UDAAN

2026

Quadratic Equations

MATHS LECTURE-7

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Topics *to be covered*

Word Problems Part-2

#Q. The roots of the equation $\sqrt{x^2 + 15} = 8$ are :

A. $x = 7$

B. $x = \pm 7$

C. $x = -7$

D. $x = 0$

$$\sqrt{x^2+15} = 8$$

S.B.S

$$\left(\sqrt{x^2+15}\right)^2 = (8)^2$$

$$x^2+15 = 64$$

$$x^2 = 64-15$$

$$x^2 = 49$$

$$x = \pm 7$$

#Q. A two-digit number is 4 times the sum of its digits and twice the product of its digits. Find the numbers.

$10y+x = 4(x+y)$

$10y+x = 4x+4y$

$6y-3x=0$

$2y-x=0$ (1)

$2y=x$

$10y+x = 2(xy)$

$10y+x = 2xy$ (2)

$10y+2y = 2(2y)(y)$

$12y = 4y^2$

$0 = 4y^2-12y$

$0 = 4y(y-3)$

$0 = 4y$, $0 = y-3$

$y = 0, 3$

If $y=0$

$2y=x$

$2(0)=x$

$0=x$

If $y=3$

$2y=x$

$2(3)=x$

$6=x$

Ans: 36

let,

units digit $= x$

ten's digit $= y$

Two digit no. / original no. $= 10y+x$

Reversed no. $= 10x+y$

Ans. 36

#Q. A 2-digit number is such that the product of its digits is 24. If 18 is subtracted from the number, the digits interchange their places. Find the number.

CBSE 2022

$xy = 24$ ... (1)

$10y + x - 18 = 10x + y$

$9y - 9x - 18 = 0$

$y - x = 2$ ... (2)

Let:

Unit's digit $= x$

ten's digit $= y$

two-digit no $= 10y + x$

Reversed no $= 10x + y$

Ans. 64

#Q. Find a natural numbers whose square diminished by 84 is equal to thrice of 8 more than the given number.

NCERT EXAMPLAR

Let the no. be x,

$$x^2 - 84 = 3(8 + x)$$

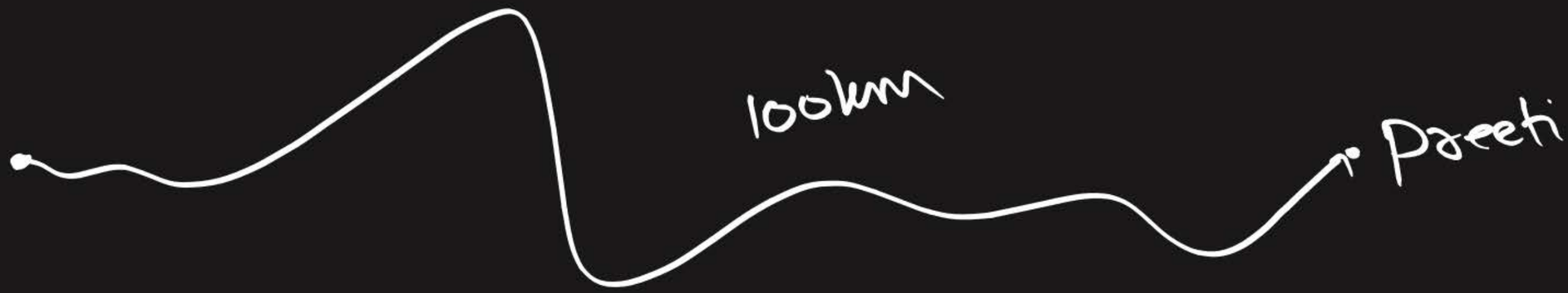
Ans. 12

#Q. A natural number when increased by 12 equals 160 times its reciprocal. Find the number.

NCERT EXAMPLAR

#Gplu

Ans. 8



D = 100km

S = 20km/hr

T = ?

$T = \frac{D}{S}$

$T = \frac{100}{20}$

T = 5hr

D = SXT

$S = \frac{D}{T}$

$T = \frac{D}{S}$

$T = \frac{D}{S}$

#Q. A train travels a distance of 300 km at constant speed. if the speed of the train is increased by 5 km an hour, the journey would have taken 2 hours less. Find the original speed of the train.

let original speed = x km/hr

(I)

$D = 300$

$S = x$

$T = T$

$T = \frac{300}{x}$ (1)

(II)

$D = 300$

$S' = x+5$

$T' = T-2$

$T-2 = \frac{300}{x+5}$ (2)

$\frac{300}{x} - 2 = \frac{300}{x+5}$

$$\frac{300}{x} - \frac{300}{x+5} = 2$$

$300\left[\frac{1}{x} - \frac{1}{x+5}\right] = 2$

$\frac{1}{x} - \frac{1}{x+5} = \frac{2}{300}$

$\frac{x+5-x}{x(x+5)} = \frac{1}{150}$

$$\frac{5}{x^2+5x} = \frac{1}{150}$$

$$750 = x^2+5x$$

$$0 = x^2+5x-750$$

$$S = 5, \; P = -750$$

$30, -25$

$x = -30, 25$

Ans: original speed $= x = 25$ km/hr

$\frac{30}{60} = \frac{1}{2}$

#Q. A plane left 30 minutes later than the schedule time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.

CBSE 2016

Usual speed $= x$ km/hr

(I)

$D = 1500$

$S = x$

$T = T$

$T = \frac{1500}{x}$ (1)

(II)

$D = 1500$

$S' = x + 250$

$T' = T - \frac{30}{60}$

$T - \frac{1}{2} = \frac{1500}{x+250}$ (2)

$\frac{1500}{x} - \frac{1}{2} = \frac{1500}{x+250}$

$\frac{1500}{x} - \frac{1500}{x+250} = \frac{1}{2}$

$1500\left[\frac{1}{x} - \frac{1}{x+250}\right] = \frac{1}{2}$

Ans. 750 km/h

$$\frac{1}{x} - \frac{1}{x+250} = \frac{1}{3000}$$

$$\frac{x+250-x}{x(x+250)} = \frac{1}{3000}$$

$$\frac{250}{x^2+250x} = \frac{1}{3000}$$

$$750000 = x^2+250x$$

$$0 = x^2+250x-750000$$

$D = b^2-4ac$

$= (250)^2 - 4(1)(-750000)$

$= 62500 + 3000000$

$D = 3062500$

5	3062500
5	612500
5	122500
7	24500
7	4900
	700
	100
	1

$\sqrt{D} = \sqrt{3062500}$

$= \sqrt{5\times5\times5\times5\times7\times7\times10\times10}$

$= 5\times5\times7\times10 = 1750$

#Q. In a flight of 600 km, a aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time off light increased by 30 minutes. Find the duration of flight.

Original

Original speed = x km/hr

(I) (II)

D = 600 D = 600

S = x $S' = x - 200$

T = T $T' = T + \frac{30}{60}$

$T = \frac{600}{x}$ (1)

$T + \frac{1}{2} = \frac{600}{x-200}$ (2)

Ans. 1 hour

#Q. A fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speeds of the two trains.

Let, Speed of fast train = x km/hr

" " " " " = $(x-10)$ km/hr

F.T

$D = 600$

$S = x$

$T = T$

S.L

$D = 600$

$S' = x-10$

$T' = T+3$

$$T = \frac{600}{x} \quad (1)$$

$$T+3 = \frac{600}{x-10} \quad (2)$$

Ans. 40 km/h, 50 km/h

#Q. A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/hr more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed?

CBSE 2023

$D = 54$
$S = x$
$T = T_1$

$D = 63$
$S' = x + 6$
$T' = T_2$

$T_1 = \frac{54}{x}$ ... (1)

$T_2 = \frac{63}{x+6}$

$T_1 + T_2 = 3$

$$\frac{54}{x} + \frac{63}{x+6} = 3$$

Ans. 36 km/h

#Q. While boarding an aeroplane, a passenger got hurt. The pilot showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late by 30 minutes to reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hr. Find the original speed/hour of the plane.

CBSE 2013

#Gpk

$D = 1500$

$S = x$

$T = T$

$D = 1500$

$S' = x + 100$

$T' = T - \frac{30}{60}$

#Q. A car moves a distance of 2592 km with uniform speed. The number of hours taken for the journey is one-half the number representing the speed in km/hour. Find the time taken to cover the distance.

CBSE 2017

$D = 2592$

$S = x$

$T = \frac{1}{2}x$

#Gpy

$$\frac{1}{2}x = \frac{2592}{x}$$

$$x^2 = 5184$$

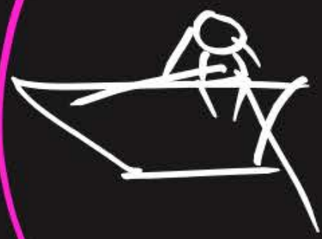
$$x = \pm\sqrt{5184}$$

Ans. 36 hours

Upstream

Downstream

$DS = x + y$



① speed of boat / aapki speed $= x$

② Stream / current / paani ki speed $= y$

$US = x - y$

#Q. The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream.

Speed of boat = 15 km/hr

let, speed of stream = x

speed 'up' = $15 - x$

speed 'down' = $15 + x$

up	down
$D = 30$	$D = 30$
$S = 15 - x$	$S = 15 + x$
$T = T_1$	$T = T_2$

(1) $T_1 = \frac{30}{15 - x}$

CBSE 2017

(2) $T_2 = \frac{30}{15 + x}$

$T_1 + T_2 = 4 + \frac{30}{60} = 4 + \frac{1}{2}$

$$\frac{30}{15 - x} + \frac{30}{15 + x} = \frac{9}{2}$$

$$30\left[\frac{1}{15-x}+\frac{1}{15+x}\right]=\frac{9}{2}$$

$$\frac{15+x+15-x}{(15-x)(15+x)}=\frac{9}{30\times 2}$$

$$\frac{30}{15^2-x^2}=\frac{3}{20}$$

$$600=3(225-x^2)$$

$$600=675-3x^2$$

$$3x^2=675-600$$

$$x^2=\frac{75}{3}$$

$$x^2=25$$

$$x=\pm 5$$

$\therefore$ speed of stream $= 5$ km/hr

#Hast

#Q. A motor boat whose speed in still water is 18 km/hr takes 1 hour more to go 24 km up stream that to return down stream to the same spot. Find the speed of the stream.

CBSE 2014, 18

Speed of boat = 18km/hr

Let " " Stream = x

Speed upstream = 18 − x

" downstream = 18 + x

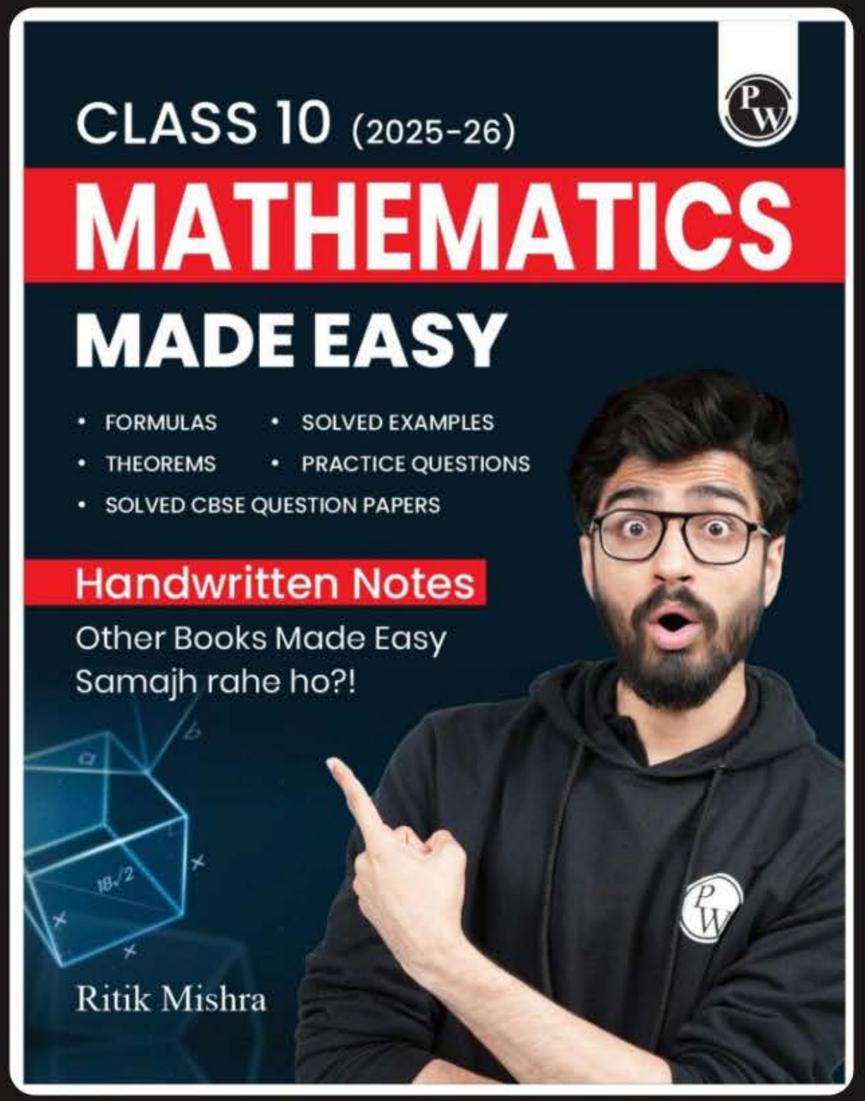
up	down
D = 24	D = 24
S = 18 − x	S' = 18 + x
T = T + 1	T' = T

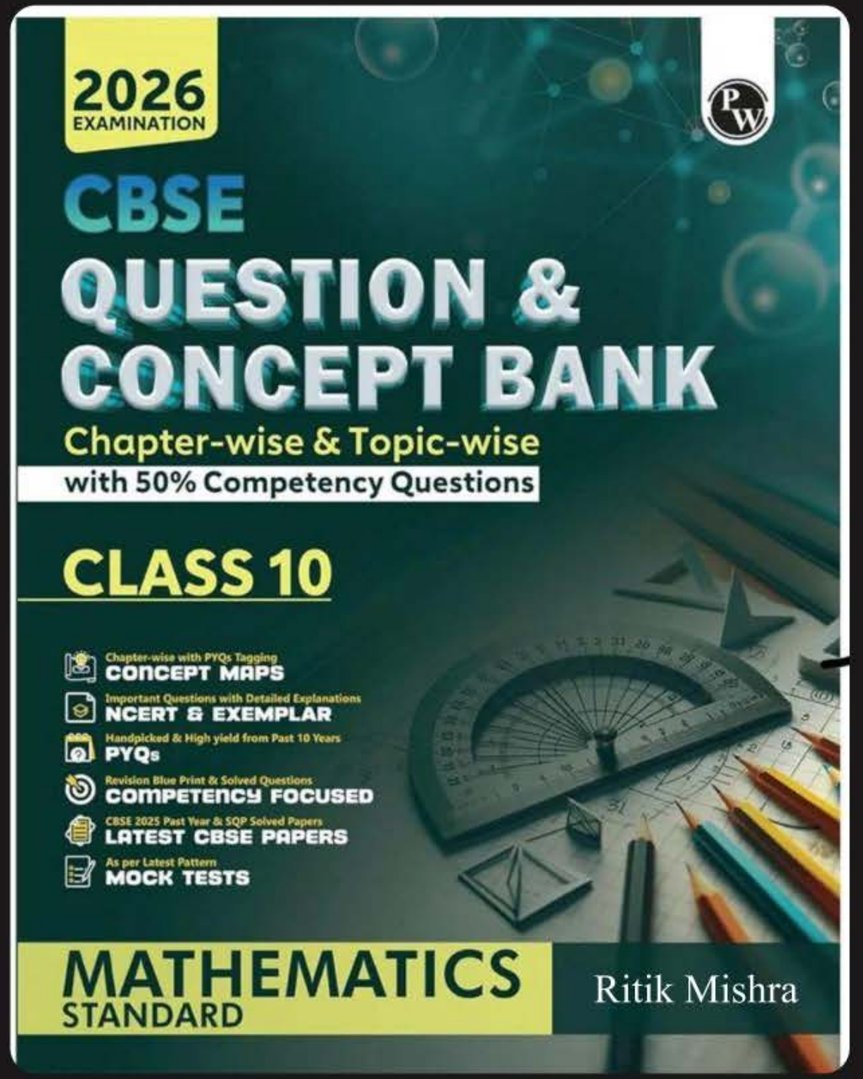
$$T + 1 = \frac{24}{18 - x} \quad (1)$$

$$T = \frac{24}{18 + x} \quad (2)$$

Ans. 6 km/h


Wedding in other countries:
Invite:200
Attends:170
Gifts:160
Wedding in India:
Invite:200
Attends:400
Gifts:45
Missing: 70 Plates, 25 Gifts
10 chairs 💀





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Bhai raat ke 3 baje uski bohot yaad aati hai
2:58 par so jaya kar


WORK HARD
DREAM BIG
NEVER GIVE UP

RITIK SIR

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Thank You