

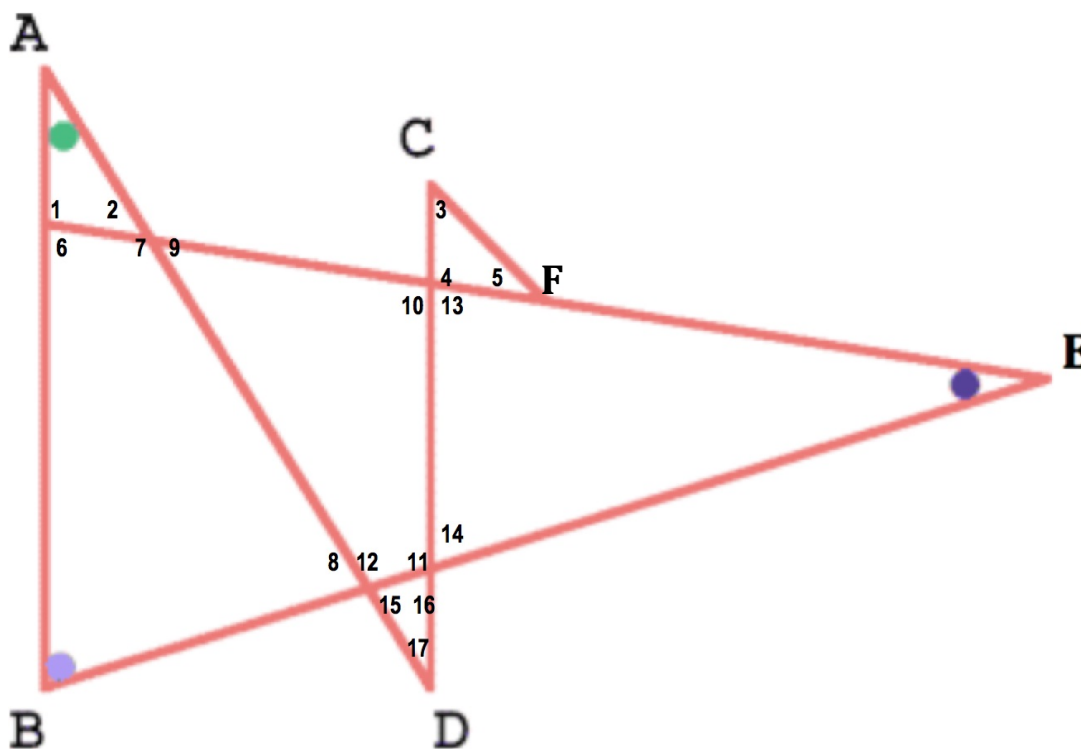
Title: RATTY (Grades 7 to 9)

RATTY

If you know the sizes of the angles marked with coloured dots in the diagram which angles can you find by calculation? Explain your reasoning.

If you also know that AB and CD are parallel which angles can you find?

What extra information do you need to find all the numbered angles?



Solution

$$\angle 6 = 180 - (B + E)$$

$$\angle 1 = B + E$$

$$\angle 2 = 180 - (A + B + E)$$

$$\angle 8 = 180 - (A + B)$$

$$\angle 12 = A + B$$

$$\angle 15 = \angle 8 = 180 - (A + B)$$

$$\angle 7 = 360 - (B + 6 + 8) = A + B + E$$

$$\angle 9 = 180 - (A + B + E)$$

Angles of Δ add to 180°

Adjacent angles on a straight line add to 180°

Angles of Δ add to 180°

Angles of Δ add to 180°

Adjacent angles on a straight line add to 180°

Vertically opposite angles

Angles in a quadrilateral add to 360°

Adjacent angles on a straight line add to 180°

If we know that AB and CD are parallel then

$$\angle 17 = A$$

Alternate angles

$$\angle 16 = B$$

Alternate angles

$$\angle 11 = 180 - \angle 8 = A + B$$

Adjacent angles on a straight line add to 180°

$$\angle 14 = \angle 16 = B$$

Vertically opposite angles

$$\angle 13 = \angle 6 = 180 - (B + E)$$

Corresponding angles

$$\angle 10 = 180 - \angle 6 = B + E$$

Adjacent angles on a straight line add to 180°

$$\angle 4 = \angle 1 = B + E$$

Adjacent angles on a straight line add to 180°

If we also know that AD and CF are parallel then

$$\angle 3 = \angle 17 = A$$

Alternate angles

$$\angle 5 = \angle 2 = 180 - (A + B + E)$$

Angles of Δ add to 180°

Notes for teachers

Why do this activity?

This activity focuses on using the properties of triangles and quadrilaterals, and of parallel lines, to find unknown angles without the distraction of actually doing the calculations so that they concentrate on the geometry. It gives them practice in the skill of looking at the whole diagram and deciding the order in which to find the unknowns and what facts they need to use.

Possible approach

Show the Ratty diagram to the class either by drawing it on the board or by making copies of the question as given above. You could refer to the rat and his tail, eye, toes and ear to locate parts of the diagram. To review what the learners know and remember you could ask how they would find certain angles, and write this down on the board, and then ask them to record in a similar way how they would find the remaining angles.

Later, when most of the learners have had time to do this, you can lead a plenary in which the learners explain how they would find each angle and you emphasise the way you want them to record this. In this way you can base your explanations on what the learners have experienced and summarize what they have learned.

Key Questions

What do you know about the angles of a triangle?

What do you know about adjacent angles on a straight line?

What do you know about the angles of a quadrilateral?

What do you know about those two angles?

If you know those two lines are parallel can you find a pair of alternate angles?

If you know those two lines are parallel can you find a pair of corresponding angles?

If you know those two lines are parallel what can you say about those two angles?

Possible Extension

Learners who finish this activity ahead of the class can be asked to draw a diagram and make up a similar question then to write out a solution.

Possible Support

To help learners to make progress with this task you could give them the order in which they could find the angles.