

# SCAVENGER HUNT



## COMPLEMENTARY, SUPPLEMENTARY AND VERTICAL ANGLES

Angle Pairs: Equal,  $180^\circ$ , or  $90^\circ$ ?

Vertical · linear pair · complementary · the cards check the answers

FREE

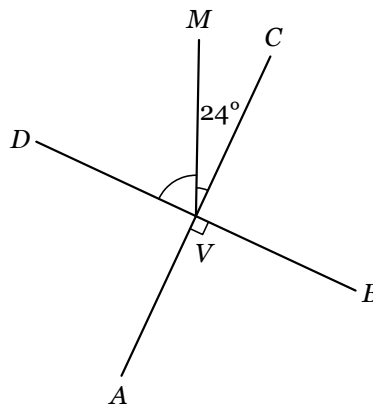
ANSWER

**$123^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray,  
and  $m\angle CVM = 24^\circ$ .

Find  $m\angle MVD$ .

One small square makes all four angles right  
angles.



**A**

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1. **Tape the 16 cards around the room**, in any order. Send each group to a *different* card. Each card has a large letter in its bottom left corner. Start each group on one of these eight letters: *C K A D Q H B L*.
2. **Say this once:** “*Before you find any number, decide what kind of pair it is. Are the two angles equal, do they add to 180, or do they add to 90? Write your choice next to your answer. After eight right answers you are back at your first card.*”
3. **Find the missing angle. Then find the card with your answer at the top.**

|                     |                                                                         |
|---------------------|-------------------------------------------------------------------------|
| <b>16 cards</b>     | pages 3–10, one copy. Two cards to a sheet: cut the stack once.         |
| <b>Record sheet</b> | page 11, one per student. It shows the three kinds of pair as pictures. |
| <b>Answers</b>      | pages 12–13, for you only. Do not put them up in the room.              |

**Choosing the kind of pair is the hard part, not the subtraction.** On eight cards the two angles are vertical, so they are equal. On six they are a linear pair, so they add to  $180^\circ$ . On two they fill a marked right angle, so they add to  $90^\circ$ . Students find it hardest to choose between *equal* and *add to a total*. The record sheet has a column for that choice beside every answer.

**The number printed on a card is sometimes the answer and sometimes not.** For vertical angles it is the answer. For a linear pair it is the most common wrong answer. Copying the printed number is right on only eight of the 16 cards, and subtracting it from 180 is right on only six.

**Eight of the 16 cards form a loop. The other eight are where a wrong answer goes.** They look like the other cards. Suppose a group thinks vertical angles add to 180, or copies the printed number for a linear pair. Its answer is at the top of one of those extra cards. The group does that card, and its answer sends the group back to the card it got wrong.

**The length of the record shows how it went.** A clean run is **eight lines**. Every wrong answer adds exactly two lines. If a group keeps going in circles, do not give the answer. Ask: “*Are the angles across from each other, or side by side on one straight line?*”



**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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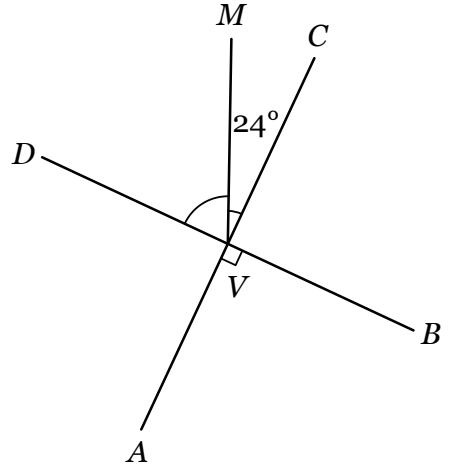
ANSWER

**$123^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray,  
and  $m\angle CVM = 24^\circ$ .

Find  $m\angle MVD$ .

One small square makes all four angles right  
angles.



**A**

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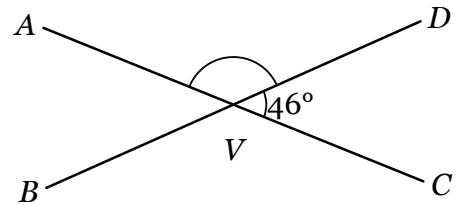
ANSWER

**$29^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $m\angle CVD =$   
 **$46^\circ$** .

Find  $m\angle DVA$ .

The number printed is sometimes the answer  
and sometimes the trap.



**B**

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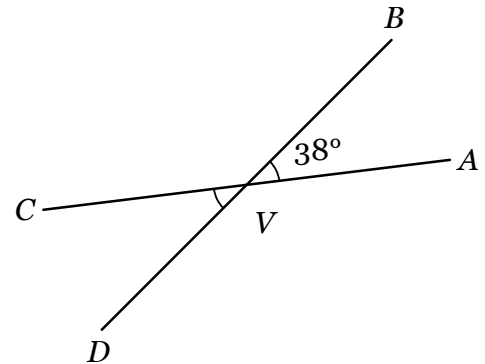
ANSWER

**$77^\circ$**

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

Find  $m\angle CVD$ .

Across from each other, or side by side? That comes before any number.



**C**

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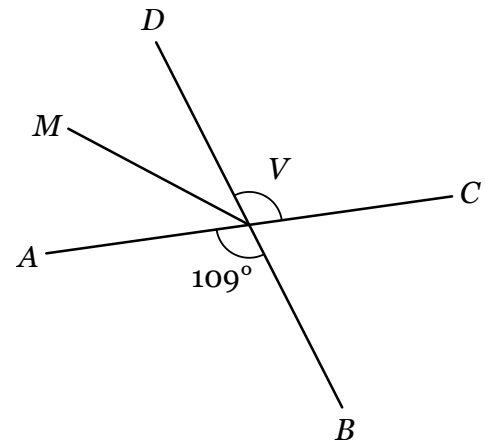
ANSWER

**$66^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray, and  $m\angle AVB = 109^\circ$ .

Find  $m\angle CVD$ .

A ray in the picture does not have to be part of the question.



**D**

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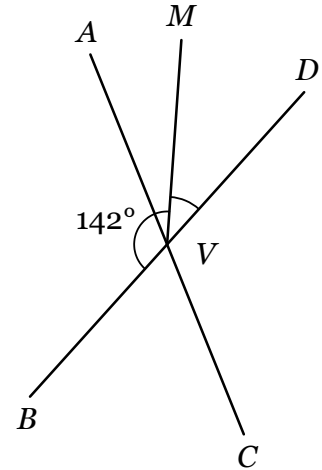
ANSWER

**$57^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray, and  $m\angle MVB = 142^\circ$ .

Find  $m\angle DVM$ .

Put a finger on each outer arm. Do they make one straight line?



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**E**

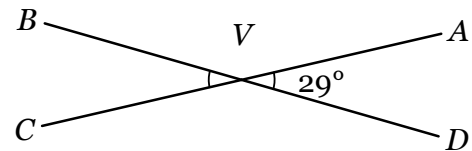
ANSWER

**$46^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $m\angle DVA = 29^\circ$ .

Find  $m\angle BVC$ .

The two angles sit side by side on one straight line. They share 180 between them.



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**F**

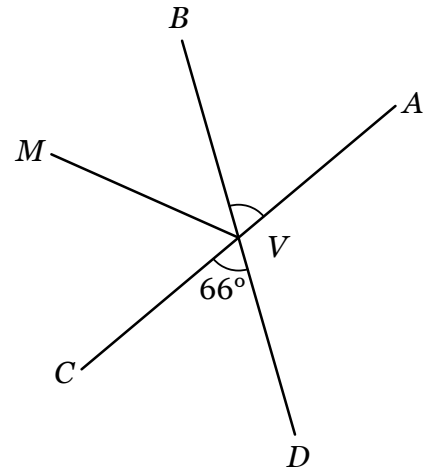
ANSWER

**$71^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray,  
and  $m\angle CVD = 66^\circ$ .

Find  $m\angle AVB$ .

Decide the pair first, then the number.



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**G**

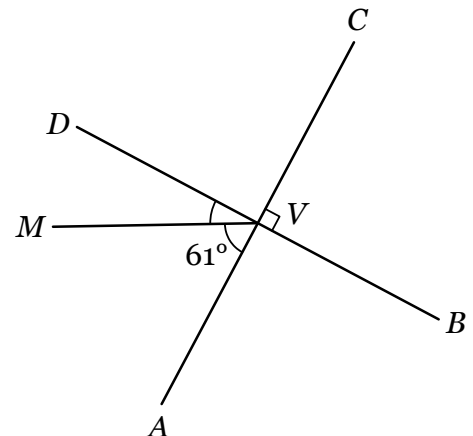
ANSWER

**$52^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray,  
and  $m\angle MVA = 61^\circ$ .

Find  $m\angle DVM$ .

Add your answer to the given number. Does it  
make 90, make 180, or is it the same?



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**H**

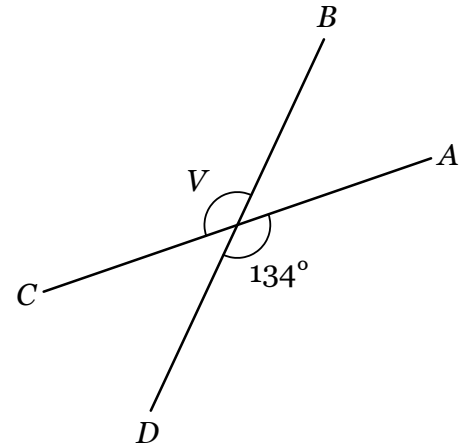
ANSWER

**$103^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $m\angle DVA = 134^\circ$ .

Find  $m\angle BVC$ .

Only the two opposite angles of two lines are sure to be equal.



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**J**

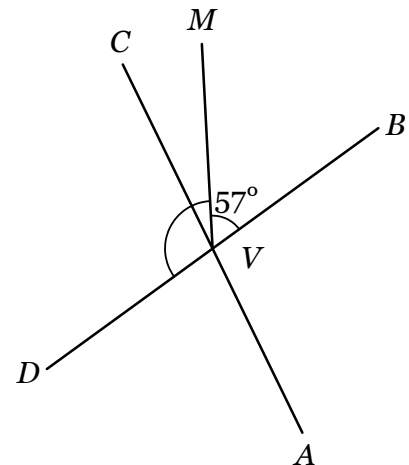
ANSWER

**$38^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray, and  $m\angle BVM = 57^\circ$ .

Find  $m\angle MVD$ .

Follow the two outer arms. One straight line means 180.



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**K**

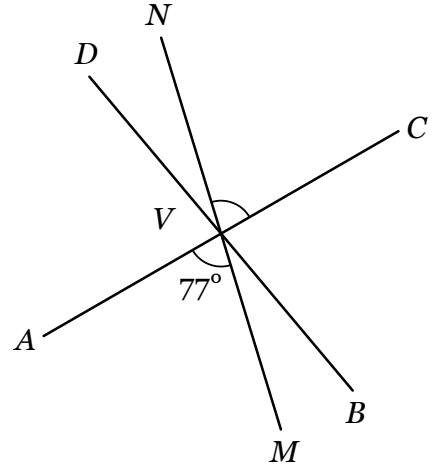
ANSWER

**$134^\circ$**

Lines  $AC$ ,  $BD$  and  $MN$  cross at  $V$ , and  $m\angle AVM = 77^\circ$ .

Find  $m\angle CVN$ .

Three lines cross at one point. Find the line each arm belongs to.



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**L**

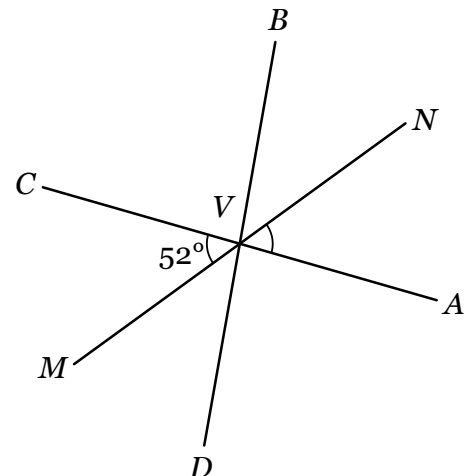
ANSWER

**$119^\circ$**

Lines  $AC$ ,  $BD$  and  $MN$  cross at  $V$ , and  $m\angle CVM = 52^\circ$ .

Find  $m\angle AVN$ .

Inside a right angle the two parts make 90, and 90 is not 180.



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**M**

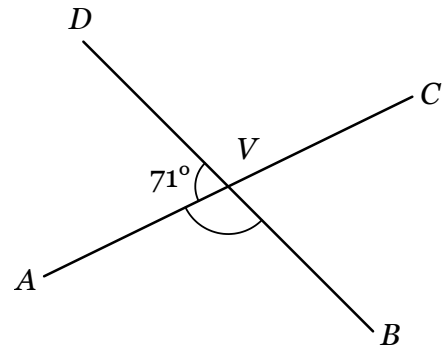
ANSWER

**128°**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $m\angle DVA = 71^\circ$ .

Find  $m\angle AVB$ .

The number printed on the card is not the answer to every card.



**N**

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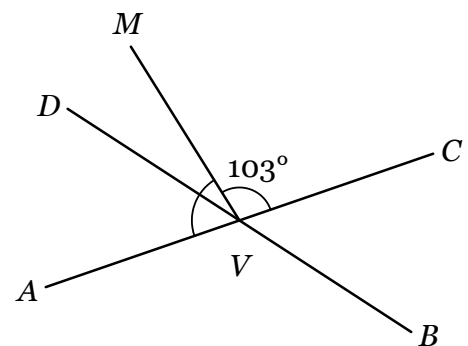
ANSWER

**142°**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $VM$  is a ray, and  $m\angle CVM = 103^\circ$ .

Find  $m\angle MVA$ .

Two angles side by side on a line share 180. They are not equal.



**P**

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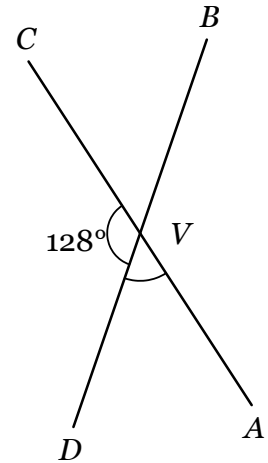
ANSWER

**$109^\circ$**

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

Find  $m\angle DVA$ .

Circle the angle you are asked for before you find the answer.



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**Q**

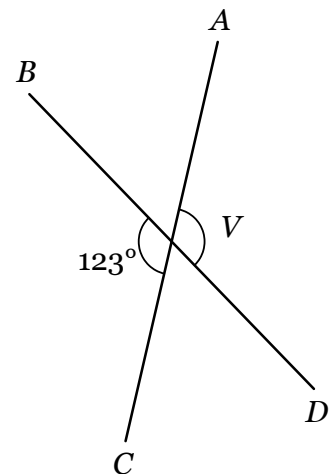
ANSWER

**$156^\circ$**

Lines  $AC$  and  $BD$  cross at  $V$ , and  $m\angle BVC = 123^\circ$ .

Find  $m\angle DVA$ .

Opposite angles of two lines are equal. Nothing to subtract.



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**R**

# Scavenger Hunt — where I went

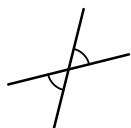
Angle pairs

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

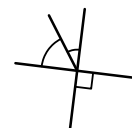
Work out the card you are at, fill in one line, then find the card with your answer at the top. **First decide. Are the two angles equal, do they add to  $180^\circ$ , or do they add to  $90^\circ$ ?** A clean run is eight lines. A longer row means one answer was wrong. **If you are on a card because you went wrong, its foot line says what to check on the card you came from.** If you were right, skip it.



**Vertical angles**  
two lines · EQUAL



**Linear pair**  
one straight line · ADD TO  $180^\circ$



**Inside a marked right angle**  
ADD TO  $90^\circ$

| Card letter | My answer | Equal, $180^\circ$ , or $90^\circ$ ? |
|-------------|-----------|--------------------------------------|
| 1           |           |                                      |
| 2           |           |                                      |
| 3           |           |                                      |
| 4           |           |                                      |
| 5           |           |                                      |
| 6           |           |                                      |
| 7           |           |                                      |
| 8           |           |                                      |
| 9           |           |                                      |
| 10          |           |                                      |
| 11          |           |                                      |
| 12          |           |                                      |

**What did one vertical angle say to the angle across from it?**

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 across. **If it does not spell two words, one answer was wrong.**

29 = S   38 = A   46 = H   52 = M   57 = E   66 = E   71 = A   77 = H   103 = R   109 = E   119 = S   123 = R   128 = E   134 = E  
142 = M   156 = E

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

29   38   46   52   57   66   71   77   103   109   119   123   128   134   142   156



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# Scavenger Hunt — answers

For the teacher

The loop in order. A group may start anywhere on it. Wherever it starts, eight right answers bring it back to that card.

**C → K → A → D → Q → H → B → L → C**

**What did one vertical angle say to the angle across from it?** *SAME HERE*. The letters spell this when the answers are put in order from smallest to largest. The boxes on the record sheet are in that order.

The answers on the loop, smallest first:  $29^\circ = S$ ,  $38^\circ = A$ ,  $52^\circ = M$ ,  $66^\circ = E$ ,  $77^\circ = H$ ,  $109^\circ = E$ ,  $123^\circ = R$ ,  $134^\circ = E$ . That spells SAME HERE.

|   | Card     | Given                    | Asked        | The two angles     | Answer                        | Wrong answer | Letter for the number at its top |
|---|----------|--------------------------|--------------|--------------------|-------------------------------|--------------|----------------------------------|
| 1 | <b>C</b> | $\angle AVB = 38^\circ$  | $\angle CVD$ | equal              | <b><math>38^\circ</math></b>  | $142^\circ$  | H                                |
| 2 | <b>K</b> | $\angle BVM = 57^\circ$  | $\angle MVD$ | add to $180^\circ$ | <b><math>123^\circ</math></b> | $57^\circ$   | A                                |
| 3 | <b>A</b> | $\angle CVM = 24^\circ$  | $\angle MVD$ | add to $90^\circ$  | <b><math>66^\circ</math></b>  | $156^\circ$  | R                                |
| 4 | <b>D</b> | $\angle AVB = 109^\circ$ | $\angle CVD$ | equal              | <b><math>109^\circ</math></b> | $71^\circ$   | E                                |
| 5 | <b>Q</b> | $\angle CVD = 128^\circ$ | $\angle DVA$ | add to $180^\circ$ | <b><math>52^\circ</math></b>  | $128^\circ$  | E                                |
| 6 | <b>H</b> | $\angle MVA = 61^\circ$  | $\angle DVM$ | add to $90^\circ$  | <b><math>29^\circ</math></b>  | $119^\circ$  | M                                |
| 7 | <b>B</b> | $\angle CVD = 46^\circ$  | $\angle DVA$ | add to $180^\circ$ | <b><math>134^\circ</math></b> | $46^\circ$   | S                                |
| 8 | <b>L</b> | $\angle AVM = 77^\circ$  | $\angle CVN$ | equal              | <b><math>77^\circ</math></b>  | $103^\circ$  | E                                |

**Each number in the “Wrong answer” column is at the top of a card on the next page.** A student who thinks vertical angles add to 180 gets 180 minus the given angle. A student who thinks a linear pair is equal gets the given angle back. A student who mixes up complementary and supplementary gets 180 minus the given angle instead of 90 minus it. None of these is an arithmetic slip.

## Scavenger Hunt — the cards off the loop

*For the teacher*

These eight cards are where a wrong answer goes. The number at the top of each is what a group gets with the wrong kind of pair at one card of the loop. Its own answer is the number at the top of that loop card. So a group that lands here goes back to the card it got wrong, and its record gets two lines longer.

**A group cannot reach one of these cards with a right answer.** A second wrong answer here sends the group one more card back, never forward.

| Card | Given                    | Asked        | The two angles     | Answer                        | Wrong answer | Letter for the number at its top |
|------|--------------------------|--------------|--------------------|-------------------------------|--------------|----------------------------------|
| E    | $\angle MVB = 142^\circ$ | $\angle DVM$ | add to $180^\circ$ | <b><math>38^\circ</math></b>  | $142^\circ$  | E                                |
| F    | $\angle DVA = 29^\circ$  | $\angle BVC$ | equal              | <b><math>29^\circ</math></b>  | $151^\circ$  | H                                |
| G    | $\angle CVD = 66^\circ$  | $\angle AVB$ | equal              | <b><math>66^\circ</math></b>  | $114^\circ$  | A                                |
| J    | $\angle DVA = 134^\circ$ | $\angle BVC$ | equal              | <b><math>134^\circ</math></b> | $46^\circ$   | R                                |
| M    | $\angle CVM = 52^\circ$  | $\angle AVN$ | equal              | <b><math>52^\circ</math></b>  | $128^\circ$  | S                                |
| N    | $\angle DVA = 71^\circ$  | $\angle AVB$ | add to $180^\circ$ | <b><math>109^\circ</math></b> | $71^\circ$   | E                                |
| P    | $\angle CVM = 103^\circ$ | $\angle MVA$ | add to $180^\circ$ | $77^\circ$                    | $103^\circ$  | M                                |
| R    | $\angle BVC = 123^\circ$ | $\angle DVA$ | equal              | <b><math>123^\circ</math></b> | $57^\circ$   | E                                |

**Every card has a reminder line at the bottom, in the same place.** It is a habit to practice, not an answer. So nothing on the cards shows which ones are off the loop. No two cards show the same given angle and the same answer.