GRADE 7 ACCELERATED · UNIT 6 · THREAD B · DAY 2

Interior and Exterior Angles of a Triangle

MA.8.GR.1.5

I can find a missing angle of a triangle, inside or outside, with the Triangle Sum and the Exterior Angle Theorem.

Warm-Up

1. What is the supplement of 83°?
2. How far apart are $(-4, -1)$ and $(4, 5)$?
3. 12 pens cost $9. What does one pen cost?
4. A straight angle is split into 50°, 60° and x°. Find x.

Warm-Up

1. What is the supplement of 83°? **97°**
2. How far apart are $(-4, -1)$ and $(4, 5)$? **10 units**
3. 12 pens cost \$9. What does one pen cost? **\$0.75**
4. A straight angle is split into 50°, 60° and x°. Find x. **70**

Vocabulary

interior angle

an angle inside a triangle, at one of its corners

exterior angle

the angle between one side of a triangle and the next side extended; it makes a linear pair with the interior angle beside it

remote interior angles

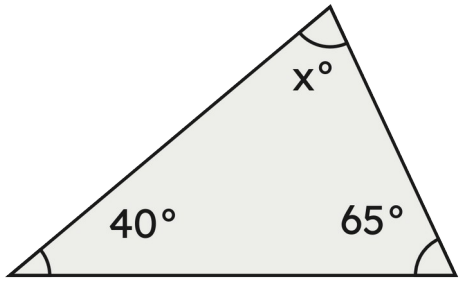
the two interior angles that are not beside a given exterior angle

Triangle Sum Theorem

the three interior angles of a triangle add to 180°

Notes

I. The Triangle Sum: the three angles make 180°

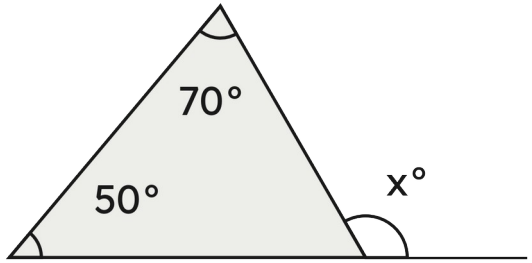


$$x + 65 + 40 = 180, \quad x = 75$$

A triangle's three angles add to 180°: $m\angle A + m\angle B + m\angle C = 180°$

Notes

II. The Exterior Angle Theorem: outside = the two remote angles

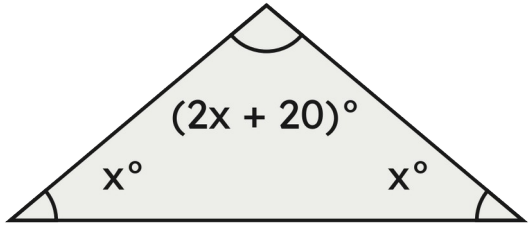


$x = 50 + 70 = 120$ check: $60 + 120 = 180$

Not the angle beside it, and not the angle around the outside.

Notes

III. Angles as expressions

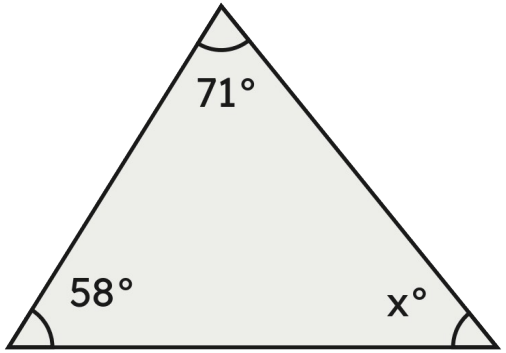


$$x + x + (2x + 20) = 180, \quad 4x = 160, \quad x = 40$$

the angles: 40, 40, 100

Example 1

Two angles of a triangle are $58°$ and $71°$.



Find the third angle.

Example 1

$$58 + 71 = 129$$

$$x = 180 - 129 = 51$$

Answer: The third angle is 51°.

Your Turn

Two angles of a triangle are $39°$ and $84°$.

Find the third angle.

Your Turn

Two angles of a triangle are $39°$ and $84°$.

Find the third angle.

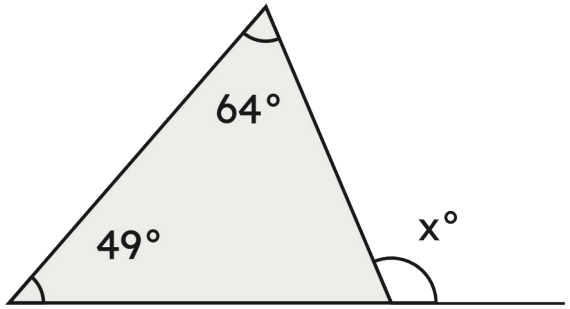
$$39 + 84 = 123$$

$$180 - 123 = 57$$

Answer: $57°$

Example 2

A triangle's remote interior angles are $64°$ and $49°$.



Find the exterior angle x.

Example 2

$x = 64 + 49 = 113$

$180 - 113 = 67, \quad 64 + 49 + 67 = 180$

Answer: The exterior angle is 113°.

Your Turn

A triangle's remote interior angles are $72°$ and $35°$.

Find the exterior angle.

Your Turn

A triangle's remote interior angles are $72°$ and $35°$.

Find the exterior angle.

$$72 + 35 = 107$$

Answer: $107°$

Whiteboards · Question 1 of 9

Two angles of a triangle are 47° and 68°. Find the third angle.

Answer it.

Whiteboards · Question 1 of 9

Two angles of a triangle are 47° and 68°. Find the third angle.

$$47 + 68 = 115$$

$$180 - 115 = 65$$

Answer: 65°

Whiteboards · Question 2 of 9

An isosceles triangle's two base angles are equal. Each is 52°.

Find the third angle.

Answer it.

Whiteboards · Question 2 of 9

An isosceles triangle's two base angles are equal. Each is 52°.

Find the third angle.

$$52 + 52 = 104$$

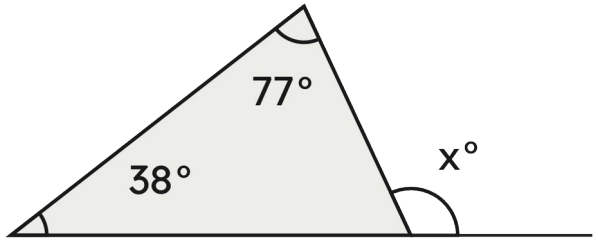
$$180 - 104 = 76$$

Answer: 76°

Whiteboards · Question 3 of 9

A triangle's remote interior angles are 38° and 77°.

Find the exterior angle x.

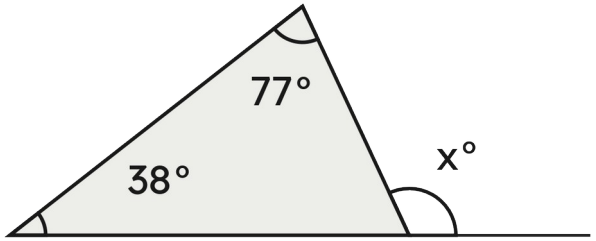


Answer it.

Whiteboards · Question 3 of 9

A triangle's remote interior angles are 38° and 77°.

Find the exterior angle x.



$x = 38 + 77 = 115$

Answer: 115°

Whiteboards · Question 4 of 9

A triangle's angles are 45°, 60° and 75°.

What is the exterior angle beside the 75°?

A. 75°

B. 105°

C. 285°

D. 60°

Answer it.

Whiteboards · Question 4 of 9

A triangle's angles are 45°, 60° and 75°.

What is the exterior angle beside the 75°?

$$45 + 60 = 105$$

check: $105 + 75 = 180$

Answer: B — 105°

Whiteboards · Question 5 of 9

An exterior angle of a triangle is 130°. One remote interior angle is 55°.

Find the other remote interior angle.

Answer it.

Whiteboards · Question 5 of 9

An exterior angle of a triangle is 130°. One remote interior angle is 55°.

Find the other remote interior angle.

$$55 + x = 130$$

$$x = 75$$

Answer: 75°

Whiteboards · Question 6 of 9

A triangle's angles are $x°$, $3x°$ and $(2x + 12)°$.

Find each angle.

Answer it.

Whiteboards · Question 6 of 9

A triangle's angles are $x°$, $3x°$ and $(2x + 12)°$.

Find each angle.

$$x + 3x + 2x + 12 = 180, \quad 6x = 168, \quad x = 28$$

$$3(28) = 84, \quad 2(28) + 12 = 68$$

Answer: 28°, 84° and 68°

Whiteboards · Question 7 of 9

An exterior angle measures $(5x + 4)°$.

Its remote interior angles measure $52°$ and $(3x)°$.

Which equation finds x?

A. $5x + 4 + 3x = 180$

B. $5x + 4 = 3x$

C. $5x + 4 = 52 + 3x$

D. $5x + 4 + 52 + 3x = 180$

Answer it.

Whiteboards · Question 7 of 9

An exterior angle measures $(5x + 4)°$.

Its remote interior angles measure $52°$ and $(3x)°$.

Which equation finds x?

outside = the two far ones: $5x + 4 = 52 + 3x$

$2x = 48$, $x = 24$

Answer: C — $5x + 4 = 52 + 3x$

Whiteboards · Question 8 of 9

A triangle has angles of 41° and 66°, and its longest side is 9 cm.

Find its third angle.

Answer it.

Whiteboards · Question 8 of 9

A triangle has angles of 41° and 66°, and its longest side is 9 cm.

Find its third angle.

$$41 + 66 = 107$$

$$180 - 107 = 73$$

Answer: 73°

Whiteboards · Question 9 of 9

Why is an exterior angle of a triangle always bigger than either of its remote interior angles? Explain.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Why is an exterior angle of a triangle always bigger than either of its remote interior angles? Explain.

for example: $40 + 65 = 105$, more than 40 and more than 65

Answer: It is the two remote angles added, each more than 0°.

Independent Set

1. Two angles of a triangle are $63°$ and $79°$. Find the third angle.
2. An isosceles triangle's two base angles are equal. The angle between its two equal sides is $40°$. Find each base angle.
3. A triangle's remote interior angles are $46°$ and $58°$. Find the exterior angle.
4. An exterior angle of a triangle is $140°$. One remote interior angle is $62°$. Find the other.
5. A triangle's angles are $(2x)°$, $(3x)°$ and $(4x)°$. Find each angle.
6. An exterior angle of a triangle measures $(4x + 10)°$; its remote interior angles measure $50°$ and $(2x)°$. Write an equation and find x.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 67. Due by the Unit 11 test.

Today's skills — all required

Find missing angles in triangles — JFJ
Exterior Angle Theorem — FMP
Triangle Angle-Sum Theorem — 6Q6