



MATH WITH MR DJ

GRADE 8 • GEOMETRY

ANGLES IN TRIANGLES AND PARALLEL LINES

Today's goal: I can use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.



Tan



Digit



Blaze



Pi



The one fact

- 1 Parallel lines cut by a transversal: **ALTERNATE** angles are equal.

TURN & TALK

Everything else today comes from this plus “angles on a straight line make 180”.



WATCH OUT!

Angle sum, built not told

- 1 Draw a line through the apex, parallel to the base.
- 2 The two outer angles equal the base angles — alternate angles.
- 3 All three sit on a straight line.

DON'T FALL FOR IT

So the triangle's angles make 180° . That is an argument, not a rule.



BIG IDEA 2

The exterior angle

- 1 Exterior + its neighbour = 180.
- 2 The three interior angles = 180.
- 3 Subtract the same thing from both.

REMEMBER

Exterior = the two OPPOSITE interior angles added. Not the neighbour.



BIG IDEA 3

Three named pairs

- 1 Alternate: equal.
- 2 Corresponding: equal.
- 3 Co-interior: add to 180.

REMEMBER

Two are equal. One is not. That is why the third gets it wrong.



BIG IDEA 4

Rebuild the odd one out

- 1 Co-interior sits on a straight line with the alternate angle.
- 2 Alternate = 65, so co-interior = $180 - 65 = 115$.

REMEMBER

Never recall which pair is which. Derive it in one step.



BIG IDEA 5

Angle-angle gives SIMILAR

- 1 Two angles equal $\Rightarrow$ the third is too, since they make 180.
- 2 Same angles fix the SHAPE. Nothing fixes the size.

REMEMBER

50-60-70 could be a 3-4-5 triangle or a 9-12-15 one. Similar, not congruent.



Something went wrong here...

THE PROBLEM

Name the three pairs of angles made when parallel lines are cut by a transversal, and say what is true of each.

WHAT A STUDENT DID

Said all three are equal. Two out of three being equal is what makes this error reasonable.

YOUR MISSION

What went wrong? What's the right answer?



Name the three pairs of angles made when parallel lines are cut by a transversal, and say what is true of each.

1 Two of the three are equal pairs.

2 Co-interior is the exception, and it is the one worth deriving rather than recalling.

Answer:

alternate — equal; corresponding — equal; co-interior — supplementary



Pick your pepper!

**MILD**

A triangle has angles 35° and 85° . Find the third angle.

#1 on your practice sheet

**MEDIUM**

A transversal makes 40° with two parallel lines. Give the alternate, corresponding and co-interior angles.

#2 on your practice sheet

**SPICY**

Explain, using a line drawn parallel to one side, why a triangle's angles add to 180° .

#4 on your practice sheet

How's it going?



3 • Got it!

I could teach it



2 • Almost

One more example, please



1 • Not yet

I need some help



MATH WITH MR DJ

NOW YOU!

Practice sheet: everyone does Mild & Medium, then climb the peppers.

Stuck? Look back at Mr DJ's example at the top of the sheet.

Need it again? Watch "Angles and Parallel Lines Explained Step by Step" on YouTube @MathWithMrDJ

Brain break: 3 new daily puzzles at puzzles.mathwithmrdj.com

