

NOTE
Maths
DPE
College

Jan 17 2021
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Mathematical Science
Exercise

1. The sum of 3 numbers is an AP is 18,
the sum of their squares is 206 find the numbers
solution

Let the three numbers be

$$a-d, a, \text{ and } a+d$$

$$a = d + a + a + d = 18$$

$$\frac{2a}{2} = \frac{18}{2}$$

$$a = 6$$

$$(a-d)^2 + a^2 + (a+d)^2 = 206$$

$$(a-d)(a-d) + a^2 + (a+d)(a+d) = 206$$

$$a^2 - ad - ad + d^2 + a^2 + a^2 + ad + ad + d^2 = 206$$

$$3a^2 - 2ad + d^2 + a^2 + a^2 + 2ad + d^2 = 206$$

$$3a^2 + 2d^2 = 206$$

$$a = 6$$

$$3(6)^2 + 2d^2 = 206$$

$$108 + 2d^2 = 206$$

$$2d^2 = 206 - 108$$

$$2d^2 = 98$$

$$\sqrt{d^2} = \sqrt{49}$$

$$d = \pm 7$$

When $a = 6$ and $d = 7$

$$a-d = 6-7 = -1$$

$$a = 6$$

$$a+d = 6+7 = 13$$

When $a = 6$ and $d = -7$

$$a-d = 6-(-7) = 13$$

$$a = 6$$

$$a+d = 6+(-7) = -1$$

When $a = 6$ and $d = -7$

$$a-d = 6-(-7) = 13$$

$$a = 6$$

$$a+d = 6+(-7) = -1$$

The numbers are $-1, 6$ and 13 or $13, 6$ and -1

\therefore the numbers are $-1, 6$ and 13 or $13, 6$ and -1

2) Find 3 numbers in GP whose sum is 28 and whose product is 512.

Solution

Let the numbers be

$$a/r, a, ar$$

$$\frac{a}{r} + a + ar = 28$$

$$a \left(\frac{1}{r} + 1 + r \right) = 28 \quad \text{--- (1)}$$

$$\frac{a}{r} \times a \times ar = 512$$

$$a^3 = 512$$

$$a = 8$$

Substitute $a = 8$ in eqn (1)

$$8 \left(\frac{1}{r} + 1 + r \right) = \frac{28}{8}$$

$$\frac{1}{r} + 1 + r = 3.5$$

$$\frac{1}{r} + \frac{1+r}{1} = 3.5$$

$$\frac{1+r^2}{r} = .$$

$$\frac{1+r}{r} = 3.5 - 1$$

$$\frac{1+r^2}{r} = 2.5$$

$$1+r^2 = 2.5r$$

$$r^2 - 2.5r + 1 = 0$$

$$r^2 - \frac{5r}{2} + 1 = 0$$

$$2r^2 - 5r + 2 = 0$$

$$2r^2 - 4r - r + 2 = 0$$

$$2r(r-2) - 1(r-2) = 0$$

$$(2r-1)(r-2) = 0$$

$$r = \frac{1}{2} \text{ or } r = 2$$

Hence

$$a = 8$$

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

$$a/r = 16$$

$$ar = 8 \times \frac{1}{2} = 4$$

or

$$a = 8$$

$$r = 2$$

$$a/r = 8/2 = 4$$

$$ar = 8 \times 2 = 16$$

∴ The numbers are 16, 8 and 4 or 4, 8 and 16