .

Hence, in 1990 were produced  $x = \frac{21.7}{0.7^{15}} \approx 4570.8 \text{ mln cubic meters}$ .

### Answer

$$\sum_{n=0}^{15} 0.7^n x$$

4570.8 mln cubic meters