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**VIRTUAL COACHING CLASSES
ORGANISED BY BOS (ACADEMIC), ICAI**

**FOUNDATION LEVEL
PAPER 1: BUSINESS MATHEMATICS, LOGICAL
REASONING & STATISTICS**

Equations 2 & 3
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Example

- The sum of 2 numbers is 52 and difference is 2
- Find the numbers

Example

- For a certain commodity the demand equation giving demand 'd' in kg, for a price 'p' in rupees per kg. is $d = 100(10 - p)$.
- The supply equation giving the supply s in kg. for a price p in rupees per kg. is $s = 75(p - 3)$. The market price is such at which demand equals supply.
- Find the market price and quantity that will be bought and sold

Example

- If the numerator of a fraction is increased by 2 and the denominator by 1 it becomes 1. Again if the numerator is decreased by 4 and the denominator by 2 it becomes $\frac{1}{2}$.
- Find the fraction.

Example 3, pg 2.13 of study material,

- A number consist of three digit of which the middle one is zero and the sum of the other digits is 9.
- The number formed by interchanging the first and third digits is more than the original number by 297
find the number

Extra – soln

- **SOLUTION:** Let the number be $100x + y$.
- we have $x + y = 9$(i) Also $100y + x = 100x + y + 297$ (ii)
- From (ii) $99(x - y) = -297$
- or $x - y = -3$ (iii)
- Adding (i) and (ii) $2x = 6$ or $x = 3$ □ from (i) $y = 6$
- □ Hence the number is 306.

Pg2.5 q5, Unit 1, exercise B

- The fourth part of a number exceeds the sixth part by 4. The number is_____
- Solution
- $X = 48$

Example

- The number of students in each section of a school is 36. After admitting 12 new students , 4 sections were started, each having 30 students . How many sections were there initially ?

Quadratic equation

- An equation of the form
- $ax^2 + bx + c = 0$ where x is a variable and a , b , c are constants with a not equal to 0 is called a quadratic equation or equation of the second degree.
- When $b=0$ the equation is called a pure quadratic equation; when b is not = 0 the equation is called an affected quadratic.

Quadratic Formula:

For $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Roots

Roots of quadratic equation

- Let roots of quadratic equation be : α & β
- 1) sum of roots = $-\frac{b}{a}$
- 2) Product of roots = $\frac{c}{a}$

Forms

Equation	Is it Quadratic?	Explanation
$3x^3 - 4x + 5$	No	The first term is raised to the 3 rd power. It must be raised to the 2 nd power in order to be quadratic.
$5x^2 - 4x + 2$	Yes	This equation is in the correct form: $ax^2 + bx + c$
$7x^2 = 49$	Yes	This equation can be rewritten as: $7x^2 - 49$. In this equation, b is 0. B or c can be 0; however, a cannot be 0.
$2x^2 = 8x - 3$	Yes	This equation can be rewritten as $2x^2 - 8x + 3$ which would then be in the correct form of: $ax^2 + bx + c$.

Roots

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If $b^2 - 4ac = 0$ the roots are real and equal;

If $b^2 - 4ac > 0$ then the roots are real and unequal (or distinct);

If $b^2 - 4ac < 0$ then the roots are imaginary;

If $b^2 - 4ac$ is a perfect square ($\neq 0$) the roots are real, rational and unequal (distinct)

Let's solve together : **Example**

- Solve $x^2 - 5x + 6 = 0$

Pg 2.20 Ex F q No 2

■ If $2^{2x+3} - 3^2 \cdot 2^x + 1 = 0$ then values of x are ____ and ____

■ Ans : $x = 0, -3$

Example 3 (Study material pg 2.4)

- *A number consists of two digits the digit in the ten's place is twice the digit in the unit's place.*
- *If 18 be subtracted from the number the digits are reversed. Find the number.*

Example 4 -- Study material :

Unit 1 Ex B: No 3

- Divide 56 into two parts such that three times the first part exceeds one third of the second by 48.
- The parts are. _____ and _____

Example 5 -- Study material :

Unit 1 Ex B: No 6

- Ten years ago the age of a father was four times of his son.
- Ten years hence the age of the father will be twice that of his son. The present ages of the father and the son are. _____ & _____

Example 6 -- Study material :

Unit 1 Ex B: No 10

- A number consists of two digits. The digits in the ten's place is 3 times the digit in the unit's place.
- If 54 is subtracted from the number the digits are reversed. The number is

Example 10 -- Study material :

Unit 1 Ex E: No 1-- simultaneous equation

- Monthly incomes of two persons are in the ratio 4 : 5 and their monthly expenses are in the ratio 7 : 9. If each saves ₹ 50 per month find their monthly incomes.

- Ans : 400, 500

Example 11 -- Study material :

Unit 1 Ex E: No 6

simultaneous equation

- A number consisting of two digits is four times the sum of its digits and if 27 be added to it the digits are reversed.
- The number is :

Example 15 : Quadratic : Nature of roots (Example 2, page no 2.16 : study material)

■ Examine the nature of the roots of the following equations

■ i) $x^2 - 8x + 16 = 0$ ii) $3x^2 - 8x + 4 = 0$

■ iii) $5x^2 - 4x + 2 = 0$ iv) $2x^2 - 6x - 3 = 0$

■ i) $b^2 - 4ac = (-8)^2 - 4.1.16 = 64 - 64 = 0$

■ The roots are real and equal.

- (ii) $3x^2 - 8x + 4 = 0$

- $a = 3, b = -8, c = 4$

- $b^2 - 4ac = (-8)^2 - 4.3.4 = 64 - 48 = 16 > 0$ and a perfect square The roots are real, rational and unequal

- (iii) $5x^2 - 4x + 2 = 0$

- $b^2 - 4ac = (-4)^2 - 4.5.2 = 16 - 40 = -24 < 0$

- The roots are imaginary and unequal

- (iv) $2x^2 - 6x - 3 = 0$

- $b^2 - 4ac = (-6)^2 - 4.2(-3)$

- $= 36 + 24 = 60 > 0$

- The roots are real and unequal. Since $b^2 - 4ac$ is not a perfect square the roots are real irrational and unequal.

Example 17

(Study material : Page 2.21,
Exercise F , No 3)

- If alpha and beta be the roots of the equation $2x^2 - 4x - 3 = 0$ the value of
- $(\alpha)^2 + (\beta)^2$ is

- Ans = 7

Example 18

(Study material : Page 2.21,
Exercise F , No 9)

- If p and q are the roots of $x^2 + 2x + 1 = 0$ then the values of $p^3 + q^3$ becomes ____

Example 20

(Study material : Page 2.22,
Exercise G , No 2)

- If the root of the equation $x^2 - 8x + m = 0$ exceeds the other by 4 then the value of m is

- Ans = 12

Example 21

(Study material : Page 2.24,
Exercise H , No 7)

There are two consecutive numbers such that the difference of their reciprocals is $1/240$.

- The numbers are

- Ans == 12, 13

Example - Study material :

- If area & perimeter of a rectangle is 6000 sq cm and 340 cm respectively, find the length

Example : CA Model TP

- If $kx - 4 = (k-1)x$ which one is true ?
- A. $x = 5$
- B. $x = -4$
- C. $x = -3$
- D. $x = 4$

Example 30 (CA MTP)

- If one root of the equation $x^2 - 3x + k = 0$ is 2 ,
 - then value of k will be
- 10
 - 0
 - 2
 - 10

Cubic equation : Example 36

- Solve $x^3 - 7x + 6 = 0$
- Putting $x = 1$ L.H.S is Zero. So $(x-1)$ is a factor of $x^3 - 7x + 6$
- We write $x^3 - 7x + 6 = 0$ in such a way that $(x-1)$ becomes its factor. This can be achieved by writing the equation in the following form.
- or $x^3 - x^2 + x^2 - x - 6x + 6 = 0$
- or $x^2(x-1) + x(x-1) - 6(x-1) = 0$ or $(x-1)(x^2 + x - 6) = 0$
- or $(x-1)(x^2 + 3x - 2x - 6) = 0$
- or $(x-1)\{ x(x+3) - 2(x+3) \} = 0$
- or $(x-1)(x-2)(x+3) = 0$
- or $x = 1, 2, -3$

Example 42

Diagonal of a rectangle is 5 cm and one of the sides is 4cm. Find area of the rectangle

Example 44 (CA MTP May 2020)

The sum of 2 numbers is 62 and their product is 960 . Sum of their reciprocal is _____

A. $\frac{31}{480}$

B. $\frac{29}{480}$

C. $\frac{61}{960}$

D. $\frac{41}{960}$

Example 46 (CA MTP May 2020)

The roots of the quadratic equation $x^2-4x+k = 0$ will be coincidental if

- A. A. $k = 4$
- B. B. $k = 3$
- C. C. $k = 2$
- D. D. $k = 1$



THANK YOU