LESSON MAKER PRO

Angles at the Crossing

Find unknown angles where lines meet.

HIGH SCHOOL · GDA.GM.H.31.a

GDA.GM.H.31.a "Investigate, prove, and apply theorems about lines and angles, including but not limited to: vertical angles are congruent; when a transversal crosses parallel lines..."

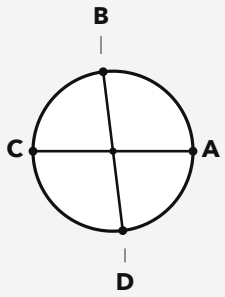
NAME _____ DATE _____

VERTICAL ANGLES

When two straight lines cross, opposite angles are vertical angles. Vertical angles have equal measures, so you can set their expressions equal and solve.

WORKED EXAMPLE

In the figure, $\angle AOB = (7x + 13)°$ and $\angle COD = 97°$. Find x.



1. The angles are vertical, so $7x + 13 = 97$.
2. Subtract 13: $7x = 84$.
3. Divide by 7: $x = 12$.

Answer: x = 12

PRACTICE 4 problems

1 Two vertical angles measure (4x + 8)° and 72°. Find x.

ANSWER _____

2 Two vertical angles measure (5x - 9)° and 76°. Find x.

ANSWER _____

3 Two vertical angles measure (2x + 15)° and (x + 39)°. Find x and their measure.

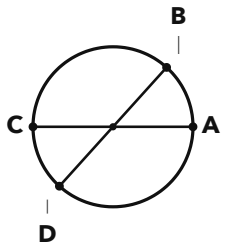
ANSWER _____

4 Two vertical angles measure (6x - 4)° and (3x + 35)°. Find x and their measure.

ANSWER _____

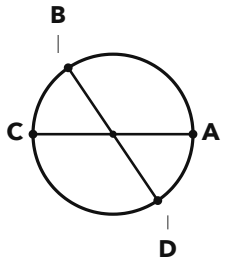
APPLY IT Show your work

1 At a round skate park, two paths cross as shown. If ∠AOB = 48°, find ∠COD.



ANSWER _____

2 Two light strips cross at the center of a round concert stage. If ∠BOC = (2x + 20)° and ∠DOA = (4x - 16)°, find x.



ANSWER _____

CHALLENGE One step up

Two vertical angles measure (5x + 10)° and (8x - 44)°. Find x and both angle measures. Explain why the measures match.

WORK SPACE AND ANSWER

ANSWER KEY

Angles at the Crossing

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Two vertical angles measure (4x + 8)° and 72°. Find x.	**x = 16**
2	Two vertical angles measure (5x - 9)° and 76°. Find x.	**x = 17**
3	Two vertical angles measure (2x + 15)° and (x + 39)°. Find x and their measure.	**x = 24; each angle measures 63°.**
4	Two vertical angles measure (6x - 4)° and (3x + 35)°. Find x and their measure.	**x = 13; each angle measures 74°.**

PART 2 · APPLY IT

1. **48°** ∠AOB and ∠COD are vertical angles, so both measure 48°.
2. **x = 18** The angles are vertical, so 2x + 20 = 4x - 16. Solving gives x = 18.

CHALLENGE

x = 18, and each angle measures 100°. They match because vertical angles are congruent.

For the challenge, accept an explanation that opposite angles formed by crossing lines have equal measures.