



Date : 22nd Nov 2023

Special Question - Quantitative Aptitude

English

Directions 1 - 2 : In the following question four equations are given in variables p, q, r, and s. You have to solve these equations.

I. $(2p + 2)(p + 4) = 0$

II. $289q^2 - 360 = 1$

III. $4r^2 - r - 5 = 0$

IV. $2s^2 - 8s + 8 = 0$

Q:1 Find the sum of the roots of equation IV and equation III.

1. 4.25
2. 4.50
3. 5.22
4. 4.20
5. 4.55

Q:2 Find the difference between the sum of all positive roots and the sum of all negative roots.

1. 13.50
2. 13.55
3. 13.47
4. 15.66
5. 12.45

Direction 3 - 5 : In the following question four equations are given in variables X, Y, P, and Q. You have to solve these equations.

I. $X^2 + 19X + 88 = 0$

II. $Y^2 + 14Y + 48 = 0$

III. $3P^2 - 8P - 11 = 0$

IV. $Q^2 - 17Q + 42 = 0$

Q:3 Find the product of the roots of the sum of both roots of P and Q.

1. 136/3
2. 27/5
3. 41/3
4. 89/7
5. 14/3

Q:4 What is the sum of the product of the smallest roots of P and Y and the product of the negative roots of X and Q?

1. -105
2. -179
3. -146
4. -123
5. -117

Q:5 Determine the difference between the sum of both roots of X and Q and the sum of both roots of P and Y.

1. 126/7
2. 257/3
3. 158/3
4. 144/7
5. 204/5



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Answer Key

1. (1) 2. (3) 3. (1) 4. (3) 5. (2)

Answers and Solutions

Q:1 The correct answer is **Option 1** i.e. **4.25**.

$$\begin{aligned} \text{I. } (2p + 2)(p + 4) &= 0 \\ 2p^2 + 8p + 2p + 8 &= 0 \\ 2p(p + 4) + 2(p + 4) &= 0 \\ (2p + 2)(p + 4) &= 0 \end{aligned}$$

$$\begin{aligned} p &= -1, -4 \\ \text{II. } 289q^2 - 360 &= 1 \\ 289q^2 &= 361 \end{aligned}$$

$$\begin{aligned} q^2 &= 19/17 \\ q &= +19/17, -19/17 \\ \text{III. } 4r^2 - r - 5 &= 0 \\ 4r^2 - 5r + 4r - 5 &= 0 \\ r(4r - 5) + 1(4r - 5) &= 0 \\ (r + 1)(4r - 5) &= 0 \end{aligned}$$

$$\begin{aligned} r &= -1, 5/4 \\ \text{IV. } 2s^2 - 8s + 8 &= 0 \\ 2s^2 - 4s - 4s + 8 &= 0 \\ 2s(s - 2) - 4(s - 2) &= 0 \\ (2s - 4)(s - 2) &= 0 \end{aligned}$$

$s = 2, 2$
Now, according to the question
The Sum of the roots of equation III = $-1 + 5/4 = (-4 + 5)/4 = 1/4 = 0.25$
The Sum of the roots of equation IV = $2 + 2 = 4$
Hence, Sum = $0.25 + 4 = 4.25$

Q:2 The correct answer is **Option 3** i.e. **13.47**.

$$\begin{aligned} \text{I. } (2p + 2)(p + 4) &= 0 \\ 2p^2 + 8p + 2p + 8 &= 0 \\ 2p(p + 4) + 2(p + 4) &= 0 \\ (2p + 2)(p + 4) &= 0 \end{aligned}$$

$$\begin{aligned} p &= -1, -4 \\ \text{II. } 289q^2 - 360 &= 1 \\ 289q^2 &= 361 \end{aligned}$$

$$\begin{aligned} q^2 &= 19/17 \\ q &= +19/17, -19/17 \\ \text{III. } 4r^2 - r - 5 &= 0 \\ 4r^2 - 5r + 4r - 5 &= 0 \\ r(4r - 5) + 1(4r - 5) &= 0 \end{aligned}$$

$$(r + 1)(4r - 5) = 0$$

$$r = -1, 5/4$$

$$\text{IV. } 2s^2 - 8s + 8 = 0$$

$$2s^2 - 4s - 4s + 8 = 0$$

$$2s(s - 2) - 4(s - 2) = 0$$

$$(2s - 4)(s - 2) = 0$$

$$s = 2, 2$$

Now, according to the question

$$\begin{aligned} \text{The sum of all positive roots} &= 19/17 + 5/4 + 2 + 2 \\ (76 + 85 + 136 + 136)/68 &= 433/68 = 6.36 \end{aligned}$$

$$\begin{aligned} \text{The sum of all negative roots} &= (-1) + (-4) + (-19/17) + (-1) \\ (-17 - 68 - 19 - 17)/17 &= -121/17 = -7.11 \end{aligned}$$

$$\begin{aligned} \text{Required difference} &= 6.36 - (-7.11) = 6.36 + 7.11 = 13.47 \end{aligned}$$

Q:3 The correct answer is **option 1** i.e. **136/3**

$$\text{I. } X^2 + 19X + 88 = 0$$

$$\Rightarrow X^2 + 8X + 11X + 88 = 0$$

$$\Rightarrow X(X + 8) + 11(X + 8) = 0$$

$$\Rightarrow (X + 8)(X + 11) = 0$$

$$\Rightarrow X = -8 \& -11$$

$$\text{II. } Y^2 + 14Y + 48 = 0$$

$$\Rightarrow Y^2 + 8Y + 6Y + 48 = 0$$

$$\Rightarrow Y(Y + 8) + 6(Y + 8) = 0$$

$$\Rightarrow (Y + 8)(Y + 6) = 0$$

$$\Rightarrow Y = -8 \& -6$$

$$\text{III. } 3P^2 - 8P - 11 = 0$$

$$\Rightarrow 3P^2 - 11P + 3P - 11 = 0$$

$$\Rightarrow P(3P - 11) + 1(3P - 11) = 0$$

$$\Rightarrow (P + 1)(3P - 11) = 0$$

$$\Rightarrow P = -1, \frac{11}{3}$$

$$\text{IV. } Q^2 - 17Q + 42 = 0$$

$$\Rightarrow Q^2 - 14Q - 3Q + 42 = 0$$

$$\Rightarrow Q(Q - 14) - 3(Q - 14) = 0$$

$$\Rightarrow (Q - 14)(Q - 3) = 0$$

$$\Rightarrow Q = 14, 3$$

$$\begin{aligned} \text{Sum of both roots of } P &= -1 + 11/3 \Rightarrow (-3 + 11)/3 = 8/3 \end{aligned}$$

$$\text{Sum of both roots of } Q = 14 + 3 = 17$$

$$\text{Product of both roots of } P \text{ and } Q = 8/3 \times 17 = 136/3$$

Q:4 The correct answer is **option 3** i.e. **- 146**

$$\text{I. } X^2 + 19X + 88 = 0$$

$$\Rightarrow X^2 + 8X + 11X + 88 = 0$$

$$\Rightarrow X(X + 8) + 11(X + 8) = 0$$

$$\Rightarrow (X + 8)(X + 11) = 0$$

$$\Rightarrow X = -8 \text{ \& } -11$$

$$\text{II. } Y^2 + 14Y + 48 = 0$$

$$\Rightarrow Y^2 + 8Y + 6Y + 48 = 0$$

$$\Rightarrow Y(Y + 8) + 6(Y + 8) = 0$$

$$\Rightarrow (Y + 8)(Y + 6) = 0$$

$$\Rightarrow Y = -8 \text{ \& } -6$$

$$\text{III. } 3P^2 - 8P - 11 = 0$$

$$\Rightarrow 3P^2 - 11P + 3P - 11 = 0$$

$$\Rightarrow P(3P - 11) + 1(3P - 11) = 0$$

$$\Rightarrow (P + 1)(3P - 11) = 0$$

$$\Rightarrow P = -1, \frac{11}{3}$$

$$\text{IV. } Q^2 - 17Q + 42 = 0$$

$$\Rightarrow Q^2 - 14Q - 3Q + 42 = 0$$

$$\Rightarrow Q(Q - 14) - 3(Q - 14) = 0$$

$$\Rightarrow (Q - 14)(Q - 3) = 0$$

$$\Rightarrow Q = 14, 3$$

The product of the smallest roots of P and Y = $-1 \times -8 = 8$

The product of the smallest root of X and the largest root of Q = $-11 \times 14 = -154$

The sum = $8 + (-154) = 8 - 154 = -146$

Q:5 The correct answer is **option 2**. i.e: **257/3**

$$\text{I. } X^2 + 19X + 88 = 0$$

$$\Rightarrow X^2 + 8X + 11X + 88 = 0$$

$$\Rightarrow X(X + 8) + 11(X + 8) = 0$$

$$\Rightarrow (X + 8)(X + 11) = 0$$

$$\Rightarrow X = -8 \text{ \& } -11$$

The product of roots = $-8 \times (-11) = 88$

$$\text{II. } Y^2 + 14Y + 48 = 0$$

$$\Rightarrow Y^2 + 8Y + 6Y + 48 = 0$$

$$\Rightarrow Y(Y + 8) + 6(Y + 8) = 0$$

$$\Rightarrow (Y + 8)(Y + 6) = 0$$

$$\Rightarrow Y = -8 \text{ \& } -6$$

The product of roots = $-8 \times (-6) = 48$

$$\text{III. } 3P^2 - 8P - 11 = 0$$

$$\Rightarrow 3P^2 - 11P + 3P - 11 = 0$$

$$\Rightarrow P(3P - 11) + 1(3P - 11) = 0$$

$$\Rightarrow (P + 1)(3P - 11) = 0$$

$$\Rightarrow P = -1, \frac{11}{3}$$

The product of roots = $-1 \times 11/3 = -11/3$

$$\text{IV. } Q^2 - 17Q + 42 = 0$$

$$\Rightarrow Q^2 - 14Q - 3Q + 42 = 0$$

$$\Rightarrow Q(Q - 14) - 3(Q - 14) = 0$$

$$\Rightarrow (Q - 14)(Q - 3) = 0$$

$$\Rightarrow Q = 14, 3$$

The product of roots = $14 \times 3 = 42$

The sum of products of both roots of X and Q = $88 + 42 = 130$

And the sum of products of both roots of Y and P = $48 + (-11/3) = 48 - 11/3 = 133/3$

The difference = $130 - 133/3 = 257/3$