



7th
Basic

8th
Advanced

Helping With Math

USA
GRADES

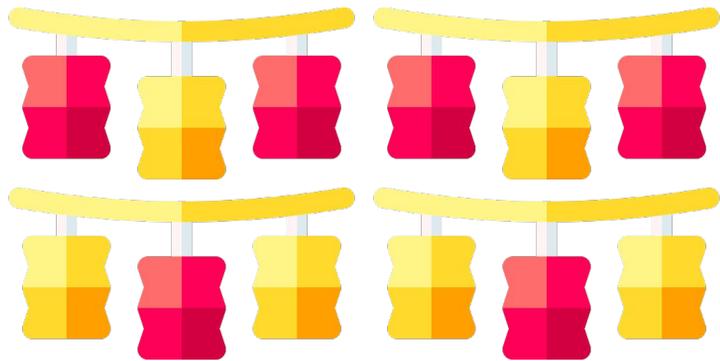
Complementary Angles

Suitable for students
aged 11-13



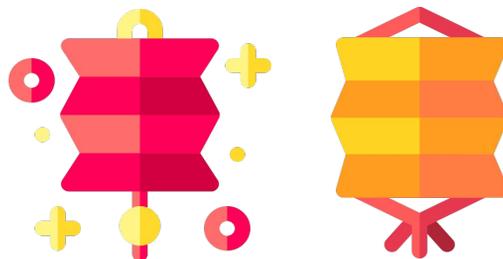
This pack is suitable for learners aged 11-13 years old or 7th to 8th grades (USA). The content covers fact files and relevant basic and advanced activities involving complementary angles.

Lantern Festival



Lantern Festival is also called Yuan Xiao Festival. This traditionally marks the first full moon of the new lunar year and the end of the Chinese New Year. It is one of the romantic traditional Chinese festivals.

- It is always celebrated between February 4 and March 6.
- Chinese Lantern Festival will fall on February 15, Tuesday.

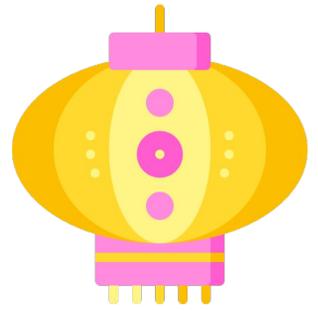


Chinese people celebrate this by watching and enjoying colored lantern displays and eating *tangyuan*.



ANGLES

In geometry, an angle can be defined as the figure formed by two rays meeting at a common endpoint called a vertex. Angle measures the amount of turn of its rays in degrees.



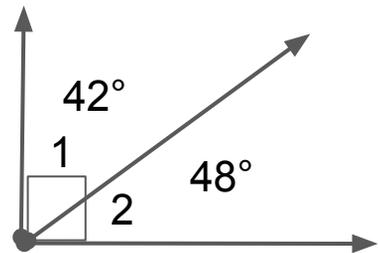
TYPES OF ANGLES

Acute Angles	angles which measure less than 90°
Right Angles	angles which measure exactly 90°
Obtuse Angles	angles which measure greater than 90° but less than 180°
Straight Angles	angles which measure exactly 180°
Reflex Angles	angles which measure greater than 180° but less than 360°

Remember: A full rotation angle measures exactly 360° .

COMPLEMENTARY ANGLES

Complementary angles are two angles with a sum of 90 degrees that form a right angle.



$\angle 1$ and $\angle 2$ are **complementary angles**.

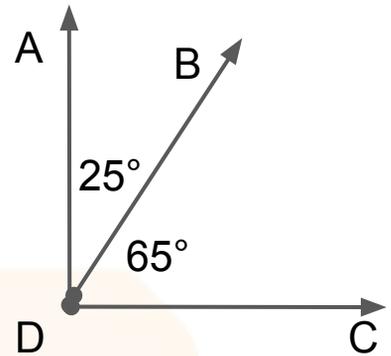
- 42° is the complement of 48°
- 48° is the complement of 42°
- Complementary angles can be either adjacent or nonadjacent.
- Complementary angles are only limited to two angles. Three or more angles with a sum of 90° cannot be complementary.
- Two acute angles of a right-angled triangle are complementary.



ILLUSTRATIVE EXAMPLES

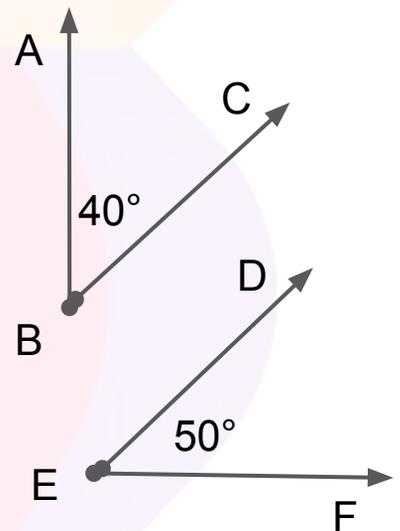
ADJACENT COMPLEMENTARY ANGLES

These are angles with a common vertex and a common side (arm). In the figure given, $\angle ADB$ and $\angle CDB$ are adjacent angles as they have a common vertex and side. Also, they have a sum of 90° . Thus, these two angles are adjacent complementary angles.



NON-ADJACENT COMPLEMENTARY ANGLES

Angles are nonadjacent angles as they NEITHER have a common vertex nor a common side (arm). In the figure given, $\angle ABC$ and $\angle DEF$ add up to 90° and do not have common a vertex and arm. Thus, these two angles are non-adjacent complementary angles.



PRACTICE EXERCISES

- 1.) If $\angle ABC$ and $\angle DEF$ are complementary angles, what is the measurement of $\angle DEF$?

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

- 2.) If $\angle WXY = 67^\circ$, what is the measurement of $\angle YXZ$?

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

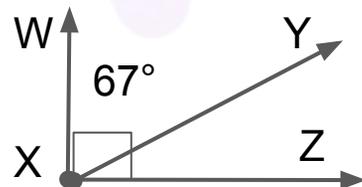
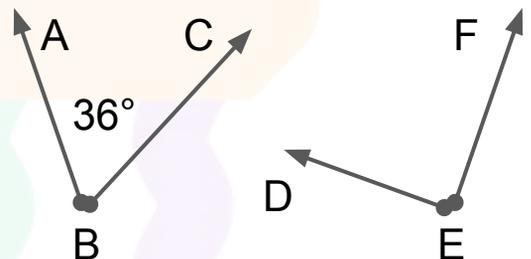


TABLE OF ACTIVITIES

Ages 11-12 (Basic)		<u>7th Grade</u>
1	Lantern Festival Preparation	
2	Festival Greeting Card	
3	Lantern Making Contest	
4	Guessing Lantern Riddles	
5	Do-It-Yourself Lantern	
Ages 12-13 (Advanced)		<u>8th Grade</u>
6	Lion Dance Route	
7	Dancing On Stilts	
8	Circular Lanterns	
9	Rice Dumpling Balls	
10	Beautiful Lanterns	



LANTERN FESTIVAL PREPARATION

G7
Basic

It's Lantern Festival Day! Andrew's family is preparing to go to watch the beautiful lanterns. To get a pass, they need to identify whether the statements are true or not. Write TRUE if the statement is TRUE. Otherwise, correct the statement.



1. An angle which measures 180.1° is a straight angle.

2. The complement of 62° is a 26° .

3. Two angles with a sum of 90° are complementary angles.

4. 18° and 82° are complementary angles.

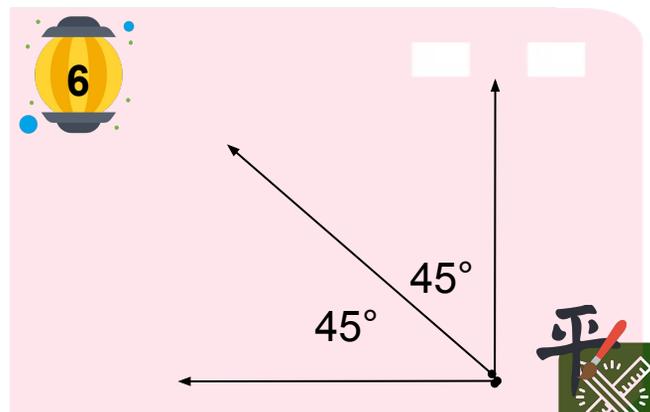
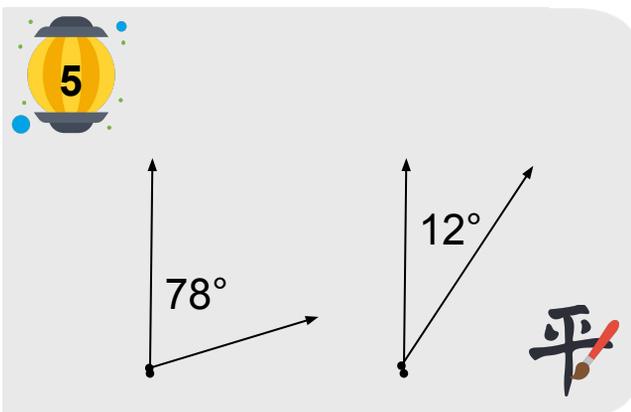
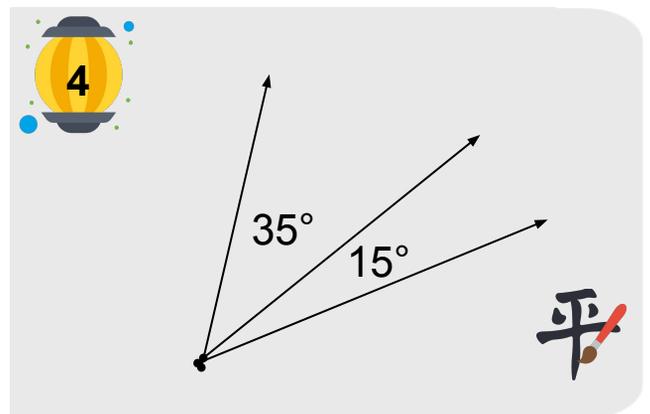
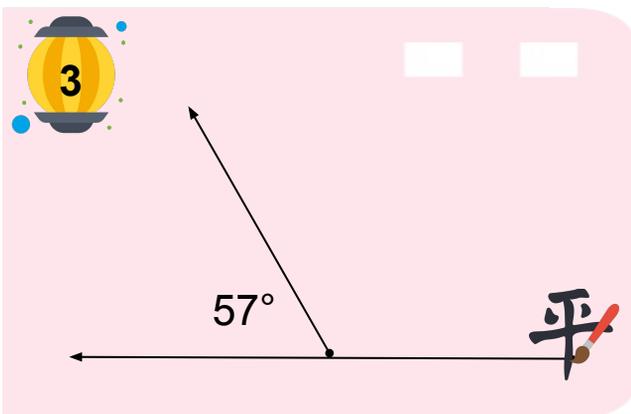
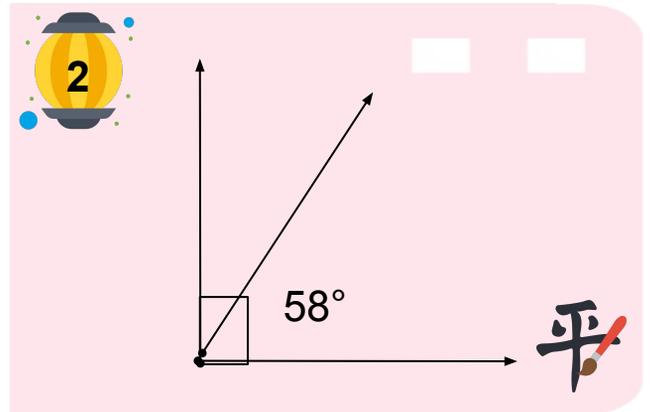
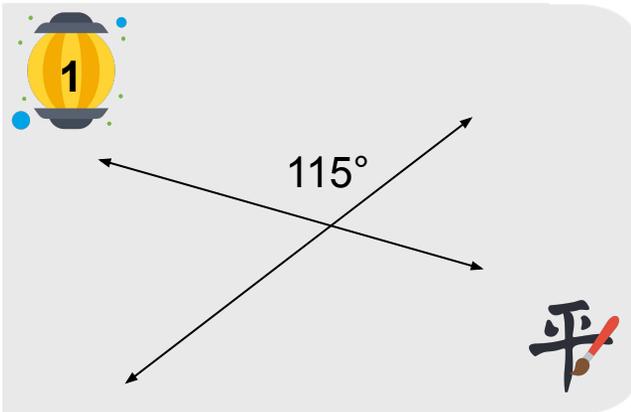
5. Complementary angles can also be adjacent angles.



FESTIVAL GREETING CARD

G7
Basic

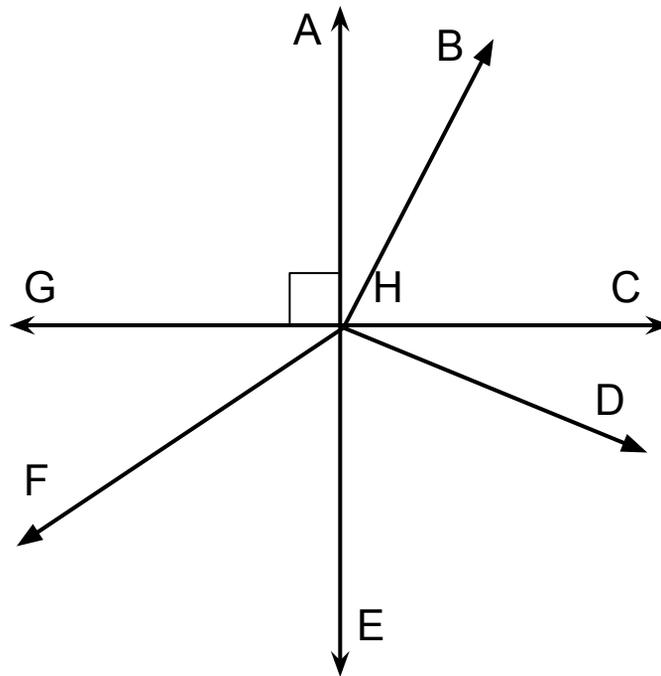
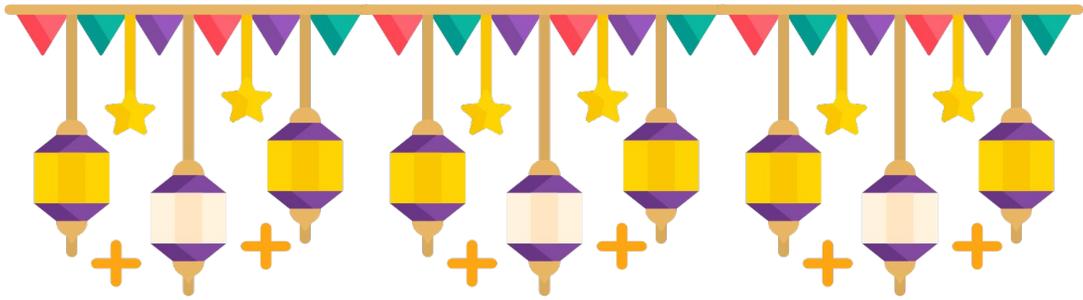
Feel the festival spirit by giving and sending these greeting cards to your closest friends with different angle designs on them. Before writing a message and giving it to them, identify the complementary angles by encircling the numbers.



LANTERN MAKING CONTEST

G7
Basic

Every year, thousands of lanterns are seen on the streets. As part of the celebration, Chinese people organize a lantern-making competition. Have a chance to know each lantern by identifying the pairs of complementary angles given in the figure.



1.

2.

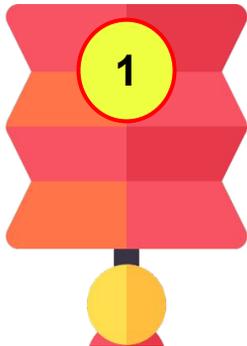
3.



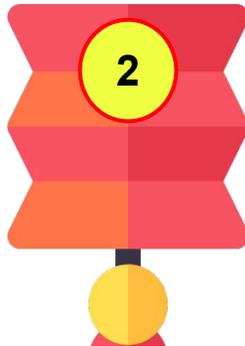
GUESSING LANTERN RIDDLES

G7
Basic

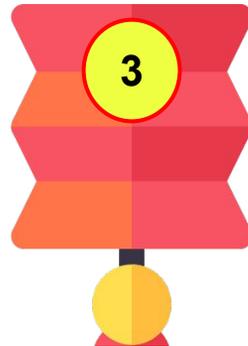
Lantern owners write riddles on paper notes and attach them to the lanterns. People try to guess the riddles and get a small prize if the answer is correct. This year, they included a math problem. Find the complement of each angle shown below and get a prize.



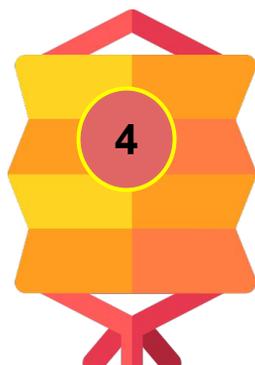
What is the complement of 65° ?



What is the complement of 12° ?



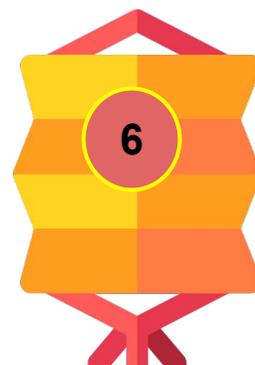
What is the complement of 23° ?



What is the complement of 17.1° ?



What is the complement of 33.29° ?



What is the complement of 88.67° ?



DO-IT-YOURSELF LANTERN

G7

Basic

Andrew and his cousins joined the DIY lantern contest in their school. They need to use the concept of complementary angles in making one. To be accurate, Andrew needs to measure the angles. Help Andrew illustrate the adjacent complementary angles below by drawing them inside each lantern.

1) 52° & 38°

2) 25° & 65°

3) 45° & 45°

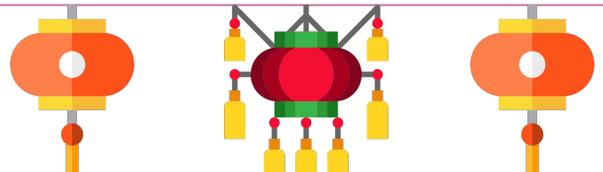
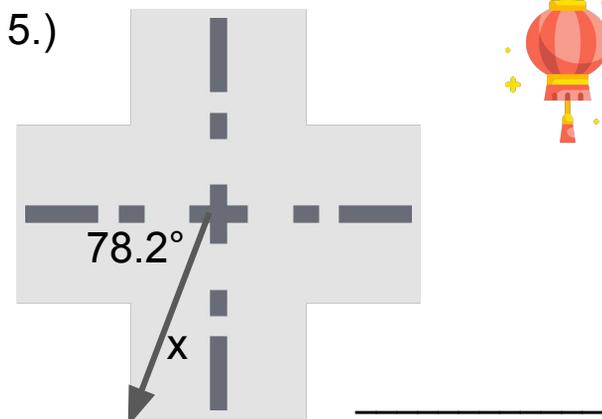
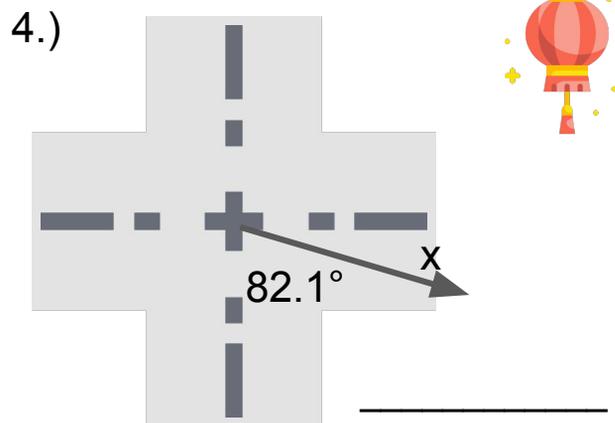
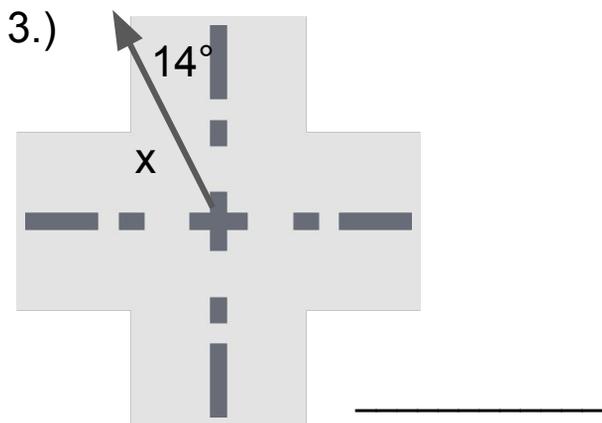
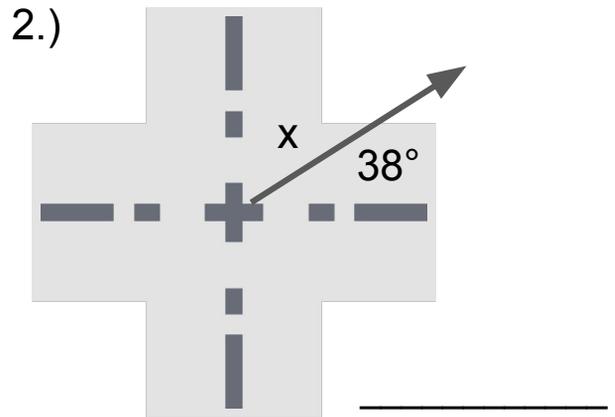
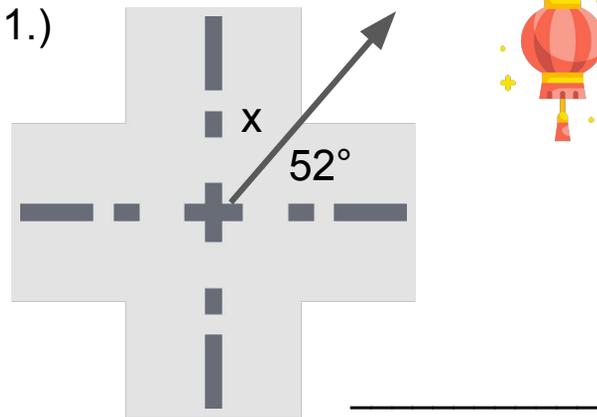
4) 18.5° & 71.5°



LION DANCE ROUTE

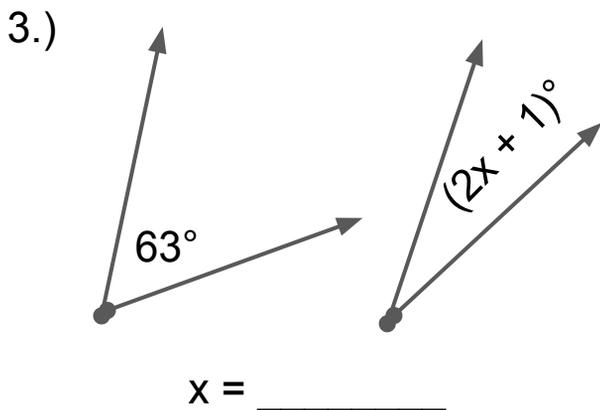
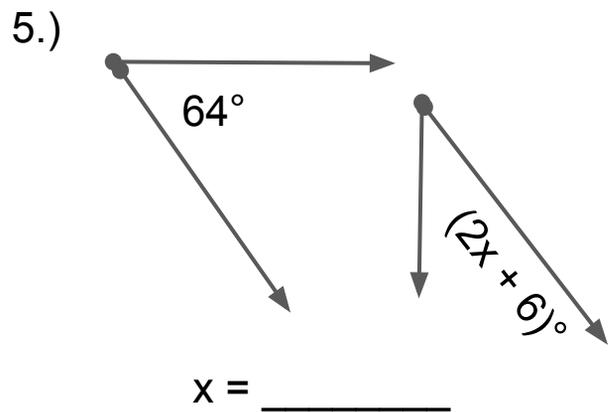
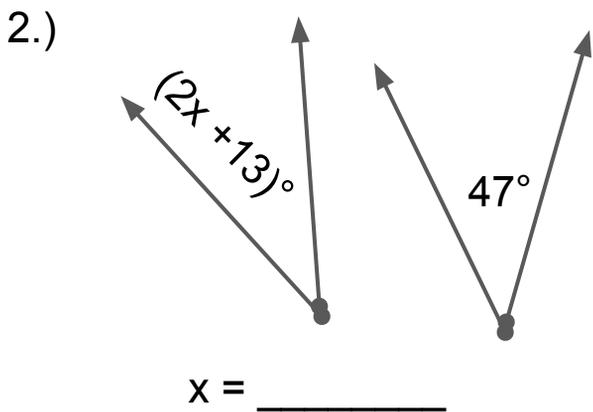
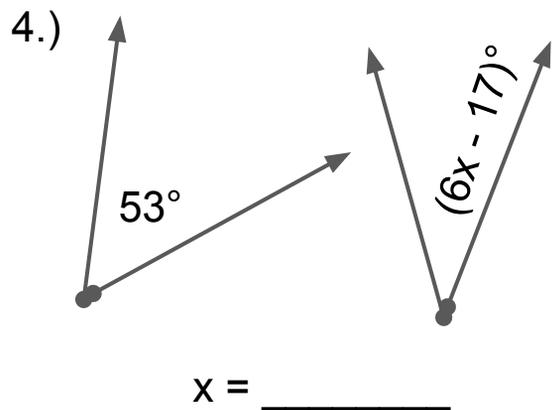
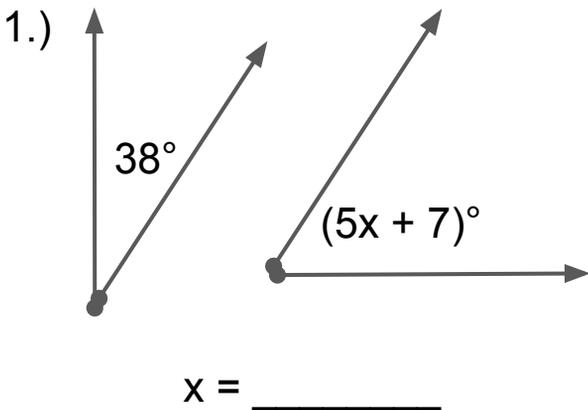
G8
Advanced

In some parts of China, dragon and lion dances are also performed during the Lantern Festival. The angles below are representations of the routes of the lion dance parade. Find the missing angle.



DANCING ON STILTS

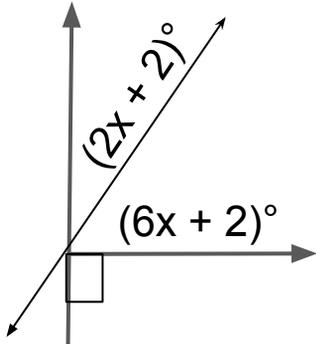
Dancing on stilts is very famous during the Chinese lantern festival. People are dancing while holding their lanterns and a pair of dancers needs to create angles using their arms which will have a sum of 90 degrees. Look at the angles formed and find the value of x .



CIRCULAR LANTERNS

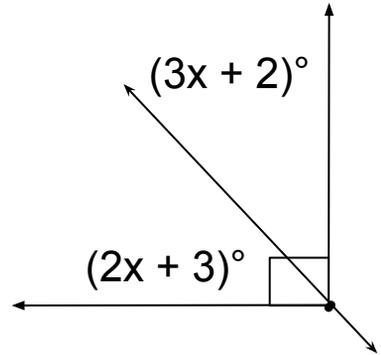
Mr. Tan's family is selling circular lanterns which have strings inside. Find the value of x and the measurements of the angles if they are complementary.

1.)



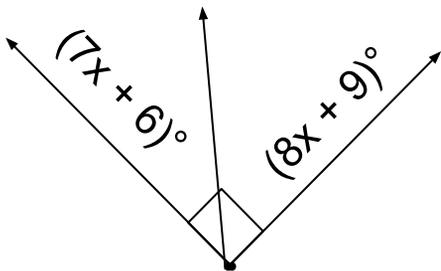
$x = \underline{\hspace{2cm}}$, $\angle = \underline{\hspace{2cm}}$, $\underline{\hspace{2cm}}$

4.)



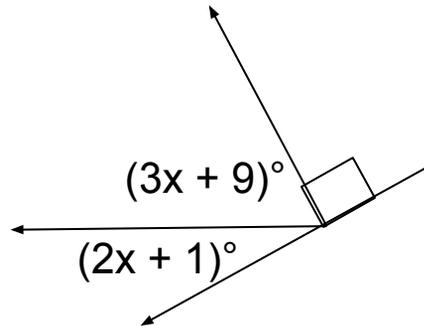
$x = \underline{\hspace{2cm}}$, $\angle = \underline{\hspace{2cm}}$, $\underline{\hspace{2cm}}$

2.)



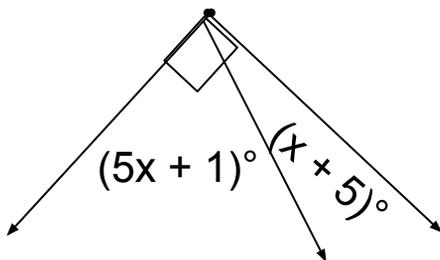
$x = \underline{\hspace{2cm}}$, $\angle = \underline{\hspace{2cm}}$, $\underline{\hspace{2cm}}$

5.)



$x = \underline{\hspace{2cm}}$, $\angle = \underline{\hspace{2cm}}$, $\underline{\hspace{2cm}}$

3.)



$x = \underline{\hspace{2cm}}$, $\angle = \underline{\hspace{2cm}}$, $\underline{\hspace{2cm}}$



RICE DUMPLING BALLS

G8
Advanced

During Chinese lantern festival, rice dumpling balls are on the streets. A group of Chinese people gives free rice dumpling balls to those who can answer their questions. Test yourself if you can get one.

- 1.) The measures of angles X and Y are complementary and equal. What is the measure of angles X and Y?

$$\angle X = \underline{\hspace{2cm}}$$

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

- 3.) The complement of an angle is 30 less than twice the angle. Find the larger angle.

$$\text{Angle} = \underline{\hspace{2cm}}$$

- 2.) An angle is 62 degrees less than its complement. Find both angles.

$$\text{Angle 1} = \underline{\hspace{2cm}}$$

$$\text{Angle 2} = \underline{\hspace{2cm}}$$

- 4.) Angles A and B are complementary. If $m\angle A = x + 2$ and $m\angle B = 4x - 7$, what is the measure of each angle?

$$\angle A = \underline{\hspace{2cm}}$$

$$\angle B = \underline{\hspace{2cm}}$$



BEAUTIFUL LANTERNS

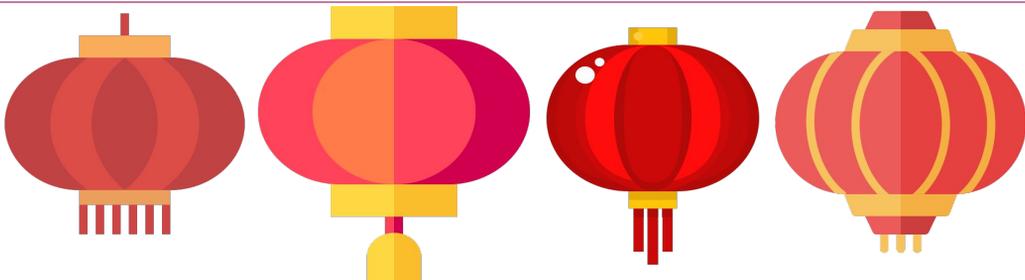
G8
Advanced

It's almost midnight, and Mr. Tan's children are about to rest. While fixing and looking at the beauty of the lanterns, they talked about the angles formed inside them. Here are their questions to each other.



- 1.) Give me at least one application of complementary angles in real life.

- 2.) True or False: All adjacent angles are complementary. Why true? Why false?



ANSWER GUIDE

Activity 1

- 1.) Obtuse angle 3.) True 5.) True
2.) 28° 4.) 72°

Activity 2

Complementary angles: 2, 5, 6

Activity 3

- 1.) $\angle AHB$ & $\angle BHC$ 2.) $\angle CHD$ & $\angle DHE$ 3.) $\angle EHF$ & $\angle FHG$

Activity 4

- 1.) 25° 2.) 78° 3.) 67° 4.) 72.9° 5.) 72.9° 6.) 1.33°

Activity 5

Illustrations of the angles may vary.

Activity 6

- 1.) 38° 2.) 52° 3.) 76° 4.) 7.9° 5.) 11.8°

Activity 7

- 1.) 9 2.) 15 3.) 13 4.) 9 5.) 10



ANSWER GUIDE

Activity 8

1.) $x = 10.75$, $\angle = 23.5^\circ$, 66.5°

2.) $x = 5$, $\angle = 41^\circ$, 49°

3.) $x = 14$, $\angle = 71^\circ$, 19°

4.) $x = 17$, $\angle = 53^\circ$, 37°

5.) $x = 16$, $\angle = 57^\circ$, 33°

Activity 9

1.) $\angle X = 45^\circ$, $\angle X = 45^\circ$

2.) Angle 1 = 14°

Angle 2 = 76°

3.) Angle = 50°

4.) $\angle A = 21^\circ$, $\angle X = 69^\circ$

Activity 10

1.) Answers may vary.

2.) False. There are adjacent angles which don't have a sum of 90 degrees.



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