

CHAPTER 13

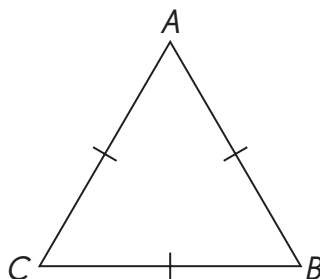
Properties of Triangles and Four-Sided Figures

Worksheet 1 Classifying Triangles

The figures are not drawn to scale.

Write *true* or *false* for each statement.

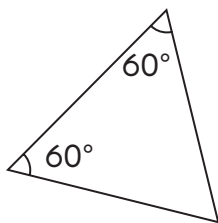
Triangle ABC is an equilateral triangle.



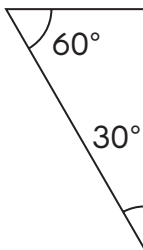
1. Any two sides are equal. _____
2. All the angles measure 60° . _____
3. A right triangle can also be an equilateral triangle. _____
4. An equilateral triangle can also be an isosceles triangle. _____
5. An isosceles triangle can never be an equilateral triangle. _____

Put a check in the box if the triangle is an equilateral triangle.

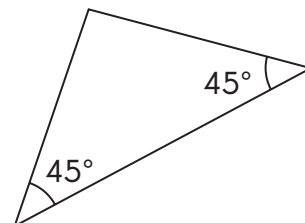
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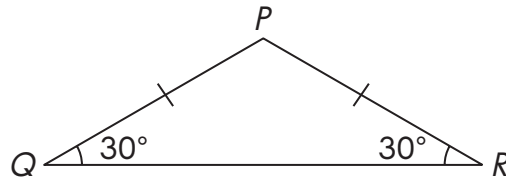

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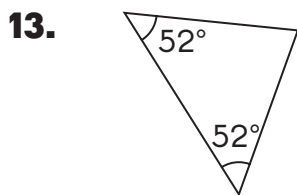
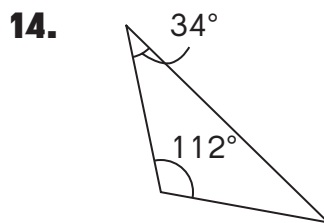
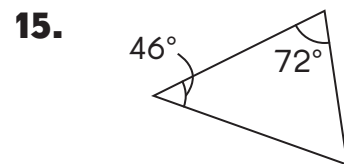
Write *true* or *false* for each statement.

Triangle PQR is an isosceles triangle.



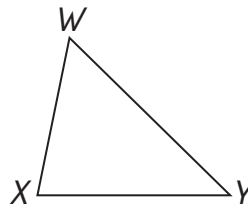
9. Two sides are equal. _____
10. Any two angles are equal. _____
11. A triangle with three equal sides can also be an isosceles triangle. _____
12. A right triangle can also be an isosceles triangle. _____

Put a check in the box if the triangle is an isosceles triangle.


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Write *true* or *false* for each statement.

Triangle WXY is a scalene triangle.



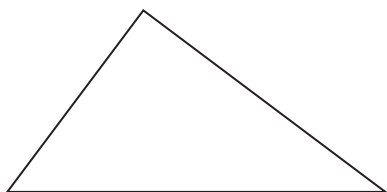
16. All three sides are of different lengths. _____
17. All three angle measures are different. _____

Name: _____

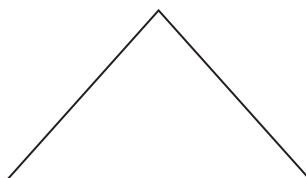
Date: _____

Put a check in the box if the triangle is a scalene triangle.

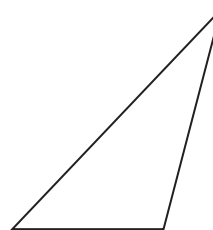
18.


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19.

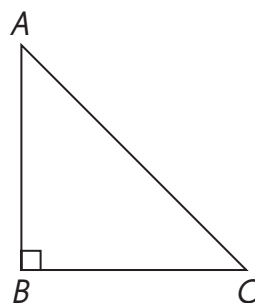

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20.


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Write *true* or *false* for each statement.

Triangle ABC is a right triangle.



21. One angle is 90° .

22. The sum of any two angle measures is 90° .

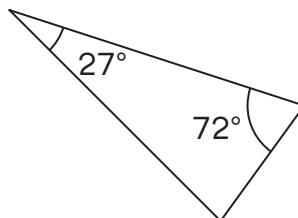
23. The sum of all the angle measures is 90° .

Put a check in the box if the triangle is a right triangle.

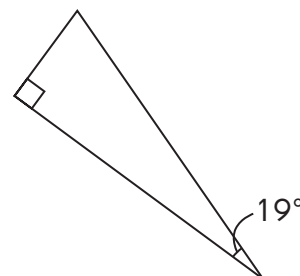
24.


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25.


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26.

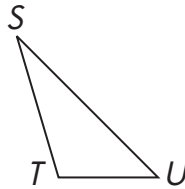

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Name: _____

Date: _____

Write *true* or *false* for each statement.

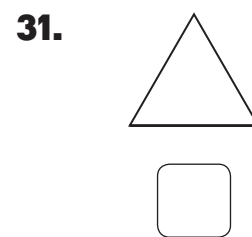
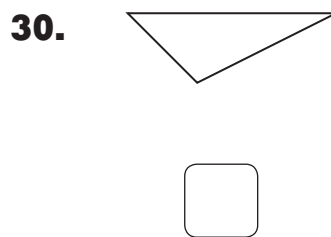
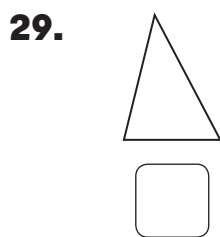
Triangle STU is an obtuse triangle.



27. All the angles measure less than 90° . _____

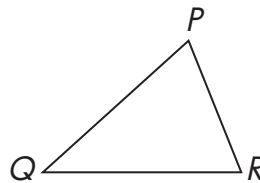
28. An obtuse triangle can also be an isosceles or a scalene triangle. _____

Put a check in the box if the triangle is an obtuse triangle.



Write *true* or *false* for each statement.

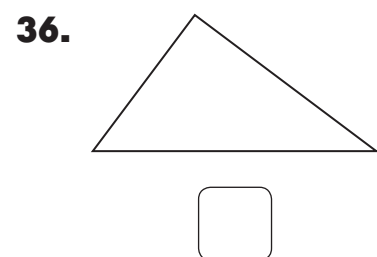
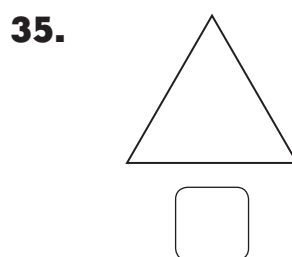
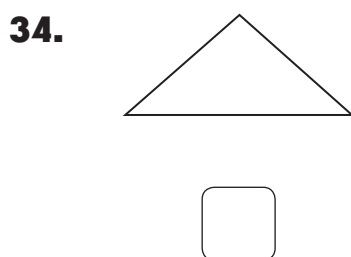
Triangle PQR is an acute triangle.



32. All the angles measure greater than 90° . _____

33. An acute triangle can also be an equilateral, isosceles, or scalene triangle. _____

Put a check in the box if the triangle is an acute triangle.



Name: _____

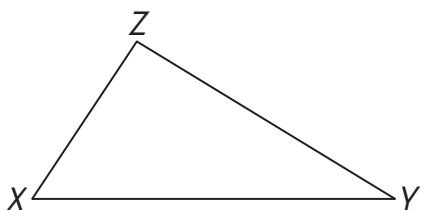
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Worksheet 2 Measures of Angles of a Triangle

The figures are not drawn to scale.

Write *true* or *false* for each statement.

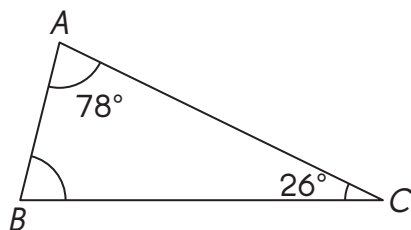
Triangle XYZ has three unequal sides.



1. $\angle X$, $\angle Y$, and $\angle Z$ are the three angles of the triangle. _____
2. The sum of the measures of $\angle X$, $\angle Y$, and $\angle Z$ is 180° . _____
3. All the angles must measure less than 90° . _____
4. At most one angle measure is equal to or greater than 90° . _____

Complete. Find the unknown angle measures.

Example

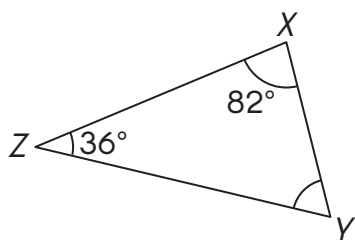


$$m\angle B = \underline{76^\circ}$$

Name: _____

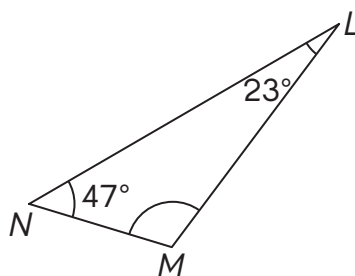
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5.



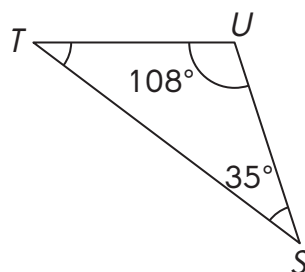
$$m\angle Y = \underline{\hspace{2cm}}$$

6.



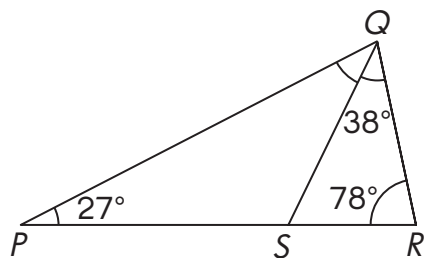
$$m\angle M = \underline{\hspace{2cm}}$$

7.

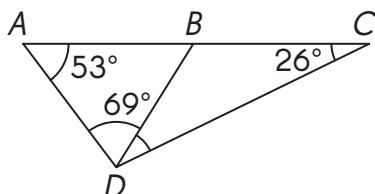


$$m\angle T = \underline{\hspace{2cm}}$$

8. \overline{PR} is a line segment. Find the measure of $\angle PQS$.



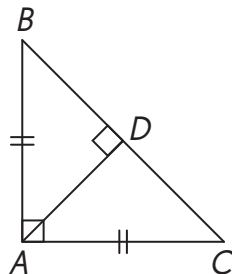
9. \overline{AC} is a line segment. Find the measure of $\angle BDC$.



Name: _____

Date: _____

10. ABC is a right triangle.



- a. Find the measure of $\angle C$.

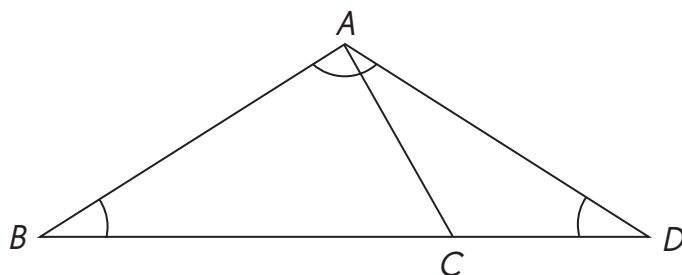
- b. \overline{AD} is perpendicular to \overline{BC} at D . Find the measure of $\angle DAC$.

Name: _____

Date: _____

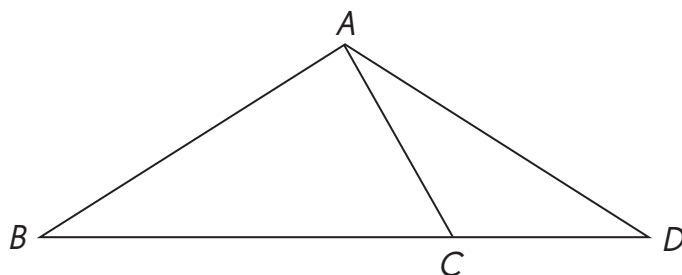
Complete.

11.



$$m\angle \underline{\hspace{2cm}} + m\angle \underline{\hspace{2cm}} + m\angle \underline{\hspace{2cm}} = 180^\circ$$

Write *true* or *false* for each statement.



12. $m\angle ABC + m\angle BAC + m\angle BCA = 90^\circ$ _____

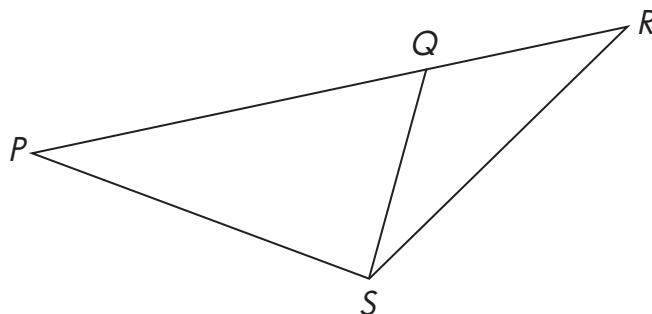
13. $m\angle ADC + m\angle DAC + m\angle BAC + m\angle ABC = 180^\circ$ _____

14. $m\angle ADC + m\angle DAC + m\angle ACD = 180^\circ$ _____

Name: _____

Date: _____

Use the figure below to complete Exercises 15 to 18.



Write 3 sets of angles that total 180° .

15.

$m\angle$

$m\angle$

$m\angle$

16.

$m\angle$

$m\angle$

$m\angle$

17.

$m\angle$

$m\angle$

$m\angle$

Write a set of 4 angles that total 180° .

18.

$m\angle$

$m\angle$

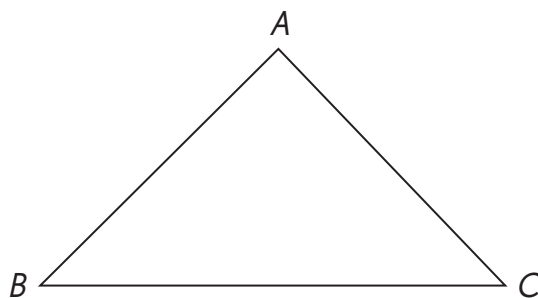
$m\angle$

$m\angle$

Name: _____

Date: _____

Triangle ABC is not drawn to scale.



Write *true* or *false* for each statement.

19. If $m\angle B + m\angle C = 90^\circ$, then $m\angle A$ is 90° . _____

20. If $m\angle A = 90^\circ$, then $m\angle B$ is less than 90° . _____

Write 3 different possible measures for $\angle B$ and $\angle C$.

21. If $m\angle A = 80^\circ$, then $m\angle B =$ _____ $m\angle C =$ _____

22. If $m\angle A = 80^\circ$, then $m\angle B =$ _____ $m\angle C =$ _____

23. If $m\angle A = 80^\circ$, then $m\angle B =$ _____ $m\angle C =$ _____

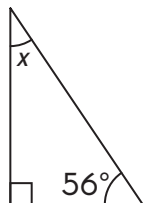
Name: _____

Date: _____

Worksheet 3 Right, Isosceles, and Equilateral Triangles

Find the unknown angle measure in each right triangle.

Example



$$m\angle x = \underline{34}^\circ$$

This is a **right triangle**.

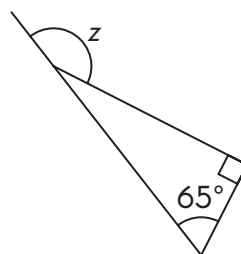


1.



$$m\angle y = \underline{\hspace{2cm}}^\circ$$

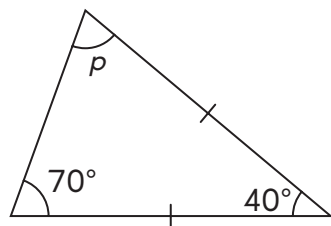
2.



$$m\angle z = \underline{\hspace{2cm}}^\circ$$

Find the unknown angle measure in each isosceles triangle.

Example

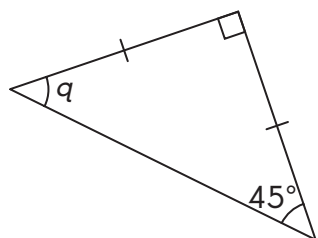


$$m\angle p = \underline{70}^\circ$$

This is an **isosceles triangle**.

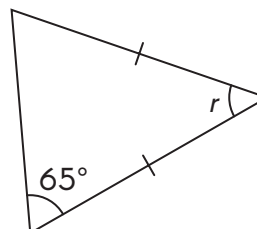


3.



$$m\angle q = \underline{\hspace{2cm}}^\circ$$

4.



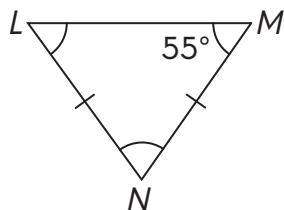
$$m\angle r = \underline{\hspace{2cm}}^\circ$$

Name: _____

Date: _____

Find the unknown angle measure(s) in each isosceles triangle.

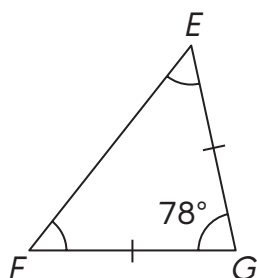
Example



$$m\angle MLN = \underline{55}^{\circ}$$

$$m\angle LNM = \underline{70}^{\circ}$$

5.

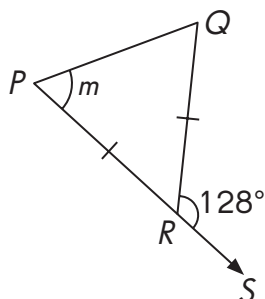


$$m\angle FEG = \underline{\hspace{2cm}}^{\circ}$$

$$m\angle EFG = \underline{\hspace{2cm}}^{\circ}$$

6.

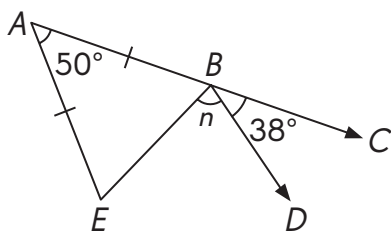
\overrightarrow{PS} is a ray.



$$m\angle m = \underline{\hspace{2cm}}^{\circ}$$

7.

\overrightarrow{AC} is a ray.



$$m\angle n = \underline{\hspace{2cm}}^{\circ}$$

Name: _____

Date: _____

8. ABC is an isosceles triangle with sides $AB = AC$.

a. $m\angle A = 70^\circ$

Find the measure of $\angle C$.

b. Point D is on segment BC . \overline{AD} is perpendicular to \overline{BC} .

Find the measure of $\angle DAC$.

9. ABC is an isosceles triangle with sides $AB = AC$.

a. $m\angle A = 105^\circ$

Find the measure of $\angle C$.

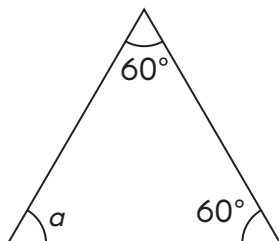
b. Point D is on segment BC .

$m\angle DAC = 25^\circ$

Find the measure of $\angle ADB$.

Find the unknown angle measure(s).

Example



$m\angle a = 60^\circ$

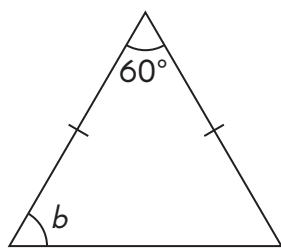
This is an **equilateral triangle**.



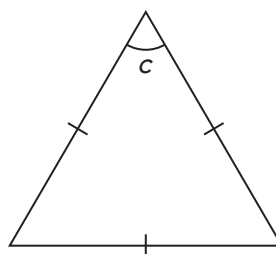
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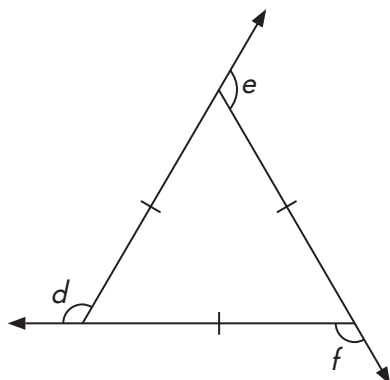
10.



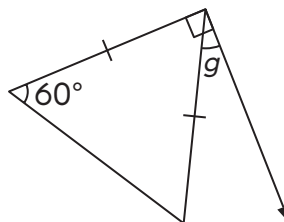
11.



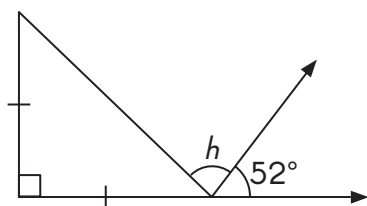
12.



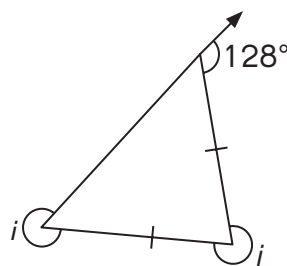
13.



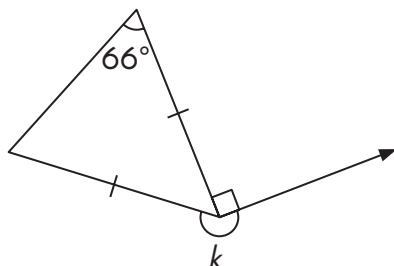
14.



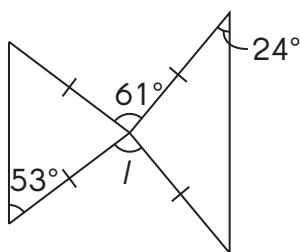
15.



16.



17.



Name: _____

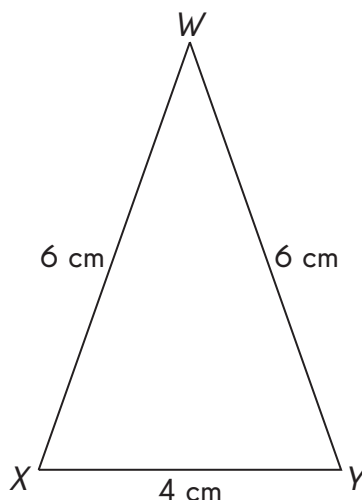
Date: _____

Worksheet 4 Triangle Inequalities

The figure is not drawn to scale.

Example

Complete.



$$WX = \underline{6} \text{ cm}$$

$$XY = \underline{4} \text{ cm}$$

$$WY = \underline{6} \text{ cm}$$

$$WX + XY = \underline{10} \text{ cm}$$

$$XY + WY = \underline{10} \text{ cm}$$

$$WX + WY = \underline{12} \text{ cm}$$

Look at the triangle WXY. Fill in the blanks with Yes or No.

Is $WX + XY > WY$? Yes

Is $XY + WY > WX$? Yes

Is $WX + WY > XY$? Yes

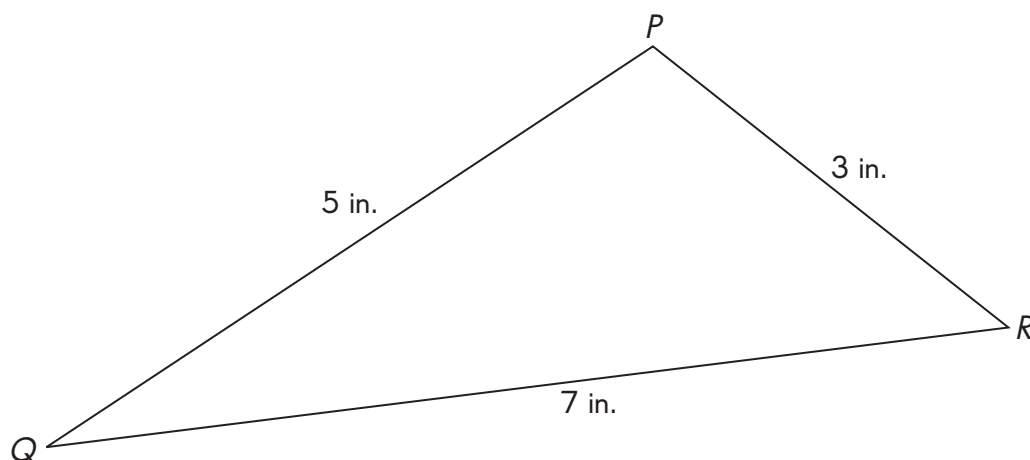
These are **inequalities**.



Name: _____

Date: _____

**The figure is not drawn to scale.
Complete.**



1. $PQ =$ _____ in.
2. $QR =$ _____ in.
3. $PR =$ _____ in.
4. $PQ + QR =$ _____ in.
5. $QR + PR =$ _____ in.
6. $PQ + PR =$ _____ in.

Look at the triangle PQR . Fill in the blanks with *Yes* or *No*.

7. Is $PQ + QR > PR$? _____
8. Is $QR + PR > PQ$? _____
9. Is $PQ + PR > QR$? _____

Name: _____

Date: _____

Show whether it is possible to form triangles with these sides.

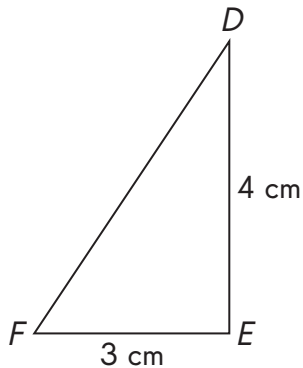
10. 2 in., 3 in., 5 in.

11. 4 cm, 5 cm, 10 cm

12. 6 cm, 7 cm, 8 cm

Find all the possible lengths for the missing side. The lengths are in whole centimeters or whole inches.

Example



DF is greater than 4 centimeters.

What are the possible lengths of \overline{DF} ?

$$DE + EF = 4 \text{ cm} + 3 \text{ cm} \\ = 7 \text{ cm}$$

$$DE + EF > DF$$

$$7 \text{ cm} > DF$$

So, DF is greater than 4 centimeters and less than 7 centimeters. The possible lengths of DF are 5 centimeters and 6 centimeters.

- 13.** In triangle ABC , $AB = 5$ inches, $BC = 6$ inches, and AC is greater than 4 inches. What are the possible lengths of \overline{AC} ?
- 14.** XYZ is a triangle in which $XY = 11$ centimeters and $YZ = 15$ centimeters. The length of XZ is in whole centimeters and is greater than 20 centimeters. What are the possible lengths of \overline{XZ} ?

Name: _____

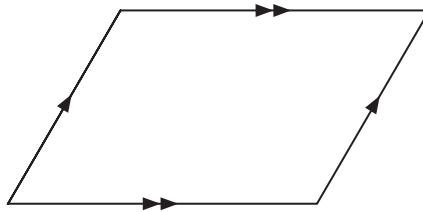
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Worksheet 5 Parallelogram, Rhombus, and Trapezoid

The figures are not drawn to scale.

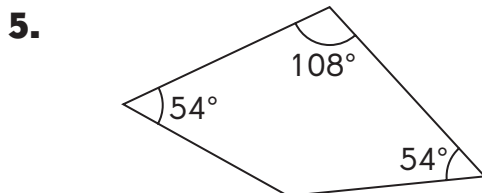
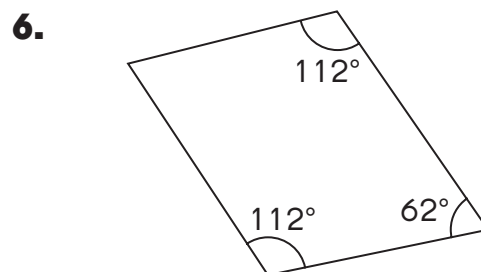
Write *true* or *false* for each statement.

The figure is a parallelogram.



1. All sides are of equal length. _____
2. All angle measures are equal. _____
3. Opposite sides of the parallelogram are of equal length. _____
4. The measures of the opposite angles of the parallelogram are equal. _____

Put a check in the box if the figure is a parallelogram.

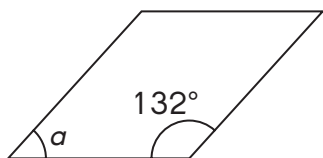
☐☐

Name: _____

Date: _____

Find the unknown angle measure(s) in each parallelogram.

Example

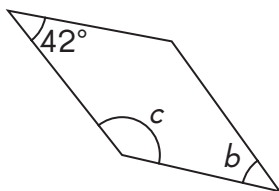


$$\begin{aligned} m\angle a &= 180^\circ - 132^\circ \\ &= 48^\circ \end{aligned}$$

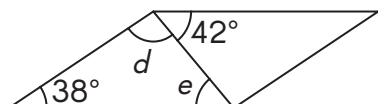
This is a **parallelogram**.
The opposite sides are parallel.



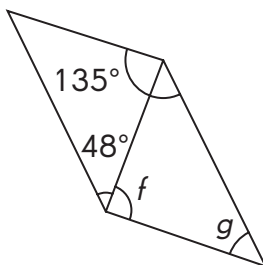
7.



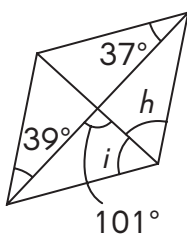
8.



9.



10.

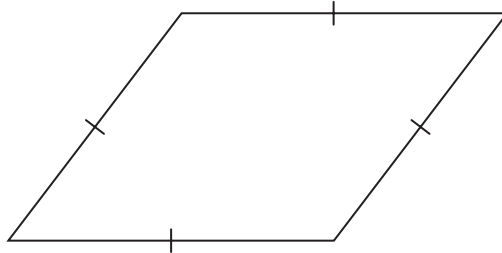


Name: _____

Date: _____

Write *true* or *false* for each statement.

The figure is a rhombus.



11. All the sides of a rhombus are of equal length. _____

12. All the angle measures of a rhombus are equal. _____

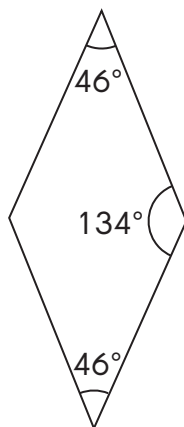
13. Opposite sides of a rhombus are of equal length. _____

14. The measures of the opposite angles of a rhombus are equal. _____

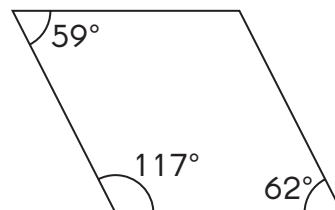
15. A rhombus is also a parallelogram. _____

Put a check in the box if the figure is a rhombus.

16.

☐

17.

☐

Name: _____

Date: _____

Find the unknown angle measure(s) in each rhombus.

Example

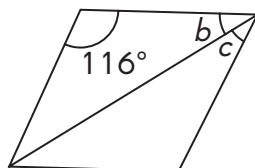


$$\begin{aligned} m\angle a &= 180^\circ - 148^\circ \\ &= 32^\circ \end{aligned}$$

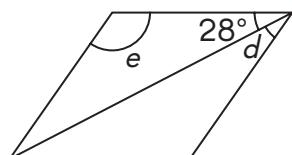
A **rhombus** is a special kind of parallelogram.



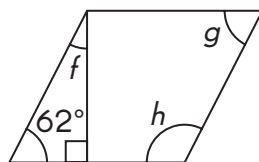
18.



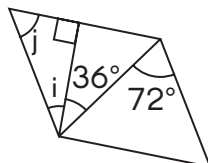
19.



20.



21.

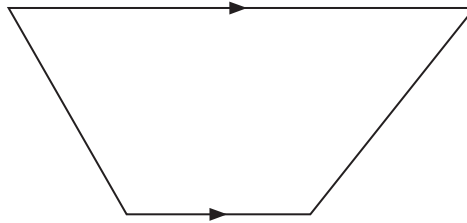


Name: _____

Date: _____

Write *true* or *false* for each statement.

The figure is a trapezoid.



22. All the sides of a trapezoid are of equal length. _____

23. All the angle measures of a trapezoid are equal. _____

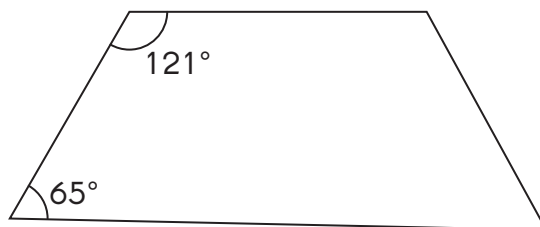
24. A trapezoid has only one pair of opposite sides of equal length. _____

25. A trapezoid has only one pair of opposite angles of equal measure. _____

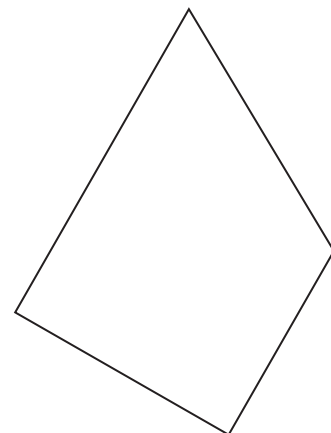
26. A trapezoid is also a parallelogram. _____

Put a check in the box if the figure is a trapezoid.

27.

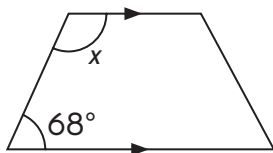
☐

28.

☐

Name: _____

Date: _____

Find the unknown angle measure(s) in each trapezoid.*Example*

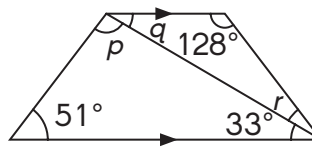
$$m\angle x + \underline{68^\circ} = 180^\circ$$

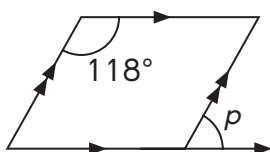
$$m\angle x = \underline{180^\circ} - \underline{68^\circ}$$

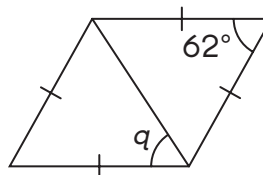
$$= \underline{112^\circ}$$

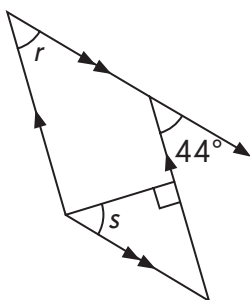
This is a **trapezoid**.
One pair of opposite sides is parallel.

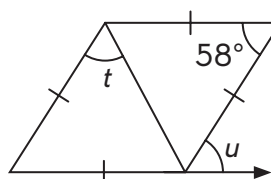
**29.**

30.

31.

32.

33.

34.

35.