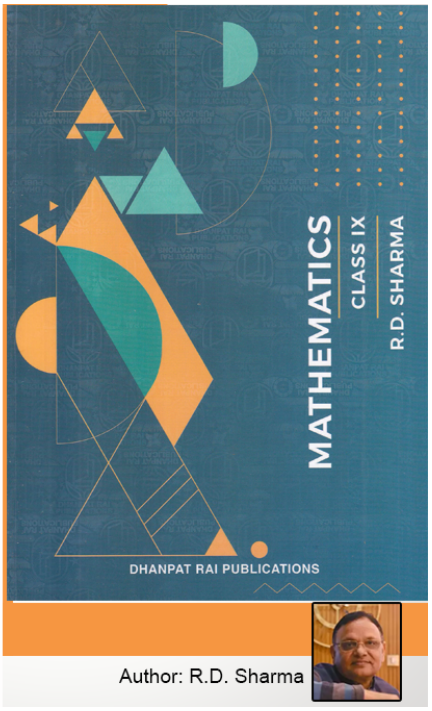
Class 9 - Chapter 9 Triangle and its Angles



RD Sharma Solutions for Class 9 Maths Chapter 9–Triangle and its Angles

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Exercise 9.1 Page No: 9.9

Question 1: In a ΔABC, if $\angle A = 55^0$, $\angle B = 40^0$, find $\angle C$.

Solution:

Given: $\angle A = 55^0$, $\angle B = 40^0$

We know, sum of all angles of a triangle is 180^0

$\angle A + \angle B + \angle C = 180^0$

$55^0 + 40^0 + \angle C = 180^0$

$95^0 + \angle C = 180^0$

$\angle C = 180^0 - 95^0$

$\angle C = 85^0$

Question 2: If the angles of a triangle are in the ratio 1:2:3, determine three angles.

Solution:

Angles of a triangle are in the ratio 1:2:3 (Given)

Let the angles be x, 2x, 3x

Sum of all angles of triangles = 180^0

$x + 2x + 3x = 180^0$

$6x = 180^0$

$x = 180^0/6$

$x = 30^0$

Answer:

$x = 30^0$

$2x = 2(30)^0 = 60^0$

$3x = 3(30)^0 = 90^0$

Question 3: The angles of a triangle are $(x - 40)^0$, $(x - 20)^0$ and $(1/2\ x - 10)^0$. Find the value of x.

Solution:

The angles of a triangle are $(x - 40)^0$, $(x - 20)^0$ and $(1/2\ x - 10)^0$

Sum of all angles of triangle = 180^0

$(x - 40)^0 + (x - 20)^0 + (1/2\ x - 10)^0 = 180^0$

$5/2\ x - 70^0 = 1800$

$5/2\ x = 180^0 + 70^0$

$5x = 2(250)^0$

$x = 500^0/5$

$x = 100^0$

Question 4: The angles of a triangle are arranged in ascending order of magnitude. If the difference between two consecutive angles is 10^0, find the three angles.

Solution:

The difference between two consecutive angles is 10^0 (given)

Let x, $x + 10^0$, $x + 20^0$ be the consecutive angles

$x + x + 10^0 + x + 20^0 = 180^0$

$3x + 30^0 = 180^0$

$3x = 180^0 - 30^0$

$3x = 150^0$

or $x = 50^0$

Again,

$x + 10^0 = 50^0 + 10^0 = 60^0$

$x+20^0 = 50^0 + 20^0 = 70^0$

Answer: Three angles are 50^0,60^0 and 70^0.

Question 5: Two angles of a triangle are equal and the third angle is greater than each of those angles by 30^0. Determine all the angles of the triangle.

Solution:

Two angles of a triangle are equal and the third angle is greater than each of those angles by 30^0. (Given)

Let x, x, $x + 30^0$ be the angles of a triangle.

Sum of all angles in a triangle = 180^0

$x + x + x + 30^0 = 180^0$

$3x + 30^0 = 180^0$

$3x = 150^0$

or $x = 50^0$

And $x + 30^0 = 50^0 + 30^0 = 80^0$

Answer: Three angles are 50^0, 50^0 and 80^0.

Question 6: If one angle of a triangle is equal to the sum of the other two, show that the triangle is a right angle triangle.

Solution:

One angle of a triangle is equal to the sum of the other two angles (given)

To Prove: One of the angles is 90^0

Let x, y and z are three angles of a triangle, where

$z = x + y$ …(1)

Sum of all angles of a triangle = 180^0

$x + y + z = 180^0$

$z + z = 180^0$ (Using equation (1))

$2z = 180^0$

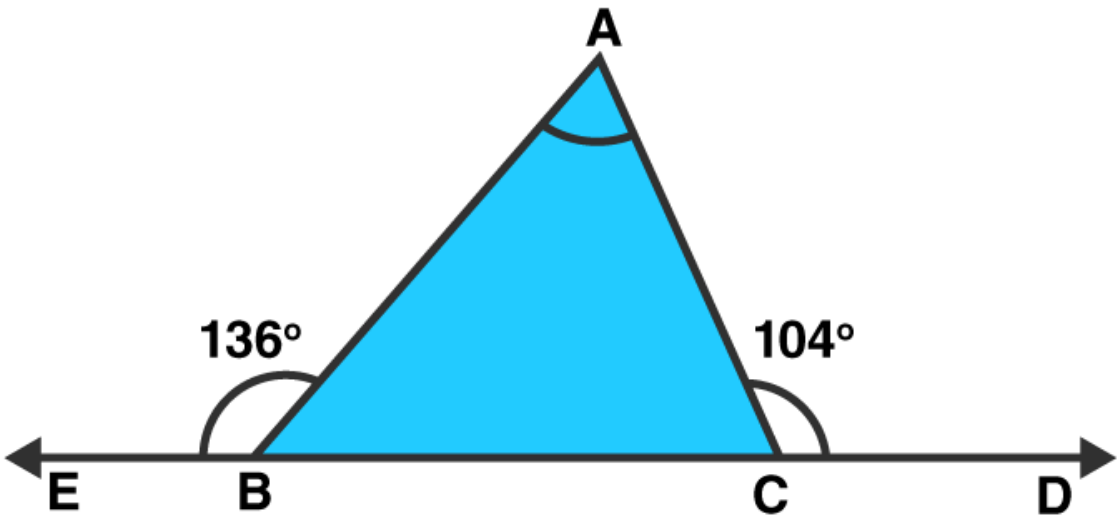
$z = 90^0$ (Proved)

Therefore, triangle is a right angled triangle.

Exercise 9.2 Page No: 9.18

Question 1: The exterior angles, obtained on producing the base of a triangle both ways are 104^0 and 136^0. Find all the angles of the triangle.

Solution:



∠ACD = ∠ABC + ∠BAC [Exterior angle property]

Find ∠ABC:

∠ABC + ∠ABE = 180^0 [Linear pair]

∠ABC + 136^0 = 180^0

∠ABC = 44^0

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Find ∠ACB:

∠ACB + ∠ACD = 180^0 [Linear pair]

∠ACB + 104^0 = 180^0

∠ACB = 76^0

Now,

Sum of all angles of a triangle = 180^0

∠A + 44^0 + 76^0 = 180^0

∠A = $180^0 - 44^0 - 76^0$

∠ A = 60^0

Answer: Angles of a triangle are ∠ A = 60^0, ∠B = 44^0 and ∠C = 76^0

Question 2: In a △ABC, the internal bisectors of ∠B and ∠C meet at P and the external bisectors of ∠B and ∠C meet at Q. Prove that ∠BPC + ∠BQC = 180^0.

Solution:

In triangle ABC,

BP and CP are internal bisector of ∠B and ∠C respectively

=> External ∠B = 180^o – ∠B

BQ and CQ are external bisector of ∠B and ∠C respectively.

=> External ∠C = 180^o – ∠C

In triangle BPC,

∠BPC + 1/2∠B + 1/2∠C = 180^o

∠BPC = 180^o – 1/2(∠B + ∠C) …. (1)

In triangle BQC,

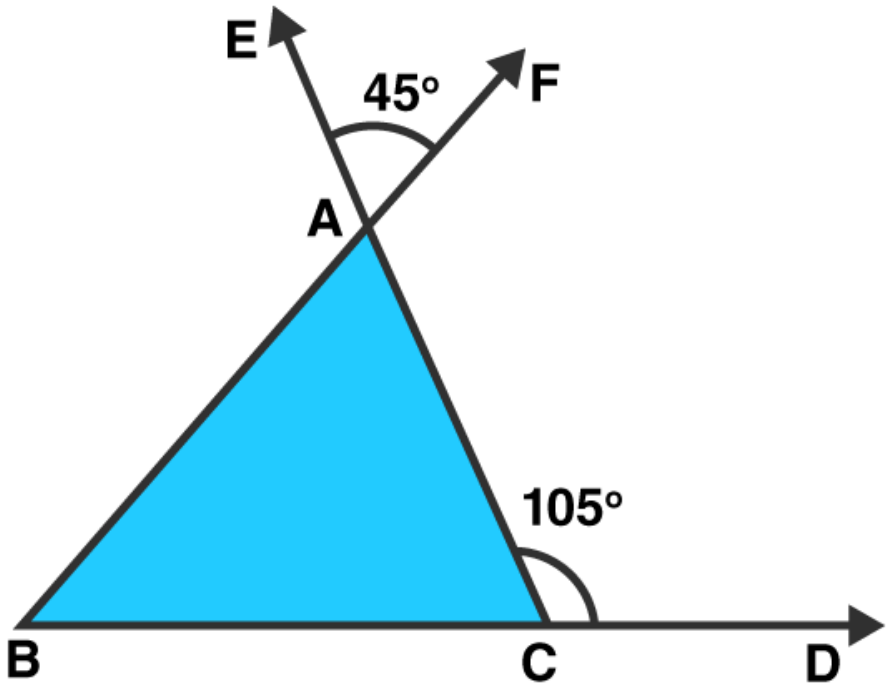
∠BQC + 1/2(180^o – ∠B) + 1/2(180^o – ∠C) = 180^o

$\angle BQC + 180^\circ - 1/2(\angle B + \angle C) = 180^\circ$

$\angle BPC + \angle BQC = 180^\circ$ [Using (1)]

Hence Proved.

Question 3: In figure, the sides BC, CA and AB of a △ABC have been produced to D, E and F respectively. If $\angle ACD = 105^0$ and $\angle EAF = 45^0$, find all the angles of the △ABC.



Solution:

$\angle BAC = \angle EAF = 45^0$ [Vertically opposite angles]

$\angle ACD = 180^0 - 105^0 = 75^0$ [Linear pair]

$\angle ABC = 105^0 - 45^0 = 60^0$ [Exterior angle property]

Question 4: Compute the value of x in each of the following figures:

(i)

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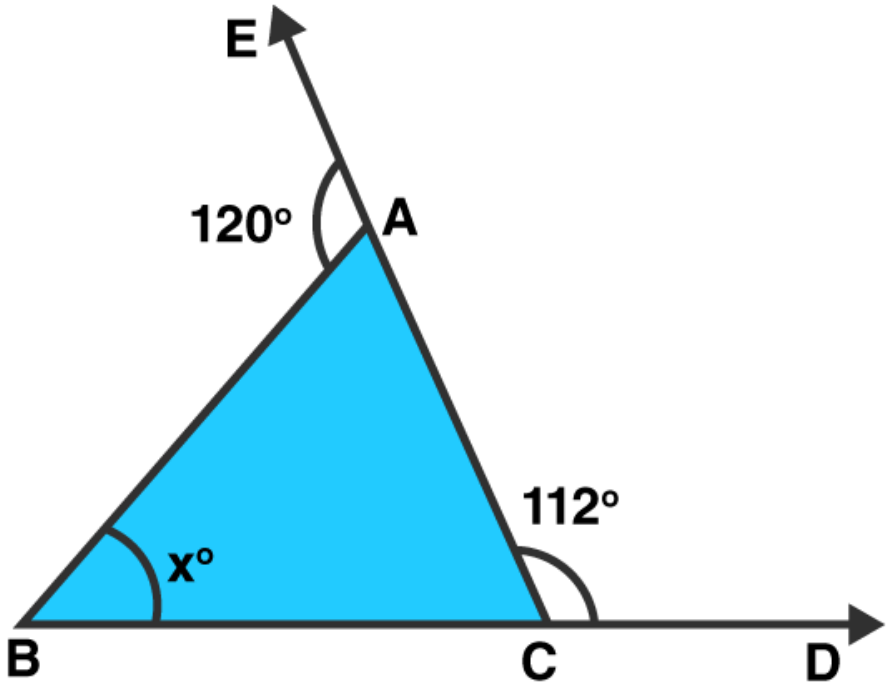


Solution:

$\angle BAC = 180^0 - 120^0 = 60^0$ [Linear pair]

$\angle ACB = 180^0 - 112^0 = 68^0$ [Linear pair]

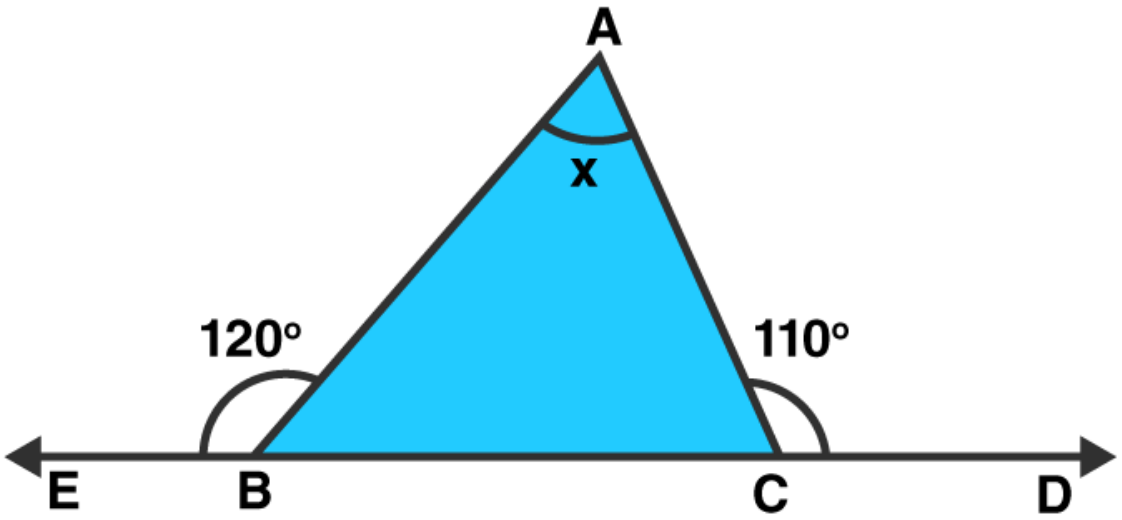
Sum of all angles of a triangle = 180^0

$x = 180^0 - \angle BAC - \angle ACB$

$= 180^0 - 60^0 - 68^0 = 52^0$

Answer: $x = 52^0$

(ii)



Solution:

$\angle ABC = 180^0 - 120^0 = 60^0$ [Linear pair]

$\angle ACB = 180^0 - 110^0 = 70^0$ [Linear pair]

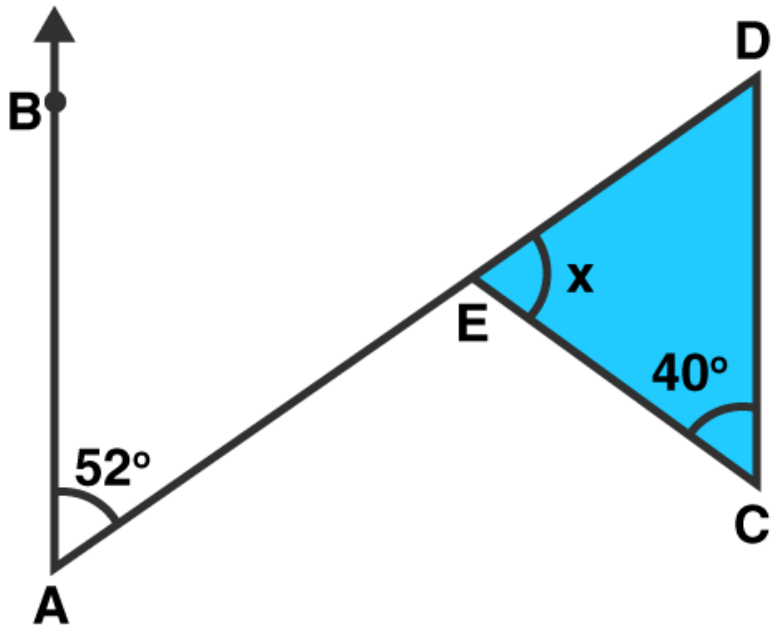
Sum of all angles of a triangle = 180^0

$x = \angle BAC = 180^0 - \angle ABC - \angle ACB$

$= 180^0 - 60^0 - 70^0 = 50^0$

Answer: $x = 50^0$

(iii)



Solution:

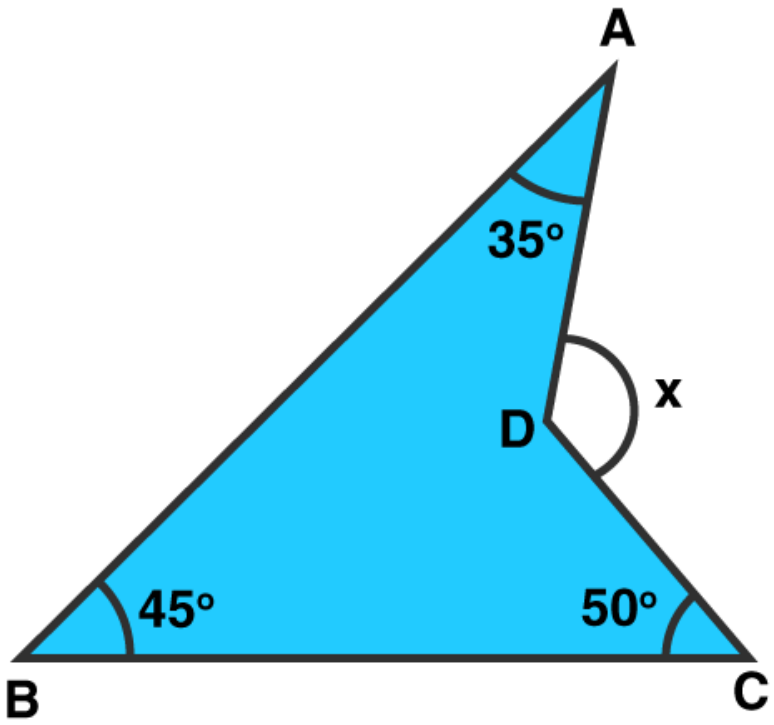
$\angle BAE = \angle EDC = 52^0$ [Alternate angles]

Sum of all angles of a triangle = 180^0

$x = 180^0 – 40^0 – 52^0 = 180^0 – 92^0 = 88^0$

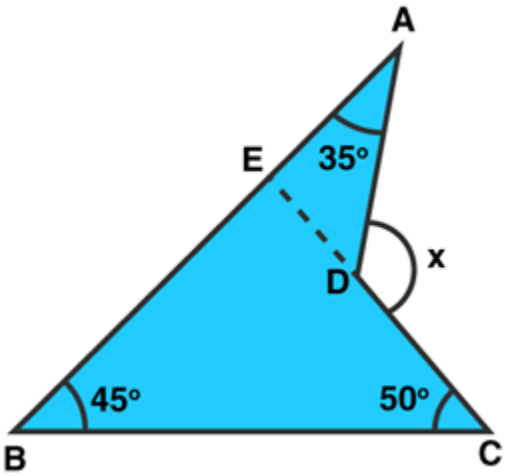
Answer: $x = 88^0$

(iv)



Solution:

CD is produced to meet AB at E.



$\angle BEC = 180^0 - 45^0 - 50^0 = 85^0$ [Sum of all angles of a triangle = 180^0]

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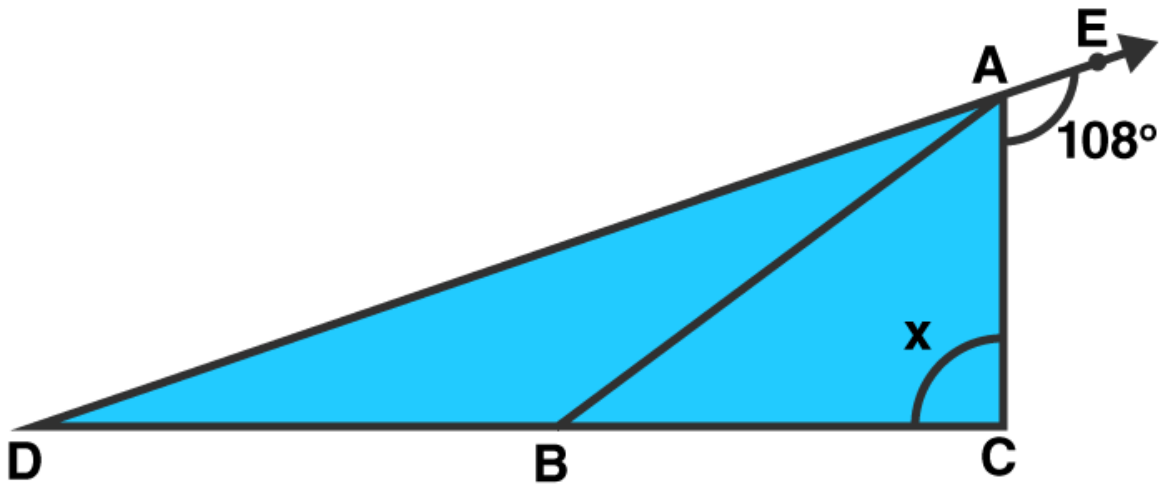
$\angle AEC = 180^0 - 85^0 = 95^0$ [Linear Pair]

Now, $x = 95^0 + 35^0 = 130^0$ [Exterior angle Property]

Answer: $x = 130^0$

Question 5: In figure, AB divides ∠DAC in the ratio 1 : 3 and AB = DB. Determine the value of x.



Solution:

∠DAC=180°−108°=72°

∠BAC/∠DAB=1/3∠DAB=3∠BAC∠BAC+∠DAB=∠DAC=72°We can write it as∠BAC+3∠BAC=72°4∠BAC=72°∠BAC=72/4=18°So we get∠DAB=3×18°=54°∠DAB=∠BDA=54°(AB=DB)∠ABD=180°−(54°+54°)=180−108°=72°Now, ∠DBA=72°=∠BAC+x (Exterior angle)So we getx=72°−18°=54°

Exercise VSAQs Page No: 9.21

Question 1: Define a triangle.

Solution: Triangle is a three-sided polygon that consists of three edges and three vertices. The most important property of a triangle is that the sum of the internal angles of a triangle is equal to 180 degrees.

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Question 2: Write the sum of the angles of an obtuse triangle.

Solution: The sum of angles of obtuse triangle = 180°.

Question 3: In △ABC, if ∠B = 60^0, ∠C = 80^0 and the bisectors of angles ∠ABC and ∠ACB meet at point O, then find the measure of ∠BOC.

Solution:

∠B = 60^0, ∠C = 80^0 (given)

As per question:

∠OBC = $60^0/2 = 30^0$ and

∠OCB = $80^0/2 = 40^0$

In triangle BOC,

∠OBC + ∠OCB + ∠BOC = 180 ^{0}[Sum of angles of a triangle = 180^0]

$30^0 + 40^0$ + ∠BOC = 180^0

∠BOC = 110^0

Question 4: If the angles of a triangle are in the ratio 2:1:3, then find the measure of smallest angle.

Solution:

Let angles of a triangles are 2x, x and 3x, where x is the smallest angle.

To find: measure of x.

As, Sum of angles of a triangle = 180^0

$2x + x + 3x = 180^0$

$6x = 180^0$

$x = 30^0$. Answer

Question 5: If the angles A, B and C of △ABC satisfy the relation B – A = C – B, then find the measure of ∠B.

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Solution:

Sum of angles of a triangle = 180^0

$A + B + C = 180^0$ …(1)

$B – A = C – B$ …(Given)

$2B = C + A$ …(2)

(1) => $2B + B = 180^0$

$3B = 180^0$

Or $B = 60^0$

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- Chapter 3–Rationalisation
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- Chapter 5–Factorization of Algebraic Expressions
- Chapter 6–Factorization Of Polynomials
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About RD Sharma

RD Sharma i*sn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many* CBSE *students lose their dread of* maths. *Sunday Times profiles the tutor turned internet star*

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.