Find the sum of first n terms?

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Important Questions

1. Check whether 6^n can end with the digit 0 for any natural number.

A. Given number $6^n = (2 \times 3)^n$
The prime factors here 2 and 3 only. To be end with zero 6^n should have a prime factor 5 and 2.
So 6^n can't end with zero

2. Solve the following equations by elimination method.
$2x + y - 5 = 0, 3x - 2y - 4 = 0$

A: Given equations $2x + y - 5 = 0$ ——(i)
$3x - 2y - 4 = 0$ ——(ii)
eq. (i) $\times 2 \Rightarrow 3x + 2y - 10 = 0$
eq.(ii) $\times 1 \Rightarrow 3x - 2y - 4 = 0$
$7x - 14 = 0$
$7x = 14$
$x = 2$
substitute $x = 2$ in eq. (i)
$2 \times 2 + y - 5 = 0$
$y - 1 = 0$
$y = 1$

3. If $9x^2 + kx + 1 = 0$ have equal roots then find k value.

A: Given that
$9x^2 + kx + 1 = 0$
have equal roots
is $b^2 - 4ac = 0$
$(k)^2 - 36 = 0$
$k^2 = 36 = 0$
$k^2 = 36 \Rightarrow k = \sqrt{3}\ b$
$k = \pm 6$

4. Find the 10^{th} term of A.P. 7, 10½, 14, …..

A: Given A.P. 7, 10½, 14, ... 84
Here $a = 7, d = 10½ - 7 = 3½$
$l = 84$
We know $S_n = \frac{n}{2}(a + (n-1)d)$
$= 7 + 9d$
$= 7 + 9\left(\frac{7}{2}\right) = \frac{77}{2}$

5. Find the total surface are of a solid hemisphere whose radius is 7 cm.

A. Given that radius of Hemisphere
r = 7 cm
Total surface area of Hemisphere is $3\pi r^2$
$= 3\ \frac{22}{7}\ 7\ 7$
$66 \times 7 = 462\ cm^2$
∴Total surface area of the hemisphere is $462\ cm^2$

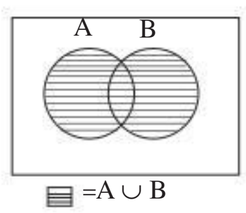
6. A solid ball is exactly fitted inside the cubical box of side a. Then write the volume of the ball.

A: Given that side of the cube = a
Side of the cube = diameter of sphere
$\therefore r = \frac{a}{2}$
Volume of the sphere
$= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi\frac{a^3}{8} = \frac{\pi a^3}{6}$

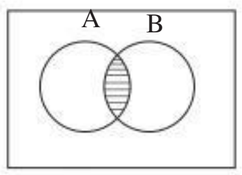
7. Which term of AP. 21, 18, 15, … is –81?

A: AP = 21, 18, 15, ...
a = 21, d = 18 – 21 = –3 and also given $t_n = -81$
n^{th} term of AP = a +(n–1)d = –81
21 + (n–1) –3 = –81
21 +(n–1) – 3 = –81
21 – 3n + 3 = –81
–3n = –81 – 24
–3n = –105
$n = \frac{-105}{-3} = 35$
∴ 35^{th} term of AP is – 81

8. represent A∪B, A∩B on venn diagram.



=A ∪ B



=A ∩ B

9. Check whether +2, +5 are zeroes of Q.P $p(x) = x^2 - 7x + 10$ and also verify relation between zeroes and co-efficients.

A: Given that
$p(x) = x^2 - 7x + 10$
$p(+2) = (2)^2 - 7(2) + 10$
$= 4 - 14 + 10$
$14 - 14 = 0$
∴ $p(2) = 0$
2 is a zero of $p(x)$
$p(5) = (5)^2 - 7(5) + 10$
$25 - 35 + 10 = 35 - 35 = 0$
∴ $p(5) = 0$
5 is a zero of $p(x)$
∴2, 5 are zeroes of given Polynomial.
Sum of zeroes $\alpha + p = -\frac{b}{a}$
$2 + 5 = \frac{-(-7)}{1}$
$7 = 7$
Product of zeroes $\alpha\beta = \frac{c}{a}$
$2\ \ 5 = \frac{10}{1}$
$10 = 10$
Verified

10. If $x^2 + y^2 = 6xy$ then prove that $2\log(x+y) = 3\log 2 + \log x + \log y$.

A: Given $x^2 + y^2 = 6xy$
Add 2xy on both sides.
$x^2 + y^2 + 2xy = 8xy$
$(x + y)^2 = 8xy$ $(\because (a+b)^2 = a^2 + b^2 + 2ab)$
Apply logarithms both sides.
$\log(x + y)^2 = \log(8xy)$
$2\log(x + y) = \log 8 + \log x + \log y$
$[\because \log a^m = m \log a$
$\log ab = \log a + \log b]$
$2\log(x + y) = \log 2^3 + \log x - 1 + \log y$
$2\log(x + y) = 3\log 2 + \log x + \log y$
$[\because \log a^m = m \log a]$

11. If A = {x: x is a letter in the word ASSASSINATION}

B = {x: x is a letter in the word STATION}
Then show that A and B are equal.

A: Given that A = {x : x is a letter in the word ASSASSINATION}
B = {x: x is aletter in the word STATION}
Roster form A = {A, I, O, S, T}
B = {A, I, O, S T}
∴ A & B are equal sets.

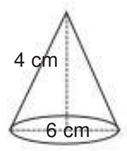
12. For what value of k the pair of linear equations $3x + 4y + 2 = 0$, $9x + 12y + k = 0$ represent co-incidents.

A: Given equations $3x + 4y + 2 = 0$
$9x + 12y + k = 0$
and also given co-incidents
ie. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{3}{9} = \frac{4}{12} = \frac{2}{k}$
$\frac{4}{12} = \frac{2}{k} \Rightarrow 4k = 24 \Rightarrow k = 6$
∴ k = 6

13. Determine theAP whose 3^{rd} term is 5 and the 7^{th} term is 9.

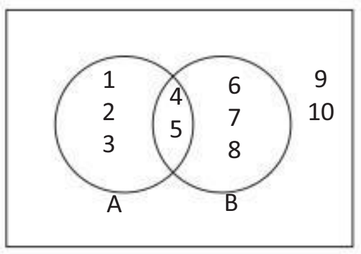
A: Given that 3^{rd} term is 5
ie. $a + 2d = 5$ —(i)
7^{th} term of AP is 9
ie. $a + 6d = 9$ ——(ii)
Solve (i) & (ii) we will get
$a + 2d = 5$
$a + 6d = 9$
$-4d = -4$
$d = 1$
if d =1 then a = 3
The required AP 3, 4, 5, 6, 7, 8, 9 ....

14. A toy is in the form of a cone mounted on a hemisphere. The diameter of the base and the height of the cone are 6 cm, 4cm respectively. Determine the surface are of the toy.



A: Given that h = 4cm
diameter of cone
d = 6 cm, r = 3 cm
Slant height of the cone
$l = \sqrt{r^2 + h^2} \Rightarrow l = \sqrt{3^2 + 4^2}$
$\Rightarrow l = \sqrt{25} = 5cm$
C.S.A. of hemisphere = $2\pi r^2$
$= \frac{22}{7}\ \ 3\ \ 5 = \frac{330}{7}\ cm^2$
Hence surface Area of the toy
= C.S.A. of cone + C.S.A Hemisphere
$\frac{330}{7} + \frac{396}{7} = \frac{726}{7} = 103.71$

15. Read the following picture and answer the following questions.



write the element of sets
i) Write set A
ii) A ∪ B
iii) A ∩ B
iv)

A: A = {1, 2, 3, 4, 5}
A ∪ B = {1, 2, 3, 4, 5,6, 7, 8}
A ∩ B = {4, 5}
= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

16. Cylinder and cone have bases of equal radii and are of equal heights. Show that their values are in the ratio of 3 : 1

A: Volume of cone $= \frac{1}{3}\pi r^2 h$
Volume of cylinder = $\pi r^2 h$
The ratio of volume of cone and cylinder
$\frac{\frac{1}{3}\pi r^2 h}{\pi r^2 h} = 1:3$
The ratio of cylender volume and cone volume is 3 : 1

17. If the sum of first 7 terms of an A.P. is 49 and that of 17 terms are 289. Then find the sum of first n terms.

A: Given that sum of 7 terms of AP = 49
ie. $S_7 = 49 \Rightarrow \frac{7}{2}[2a + (7-1)d] = 49$
$= 2a + 6d = 49\ \ \frac{2}{7} \Rightarrow 2a + 6d = 14$ ——(1)
and also given sum of 17 terms of AP=289
ie. $S_{17} \Rightarrow \frac{17}{2}[2a + 16d] = 289$
$2a + 16d = 289 \times \frac{2}{17}$
$2a + 16d = 34$ ——(2)
Solve (1) & (2) we will get
$2a + 6d = 14$
$2a + 16d = 34$
$-10d = -20$ $\quad d = 2$
Substitute d = 2 in eq. (1)
$2a + 12 = 14 \Rightarrow 2a = 2 \Rightarrow a = 1$
We know the formula of sum of n terms
$S_n = \frac{n}{2}[2a + (n-1)]d = \frac{n}{2}[2 + (n-1)2]$
$= \frac{n}{2}[2 + 2n - 2] = \frac{n}{2}[2n] = n^2$