

CRIME SCENE

Elementary



**SHAPES, AREA
& PERIMETER**



CSI ELEMENTARY

Shapes, Area & Perimeter

IDEAL UNIT:	Geometry	TIME RANGE:	45-60 Minutes	SUPPLIES:	Pencil & Paper
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TOPICS OF FOCUS:

- Classifying Shapes
- Calculating Area of Rectangles and Triangles
- Calculating Perimeter
- Volume with Cubes

COMMON CORE ALIGNMENT:

This particular unit was mapped to the curriculum of most upper elementary content standards. CSI activities are ideal as a small group unit review or an enrichment activity.

4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.
5.MD.C.3a	A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
5.MD.C.5b	Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.



CSI

General Procedures

*A.) As an optional hook, you can provide or read students the letter from Chief Harris. These are relatively the same for each CSI activity and introduce the criminal, world region the crimes take place and the math topic.

B.) Provide groups (ideally 2-3), the possible suspects, 6 crime scene puzzles and worksheet. You may choose to laminate the criminals or crime scenes for easier reuse. They also work well printed as a packet.

C.) Students will work to solve the crime. Generally, it takes between 45-60 minutes to complete. You can drop hints or provide assistance to help groups that are behind the pace. There are some problems that push advanced critical thinking in applications and others that focus on repeated skill practice. Previewing which crime scenes might be the most challenging so you can be prepared to help small groups or the whole class is a good idea.

Answers in this document are provided, but not with much detail because there have been instances of students or their parents purchasing the documents when teachers have opted to use it as a summative assessment.

D.) At the end of each scene, students will receive a clue that will substitute into the “Cryptic Text Message”. This provides an element of self-checking because if the Cryptic Text does not lead to a criminal, they know they need to recheck their work. In the end, students will determine which suspect should be arrested. *The gender, race and ethnicity of the guilty “suspect” is intentionally varied across the entire CSI series.*

*E.) There is an emphasis on “evidence” since this is an investigation. This means detailed work and the ability to argue their logic. You may like for students to create a portfolio of evidence proving that they have arrested the right person and will demonstrate their understanding of their mathematical content present in the problem.

*F.) Some teachers enjoy having their students present and defend their evidence to the class in a brief oral presentation.

*Optional Extensions

THE EVIDENCE

INVESTIGATOR: _____



1.

CLUE

2.

CLUE

3.

CLUE



4.

CLUE

5.

CLUE

6.

CLUE

CRYPTIC TEXT MESSAGE

SUSPECT

CSI: Shapes, Area & Perimeter



Detectives,

As you know, we are after a group of international evil geniuses, the Mathemagicians. Our evidence shows they have plans to build a world conquering device - to conquer the world. It seems that one of the henchmen, "Convex Dodecahedron", has committed a string of robberies all over Western Europe.

A cryptic text message was sent to police, but it requires the puzzles to be cracked. We've been told the result of the cryptic text message will calculate to Dodecahedron's favorite number.

Thus far there are six suspects that police have questioned. You need to be prepared to state your case and demonstrate your understanding of the following skills that Dodecahedron is known to use in the notes.



- Classifying Shapes
- Calculating Area of Rectangles and Triangles
- Calculating Perimeter
- Volume with Cubes

Good luck to you,

Chief Harris



THE SUSPECTS

Who is Convex Dodecahedron?



<p>NAME Doyle</p> <p>OCCUPATION Landscaper</p> <p>FAVORITE NUMBER 121</p> 	<p>NAME Tripiti</p> <p>OCCUPATION Pet Store Owner</p> <p>FAVORITE NUMBER 75</p> 
<p>NAME Trish</p> <p>OCCUPATION Factory Supervisor</p> <p>FAVORITE NUMBER 107</p> 	<p>NAME Sam</p> <p>OCCUPATION Recruiter</p> <p>FAVORITE NUMBER 90</p> 
<p>NAME Cesar</p> <p>OCCUPATION Insurance Claims Adjuster</p> <p>FAVORITE NUMBER 145</p> 	<p>NAME Charlie</p> <p>OCCUPATION Historian</p> <p>FAVORITE NUMBER 105</p> 



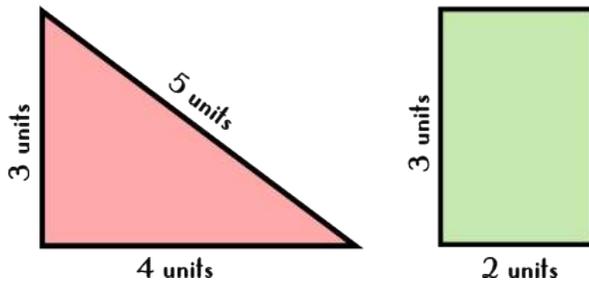
Scene #1 The Louvre -- Paris, France



Convex Dodecahedron broke into the Louvre and stole the Mona Lisa! It is unclear to police how the painting will be used in the World Conquering Device.

Convex Dodecahedron is going to rule the universe! Yay!

The Louvre is considering new designs for an exhibit space. Compare the areas and the perimeters of the two shapes.



Which is true? Find the clue!

Different Area & Different Perimeter A = 1	Same Area & Same Perimeter B = 2	Different Area & Same Perimeter Y = 3	Same Area & Different Perimeter Z = 4
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Scene #2 Spanish Port -- Bilbao, Spain

Convex Dodecahedron broke into a port and stole three ships.

A 	B
Sides	Sides
Angles	Angles
Y 	Z
Sides	Sides
Angles	Angles

Measure the sails on these boats. What types of triangles are they?

Use these words to fill-in the blanks.

Sides: Equilateral, Isosceles, Scalene
Angles: Acute, Obtuse, Right

One of the sails has side and angle classifications that both repeat. The letter of this sail will be equal to 10.

_____ = 10

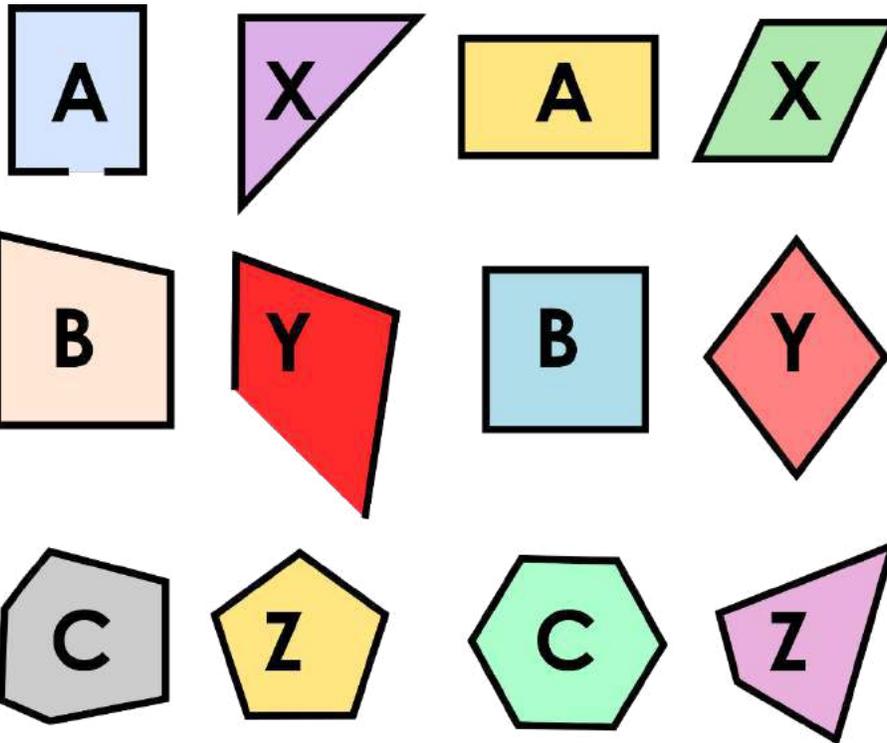


A security guard noticed that an ancient cannon was stolen from the Tower of London.

Mystery Jewel



In London, Sherlock Holmes is on the hunt for a mystery jewel. Use the clues to determine which jewel is the mystery jewel.



1. The mystery jewel is a closed shape, not open.
2. The mystery jewel is not a regular polygon.
3. The mystery jewel has four angles.
4. The mystery jewel has only one pair of parallel sides.

The letter of the leftover jewel will be equal to 25.

 = 25

Scene #4 Deutches Museum -- Berlin, Germany

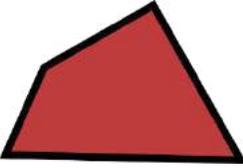
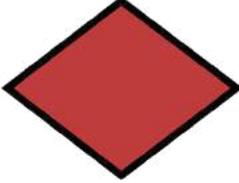
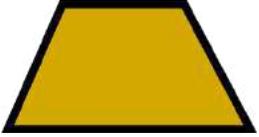


In the night, Dodecahedron stole the entire exhibit of German stain glass.



Consider these four unique pieces of German stained glass. Under each of the quadrilaterals are classifications, but they are not all correct. Find out which shapes have classification mistakes.



 <p>Trapezoid Rhombus</p>	 <p>Rectangle Parallelogram Square</p>	 <p>Rhombus Parallelogram</p>	 <p>Trapezoid Parallelogram Rectangle</p>
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How many of these shapes have classification mistakes? This number will be equal to A.

A = _____

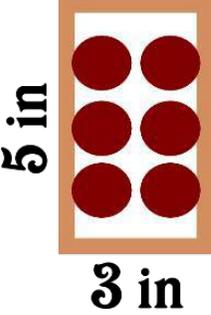
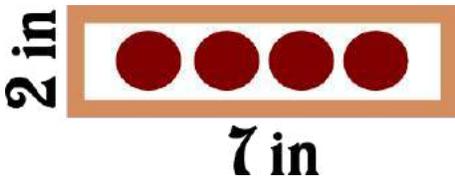
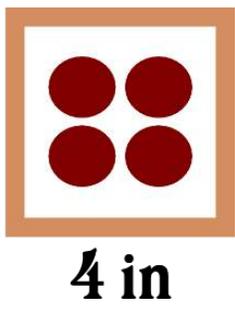
Scene #5 Italiano Pizzeria -- Rome, Italy

Before opening, a chef noticed all of their pepporoni was stolen.



It's time for a delicious Italian personal pizza. They each have the same price. *Calculate the area of the pizzas to figure out which one is the best deal. The clue will be the letter of the pizza equal to its area.*



<p>Pizza B</p>  <p>Area:</p>	<p>Pizza C</p>  <p>Area:</p>	<p>Pizza X</p>  <p>Area:</p>
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=

_____ = _____

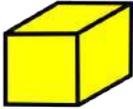
letter of the pizza area of the pizza



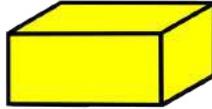
I think after I take over the world, I am going to rebuild it with LEGO!

Determine the volume of the Lego letters in cubic units.

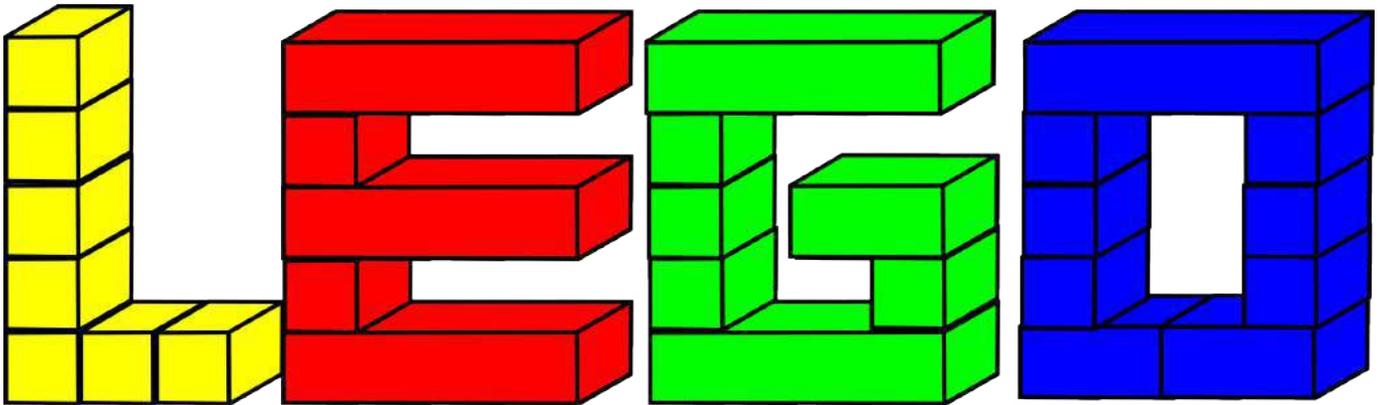
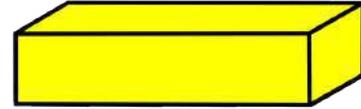
1 cubic unit



2 cubic units



4 cubic units



The total volume in cubic units will be equal to C.

C = _____

CRYPTIC PUZZLE SOLVER TEXT MESSAGE

Take care now, bye bye then.

$$A + B + C + X + Y + Z$$

~Convex



THE SUSPECTS

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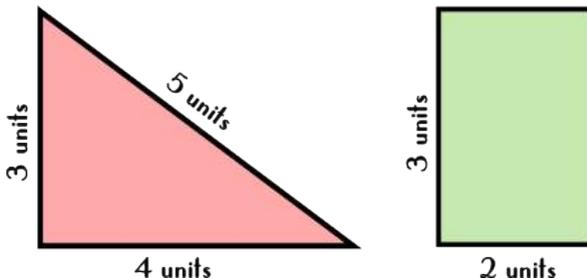
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Convex Dodecahedron broke into a port and stole three ships.

A 	B
Sides Scalene	Sides Isosceles
Angles Obtuse	Angles Right
Y 	Z
Sides Scalene	Sides Equilateral
Angles Right	Angles Acute

Measure the sails on these boats. What types of triangles are they?

Use these words to fill-in the blanks.

Sides: Equilateral, Isosceles, Scalene
Angles: Acute, Obtuse, Right

One of the sails has side and angle classifications that both repeat. The letter of this sail will be equal to 10.

Y = 10

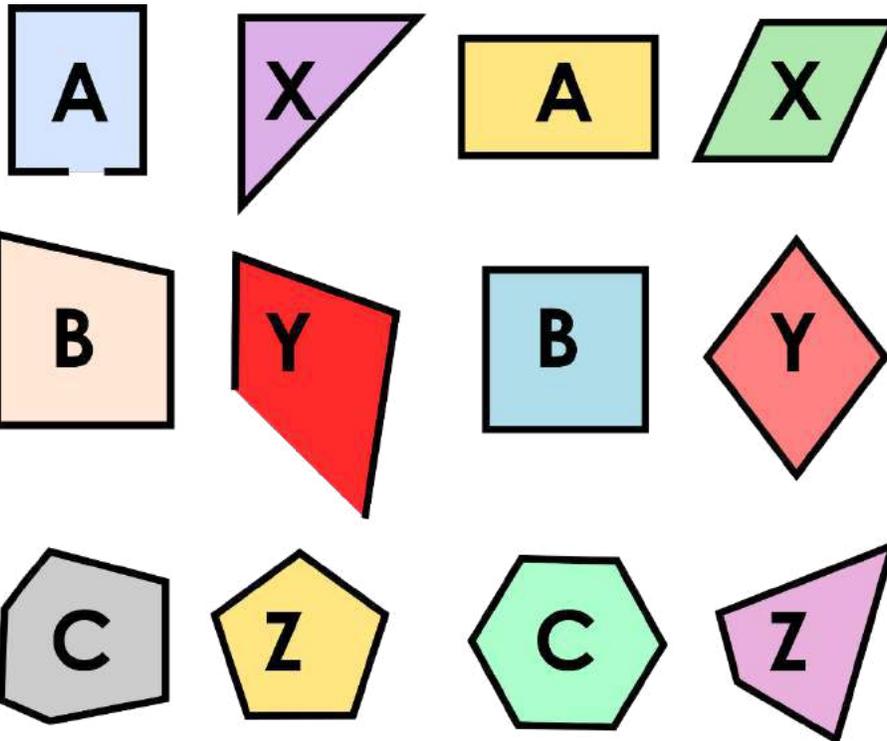


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B = 25

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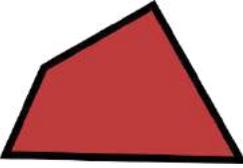
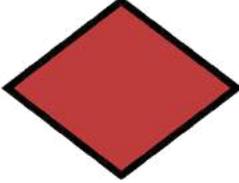


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How many of these shapes have classification mistakes? This number will be equal to A.

A = 3

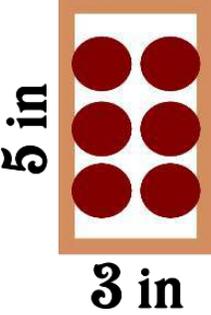
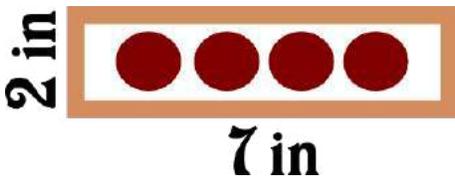
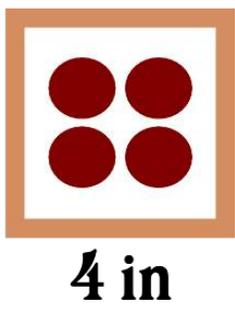
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It's time for a delicious Italian personal pizza. They each have the same price. *Calculate the area of the pizzas to figure out which one is the best deal. The clue will be the letter of the pizza equal to its area.*



<p>Pizza B</p>  <p>Area: 15</p>	<p>Pizza C</p>  <p>Area: 14</p>	<p>Pizza X</p>  <p>Area: 16</p>
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x=16

letter of the pizza

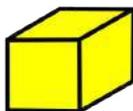
area of the pizza



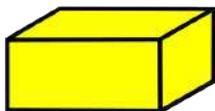
I think after I take over the world, I am going to rebuild it with LEGO!

Determine the volume of the Lego letters in cubic units.

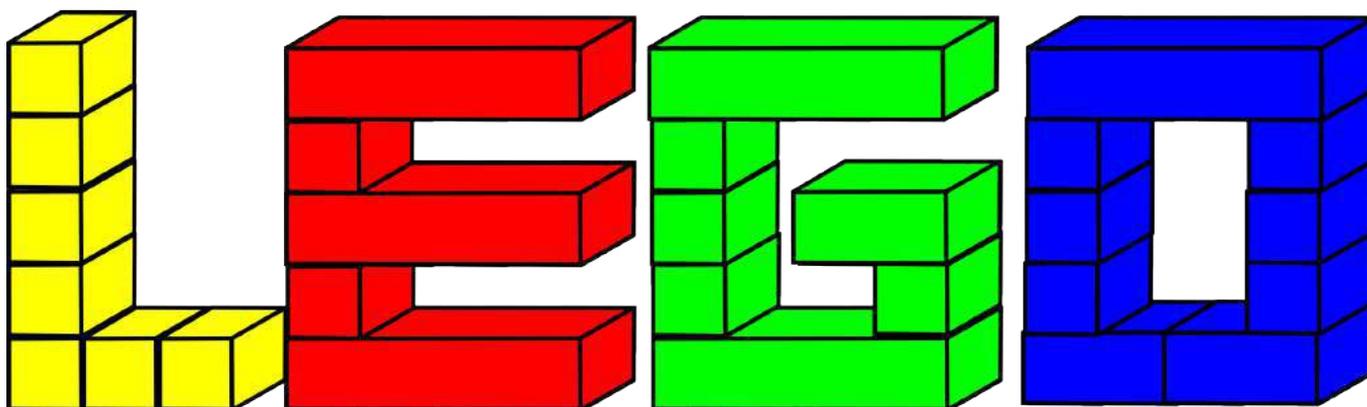
1 cubic unit



2 cubic units



4 cubic units



The total volume in cubic units will be equal to C.

$$C = 49$$

CRYPTIC PUZZLE SOLVER TEXT MESSAGE

Take care now, bye bye then.

$$A + B + C + X + Y + Z$$

~Convex

From Puzzle 1 $z = 4$
From Puzzle 2 $y = 10$
From Puzzle 3 $b = 25$
From Puzzle 4 $a = 3$
From Puzzle 5 $x = 16$
From Puzzle 6 $c = 49$

$$A + B + C + X + Y + Z$$

$$(3) + (25) + (49) + (16) + (10) + (4) = 107$$

CSI

Shapes, Area & Perimeter Rubric



Skills & Understandings		Exemplary	Proficient	Developing
I can classify shapes by properties and definitions.				
I can calculate the area of a rectangle and a triangle.				
I can determine the perimeter of any shape if given all of the side lengths.				
I can solve volume problems that are modeled with cubes.				
Math Processes		Exemplary	Proficient	Developing
Skills & Mechanics	<i>accurately performs calculations</i>			
	<i>demonstrates fluency with mathematical skills and processes</i>			
Applications	<i>accurately interprets word problems and addresses them with appropriate math skills</i>			
	<i>can articulate the meaning of calculations in the context of the problems.</i>			
Use of Evidence & Analysis	<i>can determine what evidence is appropriate to answer a question</i>			
	<i>utilizes mathematical outcomes to support their conclusions</i>			

COMMENTS: