| **Script Code** | v22cb09ma0805 |
| --- | --- |
| **Screenplay Status** | TL Review |
| **Title** | Properties of Parallelograms (III) |
| **Grade** | 9 |
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| **Final Sign-off** | [Vishnu Dev](mailto:vishnu.dev@narayanagroup.com) |
| **Mini Takeaway** | If in a quadrilateral each pair of opposite angles is equal, then it is a parallelogram. |
| **Key Takeaway** | Properties of Parallelogram (III) |
| **Research Doc.** | [Link](https://docs.google.com/document/d/1mLVXJotDMS9zFhEGMv0v367YeX-XqrgXdvE0ogEr8GI/edit#) |
| **Pitch Doc.** | [Link](https://docs.google.com/document/d/1t1Z18dRYZJ8FMqV0uJHmKxyszLWc6I3tzH7svLlyeaY/edit) |
| **Word Count** |  |
| **Presenter** | [Aashay Chandrakant Mane](mailto:aashay.mane@narayanagroup.com) |
| **Characters** | Presenter |
| **Locations** | STUDIO |
| **Presenter Outfit** | Smart Casual |
|
| **Props** | Not required |
| **Sub strand** | Geometry III |

**INSERT TITLE CARD:** ‘Properties of Parallelogram III’([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_208))

**INSERT ENDS**

**INT. STUDIO - AFTERNOON**

PRESENTER enters the frame and turns to the viewers breaking the fourth wall.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g2415a5cbdd8_0_84))

PRESENTER

Hey everyone! I’ve come across a really interesting interactive platform.

(beat)

Yesterday my nephew was playing with an app on geometry.

**Screen split:(**[**ref**](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_0)**)**

**Left side:** A quadrilateral appears beside the presenter and the figure starts to move with its edges as we highlight its opposite pair of angles.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_10))

**Right side:** Presenter points to his right.

PRESENTER

He chose a quadrilateral and he tried to keep each pair of opposite angles equal.

**Left side:** The title “Parallelogram” appears over the figure with the pair of opposite angles highlighted.

**Right side:** Presenter points to his right.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_24))

PRESENTER

Interestingly the figure formed looks like a parallelogram.

**Transition to presenter in the whole frame.**([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_128))

PRESENTER

Wondering how?

On cue with “Well that is one of the properties …” highlight angle A and angle C as the first pair and, angle B and angle D as the second pair,

Then add the label “Parallelogram".([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_141))

PRESENTER

Well that is one of the properties of parallelograms.

(beat)

If in a quadrilateral, each pair of opposite angles is equal then it is a parallelogram.

(beat)

Let’s understand this together with its proof.

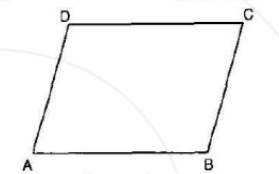
**FSA(Section card): “**If in a quadrilateral, each pair of opposite angles is equal, then it is a parallelogram.” ([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g22d781e7ea1_0_0))

**FSA ENDS.**

**INSERT MoG:**

On cue with “We are given…” add the following figure and the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_69))

**Given:** ABCD is a quadrilateral



PRESENTER

We are given a quadrilateral ABCD,

whose each pair of opposite angles is equal.

On cue with “Which means…” highlight both the pair of angles, angle A and angle C, and then angle B and angle D.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_157))

∠A = ∠C,

∠B = ∠D

PRESENTER

Which means angle A is equal to angle C

(beat)

And angle B is equal to angle D.

On cue with “And we have to prove…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_77))

**To prove:** ABCD is a parallelogram

i.e., AB || DC

BC || DA

PRESENTER

And we have to prove that ABCD is a parallelogram,

(beat)

by proving that its two pairs of opposite sides are parallel.

(beat)

That is, side AB is parallel to side DC,and side BC is parallel to side DA.

**INSERT ENDS.**

**FSA:** On cue with “So let’s start…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_105))

**Proof:**

PRESENTER(V.O.)

So let’s start with the proof,

On cue with “It’s given to us…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_105))

∠A = ∠C **(Given)------ (1)**

∠B = ∠D **(Given)------ (2)**

PRESENTER(V.O.)

It’s given to us that angle A is equal to angle C,

(beat)

Let’s consider this as equation one,

(beat)

We are also given that angle B is equal to angle D.

(beat)

We will consider this as equation two.

On cue with “We will get…” add the following text and on cue with “Let’s consider this…” mark it as “(3)” as shown below.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_114))

∠A = ∠C **(Given)------ (1)**

∠B = ∠D **(Given)------ (2)**

Adding eq.(1) and eq.(2)

**∠A + ∠B = ∠C + ∠D……………………………….(3)**

PRESENTER(V.O.)

Now let’s add equation one and equation two.

(beat)

We will get, angle A plus angle B equals angle C plus angle D.

Let’s consider this equation three.

On cue with “We know that the sum…” add the following TOS and on cue with “So angle A plus…” add the following text, and on cue with.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_166))

**∠A + ∠B + ∠C + ∠D = 360°**

PRESENTER(V.O.)

We know that the sum of all angles in a quadrilateral is equal to three hundred sixty degrees.

(beat)

So angle A plus angle B plus angle C plus angle D is equal to three hundred sixty degrees.

**TOS:**

The sum of all angles in a quadrilateral is 360°.

On cue with “Now using equation…” highlight equation (3),

And on cue with “We will replace angle…” replace “∠C + ∠D” with “∠A + ∠B”.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_124))

**∠A + ∠B + ∠A + ∠B = 360° [From Eq. (3)]**

PRESENTER(V.O.)

Now using equation three.

(beat)

We will replace angle C plus angle D with angle A plus angle B

(beat)

On doing so, we get angle A plus angle B plus,

(beat)

angle A plus angle B equal to three hundred sixty degrees.

On cue with “This can be simplified further as…” add the following text. ([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_146))

**2∠A + 2∠B = 360°**

PRESENTER(V.O.)

This can be simplified further as twice of angle A plus twice of angle B equal to three hundred sixty degrees.

on cue with “Or we can write this…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_158))

**2(∠A + ∠B) = 360°**

PRESENTER(V.O.)

Or we can write this as twice the sum of angle A and angle B equal to three hundred sixty degrees.

On cue with “This gives us…” add the following text and on cue with “And when a transversal…” add the following TOS.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_171))

**∠A + ∠B = 180° ……………(4)**

PRESENTER(V.O.)

This gives us angle A plus angle B equal to one hundred eighty degrees and consider this equation 4.

On cue with “Thus, AB is a…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_185))

**AB is a transversal**

PRESENTER(V.O.)

Also the line AB intersects sides AD and BC at two points A and B respectively.

(beat)

Thus, AB is a transversal.

On cue with “Now observe angle A…” highlight angle A and B and then add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24322a334ea_0_179))

**∠A + ∠B = 180° [Sum of interior angles]**

PRESENTER(V.O.)

Now observe angle A and angle B

(beat)

They are nothing but interior angles lying on the same side of the transversal and from equation four, their sum is 180 degrees, that is, angle A and angle B are supplementary angles.

On cue with “We know that,…” add the following TOS and on cue with “Therefore, side…” add the following Text([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_200))

**AD || BC……………(5)**

PRESENTER(V.O.)

We know that, when a transversal cuts two lines, such that pairs of interior angles on the same side of the transversal are supplementary, the lines have to be parallel.[[G7 Ch06](https://drive.google.com/file/d/11fqqvSx5sGSPKcXUauTy3uvHJbUNnHV8/view?usp=share_link)]

(beat)

Therefore, side AD is parallel to side BC,

Consider it as equation five.

**TOS:**

When a transversal cuts two lines, such that pairs of interior angles on the same side of the transversal are supplementary, the lines have to be parallel.

On cue with “Again, consider equation four…” highlight equation (4) and add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_331))

**Again, ∠A + ∠B = 180°…..(4)**

∠A = ∠C **------ (1)**

PRESENTER(V.O.)

Again, consider equation four, angle A plus angle B is equal to one hundred eighty degrees,

(beat)

And we know that angle A is equal to angle C from equation 1

On cue with “This implies,…” add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_347))

**∠C + ∠B = 180°**

PRESENTER(V.O.)

This implies, substituting equation 1 in equation four, we get angle C plus angle B is equal to one hundred eighty degrees.

On cue with “Now observe these angles…” highlight angle B and angle C. and add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g24167156efc_0_4))

**∠C + ∠B = 180° [Interior angle]**

**BC is a transversal**

PRESENTER(V.O.)

Now observe these angles

(beat)

They are nothing but interior angles lying on the same side of the transversal BC

and their sum is 180 degrees, that is, angle C and angle B are supplementary angles.

On cue with “Hence we can say that…” highlight the side AD and BC and add the following Text and TOS.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_248))

**⇒ AB || DC…………………(6)**

PRESENTER(V.O.)

Hence we can say that side AB is parallel to side DC.

Let’s consider this as equation six.

**TOS:**

When a transversal cuts two lines, such that pairs of interior angles on the same side of the transversal are supplementary, the lines have to be parallel.

On cue with “Now from both equations…” highlight both the equation five and six and add the following text.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_265))

**ABCD is a parallelogram.**

PRESENTER(V.O.)

Now from both equations five and six, we can say that two pairs of opposite sides are parallel to each other.

(beat)

Which proves that ABCD is a parallelogram.

On cue with “Hence we can…” add the following TOS.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g23b4591157b_1_382))

PRESENTER(V.O.)

Hence we can say that, If in a quadrilateral, each pair of opposite angles is equal, then it’s a parallelogram.

**TOS:**

**Theorem:**If in a quadrilateral, each pair of opposite angles is equal, then it is a parallelogram.

**FSA ENDS.**

On cue with “Now have a look at this…” add the following figure beside the presenter.([ref](https://docs.google.com/presentation/d/1ZapU5iVY_f29V_UNYlnwwYhhpMctw7z1230IZqu3GDs/edit#slide=id.g22d781e7ea1_0_13))

PRESENTER

And this concludes all for this video,

Now have a look at this parallelogram,

(beat)

Observe the diagonals AC and BD.

(beat)

Do they bisect each other at point ‘O’?

(beat)

To know about this, Watch our next video.