Q8. 15, 30, 60, 120 ... are in GP

i) Find the nth term of this GP in term of r
ii) How many terms of the above GP will give the sum 945?

→ $a = 15$

$r = \frac{30}{15} = 2$

$r = 2$

$S_n = \frac{a(r^n - 1)}{r - 1}$

$945 = \frac{15(2^n - 1)}{2 - 1}$

$\frac{945}{15} = 2^n - 1$

$63 = 2^n - 1$

$63 + 1 = 2^n$

$64 = 2^n$

$2^n = 2^6$

$\Rightarrow n = 6$

ar^{n-1} $\Rightarrow$ n^{th} term of GP

$15 \cdot r^{6-1}$

$15 \cdot 2^5$

$15 \times 32 = 490$

2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
1

32
15
170
32
490

Answers:

i) 490
ii) 6

Q9 The length of three unequal edges of a rectangle solid block are in G.P. If the volume of the block is 216 cm^3 and the total surface area is 252 then find the measurment of its edge.

→ Let the length, breadth and height of rectangle solid block be $\frac{a}{r}$, a and ar

$\therefore V = \frac{a}{r} \times a \times ar = 216\ cm^3$

$a^3 = 216\ cm^3$

$a^3 = 6^3$

$\Rightarrow a = 6$

Surface area $= 2\left(\frac{a^2}{r} + a^2 r + a^2\right)$

$= 252$

$$2a^2\left(\frac{1}{r}+r+1\right)=252$$

$$2\times 36\left(\frac{1+r^2+r}{r}\right)=252$$

$$\frac{1+r^2+r}{r}=\frac{\cancel{252}^{\cancel{126}^{\cancel{42}^{21}}}}{\cancel{2}\times\cancel{36}_{\cancel{2}\,6}}$$

$$6+6r^2+6r=21r$$
$$6r^2+6r-21r+6=0$$
$$6r^2-15r+6=0$$
$$2r^2-5r+2=0$$
$$2r^2-(4+1)r+2=0$$
$$2r^2-4r-r+2=0$$
$$2r(r-2)-1(r-2)=0$$
$$(2r-1)(r-2)=0$$
$$2r-1=0,\quad r-2=0$$
$$r=\frac{1}{2},\quad r=2$$

For $r=\frac{1}{2}$

$$d=\frac{a}{r}=6\times 2=12\text{cm}$$

$$b=a=6\text{cm}$$

$$h=ar=6\times\frac{1}{2}=3\text{cm}$$

~~12, 6~~

For $r = 2$

$$d = \frac{a}{r} = \frac{6}{2} = 3\text{cm}$$

$b = a = 6\text{cm}$

$h = 9r = 6 \times 2 = 12\text{cm}$

Q10 The sequence 2, 9, 16 ... is given

i) Identify if the given sequence is an AP or a GP. Give reason to support your answer.

ii) Find the 20th term of the sequence

iii) Find the difference between the sum of its first 22 and 25 term

iv) Is the term 102 belong to this sequence?

v) If R is added to each of the above term, will the new sequen d be an AP or a GP?

→ i) Here, $9-2=7$

$16-9=7$

$\therefore d_1 = d_2 = 7$

$\therefore$ The given sequence is an AP

ii) nth term of AP $= a+(n-1)d$

$a_{20} = 2+(20-1)7$

$= 2 + 19 \times 7$

$= 2 + 133$

$= 135$

$a_{20} = 135$

iii) $S_n = \frac{n}{2}[2a+(n-1)d]$

$S_{22} = \frac{22}{2}[2\times 2 + (22-1)\times 7]$

$= 11[4 + 21 \times 7]$

$= 11[4+147]$

$= 11 \times 151$

$= 1661$

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Q2. $S_{25} = \frac{25}{2}[2\times2 + (25-1)7]$

$= \frac{25}{2}[4 + 24\times7]$

$= \frac{25}{2}[4 + 168]$

$= \frac{25}{2}\times172$

$= 2150$

$S_{25} - S_{22} = 2150 - 1661$

$= 489$

iv) $a_n = 102$

$a + (n-1)d = 102$

~~120 +~~

$2 + (n-1)7 = 102$

$2 + 7n - 7 = 102$

$7n - 5 = 102$

$7n = 107$

$n = 15\frac{2}{7}$

v) R added to each term

$2+R, 9+R, 16+R$

$d = 9+R-(2+R)$

$= 9+R-2-R$

$= 7$

∵ The common difference between the terms is still equal to 7

∴ The sequence is in AP