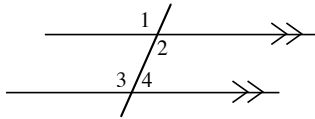


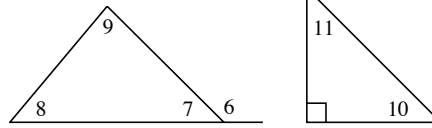
PROPERTIES OF ANGLES, LINES, AND TRIANGLES #2

Parallel lines



- corresponding angles are equal:
 $m\angle 1 = m\angle 3$
- alternate interior angles are equal:
 $m\angle 2 = m\angle 4$
- $m\angle 2 + m\angle 4 = 180^\circ$

Triangles

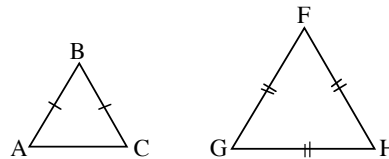


- $m\angle 7 + m\angle 8 + m\angle 9 = 180^\circ$
- $m\angle 6 = m\angle 8 + m\angle 9$
(exterior angle = sum remote interior angles)
- $m\angle 10 + m\angle 11 = 90^\circ$
(complementary angles)

Also shown in the above figures:

- vertical angles are equal: $m\angle 1 = m\angle 2$
- linear pairs are supplementary: $m\angle 3 + m\angle 4 = 180^\circ$
and $m\angle 6 + m\angle 7 = 180^\circ$

In addition, an isosceles triangle, $\triangle ABC$, has $BA = BC$ and $m\angle A = m\angle C$. An equilateral triangle, $\triangle GFH$, has $GF = FH = HG$ and $m\angle G = m\angle F = m\angle H = 60^\circ$.

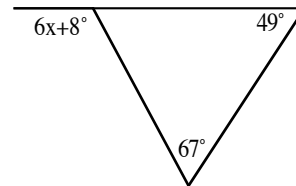


Example 1

Solve for x .

Use the Exterior Angle Theorem: $6x + 8^\circ = 49^\circ + 67^\circ$

$$6x = 108^\circ \Rightarrow x = \frac{108^\circ}{6} \Rightarrow x = 18^\circ$$

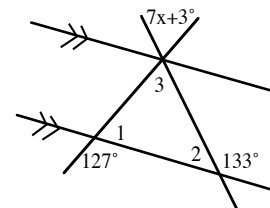


Example 2

Solve for x .

There are a number of relationships in this diagram. First, $\angle 1$ and the 127° angle are supplementary, so we know that $m\angle 1 + 127^\circ = 180^\circ$ so $m\angle 1 = 53^\circ$. Using the same idea, $m\angle 2 = 47^\circ$. Next, $m\angle 3 + 53^\circ + 47^\circ = 180^\circ$, so $m\angle 3 = 80^\circ$.

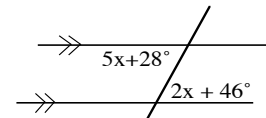
Because angle 3 forms a vertical pair with the angle marked $7x + 3^\circ$, $80^\circ = 7x + 3^\circ$, so $x = 11^\circ$.



Example 3

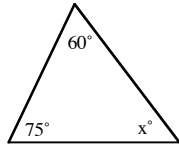
Find the measure of the acute alternate interior angles.

Parallel lines mean that alternate interior angles are equal, so $5x + 28^\circ = 2x + 46^\circ \Rightarrow 3x = 18^\circ \Rightarrow x = 6^\circ$. Use either algebraic angle measure: $2(6^\circ) + 46^\circ = 58^\circ$ for the measure of the acute angle.

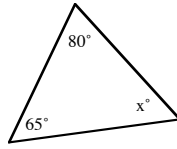


Use the geometric properties and theorems you have learned to solve for x in each diagram and write the property or theorem you use in each case.

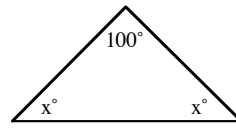
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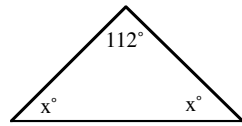
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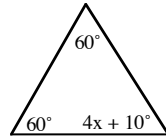
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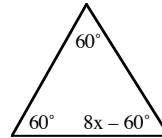
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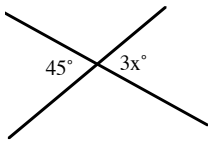
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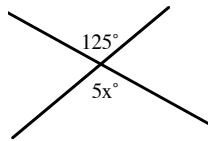
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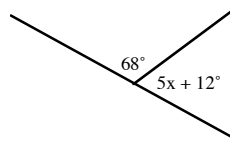
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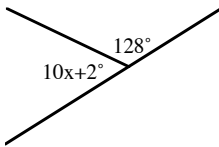
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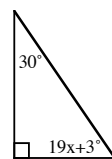
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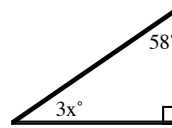
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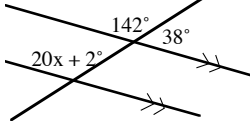
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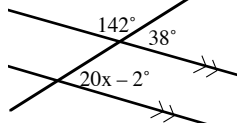
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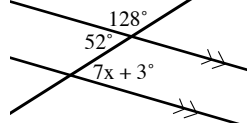
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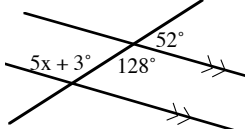
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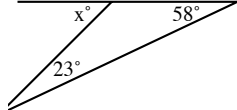
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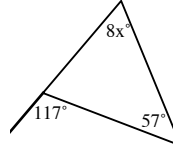
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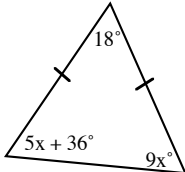
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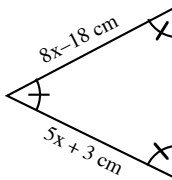
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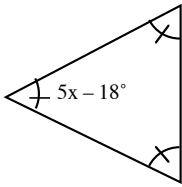
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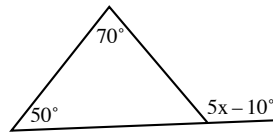
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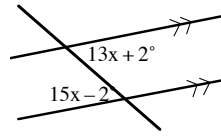
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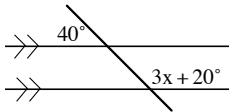
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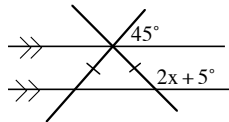
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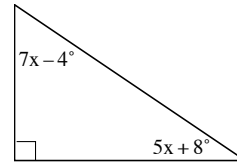
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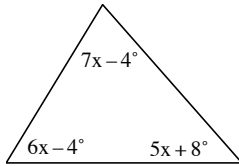
26.



27.



28.



Answers

- | | | | | | |
|----------------|-----------------|--------------------------|------------------|-----------------|---------------------------|
| 1. 45° | 2. 35° | 3. 40° | 4. 34° | 5. 12.5° | 6. 15° |
| 7. 15° | 8. 25° | 9. 20° | 10. 5° | 11. 3° | 12. $10\frac{2}{3}^\circ$ |
| 13. 7° | 14. 2° | 15. 7° | 16. 25° | 17. 81° | 18. 7.5° |
| 19. 9° | 20. 7.5° | 21. 7° | 22. 15.6° | 23. 26° | 24. 2° |
| 25. 40° | 26. 65° | 27. $7\frac{1}{6}^\circ$ | 28. 10° | | |