



7th  
Basic

8th  
Advanced

# Helping With Math

USA  
GRADES

## Similar Shapes

*Suitable for students  
aged 11-13*



This pack is suitable for learners aged 11 to 13 years old or 7th and 8th graders (USA). The content covers fact files and relevant basic and advanced activities involving similar shapes.

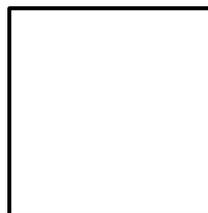
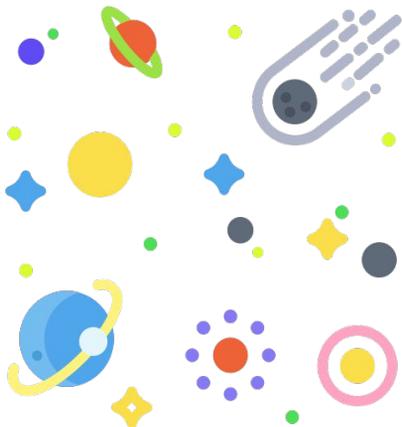


There are many similar shapes in the sky. How wonderful!

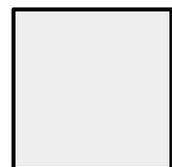


What are **Similar Shapes**?

- Similar shapes are two shapes having the same shape but different sizes.
- These shapes also have equal corresponding angles and sides.



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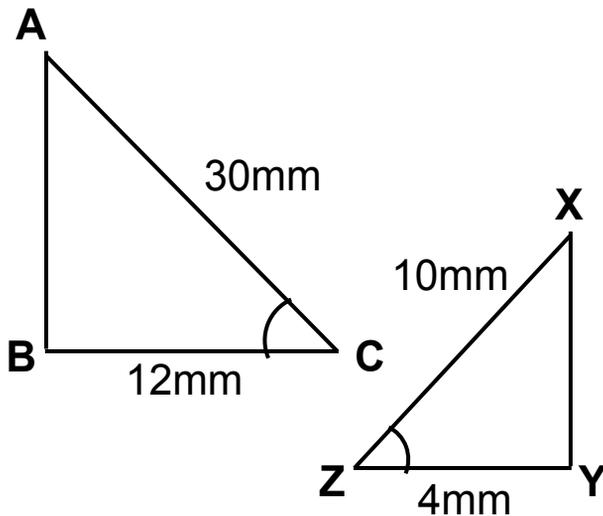
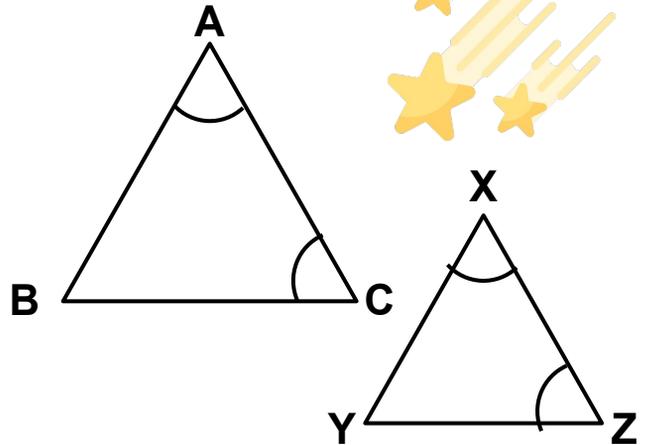


# SIMILAR TRIANGLE THEOREMS



## ANGLE-ANGLE THEOREM (AA)

This states if two triangles have two pairs of corresponding angles that are congruent, then the two triangles are similar.



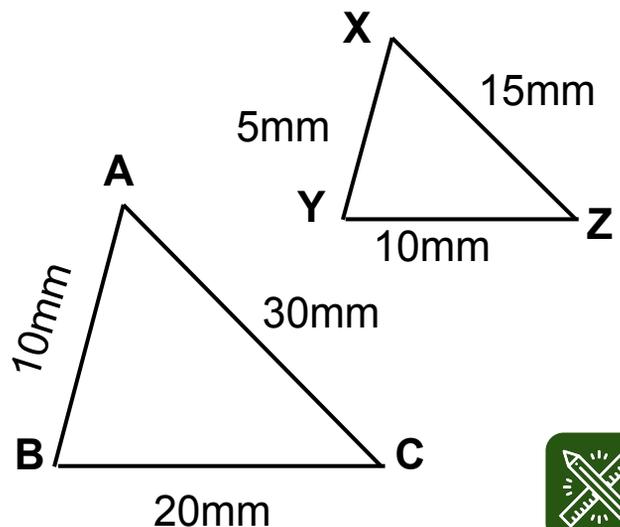
## SIDE-ANGLE-SIDE THEOREM (SAS)

This states that if two sides of one triangle are proportional to two corresponding sides of another triangle, and their included angles are congruent, then the two triangles are similar.

*The sides should have the same ratio. In this example, both corresponding sides are equal to 3mm when divided by each other.*

## SIDE-SIDE-SIDE THEOREM (SSS)

This states that if two triangles have proportional sides, then they are similar.

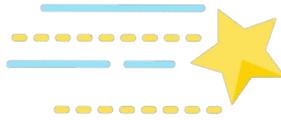


## LET'S PRACTICE!

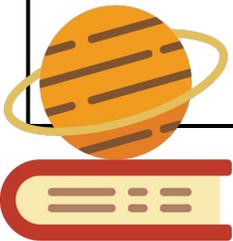


### WHAT IS THE DIFFERENCE BETWEEN CONGRUENT & SIMILAR?

Congruent shapes have the same length, shape and size. Similar shapes have the same shape but differs in length and size.



Illustrate three examples of Similar Shapes based on your understanding on the topic.



# TABLE OF ACTIVITIES

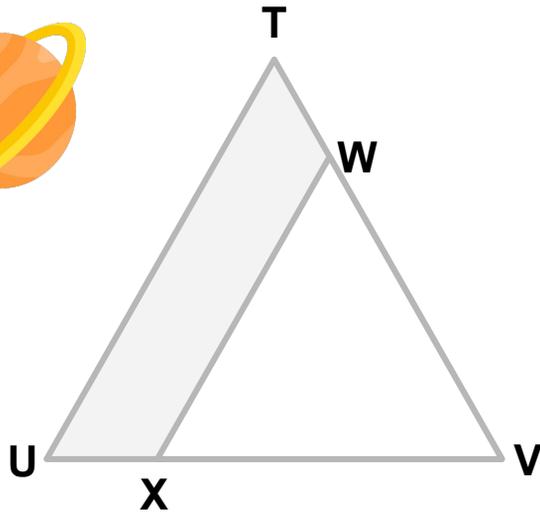
Ages 11-12 (Basic)		7th Grade
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2	My Dream	
3	The Lost Astronaut	
4	The Constellations	
5	Planets and Stars	
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# ELEMENTS IN THE UNIVERSE

G7  
Basic

You are very interested with astronomy. You love reading books about the different elements in the universe. Identify all the proportional sides of the triangles shown below.



$$\triangle TUV \sim \triangle WXV$$

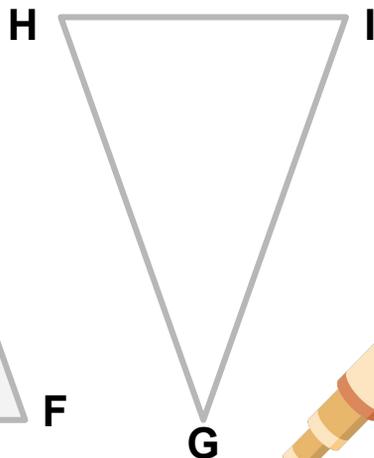
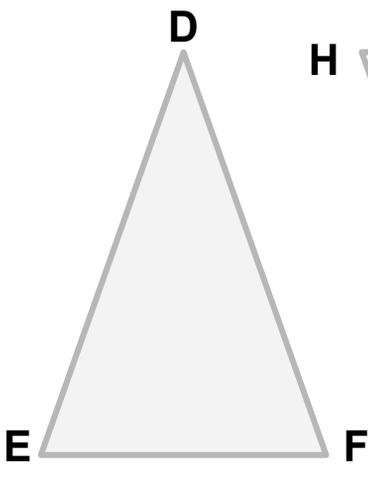
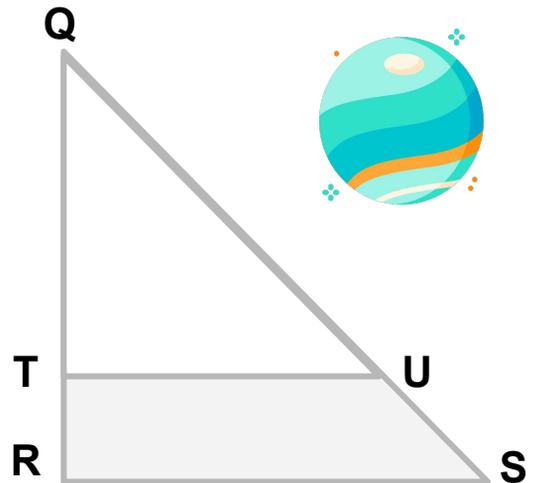
Blank space for writing the answer, consisting of a rectangular box with three horizontal lines, the middle one shaded gray.



$$\triangle QRS \sim \triangle QTU$$



Blank space for writing the answer, consisting of a rectangular box with three horizontal lines, the middle one shaded gray.



$$\triangle DEF \sim \triangle GHI$$

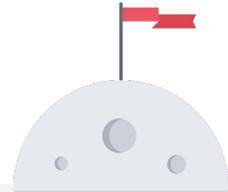
Blank space for writing the answer, consisting of a rectangular box with three horizontal lines, the middle one shaded gray.



# MY DREAM

G7  
Basic

You are dreaming of someday going to the outer space to see the different elements and objects there. Illustrate the triangles being described in the statements below.



$\triangle CDE$  is similar to  $\triangle HIJ$ . Both of them are right triangles with corresponding angles, D and I and corresponding sides DE and IJ.

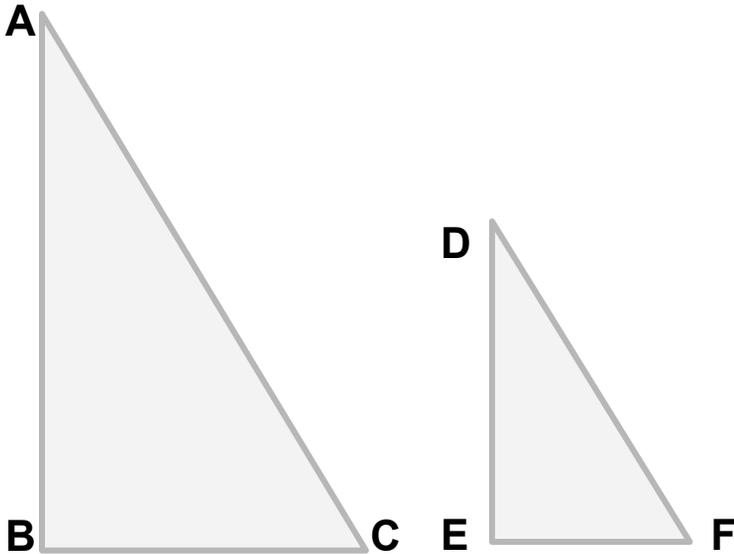
$\triangle CBA$  is similar to  $\triangle FED$ . Both triangles are equilateral with all sides proportional to each other.



# THE LOST ASTRONAUT

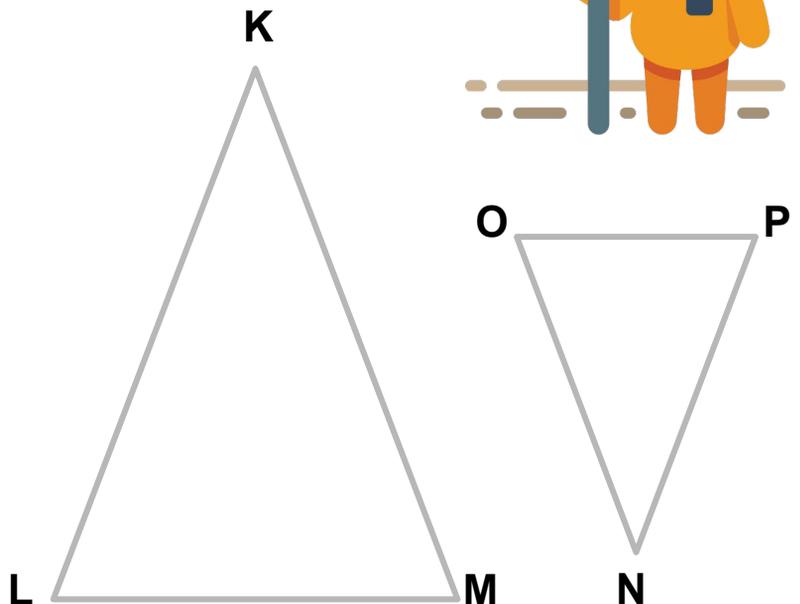
G7  
Basic

Help the astronaut find his way home by completing the statements below based on the given triangles.



<b>ANGLES</b>	
$\angle A \cong$	_____
_____ $\cong$	$\angle E$
$\angle C \cong$	_____
<b>SIDES</b>	
$AB \cong$	_____
_____ $\cong$	$EF$
_____ $\cong$	$DF$

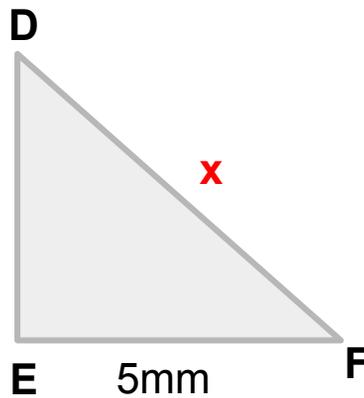
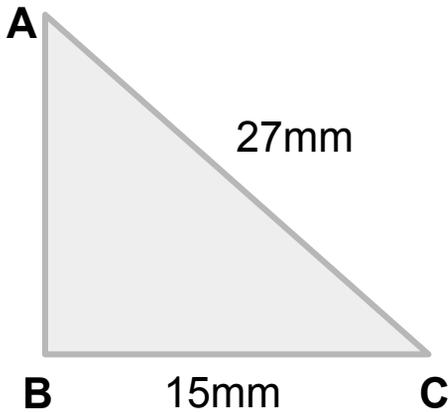
<b>ANGLES</b>	
$\angle K \cong$	_____
_____ $\cong$	$\angle P$
$\angle L \cong$	_____
<b>SIDES</b>	
$KL \cong$	_____
$LM \cong$	_____
_____ $\cong$	$NP$



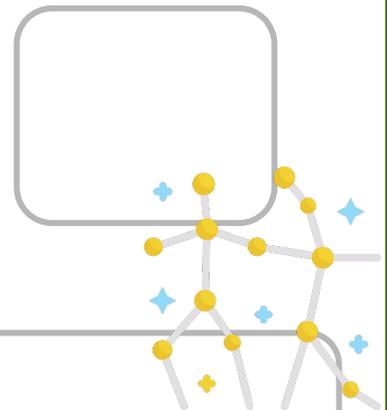
# THE CONSTELLATIONS

G7  
Basic

You planned to watch the stars with your friends tonight. Find the different constellations in the sky as you find the missing "x" to complete the measurements of the triangles below. Don't forget to show your solutions.

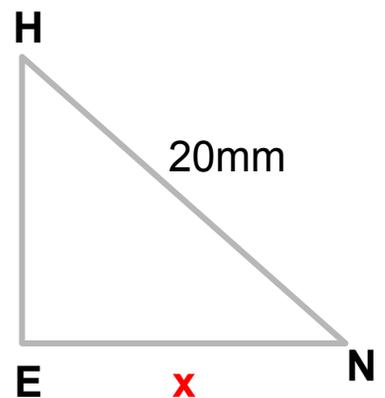
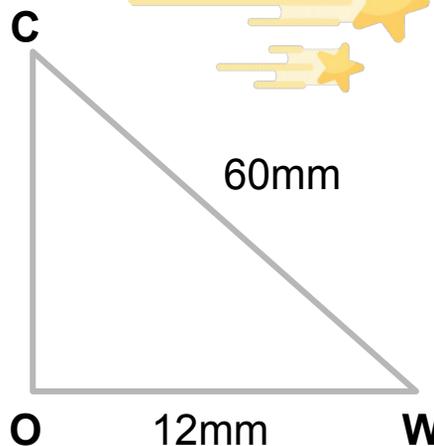


$\triangle ABC \sim \triangle DEF$   
Find x.



Show your solution:

$\triangle COW \sim \triangle HEN$   
Find x.



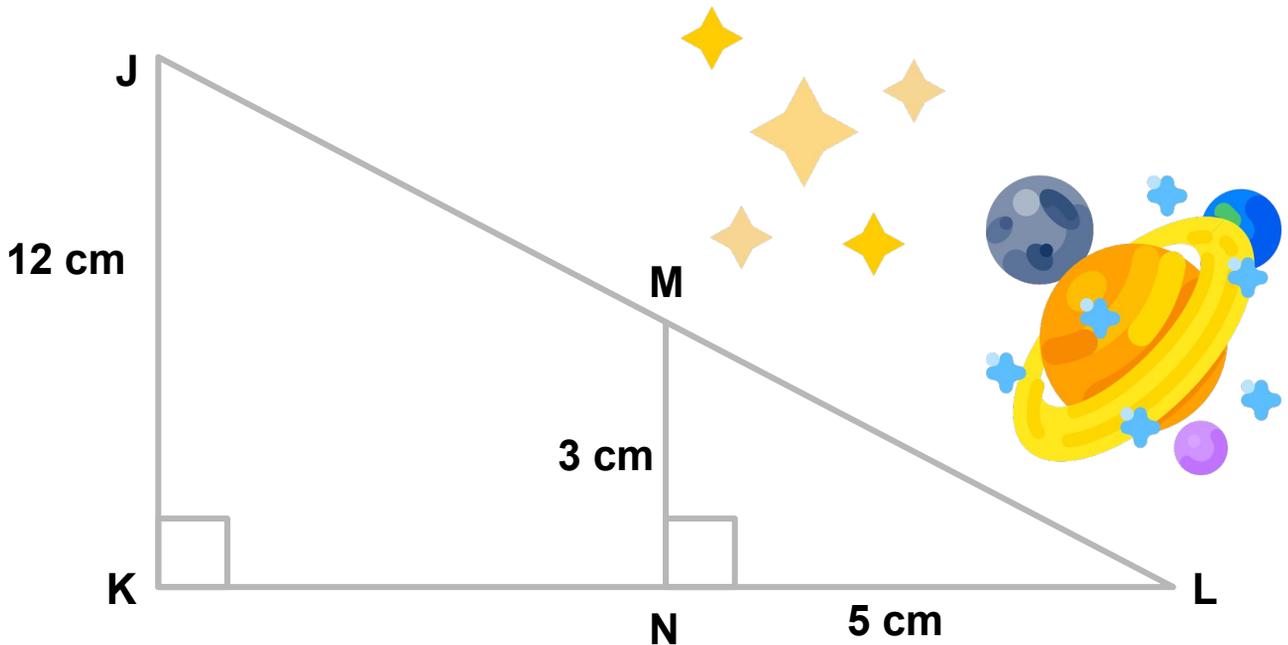
Show your solution:



# PLANETS AND STARS

G7  
Basic

Planets and stars have different characteristics each. Based on the triangles below, provide the answers for the questions below.



Which side is congruent to side $JK$ ?	
What is the length of side $KL$ ?	
What is the measurement of angle $K$ and angle $N$ ?	
Which side is congruent to side $ML$ ?	
If side $ML$ is measured at $6\text{m}$ , what is the length of side $JL$ ?	

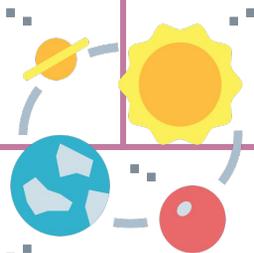


# DIFFERENT THEOREMS

G8  
Advanced

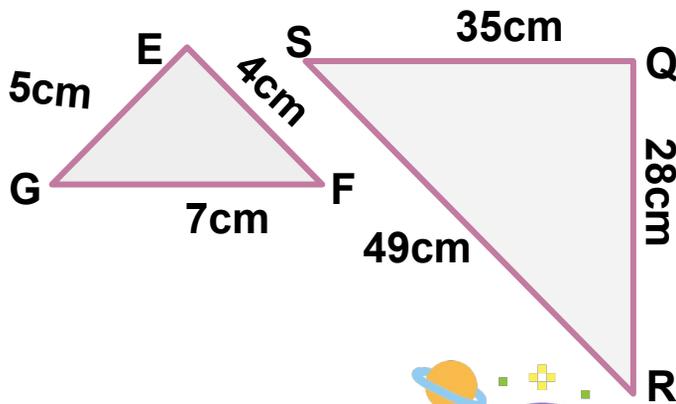
There are different theories on how the solar system was created. Similar triangles also have different theorems to prove their similarity. Enumerate these theorems and provide the statements and examples for each.

THEOREM	STATEMENT	EXAMPLE

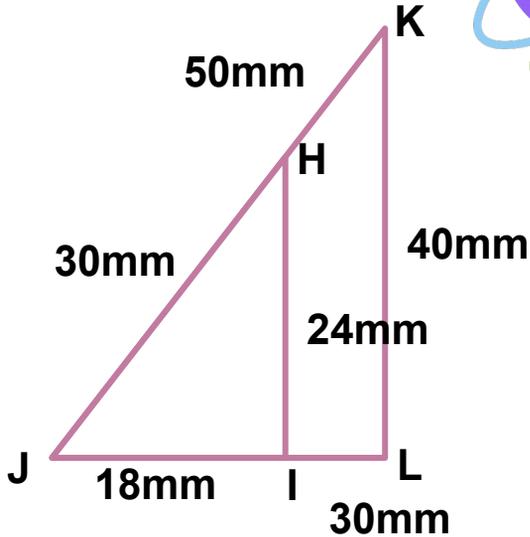
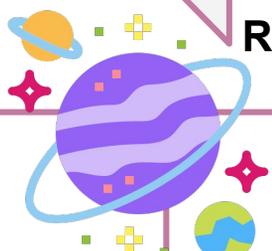


# SAME FEATURES

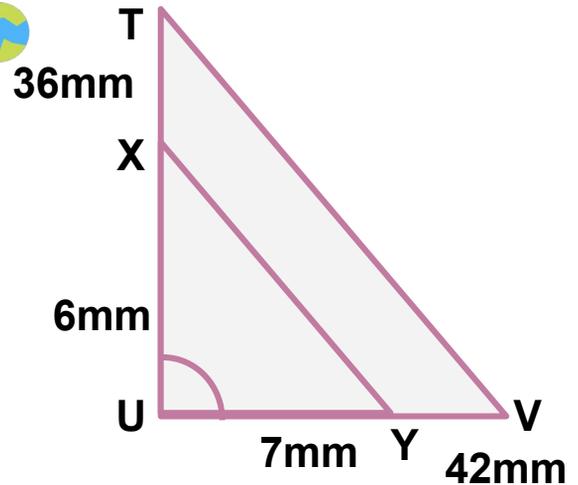
Planets have similar features. Complete the statements below and prove that the triangles below are similar.



$\triangle EFG \sim$  \_\_\_\_\_



$\triangle KIJ \sim$  \_\_\_\_\_



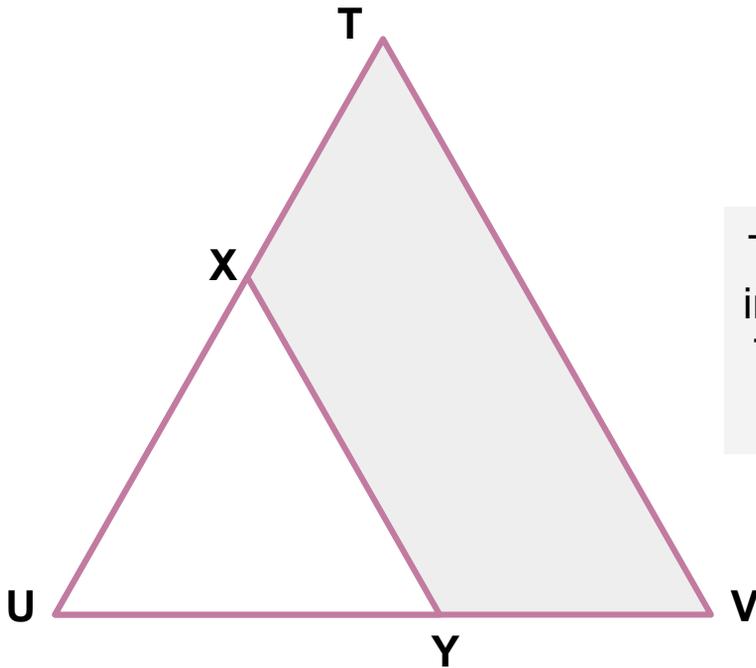
$\triangle TUV \sim$  \_\_\_\_\_



# LIFE IN ANOTHER PLANET

G8  
Advanced

There have been theories of life in another planet. The triangles below are said to be similar. Prove the statements below.

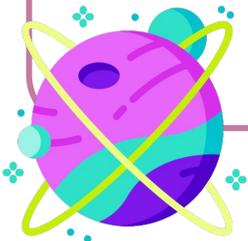


This shows  $\triangle TUV$ , where X is the midpoint of side TU, and Y is the midpoint of side UV.



Prove that  $\triangle TUV$  is similar to  $\triangle XUY$ .

Prove that side TV is parallel to side XY.



# JOHN AND SIMON

G8  
Advanced

Being an astronaut is a very honorable job. Read the short statement about John and Simon. Provide what is being asked and show your solution and illustration below.

John, an astronaut, is standing under the sun right next to his colleague, Simon, while waiting for their departure. He is 6 feet tall. While waiting, he noticed both of their shadows and decided to measure it. The length of his shadow is 7 feet while his colleague's shadow is 6 feet.

Assuming that they are both standing straight forming right angles to the ground, what is the height of Simon?

**Final Answer:**



# WHY IS IT IMPORTANT?

G8  
Advanced

**Studying Astronomy is very important. Studying about Similar Shapes is also important. What do you think is the importance of this topic? Write down your answer below.**



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# ANSWER GUIDE

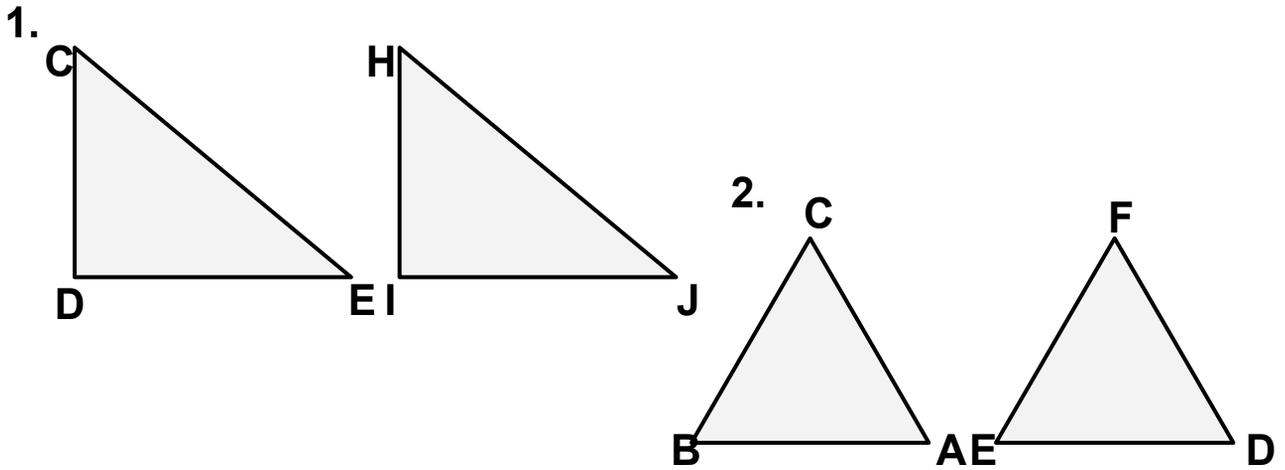
## Activity 1

1.  $TV \cong WV$   
 $TU \cong WX$   
 $UV \cong XV$

2.  $QS \cong US$   
 $QR \cong QT$   
 $RS \cong TU$

3.  $DF \cong GI$   
 $DE \cong GH$   
 $EF \cong HI$

## Activity 2



## Activity 3

### 1. ANGLES

$\angle A \cong \angle D$   
 $\angle B \cong \angle E$   
 $\angle C \cong \angle F$

### SIDES

$AB \cong DE$   
 $BC \cong EF$   
 $AC \cong DF$

### 2. ANGLES

$\angle K \cong \angle N$   
 $\angle M \cong \angle P$   
 $\angle L \cong \angle O$

### SIDES

$KL \cong NO$   
 $LM \cong OP$   
 $KM \cong NP$



# ANSWER GUIDE

## Activity 4

1.  $x = 27 \text{ mm}$

$$\frac{27\text{mm}}{x} = \frac{15\text{mm}}{5\text{mm}}$$

$$\begin{aligned}(27\text{mm})(5\text{mm}) &= (15\text{mm})x \\ 135\text{mm} &= (15\text{mm})x \\ x &= 135\text{mm}/15\text{mm} \\ x &= 27\text{mm}\end{aligned}$$

2.  $x = 4\text{mm}$

$$\frac{60\text{mm}}{20\text{mm}} = \frac{12\text{mm}}{x}$$

$$\begin{aligned}(60\text{mm})(x) &= (20\text{mm})(12\text{mm}) \\ (60\text{mm})x &= 240\text{mm} \\ x &= 240\text{mm}/60\text{mm} \\ x &= 4\text{mm}\end{aligned}$$

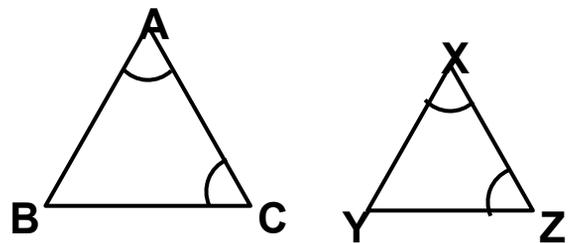
## Activity 5

1. MN
2. 20 cm
3.  $90^\circ$
4. JL
5. 24 cm

## Activity 6

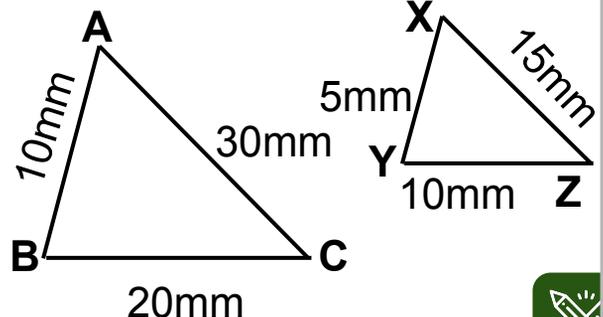
### ANGLE-ANGLE THEOREM (AA)

This states if two triangles have two pairs of corresponding angles that are congruent, then the two triangles are similar.



### SIDE-SIDE-SIDE THEOREM (SSS)

This states that if two triangles have proportional sides, then they are similar.

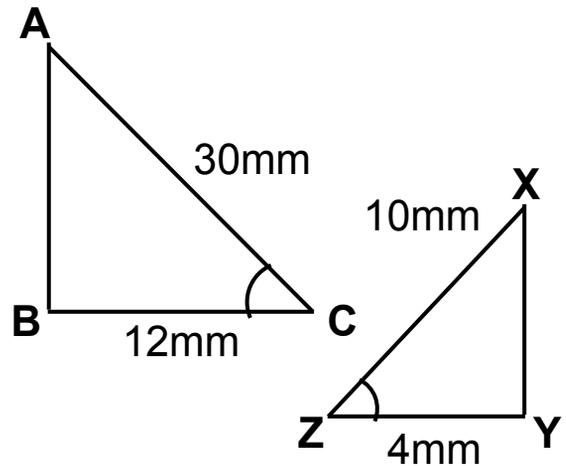


# ANSWER GUIDE

## Activity 6

### SIDE-ANGLE-SIDE THEOREM (SAS)

This states that if two sides of one triangle are proportional to two corresponding sides of another triangle, and their included angles are congruent, then the two triangles are similar.



## Activity 7

1.  $\triangle QRS$  - SSS Postulate
2.  $\triangle HIJ$  - SSS Postulate
3.  $\triangle XUV$  - SAS Postulate

## Activity 8

1.  $\angle TUV$  is congruent to  $\angle XUY$

$XU$  is the midpoint of  $TU$

$YU$  is the midpoint of  $VU$

Based on the SAS postulate,  $\triangle TUV$  is similar to  $\triangle XUY$ .

2.  $\angle UXY$  is congruent to  $\angle UTV$

$\angle UYX$  is congruent to  $\angle UVT$

Based on the AA Postulate,  $TV$  is parallel to  $XY$



# ANSWER GUIDE

## Activity 9

$$\frac{6\text{ft}}{x} \times \frac{7\text{ft}}{6\text{ft}}$$

$(6\text{ft})(6\text{ft}) = (7\text{ft})x$   
 $36\text{ft} = (7\text{ft})x$   
 $x = 36\text{ft}/7\text{ft}$   
 $x = 5.14 \text{ ft}$

**6 ft**

JOHN

**7 ft**

**x**

SIMON

**6 ft**

**Final answer: 5.14 ft**

## Activity 10

It can be used to measure heights that are unmeasurable by hand. It can also be used for aerial photography by showing the distance to the ground.

*\*This activity is subjective. Answers may vary.*



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