

SCAVENGER HUNT



PERPENDICULAR LINES AND THEIR ANGLES

Perpendicular Lines: One Mark, Four Right Angles

Complementary or supplementary? · the cards check the answers

FREE

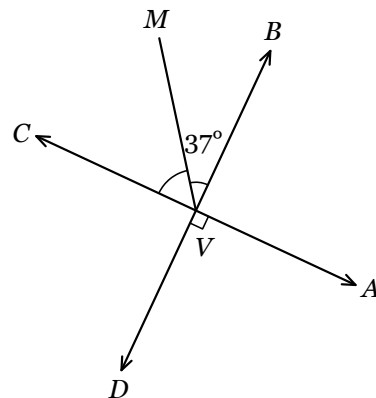
ANSWER

28°

Lines AC and BD cross at V , and $m\angle BVM = 37^\circ$.

Find $m\angle MVC$.

A ray inside a corner splits ninety degrees between the two pieces.



A

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1. **Tape the 16 cards round the room**, in any order. Send each group to a *different* card. Start each group on one of the eight cards on this page: the list is *D J A P G M R C*.
2. **Say this once:** “One small square makes all four angles right angles. Then ask: do my two angles fill a corner, or a straight line? Write every card you visit on your sheet. You are done after eight lines.”
3. **Work out the angle. Find the card with your answer at the top.** You are finished when you get back to the card you started at.

16 cards	pages 3–10, one copy. Two to a sheet — one cut through the stack.
Record sheet	page 11, one per student. It carries the three cases as pictures.
Answers	pages 12–13 — yours. They do not go in the room.

Corner, or straight line? That is the item. On six cards the two angles fill one of the four right angles and add to 90° ; on ten they fill a straight line and add to 180° . **The size of the given number does not tell them which:** ten cards give an acute angle and six of those take 90 while the rest take 180.

And a corner card cannot be started until the right angle has been deduced: the small square is never in the angle the ray is drawn into, so a group has to say *that one is a right angle too*, by one linear pair and one vertical pair.

eight of the 16 cards make the ring, and the other eight are where a wrong answer goes. They do not look any different. A group that takes the given from 90 where it should have come from 180 gets a number that is **at the top of one of those cards**, does the card standing there, and its answer sends them back to the one they got wrong.

The check is the length of their row, and it is the only one you need. A clean run is **eight lines**; every wrong answer costs exactly two more and none can cost fewer. *Count the rows.* What to ask a group going round in circles is not the answer but “*put your finger on your two angles: do they fill a corner, or a straight line?*” — which is what the line at the foot of the card they landed on says too.

Both numbers are in the room. The right answer and the wrong one are each at the top of a card, so a group cannot choose by looking for the number on the wall. **Cards stay on the wall**, and the joke on the record sheet decodes from the numbers a group wrote down.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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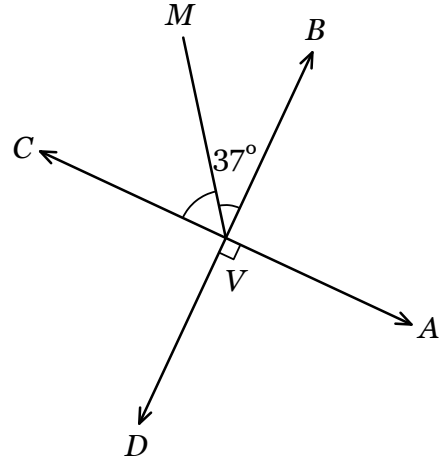
ANSWER

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A

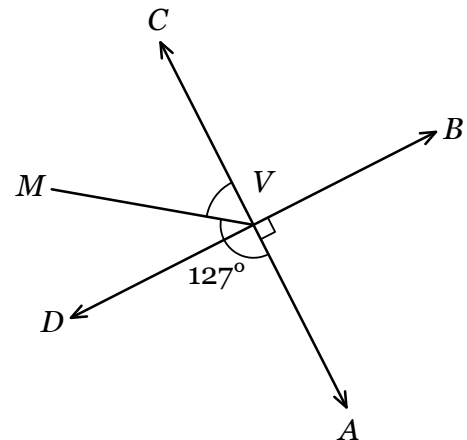
ANSWER

38°

Lines AC and BD cross at V , and $m\angle MVA = 127^\circ$.

Find $m\angle CVM$.

Both arms of the arc on one line? Then the two pieces make 180.



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B

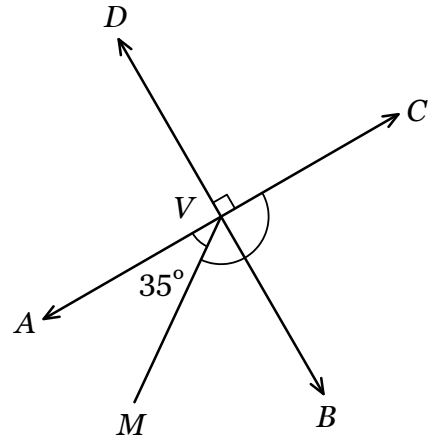
ANSWER

34°

Lines AC and BD cross at V , and $m\angle AVM = 35^\circ$.

Find $m\angle MVC$.

Follow the two arms of the arc before you reach for a number.



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C

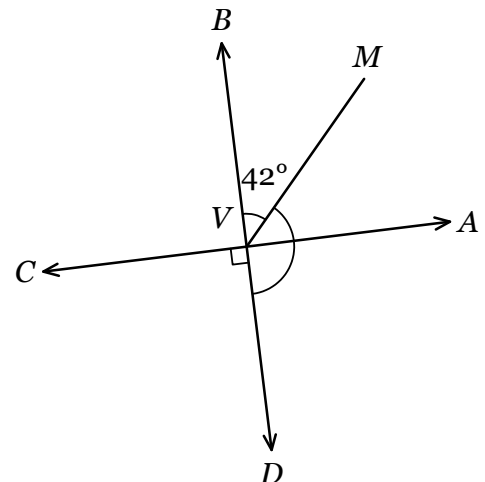
ANSWER

145°

Lines AC and BD cross at V , and $m\angle BVM = 42^\circ$.

Find $m\angle MVD$.

One small square, and all four corners are right angles. Start there.



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D

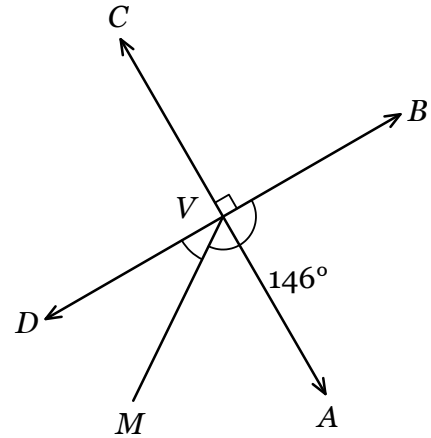
ANSWER

55°

Lines AC and BD cross at V , and $m\angle MVB = 146^\circ$.

Find $m\angle DVM$.

Read where the arc starts and where it ends, and the rule follows.



E

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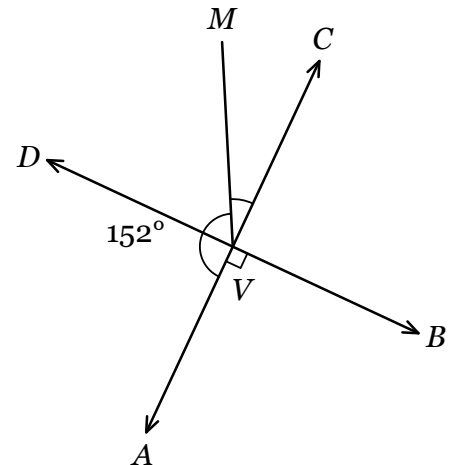
ANSWER

143°

Lines AC and BD cross at V , and $m\angle MVA = 152^\circ$.

Find $m\angle CVM$.

The arc that spans a whole corner and part of the next still lands on a straight line.



F

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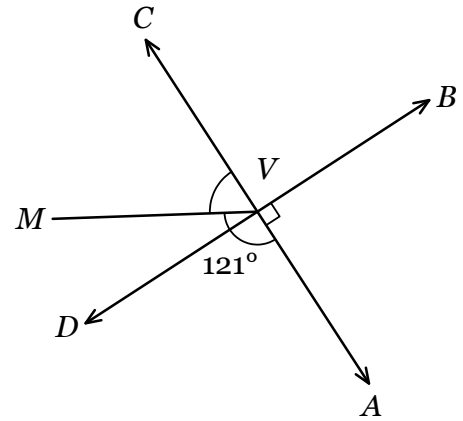
ANSWER

52°

Lines AC and BD cross at V , and $m\angle MVA = 121^\circ$.

Find $m\angle CVM$.

Which two arms does the arc run between?
That settles it, and nothing else does.



G

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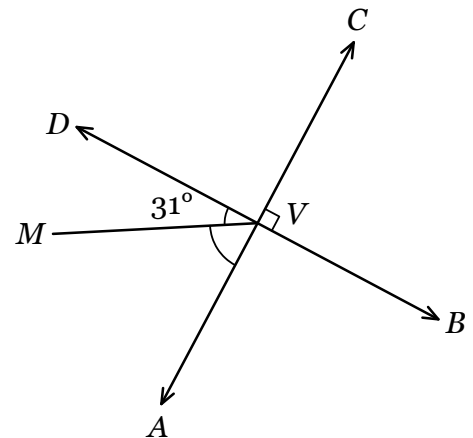
ANSWER

47°

Lines AC and BD cross at V , and $m\angle DVM = 31^\circ$.

Find $m\angle MVA$.

The corner with no square in it is a right angle
as surely as the one with.



H

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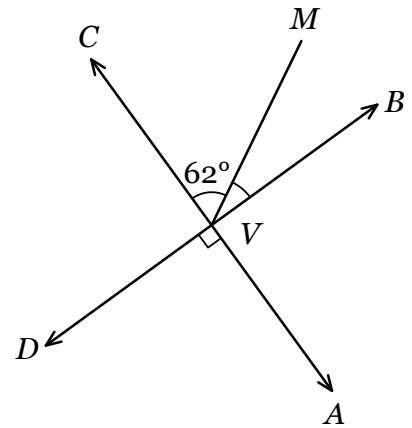
ANSWER

138°

Lines AC and BD cross at V , and $m\angle MVC = 62^\circ$.

Find $m\angle BVM$.

Is the ray drawn inside one of the corners, or taken across a whole line?



J

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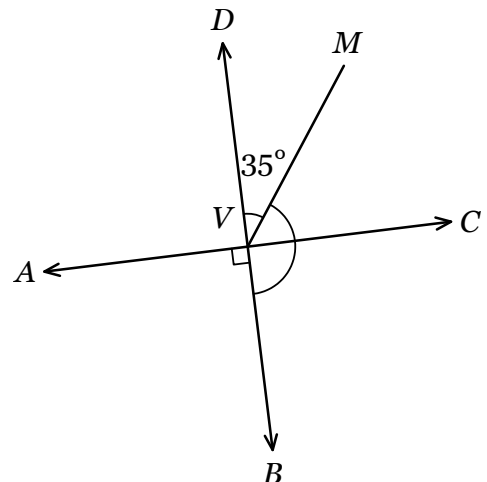
ANSWER

48°

Lines AC and BD cross at V , and $m\angle DVM = 35^\circ$.

Find $m\angle MVB$.

A ray inside a corner takes its answer off ninety, never off 180.



K

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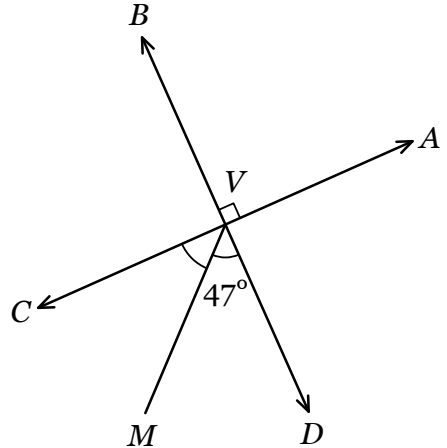
ANSWER

124°

Lines AC and BD cross at V , and $m\angle MVD = 47^\circ$.

Find $m\angle CVM$.

Ninety and 180 are not interchangeable. The arms of the arc choose between them.



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L

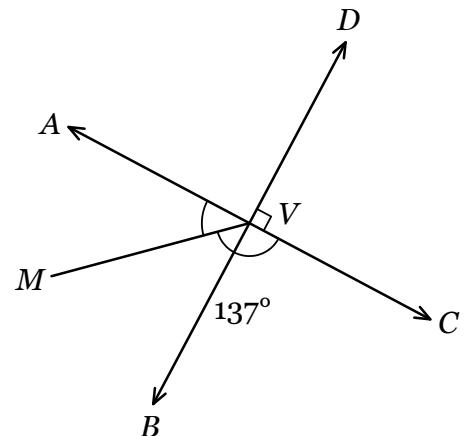
ANSWER

59°

Lines AC and BD cross at V , and $m\angle MVC = 137^\circ$.

Find $m\angle AVM$.

The square is drawn in one corner only. The other three are right angles too.



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M

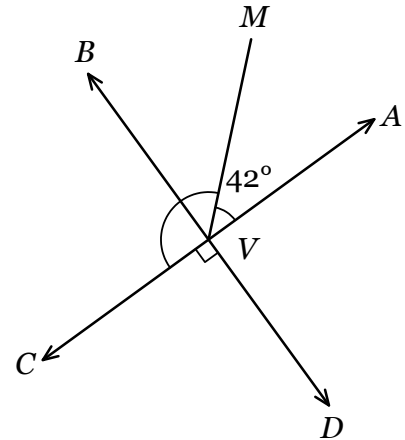
ANSWER

118°

Lines AC and BD cross at V , and $m\angle AVM = 42^\circ$.

Find $m\angle MVC$.

A ray across a line takes its answer off 180, never off ninety.



N

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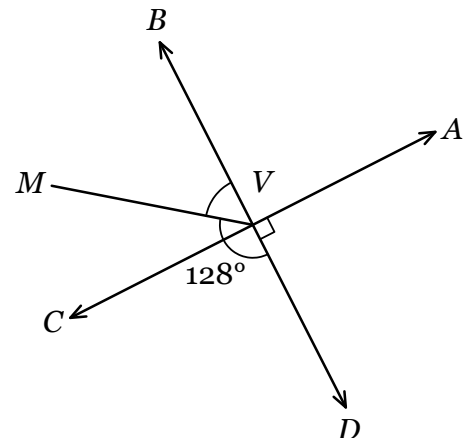
ANSWER

53°

Lines AC and BD cross at V , and $m\angle MVD = 128^\circ$.

Find $m\angle BVM$.

A ray taken across a line splits a straight angle, and that is 180.



P

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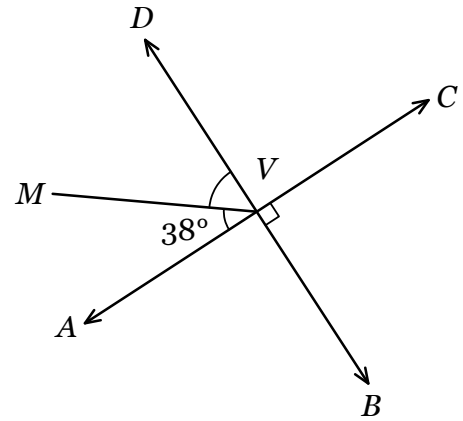
ANSWER

31°

Lines AC and BD cross at V , and $m\angle MVA = 38^\circ$.

Find $m\angle DVM$.

Both arms inside one corner? Then the two pieces make ninety.



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Q

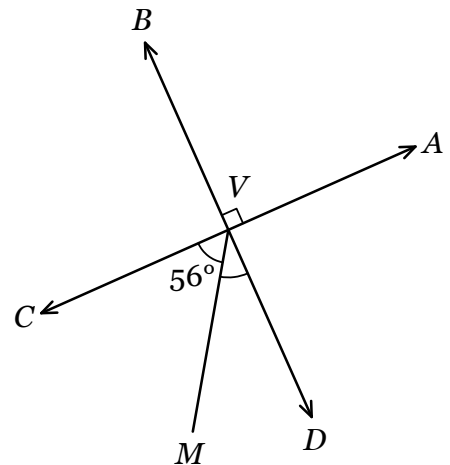
ANSWER

43°

Lines AC and BD cross at V , and $m\angle CVM = 56^\circ$.

Find $m\angle MVD$.

Ninety or a hundred and eighty: the figure says which, not the letters.



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R

Scavenger Hunt — where I went

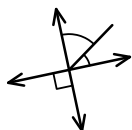
Perpendicular lines

Name _____

Period _____

Date _____

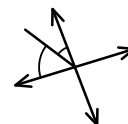
Work out the card you are at. Fill in one line. Then find the card with your answer at the top. **One small square makes all four angles right angles.** Then ask: do my two angles fill a corner (90°) or a straight line (180°)? A clean run is eight lines. A longer row means one answer was wrong. The line at the foot of the card you land on says which.



A ray inside the right angle
the two parts add to 90°



A ray and the line itself
the two add to 180°



No square, no conclusion
it only looks square

Card letter	My answer	Corner (90°) or straight line (180°)?
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Two lines meet, and neither of them will lean. What are they told to do?

Every number stands for a letter. Write the letter for each answer in the box under that number. Leave the other boxes empty. Then read the boxes you filled, from left to right. **If it does not spell two words, one answer was wrong.**

28 = S 31 = T 34 = Q 38 = M 43 = U 47 = H 48 = D 52 = A 53 = R 55 = N 59 = E 118 = K 124 = W 138 = U
143 = Y 145 = P

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28 31 34 38 43 47 48 52 53 55 59 118 124 138 143 145



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Scavenger Hunt — answers

For the teacher

The ring in order. A group may begin anywhere on it; wherever it begins, eight right answers bring it back to that card. The eight cards that are not on it are printed below, and a group can only reach one of them by going wrong.

D → J → A → P → G → M → R → C → D

Two lines meet, and neither of them will lean. What are they told to do? *SQUARE UP*. The boxes on the record sheet are in order of the answers, smallest first.

The answers on the ring, smallest first: 28 = S, 34 = Q, 43 = U, 52 = A, 53 = R, 59 = E, 138 = U, 145 = P, which spells SQUARE UP.

	Card	Given	Asked	Which rule	Answer	Wrong rule gives	Letter
1	D	$\angle BVM = 42^\circ$	$\angle MVD$	straight — 180°	138°	48°	U
2	J	$\angle MVC = 62^\circ$	$\angle BVM$	corner — 90°	28°	118°	S
3	A	$\angle BVM = 37^\circ$	$\angle MVC$	corner — 90°	53°	143°	R
4	P	$\angle MVD = 128^\circ$	$\angle BVM$	straight — 180°	52°	38°	A
5	G	$\angle MVA = 121^\circ$	$\angle CVM$	straight — 180°	59°	31°	E
6	M	$\angle MVC = 137^\circ$	$\angle AVM$	straight — 180°	43°	47°	U
7	R	$\angle CVM = 56^\circ$	$\angle MVD$	corner — 90°	34°	124°	Q
8	C	$\angle AVM = 35^\circ$	$\angle MVC$	straight — 180°	145°	55°	P

Six of the 16 cards cannot be started until the right angle has been deduced, and telling those from the rest is the item. Where the two angles fill a corner, that corner carries no mark of its own — the small square is in the angle *opposite* — so a group must first say that it is a right angle too, by one linear pair and one vertical pair. Where the two angles fill a straight line they add to 180° whatever the crossing does, and the square is not needed at all. The lesson's own summary prints both consequences side by side for this reason.

The column headed “wrong rule gives” is at the top of a card — that is the whole change, and those cards are on the next page. When those numbers were on nothing, a group could work out both and take whichever was in the room, and never read a figure at all.

Scavenger Hunt — the cards that are not on the ring

For the teacher

These eight cards are where a wrong answer goes. Each carries the number a group gets by using the wrong rule at one card of the ring, and its own answer is the number at the top of that card — so a group that lands here and works it out goes back to the card they got wrong, and their row comes out two lines longer than a clean run. **A group cannot arrive at one of these by being right**, so a sheet whose row holds one of these letters went wrong at a card you can name.

Card	Given	Asked	Which rule	Answer	Wrong rule gives	Letter
B	$\angle MVA = 127^\circ$	$\angle CVM$	straight — 180°	53°	37°	R
E	$\angle MVB = 146^\circ$	$\angle DVM$	straight — 180°	34°	56°	Q
F	$\angle MVA = 152^\circ$	$\angle CVM$	straight — 180°	28°	62°	S
H	$\angle DVM = 31^\circ$	$\angle MVA$	corner — 90°	59°	149°	E
K	$\angle DVM = 35^\circ$	$\angle MVB$	straight — 180°	145°	55°	P
L	$\angle MVD = 47^\circ$	$\angle CVM$	corner — 90°	43°	133°	U
N	$\angle AVM = 42^\circ$	$\angle MVC$	straight — 180°	138°	48°	U
Q	$\angle MVA = 38^\circ$	$\angle DVM$	corner — 90°	52°	142°	A

The line at the foot of each of these cards names the mistake — *a ray inside a corner takes its answer off ninety, never off 180*, and the seven others like it. Every card in the room carries a line in the same place, so nothing on a student's page says which cards these are.

Two of the sixteen cards print the same two numbers as each other. They are not the same card: the arcs sit in different places and the letters differ, and a group that meets both does the same arithmetic twice and goes to the same place, which is right. An obtuse answer can be drawn only one way out of the four older kinds of card, so the card that catches its mistake had to be given the fifth kind — the arc that spans a whole right angle and part of the next — and the two then share their arithmetic.