

# SCAVENGER HUNT



## TRIANGLE ANGLE SUM AND THE EXTERIOR ANGLE THEOREM

### Triangle Angle Sum & the Exterior Angle

a full class period · on their feet · no answer key in the room

FREE

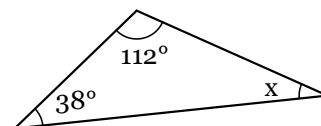
SOMEBODY'S ANSWER

**$84^\circ$**

Find the angle marked  **$x$** .

Then find the card with your answer at the top.

Is  $x$  inside the triangle or outside the corner?  
Ask that before anything else.



**D**

card D of 16 · chooseyourlesson.com

1. **Print pages 3–10. Cut them in half. Tape the 16 cards around the room** in any order. Page 11 is the record sheet, one per student.
2. **Say this once:** *“Find the angle marked x. Then walk around until you find the card with your answer printed at the top. If nothing in the room matches, your answer is wrong. Check which two angles you used.”*
3. **Start each group at a different card.** Say the letter out loud. It has to be one of the eight cards on this page: *D M H A K R F P*. Every card visited goes on one line of the sheet. **They are done after eight lines.**

|                     |                                                                              |
|---------------------|------------------------------------------------------------------------------|
| <b>The cards</b>    | pages 3–10, one copy, two to a page. Cut across the middle and tape them up. |
| <b>Record sheet</b> | page 11, one per student.                                                    |
| <b>Answers</b>      | page 12 and the next page. They show the ring and the reason for every card. |

**Eight of the 16 cards make the ring. The other eight are where a wrong answer goes.** Both kinds look the same: a number at the top, a triangle, an x and one line. A group that makes the most common mistake of this lesson gets a number that is **at the top of one of those cards**. They walk to it and do that card. Its answer sends them back to the card they got wrong. No answer key goes in the room.

**The length of the row is your check.** A clean run is **eight lines**. Every wrong answer adds exactly two more. Two other mistakes lead to no card at all: taking 180 minus one far angle, and adding the outside angle to a far angle instead of subtracting. A group that makes one of those finds no card with its answer, and knows to check its work.

**There are three kinds of card, mixed around the ring.** Seven give two angles of the triangle and ask for the third. Six give the two far angles and ask for the angle outside the corner. Three give the outside angle and one far angle, and ask for the other far angle. The answer pages show which card is which.

**The joke at the foot of the record sheet is a second check.** Every number stands for a letter. The right answers spell the answer to the joke, and the numbers a mistake gives spell nothing. **If a group is stuck**, do not give them the number. Ask whether the angle they used is *next to* the marked angle or *far from* it. The line at the foot of a card off the ring says the same.



**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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SOMEBODY'S ANSWER

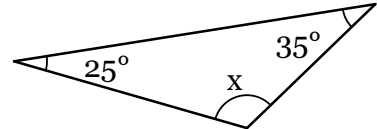
**$70^\circ$**

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Find the angle marked  $x$ .

Then find the card with your answer at the top.

Three angles inside a triangle, and they make  $180^\circ$  between them.



**A**

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SOMEBODY'S ANSWER

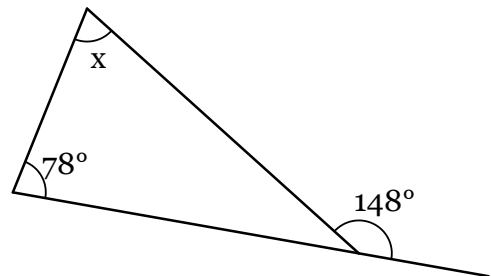
**$60^\circ$**

---

Find the angle marked  $x$ .

Then find the card with your answer at the top.

The three inside make  $180^\circ$ . The outside one is bigger than either far angle.



**B**

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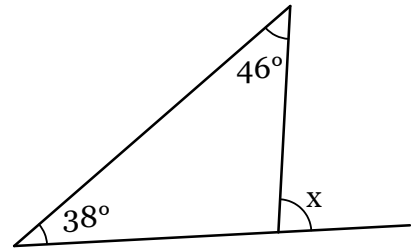
SOMEBODY'S ANSWER

**$150^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

The third angle inside is 180 less the two. The angle outside that corner is the two added.



**C**

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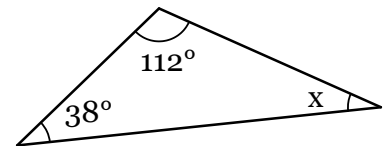
SOMEBODY'S ANSWER

**$84^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Is  $x$  inside the triangle or outside the corner? Ask that before anything else.



**D**

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SOMEBODY'S ANSWER

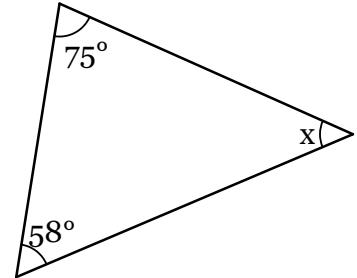
# 96°

---

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Two far angles added make the outside one. The angle beside it makes 180 with it.



**E**

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SOMEBODY'S ANSWER

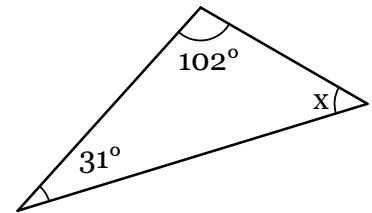
# 126°

---

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Two angles given and one wanted: that is 180 less the two, every time.



**F**

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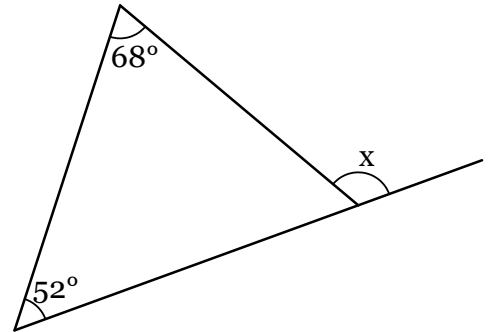
SOMEBODY'S ANSWER

# 107°

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Look at the two arms of the arc: one of them has to be a side carried on past the corner.



**G**

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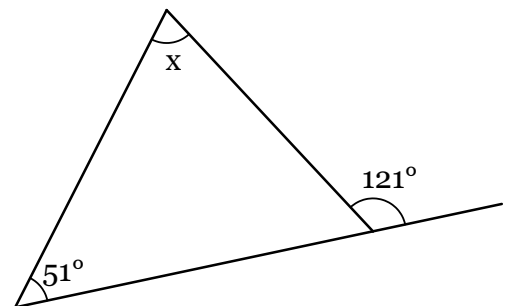
SOMEBODY'S ANSWER

# 125°

Find the angle marked  $x$ .

Then find the card with your answer at the top.

The two far angles are the ones not at that corner. Find them before you write anything.



**H**

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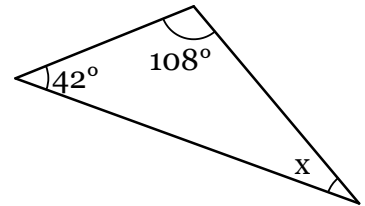
SOMEBODY'S ANSWER

**$55^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

The angle beside the exterior one is the one angle the rule never uses.



**J**

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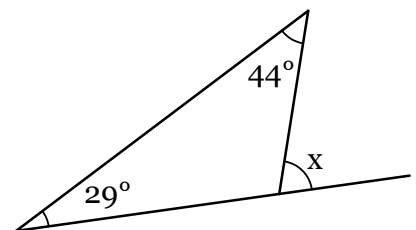
SOMEBODY'S ANSWER

**$120^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Which corner does the question mark sit at, and is it inside the triangle or outside it?



**K**

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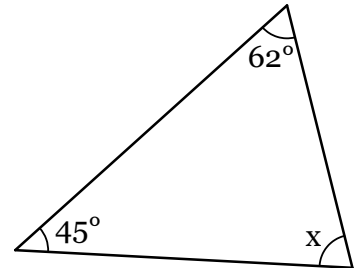
SOMEBODY'S ANSWER

**$32^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Inside the triangle, or outside the corner? The two rules are not interchangeable.



**L**

card L of 16 · chooseyourlesson.com

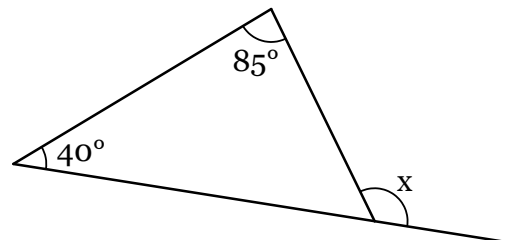
SOMEBODY'S ANSWER

**$30^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

An exterior angle is bigger than either of the two far ones. Use that to check yourself.



**M**

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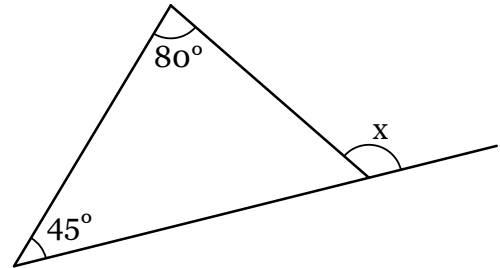
SOMEBODY'S ANSWER

**$59^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Far means not at that corner, and the angle next to  $x$  is never one of the two.



**N**

card N of 16 · chooseyourlesson.com

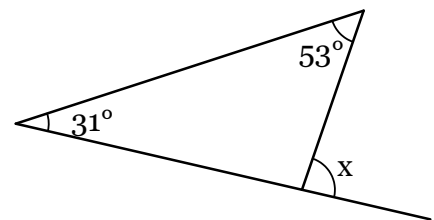
SOMEBODY'S ANSWER

**$47^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

The angle next to  $x$  at the same corner is never one of the two the rule is about.



**P**

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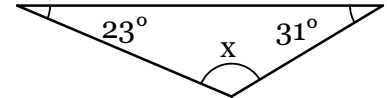
SOMEBODY'S ANSWER

**$133^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Count what the picture gives you before you decide which rule it is.



**Q**

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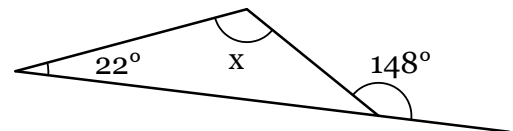
SOMEBODY'S ANSWER

**$73^\circ$**

Find the angle marked  $x$ .

Then find the card with your answer at the top.

Read the picture for which angle is the outside one before you reach for a number.



**R**

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# Scavenger Hunt — record sheet

16 cards

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

Work out the card you are at. Fill in one line. Then find the card with your answer at the top. **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.

|                                                                                                                                         |                                                                                                                                                   |                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>The three inside</b><br/><i>add to 180°</i></p> |  <p><b>The outside one</b><br/><i>the two FAR ones added</i></p> |  <p><b>Not the near one</b><br/><i>these two make 180°</i></p> |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|

| Card letter | My answer | Which rule I used |
|-------------|-----------|-------------------|
| 1           |           |                   |
| 2           |           |                   |
| 3           |           |                   |
| 4           |           |                   |
| 5           |           |                   |
| 6           |           |                   |
| 7           |           |                   |
| 8           |           |                   |
| 9           |           |                   |
| 10          |           |                   |
| 11          |           |                   |
| 12          |           |                   |

**An exterior angle is made of two angles of the triangle. Which two?**

Every number stands for a letter. Write the letter for each of your answers 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 a word, one answer was wrong.**

30° = **F**   32° = **K**   47° = **A**   55° = **N**   59° = **W**   60° = **D**   70° = **R**   73° = **T**   84° = **H**   96° = **G**   107° = **U**   120° = **E**   125° = **S**  
 126° = **T**   133° = **V**   150° = **Y**

|                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |                                                         |
|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> | <input style="width: 40px; height: 30px;" type="text"/> |
| 30                                                      | 32                                                      | 47                                                      | 55                                                      | 59                                                      | 60                                                      | 70                                                      | 73                                                      | 84                                                      | 96                                                      | 107                                                     | 120                                                     | 125                                                     | 126                                                     | 133                                                     | 150                                                     |



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# Scavenger Hunt — answers

For the teacher

The ring, in order. A group can start at any card on it. After eight right answers, it is back at the card where it started. The eight cards off the ring are on the next page. A group reaches one of them only by a wrong answer.

**D → M → H → A → K → R → F → P → D**

| Card | Why it is right                                                                                         | Answer                        | Wrong answer from the most common mistake | Joke letter | The answer is at the top of |
|------|---------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------|-------------|-----------------------------|
| D    | x is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 38 - 112$ . | <b><math>30^\circ</math></b>  | $150^\circ$                               | F           | card M                      |
| M    | x is an exterior angle, so it equals the sum of the two far angles: $x = 40 + 85$ .                     | <b><math>125^\circ</math></b> | $55^\circ$                                | S           | card H                      |
| H    | The exterior angle equals the sum of the two far angles, and x is one of them. So $x = 121 - 51$ .      | <b><math>70^\circ</math></b>  | $59^\circ$                                | R           | card A                      |
| A    | x is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 25 - 35$ .  | <b><math>120^\circ</math></b> | $60^\circ$                                | E           | card K                      |
| K    | x is an exterior angle, so it equals the sum of the two far angles: $x = 29 + 44$ .                     | <b><math>73^\circ</math></b>  | $107^\circ$                               | T           | card R                      |
| R    | The exterior angle equals the sum of the two far angles, and x is one of them. So $x = 148 - 22$ .      | <b><math>126^\circ</math></b> | $32^\circ$                                | T           | card F                      |
| F    | x is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 31 - 102$ . | <b><math>47^\circ</math></b>  | $133^\circ$                               | A           | card P                      |
| P    | x is an exterior angle, so it equals the sum of the two far angles: $x = 31 + 53$ .                     | <b><math>84^\circ</math></b>  | $96^\circ$                                | H           | card D                      |

**The answer to the joke is F A R T H E S T.** Students read it from the smallest answer to the largest, which is the order of the boxes at the foot of the record sheet. So every group fills the same boxes, wherever it starts. The answers on the ring, smallest first:  $30^\circ = F$ ,  $47^\circ = A$ ,  $70^\circ = R$ ,  $73^\circ = T$ ,  $84^\circ = H$ ,  $120^\circ = E$ ,  $125^\circ = S$ ,  $126^\circ = T$ .

**Each wrong answer in the table is at the top of a card off the ring.** Those cards are on the next page. No two answers on the ring add to  $180^\circ$ , so the most common mistake never leads to a card on the ring.

## Scavenger Hunt — the cards that are not on the ring

*For the teacher*

These eight cards are where a wrong answer goes. The top of each card is the number a group gets by making the most common mistake at one ring card. Its own answer is the top of that ring card. So a group that lands here and solves it goes back to the card it got wrong, and its row is two lines longer than a clean run. **A group cannot reach one of these cards by being right.** So a row with one of these letters shows you the card where the group went wrong.

| Card | Why it is right                                                                                           | Answer                        | Wrong answer from the most common mistake | Joke letter | The answer is at the top of |
|------|-----------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------|-------------|-----------------------------|
| B    | The exterior angle equals the sum of the two far angles, and $x$ is one of them. So $x = 148 - 78$ .      | <b><math>70^\circ</math></b>  | $32^\circ$                                | R           | card A                      |
| C    | $x$ is an exterior angle, so it equals the sum of the two far angles: $x = 38 + 46$ .                     | <b><math>84^\circ</math></b>  | $96^\circ$                                | H           | card D                      |
| E    | $x$ is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 58 - 75$ .  | <b><math>47^\circ</math></b>  | $133^\circ$                               | A           | card P                      |
| G    | $x$ is an exterior angle, so it equals the sum of the two far angles: $x = 52 + 68$ .                     | <b><math>120^\circ</math></b> | $60^\circ$                                | E           | card K                      |
| J    | $x$ is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 42 - 108$ . | <b><math>30^\circ</math></b>  | $150^\circ$                               | F           | card M                      |
| L    | $x$ is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 45 - 62$ .  | <b><math>73^\circ</math></b>  | $107^\circ$                               | T           | card R                      |
| N    | $x$ is an exterior angle, so it equals the sum of the two far angles: $x = 45 + 80$ .                     | <b><math>125^\circ</math></b> | $55^\circ$                                | S           | card H                      |
| Q    | $x$ is inside the triangle. The three angles of a triangle add to $180^\circ$ , so $x = 180 - 23 - 31$ .  | <b><math>126^\circ</math></b> | $54^\circ$                                | T           | card F                      |

**The line at the foot of each of these cards names the mistake.** One example: *adding the two given angles gives the angle outside that corner, not the third one inside.* Every card in the room has a line in the same place, so students cannot tell which cards are off the ring.