



Geometry

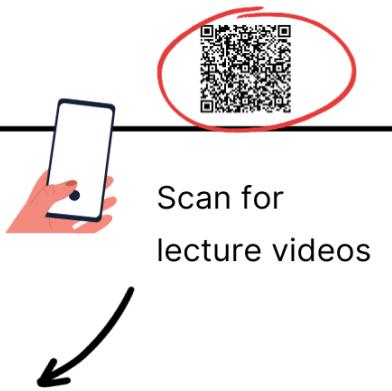
U.S. Common Core

2023 Edition

Workbook Instructions

1 Make sure to watch the lecture videos

Accompanying lectures for questions 1 - 5

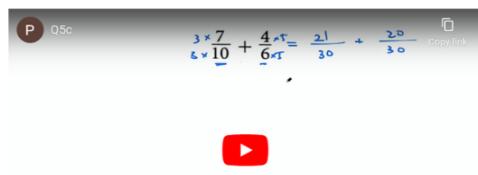


2 Review your mistakes using solution videos

Question 3: Add.

$$\frac{7}{10} + \frac{4}{6}$$

$$\text{Add. } \frac{7}{10} + \frac{4}{6}$$



Solution Video



Scan for
solution videos

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Chapter 1 Essentials of Geometry

1.0 Prerequisite Skills

Accompanying lectures for questions 1 - 1



Question 1: Copy and complete the statement.

The distance around a polygon is called its ? , and the distance around a circle is called its ?

Solution Video



Accompanying lectures for questions 2 - 5



Question 2: Simplify the expression.

$$|4 - 6|$$

Solution Video



Question 3: Simplify the expression.

$$|3 - 11|$$

Solution Video



Question 4: Simplify the expression.

$$|-4 + 5|$$

Solution Video



Accompanying lectures for questions 2 - 5



Question 5: Simplify the expression.

$$| -8 - 10 |$$

Solution Video



Accompanying lectures for questions 6 - 8



Question 6: Evaluate the expression when $x = 2$.

$5x$

Solution Video



Question 7: Evaluate the expression when $x = 2$.

$20 - 8x$

Solution Video



Question 8: Evaluate the expression when $x = 2$.

$$-18 + 3x$$

Solution Video



Accompanying lectures for questions 9 - 9



Question 9: Evaluate the expression when $x = 2$.

$$-5x - 4 + 2x$$

Solution Video



Accompanying lectures for questions 10 - 10



Question 10: Solve the equation.

$$274 = -2z$$

Solution Video



Accompanying lectures for questions 11 - 12



Question 11: Solve the equation.

$$8x + 12 = 60$$

Solution Video



Question 12: Solve the equation.

$$5n - 8 = 47$$

Solution Video



Accompanying lectures for questions 13 - 14



Question 13: Solve the equation.

$$2y - 5 + 7y = -32$$

Solution Video



Question 14: Solve the equation.

$$6p + 11 + 3p = -7$$

Solution Video



Accompanying lectures for questions 15 - 15



Question 15: Solve the equation.

$$4 + \frac{m}{7} = 10$$

Solution Video



1.1 Identity Points, Lines, and Planes

Accompanying lectures for questions 16 - 40



Question 16: Write in words what each of the following symbols means.

- a. Q
- b. \overline{MN}
- c. \overrightarrow{ST}
- d. \overleftrightarrow{FG}

Solution Video

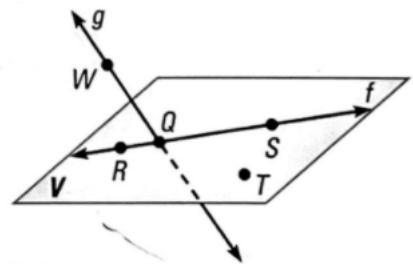


Question 17: Compare collinear points and coplanar points. Are collinear points also coplanar? Are coplanar points also collinear? Explain.

Solution Video



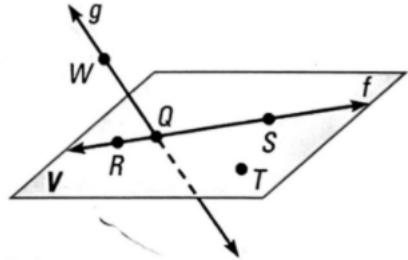
Question 18:

Give two other names for \overleftrightarrow{WQ} .[Solution Video](#)

Accompanying lectures for questions 16 - 40



Question 19: Use the diagram.

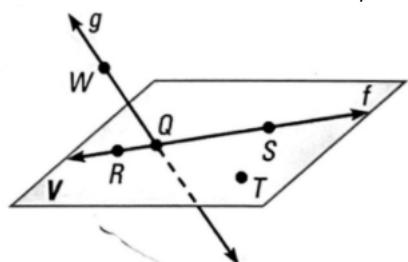


Give another name for plane V .

Solution Video



Question 20: NAMING POINTS, LINES, AND PLANES In Exercises 3-7, use the diagram.

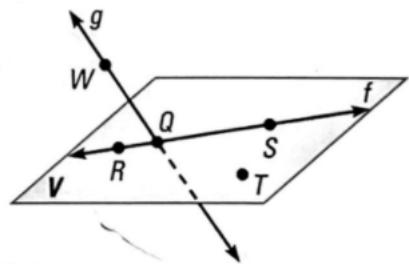


Name three points that are collinear. Then name a fourth point that is not collinear with these three points.

Solution Video



Question 21: NAMING POINTS, LINES, AND PLANES In Exercises 3-7, use the diagram.



Name a point that is not coplanar with R , S , and T .

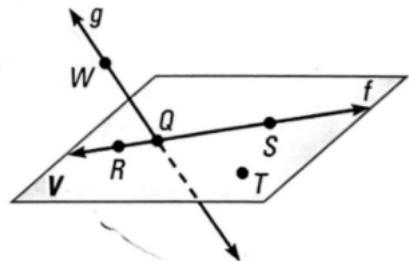
Solution Video



Accompanying lectures for questions 16 – 40



Question 22: NAMING POINTS, LINES, AND PLANES In Exercises 3-7, use the diagram.

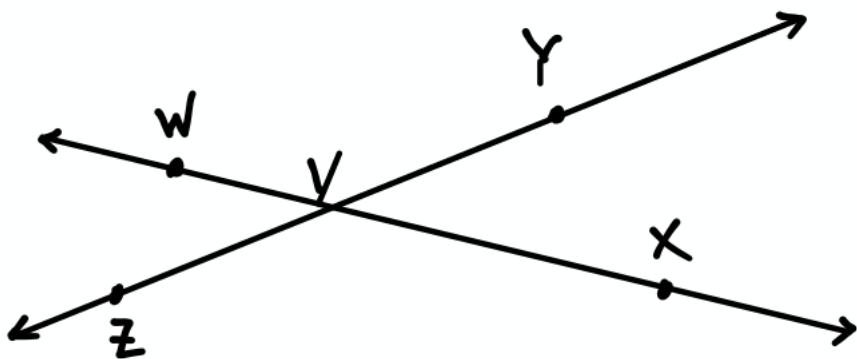


* WRITING Is point W coplanar with points Q and R ? Explain.

[Solution Video](#)



Question 23: NAMING SEGMENTS AND RAYS In Exercises 8 – 12, use the diagram.

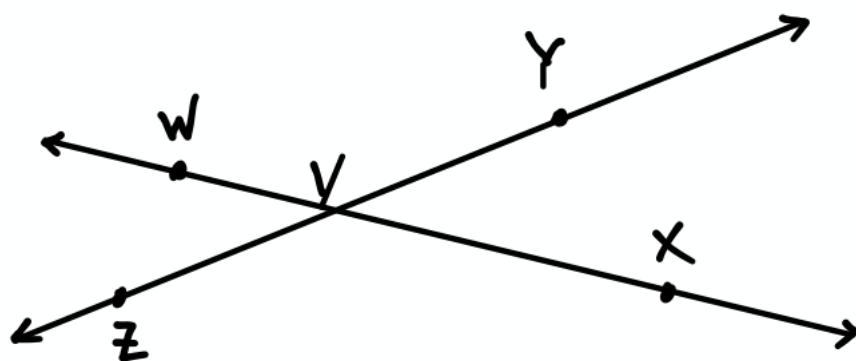


What is another name for \overline{ZY} ?

[Solution Video](#)



Question 24:



Name all rays with endpoint V .

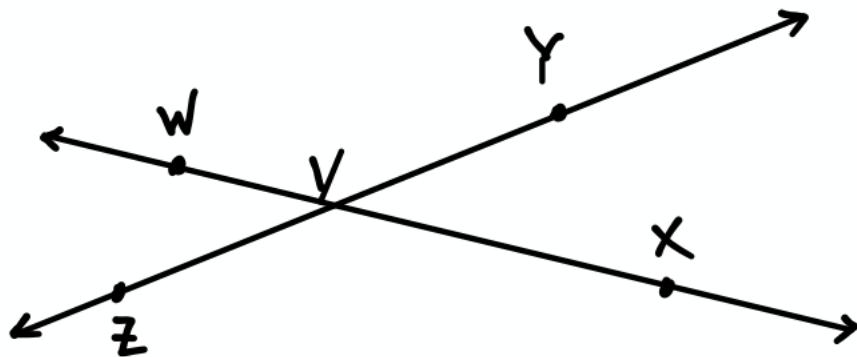
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Accompanying lectures for questions 16 - 40



Question 25:

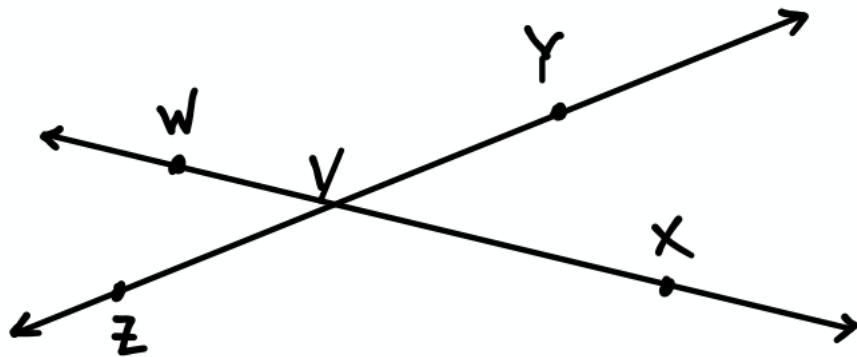


Name two pairs of opposite rays.

Solution Video



Question 26:

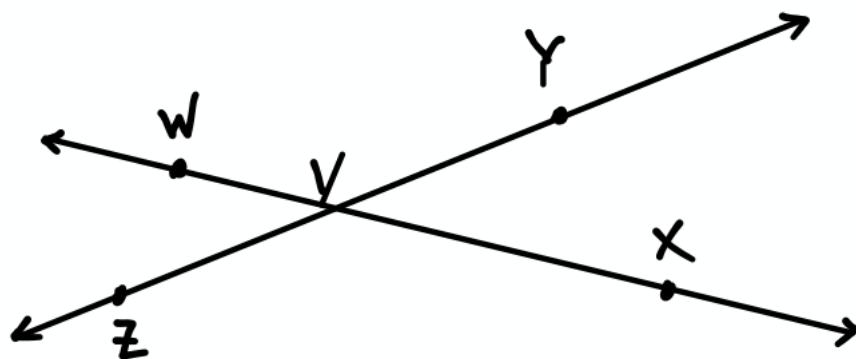


Give another name for \overrightarrow{WV} .

Solution Video



Question 27:



ERROR ANALYSIS A student says that \overrightarrow{VW} and \overrightarrow{VZ} are opposite rays because they have the same endpoint. Describe the error.

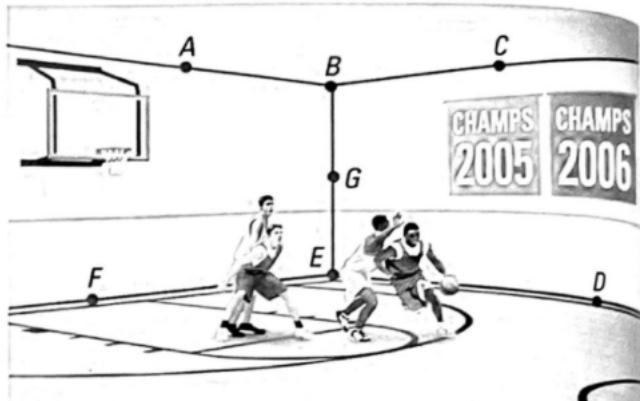
[Solution Video](#)

Accompanying lectures for questions 16 - 40



Question 28: ★ MULTIPLE CHOICE Which statement about the diagram at the right is true?

- (A) A , B , and C are collinear.
- (B) C , D , E , and G are coplanar.
- (C) B lies on \overrightarrow{GE} .
- (D) \overrightarrow{EF} and \overrightarrow{ED} are opposite rays.



Solution Video



Question 29: SKETCHING INTERSECTIONS Sketch the figure described.

Three lines that lie in a plane and intersect at one point

Solution Video



Question 30: Sketch the figure described.

One line that lies in a plane, and one line that does not lie in the plane

Solution Video



Accompanying lectures for questions 16 - 40



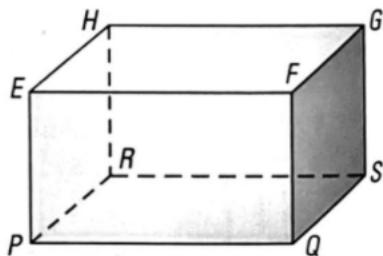
Question 31: ★ MULTIPLE CHOICE Line AB and line CD intersect at point E , with point E between A and B and between C and D . Which rays are opposite rays?

- (A) \overrightarrow{EC} and \overrightarrow{ED}
- (B) \overrightarrow{CE} and \overrightarrow{DE}
- (C) $-\overrightarrow{AB}$ and \overrightarrow{BA}
- (D) \overrightarrow{AE} and \overrightarrow{BE}

Solution Video



Question 32: Use the diagram

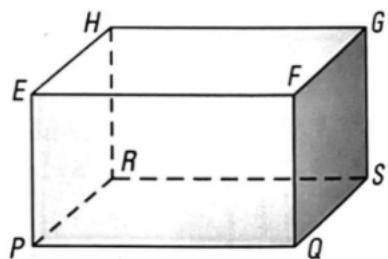


Name the intersection of \overleftrightarrow{PR} and \overleftrightarrow{HR} .

Solution Video



Question 33: READING DIAGRAMS In Exercises 17-22, use the diagram at the right.



Name the intersection of plane EFG and plane FGS .

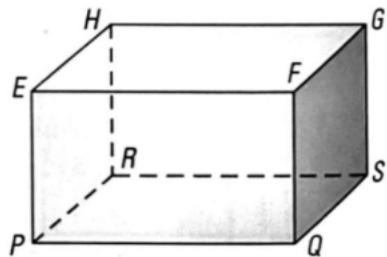
Solution Video



Accompanying lectures for questions 16 - 40



Question 34: READING DIAGRAMS In Exercises 17-22, use the diagram at the right.

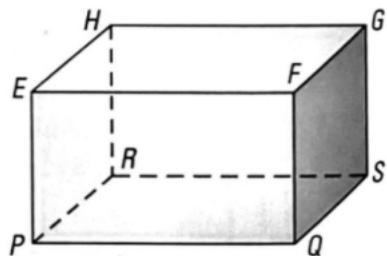


Name the intersection of plane PQS and plane HGS .

Solution Video



Question 35: Use the diagram at the right.

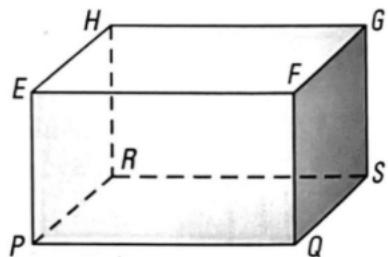


Are points P , Q , and F collinear? Are they coplanar?

Solution Video



Question 36: Use the diagram at the right.



Are points P and G collinear? Are they coplanar?

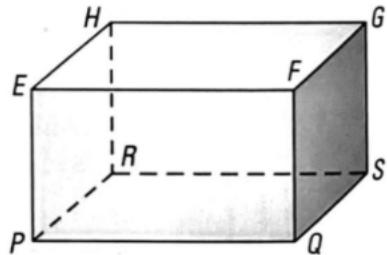
Solution Video



Accompanying lectures for questions 16 - 40



Question 37: Use the diagram at the right.



Name three planes that intersect at point E .

Solution Video

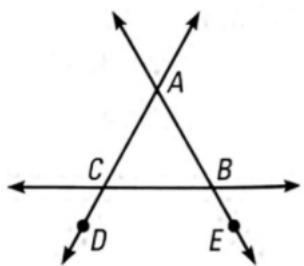


Question 38: Sketch plane J intersecting plane K . Then draw a line ℓ in plane J that intersects plane K at a single point.

Solution Video



Question 39: NAMING RAYS Name 10 different rays in the diagram at the right. Then name 2 pairs of opposite rays.



Solution Video



Accompanying lectures for questions 16 - 40



Question 40: SKETCHING Draw three noncollinear points J , K , and L . Sketch \overline{JK} and add a point M on \overline{JK} . Then sketch \overrightarrow{ML} .

Sketch JK and add a point M on JK . Then sketch ML .

Solution Video



Accompanying lectures for questions 41 - 41



Question 41: Draw two points P and Q . Then sketch \overrightarrow{PQ} . Add a point R on the ray so that Q is between P and R .

Solution Video



Accompanying lectures for questions 42 - 47



Question 42: Use substitution to determine whether the point is on the line.

$$y = x - 4; A(5, 1)$$

Solution Video



Question 43: Use substitution to determine whether the point is on the line.

$$y = x + 1; A(1, 0)$$

Solution Video



Question 44: Use substitution to determine whether the point is on the line.

$$y = 3x + 4; A(7, 1)$$

Solution Video



Accompanying lectures for questions 42 - 47



Question 45: Use substitution to determine whether the point is on the line.

$$y = 4x + 2; A(1, 6)$$

Solution Video



Question 46: Use substitution to determine whether the point is on the line.

$$y = 3x - 2; A(-1, -5)$$

Solution Video



Question 47: Use substitution to determine whether the point is on the line.

$$y = -2x + 8; A(-4, 0)$$

Solution Video



Accompanying lectures for questions 48 - 52



Question 48: Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$x \leq 3$$

Solution Video



Question 49: GRAPHING Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$x \geq -4$$

Solution Video



Question 50: GRAPHING Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$-7 \leq x \leq 4$$

Solution Video



Accompanying lectures for questions 48 - 52



Question 51: GRAPHING Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$x \geq 5 \text{ or } x \leq -2$$

Solution Video



Question 52: GRAPHING Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$x \geq -1 \text{ or } x \leq 5$$

Solution Video



Accompanying lectures for questions 53 - 53



Question 53: GRAPHING Graph the inequality on a number line. Tell whether the graph is a segment, a ray or rays, a point, or a line.

$$|x| \leq 0$$

Solution Video



Accompanying lectures for questions 54 - 54



Question 54: CHALLENGE Tell whether each of the following situations involving three planes is possible. If a situation is possible, make a sketch.

- a. None of the three planes intersect.
- b. The three planes intersect in one line.
- c. The three planes intersect in one point.
- d. Two planes do not intersect. The third plane intersects the other two.
- e. Exactly two planes intersect. The third plane does not intersect the other two.

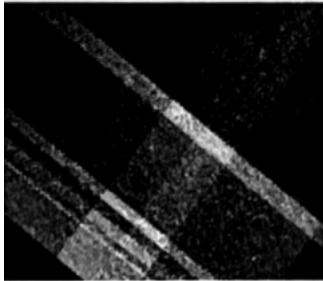
Solution Video



Accompanying lectures for questions 55 - 61



Question 55: EVERYDAY INTERSECTIONS What kind of geometric intersection does the photograph suggest?



Solution Video



Question 56: EVERYDAY INTERSECTIONS What kind of geometric intersection does the photograph suggest?



Solution Video



Question 57: EVERYDAY INTERSECTIONS What kind of geometric intersection does the photograph suggest?



Solution Video



Accompanying lectures for questions 55 - 61



Question 58: ★ SHORT RESPONSE Explain why a four-legged table may rock from side to side even if the floor is level. Would a three-legged table on the same level floor rock from side to side? Why or why not?

Solution Video



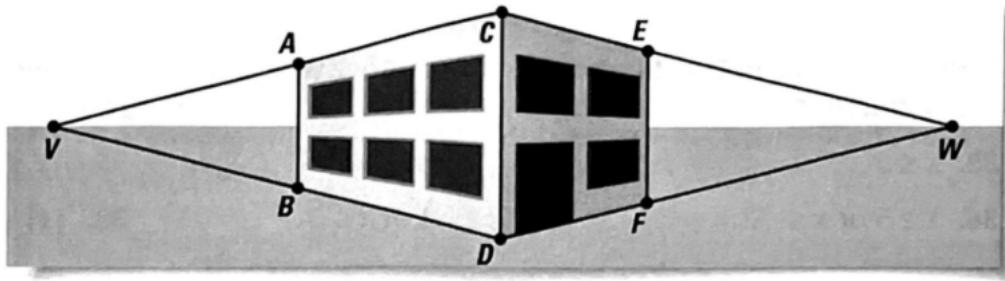
Question 59: SURVEYING A surveying instrument is placed on a tripod. The tripod has three legs whose lengths can be adjusted.

- a. When the tripod is sitting on a level surface, are the tips of the legs coplanar?
- b. Suppose the tripod is used on a sloping surface. The length of each leg is adjusted so that the base of the surveying instrument is level with the horizon. Are the tips of the legs coplanar? Explain.

Solution Video



Question 60: MULTI-STEP PROBLEM In a perspective drawing, lines that do not intersect in real life are represented by lines that appear to intersect at a point far away on the horizon. This point is called a vanishing point. The diagram shows a drawing of a house with two vanishing points.



- Trace the black line segments in the drawing. Using lightly dashed lines, join points A and B to the vanishing point W . Join points E and F to the vanishing point V .
- Label the intersection of \overleftrightarrow{EV} and \overleftrightarrow{AW} as G . Label the intersection of \overleftrightarrow{EW} and \overleftrightarrow{BW} as H
- Using heavy dashed lines, draw the hidden edges of the house: \overline{AG} , \overline{EG} , \overline{BH} , \overline{FH} , and \overline{GH} .

[Solution Video](#)



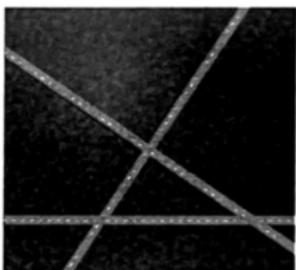
Accompanying lectures for questions 55 - 61



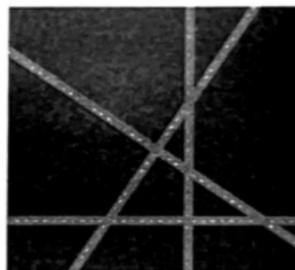
Question 61: Each street in a particular town intersects every existing street exactly one time. Only two streets pass through each intersection.



2 streets



3 streets



4 streets

- a. A traffic light is needed at each intersection. How many traffic lights are needed if there are 5 streets in the town? 6 streets?
- b. Describe a pattern you can use to find the number of additional traffic lights that are needed each time a street is added to the town.

Solution Video



1.2 Use Segments and Congruence

1.3 Use Midpoint and Distance Formulas

Accompanying lectures for questions 62 - 67

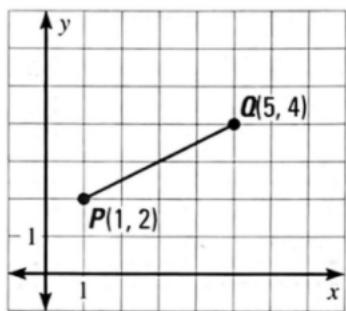


Question 62: VOCABULARY Copy and complete: To find the length of \overline{AB} , with endpoints $A(-7, 5)$ and $B(4, -6)$, you can use the ?.

Solution Video



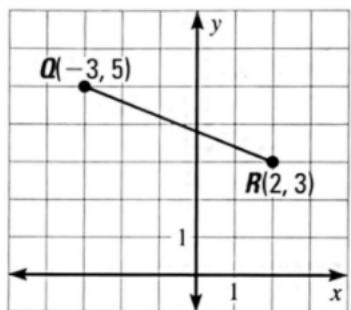
Question 63: DISTANCE FORMULA Find the length of the segment. Round to the nearest tenth of a unit.



Solution Video



Question 64: DISTANCE FORMULA Find the length of the segment. Round to the nearest tenth of a unit.



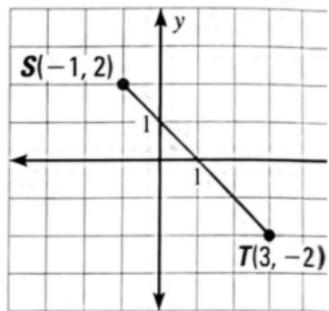
Solution Video



Accompanying lectures for questions 62 - 67



Question 65: DISTANCE FORMULA Find the length of the segment. Round to the nearest tenth of a unit.



Solution Video



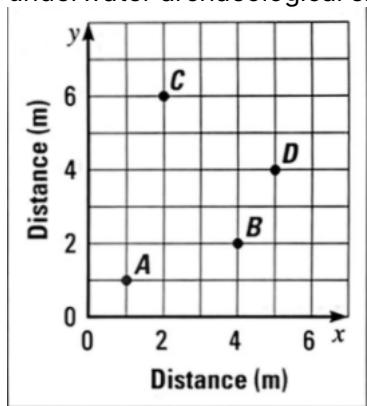
Question 66: The endpoints of \overline{MN} are $M(-3, -9)$ and $N(4, 8)$. What is the approximate length of \overline{MN} ?

- (A) 1.4 units
- (B) 7.2 units
- (C) 13 units
- (D) 18.4 units

Solution Video



Question 67: ARCHAEOLOGY The points on the diagram show the positions of objects at an underwater archaeological site. Use the diagram for Exercises 50 and 51.



Find the distance between each pair of objects. Round to the nearest tenth of a meter if necessary.

- a. A and B
- b. B and C
- c. C and D
- d. A and D
- e. B and D
- f. A and C

Solution Video



Accompanying lectures for questions 68 - 69



Question 68: ★ WRITING Explain what it means to bisect a segment. Why is it impossible to bisect a line?

Solution Video



Question 69: \overline{AB} bisects \overline{CD} at point M , \overline{CD} bisects \overline{AB} at point M , and $AB = 4 \cdot CM$. Describe the relationship between AM and CD .

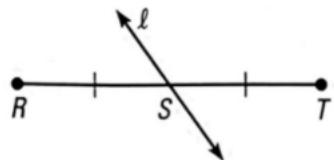
Solution Video



Accompanying lectures for questions 70 - 83



Question 70: Line ℓ bisects the segment. Find the indicated length.



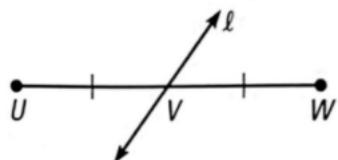
Find RT if $RS = 5\frac{1}{8}$ in.

Solution Video



Question 71: Line ℓ bisects the segment. Find the indicated length.

Find UW if $VW = \frac{5}{8}$ in.

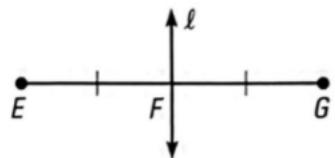


Solution Video



Question 72: Line ℓ bisects the segment. Find the indicated length.

Find EG if $EF = 13$ cm.



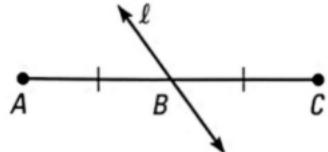
Solution Video



Accompanying lectures for questions 70 - 83



Question 73: Line ℓ bisects the segment. Find the indicated length.

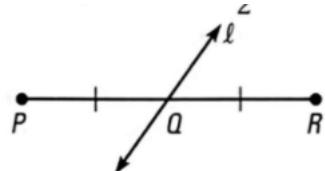


Find BC if $AC = 19$ cm.

Solution Video



Question 74: Line ℓ bisects the segment. Find the indicated length.

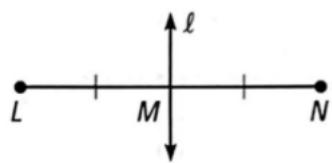


Find QR if $PR = 9\frac{1}{2}$ in.

Solution Video



Question 75: FINDING LENGTHS Line ℓ bisects the segment. Find the indicated length.



Find LM if $LN = 137$ mm.

Solution Video



Accompanying lectures for questions 70 - 83



Question 76: SEGMENT BISECTOR Line RS bisects \overline{PQ} at point R . Find RQ if $PQ = 4\frac{3}{4}$ inches.

Solution Video



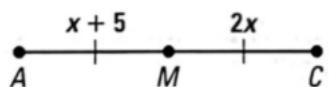
Question 77: Point T bisects \overline{UV} . Find UV if $UT = 2\frac{7}{8}$ inches.

Solution Video



Question 78: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find AM .



Solution Video

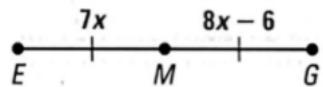


Accompanying lectures for questions 70 - 83



Question 79: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find EM .

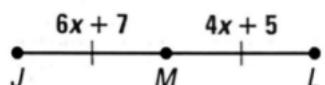


Solution Video



Question 80: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find JM .



Solution Video



Question 81: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find PR .



Solution Video

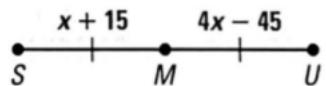


Accompanying lectures for questions 70 - 83



Question 82: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find SU .

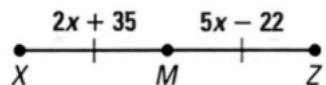


[Solution Video](#)



Question 83: In each diagram, M is the midpoint of the segment. Find the indicated length.

Find XZ .



[Solution Video](#)



Accompanying lectures for questions 84 - 90



Question 84: Find the coordinates of the midpoint of the segment with the given endpoints.

$C(3, 5)$ and $D(7, 5)$

Solution Video



Question 85: Find the coordinates of the midpoint of the segment with the given endpoints.

$E(0, 4)$ and $F(4, 3)$

Solution Video



Question 86: Find the coordinates of the midpoint of the segment with the given endpoints.

$G(-4, 4)$ and $H(6, 4)$

Solution Video



Accompanying lectures for questions 84 - 90



Question 87: Find the coordinates of the midpoint of the segment with the given endpoints.

$J(-7, -5)$ and $K(-3, 7)$

Solution Video



Question 88: Find the coordinates of the midpoint of the segment with the given endpoints.

$P(-8, -7)$ and $Q(11, 5)$

Solution Video



Question 89: Find the coordinates of the midpoint of the segment with the given endpoints.

$S(-3, 3)$ and $T(-8, 6)$

Solution Video



Accompanying lectures for questions 84 - 90



Question 90: ERROR ANALYSIS Describe the error made in finding the coordinates of the midpoint of a segment with endpoints $S(8, 3)$ and $T(2, -1)$.

$$\left(\frac{8-2}{2}, \frac{3-(-1)}{2} \right) = (3, 2) \quad \times$$

Solution Video



Accompanying lectures for questions 91 - 91



Question 91: ★ WRITING Develop a formula for finding the midpoint of a segment with endpoints $A(0, 0)$ and $B(m, n)$. Explain your thinking.

Solution Video



Accompanying lectures for questions 92 - 97



Question 92: Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(3, 0), M(0, 5)$$

Solution Video



Question 93: Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(5, 1), M(1, 4)$$

Solution Video



Question 94: Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(6, -2), M(5, 3)$$

Solution Video



Accompanying lectures for questions 92 - 97



Question 95: Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(-7, 11), M(2, 1)$$

Solution Video



Question 96: FINDING ENDPOINTS Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(4, -6), M(-7, 8)$$

Solution Video



Question 97: Use the given endpoint R and midpoint M of \overline{RS} to find the coordinates of the other endpoint S .

$$R(-4, -6), M(3, -4)$$

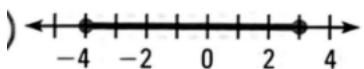
Solution Video



Accompanying lectures for questions 98 - 105



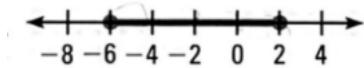
Question 98: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Solution Video



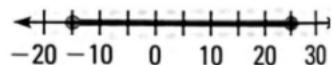
Question 99: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Solution Video



Question 100: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



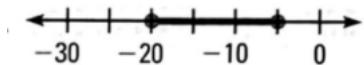
Solution Video



Accompanying lectures for questions 98 - 105



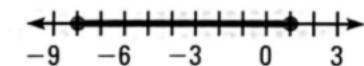
Question 101: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Solution Video



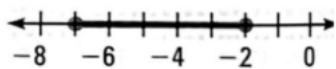
Question 102: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Solution Video



Question 103: NUMBER LINE Find the length of the segment. Then find the coordinate of the midpoint of the segment.



Solution Video



Accompanying lectures for questions 98 - 105



Question 104: One endpoint of \overline{PQ} is $P(-2, 4)$. The midpoint of \overline{PQ} is $M(1, 0)$. Explain how to find PQ .

Solution Video



Question 105: M is the midpoint of \overline{JK} , $JM = \frac{x}{8}$, and $JK = \frac{3x}{4} - 6$. Find MK .

Solution Video



Accompanying lectures for questions 106 - 109



Question 106: ★ MULTIPLE CHOICE The endpoints of \overline{LF} are $L(-2, 2)$ and $F(3, 1)$. The endpoints of \overline{JR} are $J(1, -1)$ and $R(2, -3)$. What is the approximate difference in the lengths of the two segments?

- (A) 2.24
- (B) 2.86
- (C) 5.10
- (D) 7.96

Solution Video



Question 107: The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.

$$\overline{AB} : A(0, 2), B(-3, 8)$$

$$\overline{CD} : C(-2, 2), D(0, -4)$$

Solution Video



Question 108: The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.

$$\overline{EF} : E(1, 4), F(5, 1)$$

$$\overline{GH} : G(-3, 1), H(1, 6)$$

Solution Video



Accompanying lectures for questions 106 - 109



Question 109: The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.

$$\overline{JK} : J(-4, 0), K(4, 8)$$

$$\overline{LM} : L(-4, 2), M(3, -7)$$

Solution Video



Accompanying lectures for questions 110 - 110



Question 110: Points S , T , and P . lie on a number line. Their coordinates are 0, 1, and x , respectively. Given $SP = PT$, what is the value of x ?

Solution Video



1.3.1 Mixed Review

1.4 Measure and Classify Angles

1.5 Describe Angle Pair Relationships

1.6 Classify Polygons

Chapter 2 Reasoning and Proof

2.0 Prerequisite Skills

Accompanying lectures for questions 111 - 118



Question 111: Use the diagram to name an example of the described figure.

A right angle

Solution Video



Question 112: Use the diagram to name an example of the described figure.

A pair of vertical angles

Solution Video



Question 113: Use the diagram to name an example of the described figure.

A pair of supplementary angles

Solution Video



Accompanying lectures for questions 111 - 118



Question 114: Use the diagram to name an example of the described figure.

A pair of complementary angles

Solution Video



Question 115: Describe what the notation means. Draw the figure.

\overline{AB}

Solution Video



Question 116: Describe what the notation means. Draw the figure.

\overleftrightarrow{CD}

Solution Video



Accompanying lectures for questions 111 - 118



Question 117: Describe what the notation means. Draw the figure.

EF

Solution Video



Question 118: Describe what the notation means. Draw the figure.

\overrightarrow{GH}

Solution Video



Accompanying lectures for questions 119 - 119



Question 119: Solve the equation.

$$3x + 5 = 20$$

Solution Video



Accompanying lectures for questions 120 - 120



Question 120: Solve the equation.

$$4(x - 7) = -12$$

Solution Video



Accompanying lectures for questions 121 - 121



Question 121: Solve the equation.

$$5(x + 8) = 4x$$

Solution Video



Accompanying lectures for questions 122 - 123



Question 122: Draw the angles.

$\angle 1$ and $\angle 2$ are vertical angles.

Solution Video



Question 123: Draw the angles.

$\angle ABD$ and $\angle DBC$ are complementary.

Solution Video



2.1 Use Inductive Reasoning

Accompanying lectures for questions 124 - 136



Question 124: Write a definition of conjecture in your own words.

Solution Video

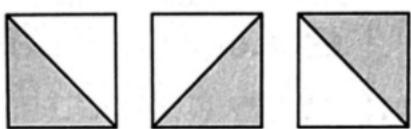


Question 125: The word counter has several meanings. Look up the word in a dictionary. Identify which meaning helps you understand the definition of counterexample.

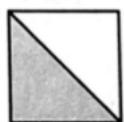
Solution Video



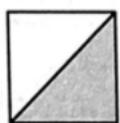
Question 126: ★ MULTIPLE CHOICE What is the next figure in the pattern?



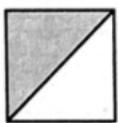
A.



B.



C.



D.



Solution Video



Accompanying lectures for questions 124 - 136



Question 127: Use these sums of odd integers: $3 + 7 = 10$, $1 + 7 = 8$, $17 + 21 = 38$. Conjecture: The sum of any two odd integers is ?

Solution Video



Question 128: Show the conjecture is false by finding a counterexample.

If the product of two numbers is positive, then the two numbers must both be positive.

Solution Video



Question 129: Show the conjecture is false by finding a counterexample.

The product $(a + b)^2$ is equal to $a^2 + b^2$, for $a \neq 0$ and $b \neq 0$.

Solution Video



Accompanying lectures for questions 124 - 136



Question 130: Show the conjecture is false by finding a counterexample.

If the product of two numbers is even, then the two numbers must both be even.

Solution Video



Question 131: Explain why only one counterexample is necessary to show that a conjecture is false.

Solution Video



Question 132: REASONING A student claims that the next number in the pattern $1, 2, 4, \dots$ is 8, because each number shown is two times the previous number. Is there another description of the pattern that will give the same first three numbers but will lead to a different pattern? Explain.

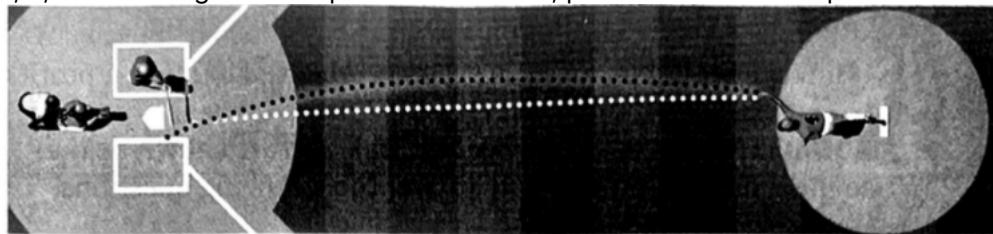
Solution Video



Accompanying lectures for questions 124 - 136



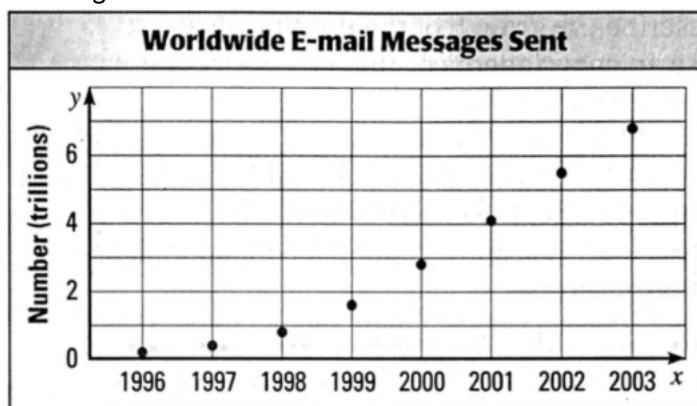
Question 133: BASEBALL You are watching a pitcher who throws two types of pitches, a fastball (F, in white below) and a curveball (C, in red below). You notice that the order of pitches was F, C, F, F, C, C, F, F. Assuming that this pattern continues, predict the next five pitches.



[Solution Video](#)



Question 134: STATISTICS The scatter plot shows the number of person-to-person e-mail messages sent each year. Make a conjecture that could be true. Give an explanation that supports your reasoning.



[Solution Video](#)



Question 135: MULTIPLE REPRESENTATIONS Use the given function table relating x and y .

- a. Making a Table Copy and complete the table.
- b. Drawing a Graph Graph the table of values.
- c. Writing an Equation Describe the pattern in words and then write an equation relating x and y .

x	y
-3	-5
?	1
5	11
?	15
12	?
15	31

Solution Video



Accompanying lectures for questions 124 - 136



Question 136: ★ EXTENDED RESPONSE Your class is selling raffle tickets for \$.25 each.

- a. Make a table showing your income if you sold 0, 1, 2, 3, 4, 5, 10, or 20 raffle tickets.
- b. Graph your results. Describe any pattern you see.
- c. Write an equation for your income y if you sold x tickets.
- d. If your class paid \$14 for the raffle prize, at least how many tickets does your class need to sell to make a profit? Explain.
- e. How many tickets does your class need to sell to make a profit of \$50 ?

Solution Video



Accompanying lectures for questions 137 - 143



Question 137: SKETCHING VISUAL PATTERNS Sketch the next figure in the pattern.



Solution Video



Question 138: Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

$$2, \frac{3}{2}, \frac{4}{3}, \frac{5}{4}, \dots$$

Solution Video



Question 139: Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

1, 8, 27, 64, 125, ...

Solution Video



Accompanying lectures for questions 137 - 143



Question 140: Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

0.45, 0.7, 0.95, 1.2, ...

Solution Video



Question 141: MAKING PREDICTIONS Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

1, 3, 6, 10, 15, ...

Solution Video



Question 142: MAKING PREDICTIONS Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

2, 20, 10, 100, 50, ...

Solution Video



Accompanying lectures for questions 137 - 143



Question 143: CHALLENGE Consider the pattern $1, 1\frac{1}{2}, 1\frac{3}{4}, 1\frac{7}{8}, \dots$

- a. Describe the pattern. Write the next three numbers in the pattern.
- b. What is happening to the values of the numbers?
- c. Make a conjecture about later numbers. Explain your reasoning.

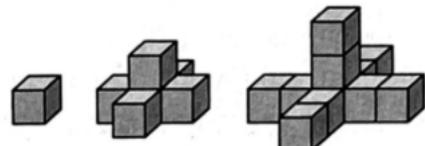
Solution Video



Accompanying lectures for questions 144 - 144



Question 144: SKETCHING VISUAL PATTERNS Sketch the next figure in the pattern.



Solution Video



Accompanying lectures for questions 145 - 153



Question 145: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

1, 5, 9, 13, ...

Solution Video



Question 146: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

3, 12, 48, 192, ...

Solution Video



Question 147: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

10, 5, 2.5, 1.25, ...

Solution Video



Accompanying lectures for questions 145 - 153



Question 148: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

$$1, \frac{2}{3}, \frac{1}{3}, 0, \dots$$

Solution Video



Question 149: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

$$-5, -2, 4, 13, \dots$$

Solution Video



Question 150: What is the first number in the pattern?

?, ?, 81, 243, 729

- (A) 1
- (B) 3
- (C) 9
- (D) 27

Solution Video



Accompanying lectures for questions 145 - 153

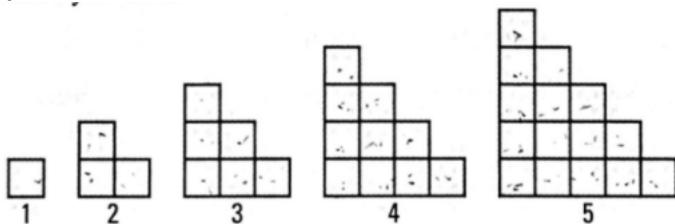


Question 151: *xy ALGEBRA* Consider the pattern $5, 5r, 5r^2, 5r^3, \dots$. For what values of r will the values of the numbers in the pattern be increasing? For what values of r will the values of the numbers be decreasing? Explain.

[Solution Video](#)



Question 152: VISUAL REASONING Use the pattern below. Each figure is made of squares that are 1 unit by 1 unit.



- Find the distance around each figure. Organize your results in a table.
- Use your table to describe a pattern in the distances.
- Predict the distance around the 20th figure in this pattern.

[Solution Video](#)



Question 153: The Fibonacci numbers are shown below. Use the Fibonacci numbers to answer the following questions.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

- a. Copy and complete: After the first two numbers, each number is the ? of the ? previous numbers.
- b. Write the next three numbers in the pattern.
- c. Research This pattern has been used to describe the growth of the nautilus shell. Use an encyclopedia or the Internet to find another real-world example of this pattern.

Solution Video



Accompanying lectures for questions 154 - 154



Question 154: DESCRIBING NUMBER PATTERNS Describe the pattern in the numbers.

Write the next number in the pattern.

4, 3, 1, -2, ...

Solution Video



Accompanying lectures for questions 155 - 155



Question 155: MAKING CONJECTURES In Exercises 12 and 13, copy and complete the conjecture based on the pattern you observe in the specific cases.

Given seven noncollinear points, make a conjecture about the number of ways to connect different pairs of the points.

Number of points	3	4	5	6	7
Picture					?
Number of connections	3	6	10	15	?

Conjecture You can connect seven noncollinear points ? different ways.

[Solution Video](#)



Accompanying lectures for questions 156 - 156



Question 156: Show the conjecture is false by finding a counterexample.

All prime numbers are odd.

Solution Video



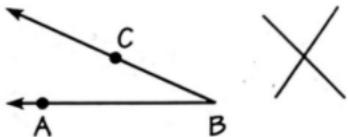
Accompanying lectures for questions 157 - 157



Question 157: ERROR ANALYSIS Describe and correct the error in the student's reasoning.

True conjecture: All angles are acute.

Example:



Solution Video



Accompanying lectures for questions 158 - 159



Question 158: Write a function rule relating x and y .

x	1	2	3
y	-3	-2	-1

Solution Video



Question 159: Write a function rule relating x and y .

x	1	2	3
y	2	4	6

Solution Video



Accompanying lectures for questions 160 - 160



Question 160: MAKING PREDICTIONS Describe a pattern in the numbers. Write the next number in the pattern. Graph the pattern on a number line.

$$0.4(6), 0.4(6)^2, 0.4(6)^3, \dots$$

Solution Video



Accompanying lectures for questions 161 - 161



Question 161: CHALLENGE Set A consists of all multiples of 5 greater than 10 and less than 100. Set B consists of all multiples of 8 greater than 16 and less than 100 . Show that each conjecture is false by finding a counterexample.

- a. Any number in set A is also in set *B*.
- b. Any number less than 100 is either in set *A* or in set *B*.
- c. No number is in both set **A** and set **B**.

Solution Video



2.2 Analyze Conditional Statements

Accompanying lectures for questions 162 - 181



Question 162: VOCABULARY Copy and complete: The ? of a conditional statement is found by switching the hypothesis and the conclusion.

Solution Video



Question 163: ★ WRITING Write a definition for the term collinear points, and show how the definition can be interpreted as a biconditional.

Solution Video



Question 164: REWRITING STATEMENTS Rewrite the conditional statement in if-then form.

When $x = 6, x^2 = 36$.

Solution Video



Accompanying lectures for questions 162 - 181



Question 165: REWRITING STATEMENTS Rewrite the conditional statement in if-then form.

The measure of a straight angle is 180° .

Solution Video



Question 166: REWRITING STATEMENTS Rewrite the conditional statement in if-then form.

Only people who are registered are allowed to vote.

Solution Video



Question 167: ERROR ANALYSIS Describe and correct the error in writing the if-then statement.

Given statement: All high school students take four English courses.

If-then statement: If a high school student takes four courses, then all four are English courses.



Solution Video



Accompanying lectures for questions 162 - 181



Question 168: Write the converse of each true statement. Tell whether the converse is true. If false, explain why.

If $x > 4$, then $x > 0$.

Solution Video



Question 169: Write the converse of each true statement. Tell whether the converse is true. If false, explain why.

If $x < 6$, then $-x > -6$.

Solution Video



Question 170: Write the converse of each true statement. Tell whether the converse is true. If false, explain why.

If $x \leq -x$, then $x \leq 0$.

Solution Video



Accompanying lectures for questions 162 - 181

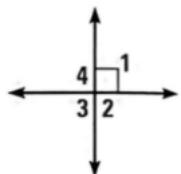


Question 171: ★ OPEN-ENDED MATH Write a statement that is true but whose converse is false.

Solution Video



Question 172: Write a series of if-then statements that allow you to find the measure of each angle, given that $m\angle 1 = 90^\circ$. Use the definition of linear pairs.



Solution Video



Question 173: In Exercises 31 and 32, use the information about volcanoes to determine whether the biconditional statement is true or false. If false, provide a counterexample.

VOLCANOES Solid fragments are sometimes ejected from volcanoes during an eruption. The fragments are classified by size, as shown in the table.

Type of fragment	Diameter d (millimeters)
Ash	$d < 2$
Lapilli	$2 \leq d \leq 64$
Block or bomb	$d > 64$



A fragment is called a block or bomb if and only if its diameter is greater than 64 millimeters.

Solution Video



Accompanying lectures for questions 162 - 181



Question 174: In Exercises 31 and 32, use the information about volcanoes to determine whether the biconditional statement is true or false. If false, provide a counterexample.

VOLCANOES Solid fragments are sometimes ejected from volcanoes during an eruption. The fragments are classified by size, as shown in the table.

Type of fragment	Diameter d (millimeters)
Ash	$d < 2$
Lapilli	$2 \leq d \leq 64$
Block or bomb	$d > 64$

A fragment is called a lapilli if and only if its diameter is less than 64 millimeters.

Solution Video



Question 175: ★ SHORT RESPONSE How can you show that the statement, "If you play a sport, then you wear a helmet." is false? Explain.

Solution Video



Question 176: ★ EXTENDED RESPONSE You measure the heights of your classmates to get a data set.

- a. Tell whether this statement is true: If x and y are the least and greatest values in your data set, then the mean of the data is between x and y . Explain your reasoning.
- b. Write the converse of the statement in part (a). Is the converse true? Explain.
- c. Copy and complete the statement using mean, median, or mode to make a conditional that is true for any data set. Explain your reasoning.

Statement If a data set has a mean, a median, and a mode, then the ? of the data set will always be one of the measurements.

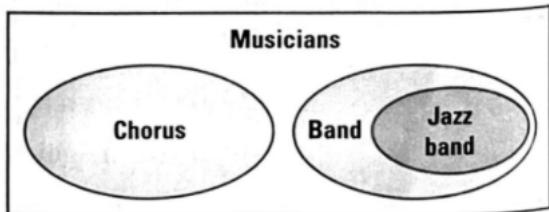
Solution Video



Accompanying lectures for questions 162 - 181



Question 177: ★ OPEN-ENDED MATH The Venn diagram at the right represents all of the musicians at a high school. Write an if-then statement that describes a relationship between the various groups of musicians.



Solution Video



Question 178: MULTI-STEP PROBLEM The statements below describe three ways that rocks are formed. Use these statements in parts (a)-(c).

Igneous rock is formed from the cooling of molten rock.

Sedimentary rock is formed from pieces of other rocks.

Metamorphic rock is formed by changing temperature, pressure, or chemistry.

- a. Write each statement in if-then form.
- b. Write the converse of each of the statements in part (a). Is the converse of each statement true? Explain your reasoning.
- c. Write a true if-then statement about rocks. Is the converse of your statement true or false? Explain your reasoning.

Solution Video



Question 179: *xy ALGEBRA* Can the statement, "If $x^2 - 10 = x + 2$, then $x = 4$," be combined with its converse to form a true biconditional?

Solution Video



Accompanying lectures for questions 162 - 181



Question 180: REASONING You are given that the contrapositive of a statement is true. Will that help you determine whether the statement can be written as a true biconditional? Explain.

Solution Video



Question 181: CHALLENGE Suppose each of the following statements is true. What can you conclude? Explain your answer.

If it is Tuesday, then I have art class.

It is Tuesday.

Each school day, I have either an art class or study hall.

If it is Friday, then I have gym class.

Today, I have either music class or study hall.

Solution Video



Accompanying lectures for questions 182 - 190



Question 182: For the given statement, write the if-then form, the converse, the inverse, and the contrapositive.

The complementary angles add to 90° .

Solution Video



Question 183: For the given statement, write the if-then form, the converse, the inverse, and the contrapositive.

Ants are insects.

Solution Video



Question 184: WRITING RELATED STATEMENTS For the given statement, write the if-then form, the converse, the inverse, and the contrapositive.

$3x + 10 = 16$, because $x = 2$.

Solution Video



Accompanying lectures for questions 182 - 190



Question 185: WRITING RELATED STATEMENTS For the given statement, write the if-then form, the converse, the inverse, and the contrapositive.

A midpoint bisects a segment.

Solution Video



Question 186: ANALYZING STATEMENTS Decide whether the statement is true or false. If false, provide a counterexample.

If a polygon has five sides, then it is a regular pentagon.

Solution Video



Question 187: ANALYZING STATEMENTS Decide whether the statement is true or false. If false, provide a counterexample.

If $m\angle A$ is 85° , then the measure of the complement of $\angle A$ is 5° .

Solution Video



Accompanying lectures for questions 182 - 190



Question 188: ANALYZING STATEMENTS Decide whether the statement is true or false. If false, provide a counterexample.

Supplementary angles are always linear pairs.

Solution Video



Question 189: ANALYZING STATEMENTS Decide whether the statement is true or false. If false, provide a counterexample.

If a number is an integer, then it is rational.

Solution Video



Question 190: Decide whether the statement is true or false. If false, provide a counterexample.

If a number is a real number, then it is irrational.

Solution Video

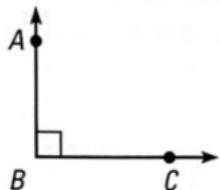


Accompanying lectures for questions 191 - 197



Question 191: USING DEFINITIONS Decide whether each statement about the diagram is true. Explain your answer using the definitions you have learned.

$$m\angle ABC = 90^\circ$$

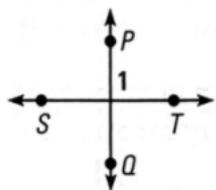


Solution Video



Question 192: Decide whether each statement about the diagram is true. Explain your answer using the definitions you have learned.

$$\overleftrightarrow{PQ} \perp \overleftrightarrow{ST}$$

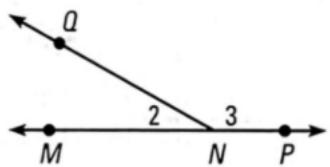


Solution Video



Question 193: USING DEFINITIONS Decide whether each statement about the diagram is true. Explain your answer using the definitions you have learned.

$$m\angle 2 + m\angle 3 = 180^\circ$$



Solution Video



Accompanying lectures for questions 191 - 197



Question 194: DEFINITIONS Determine whether the statement is a valid definition.

If two rays are opposite rays, then they have a common endpoint.

Solution Video



Question 195: DEFINITIONS Determine whether the statement is a valid definition.

If the sides of a triangle are all the same length, then the triangle is equilateral.

Solution Video



Question 196: Determine whether the statement is a valid definition.

If an angle is a right angle, then its measure is greater than that of an acute angle.

Solution Video



Accompanying lectures for questions 191 - 197



Question 197: Which statement has the same meaning as the given statement?

GIVEN - You can go to the movie after you do your homework.

- (A) If you do your homework, then you can go to the movie afterwards.
- (B) If you do not do your homework, then you can go to the movie afterwards.
- (C) If you cannot go to the movie afterwards, then do your homework.
- (D) If you are going to the movie afterwards, then do not do your homework.

Solution Video



Accompanying lectures for questions 198 - 200



Question 198: Rewrite the definition as a biconditional statement.

An angle with a measure between 90° and 180° is called obtuse.

Solution Video



Question 199: Rewrite the definition as a biconditional statement.

Two angles are a linear pair if they are adjacent angles whose noncommon sides are opposite rays.

Solution Video



Question 200: Rewrite the definition as a biconditional statement.

Coplanar points are points that lie in the same plane.

Solution Video



2.3 Apply Deductive Reasoning

Accompanying lectures for questions 201 - 229



Question 201: VOCABULARY Copy and complete: If the hypothesis of a true if-then statement is true, then the conclusion is also true by the Law of ?

Solution Video



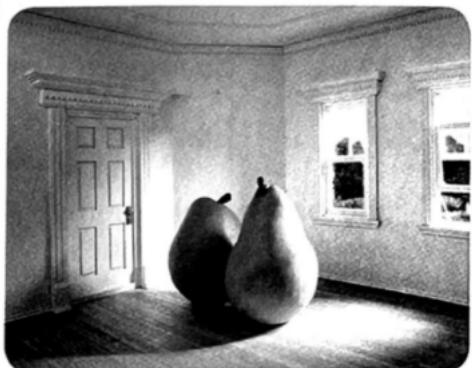
Question 202: ★ WRITING Use deductive reasoning to make a statement about the picture.



Solution Video



Question 203: ★ WRITING Use deductive reasoning to make a statement about the picture.



Solution Video



Accompanying lectures for questions 201 - 229



Question 204: LAW OF DETACHMENT Make a valid conclusion in the situation.

If the measure of an angle is 90° , then it is a right angle. The measure of $\angle A$ is 90° .

Solution Video



Question 205: Make a valid conclusion in the situation.

If $x > 12$, then $-x < -12$. The value of x is 15 .

Solution Video



Question 206: LAW OF DETACHMENT Make a valid conclusion in the situation.

If a book is a biography, then it is nonfiction. You are reading a biography.

Solution Video



Accompanying lectures for questions 201 - 229



Question 207: LAW OF SYLLOGISM In Exercises 7-10, write the statement that follows from the pair of statements that are given.

If a rectangle has four equal side lengths, then it is a square. If a polygon is a square, then it is a regular polygon.

Solution Video



Question 208: LAW OF SYLLOGISM In Exercises 7-10, write the statement that follows from the pair of statements that are given.

If $y > 0$, then $2y > 0$. If $2y > 0$, then $2y - 5 \neq -5$.

Solution Video



Question 209: LAW OF SYLLOGISM In Exercises 7-10, write the statement that follows from the pair of statements that are given.

If you play the clarinet, then you play a woodwind instrument. If you play a woodwind instrument, then you are a musician.

Solution Video



Accompanying lectures for questions 201 - 229



Question 210: LAW OF SYLLOGISM In Exercises 7-10, write the statement that follows from the pair of statements that are given.

If $a = 3$, then $5a = 15$. If $\frac{1}{2}a = 1\frac{1}{2}$, then $a = 3$.

Solution Video



Question 211: REASONING What can you say about the sum of an even integer and an even integer? Use inductive reasoning to form a conjecture. Then use deductive reasoning to show that the conjecture is true.

Solution Video



Question 212: ★ MULTIPLE CHOICE If two angles are vertical angles, then they have the same measure. You know that $\angle 1$ and $\angle 2$ are vertical angles. Using the Law of Detachment, which conclusion could you make?

- (A) $m\angle 1 > m\angle 2$
- (B) $m\angle 1 = m\angle 2$
- (C) $m\angle 1 + m\angle 2 = 90^\circ$
- (D) $m\angle 1 + m\angle 2 = 180^\circ$

Solution Video



Accompanying lectures for questions 201 - 229



Question 213: ERROR ANALYSIS Describe and correct the error in the argument: "If two angles are a linear pair, then they are supplementary. Angles C and D are supplementary, so the angles are a linear pair."

Solution Video



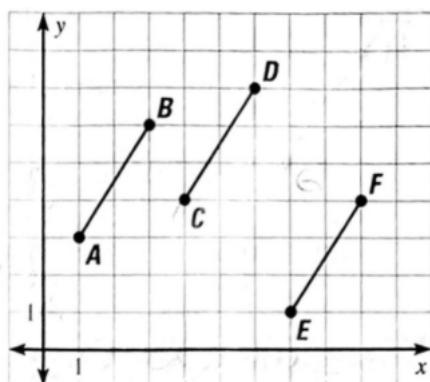
Question 214: ***xy ALGeBRA*** Use the segments in the coordinate plane.

- Use the distance formula to show that the segments are congruent.
- Make a conjecture about some segments in the coordinate plane that are congruent to the given segments. Test your conjecture, and explain your reasoning.
- Let one endpoint of a segment be (x, y) . Use algebra to show that segments drawn using your conjecture will always be congruent.
- A student states that the segments described below will each be congruent to the ones shown above. Determine whether the student is correct. Explain your reasoning.

\overline{MN} , with endpoints $M(3, 5)$ and $N(5, 2)$

\overline{PQ} , with endpoints $P(1, -1)$ and $Q(4, -3)$

\overline{RS} , with endpoints $R(-2, 2)$ and $S(1, 4)$



[Solution Video](#)



Question 215: CHALLENGE Make a conjecture about whether the Law of Syllogism works when used with the contrapositives of a pair of statements. Use this pair of statements to justify your conjecture.

If a creature is a wombat, then it is a marsupial.

If a creature is a marsupial, then it has a pouch.

Solution Video



Accompanying lectures for questions 201 - 229



Question 216: USING THE LAWS OF LOGIC In Exercises 16 and 17, what conclusions can you make using the true statement?

CAR COSTS If you save at least \$2000, then you can buy a used car. You have saved \$2400.

Solution Video



Question 217: USING THE LAWS OF LOGIC In Exercises 16 and 17, what conclusions can you make using the true statement?

PROFIT The bakery makes a profit if its revenue is greater than its costs. You will get a raise if the bakery makes a profit.

Solution Video



Question 218: USING DEDUCTIVE REASONING Select the word(s) that make(s) the conclusion true.



Mesa Verde National Park is in Colorado. Simone vacationed in Colorado. So, Simone (must have, may have, or never) visited Mesa Verde National Park.

Solution Video



Accompanying lectures for questions 201 - 229



Question 219: USING DEDUCTIVE REASONING Select the word(s) that make(s) the conclusion true.

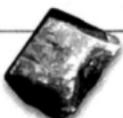
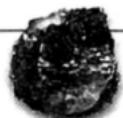


The cliff dwellings in Mesa Verde National Park are accessible to visitors only when accompanied by a park ranger. Billy is at a cliff dwelling in Mesa Verde National Park. So, Billy (is, may be, is not) with a park ranger.

[Solution Video](#)



Question 220: ★ EXTENDED RESPONSE Geologists use the Mohs scale to determine a mineral's hardness. Using the scale, a mineral with a higher rating will leave a scratch on a mineral with a lower rating. Geologists use scratch tests to help identify an unknown mineral.

Mineral				
Mohs rating	1	2	3	4

- Use the table to write three if-then statements such as "If talc is scratched against gypsum, then a scratch mark is left on the talc."
- The four minerals in the table are randomly labeled *A*, *B*, *C*, and *D*. You must identify them. The results of your scratch tests are shown below. What can you conclude? Explain your reasoning.

Mineral *A* is scratched by Mineral *B*.

Mineral *C* is scratched by all three of the other minerals.

- What additional test(s) can you use to identify all the minerals in part (b)?

[Solution Video](#)



Question 221: REASONING In Exercises 21 and 22, decide whether inductive or deductive reasoning is used to reach the conclusion. Explain your reasoning.

The rule at your school is that you must attend all of your classes in order to participate in sports after school. You played in a soccer game after school on Monday. Therefore, you went to all of your classes on Monday.

Solution Video



Accompanying lectures for questions 201 - 229



Question 222: REASONING In Exercises 21 and 22, decide whether inductive or deductive reasoning is used to reach the conclusion. Explain your reasoning.

For the past 5 years, your neighbor goes on vacation every July 4 th and asks you to feed her hamster. You conclude that you will be asked to feed her hamster on the next July 4th.

Solution Video



Question 223: ★ SHORT RESPONSE Use inductive reasoning to form a conjecture about whether the sum of an even integer and an odd integer is even or odd. Then use deductive reasoning to show that the conjecture is true. (Hint: Let the even integer be $2m$ and the odd integer be $2n + 1$.)

Solution Video



Question 224: LITERATURE George Herbert wrote a poem, Jacula Prudentum, that includes the statements shown. Use the Law of Syllogism to write a new conditional statement. Explain your reasoning.

For want of a nail the shoe is lost,
for want of a shoe the horse is lost,
for want of a horse the rider is lost.

Solution Video



Accompanying lectures for questions 201 - 229



Question 225: REASONING In Exercises 25-28, use the true statements below to determine whether you know the conclusion is true or false. Explain your reasoning.

If Arlo goes to the baseball game, then he will buy a hot dog.

If the baseball game is not sold out, then Arlo and Mia will go to the game.

If Mia goes to the baseball game, then she will buy popcorn.

The baseball game is not sold out.

Arlo bought a hot dog.

Solution Video



Question 226: REASONING In Exercises 25-28, use the true statements below to determine whether you know the conclusion is true or false. Explain your reasoning.

If Arlo goes to the baseball game, then he will buy a hot dog.

If the baseball game is not sold out, then Arlo and Mia will go to the game.

If Mia goes to the baseball game, then she will buy popcorn.

The baseball game is not sold out.

Arlo and Mia went to the game.

Solution Video



Question 227: REASONING In Exercises 25–28, use the true statements below to determine whether you know the conclusion is true or false. Explain your reasoning.

If Arlo goes to the baseball game, then he will buy a hot dog.

If the baseball game is not sold out, then Arlo and Mia will go to the game.

If Mia goes to the baseball game, then she will buy popcorn.

The baseball game is not sold out.

Mia bought a hot dog.

Solution Video



Accompanying lectures for questions 201 - 229



Question 228: REASONING In Exercises 25-28, use the true statements below to determine whether you know the conclusion is true or false. Explain your reasoning.

If Arlo goes to the baseball game, then he will buy a hot dog.

If the baseball game is not sold out, then Arlo and Mia will go to the game.

If Mia goes to the baseball game, then she will buy popcorn.

The baseball game is not sold out.

Arlo had some of Mia's popcorn.

Solution Video



Question 229: CHALLENGE Use these statements to answer parts (a)-(c).

Adam says Bob lies.

Bob says Charlie lies.

Charlie says Adam and Bob both lie.

- a. If Adam is telling the truth, then Bob is lying. What can you conclude about Charlie's statement?
- b. Assume Adam is telling the truth. Explain how this leads to a contradiction.
- c. Who is telling the truth? Who is lying? How do you know?

Solution Video



2.4 Use Postulates and Diagrams

Accompanying lectures for questions 230 - 230



Question 230: Copy and complete: A ? is a line that intersects the plane in a point and is perpendicular to every line in the plane that intersects it.

Solution Video



Accompanying lectures for questions 231 - 243



Question 231: ★ WRITING Explain why you cannot assume $\angle BHA \cong \angle CJA$ in the Concept Summary in this lesson.

Solution Video



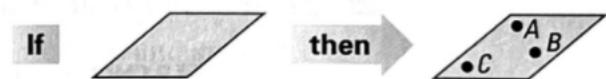
Question 232: State the postulate illustrated by the diagram.



Solution Video



Question 233: State the postulate illustrated by the diagram.



Postulate 2: If two angles are vertical angles, then they are congruent.

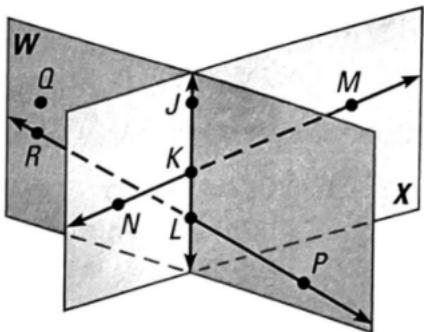
Solution Video



Accompanying lectures for questions 231 - 243



Question 234: USING A DIAGRAM Use the diagram to determine if the statement is true or false.

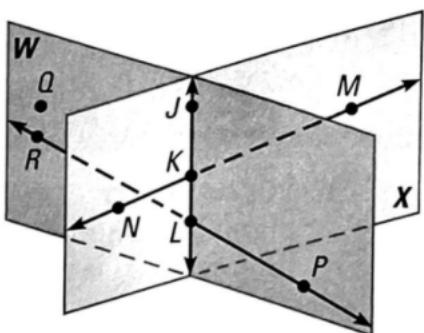


$\angle PLK$ is a right angle.

[Solution Video](#)



Question 235: USING A DIAGRAM Use the diagram to determine if the statement is true or false.

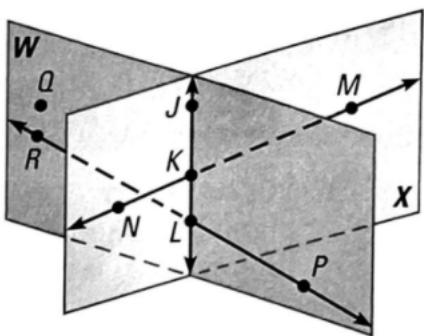


$\angle NKL$ and $\angle JKM$ are vertical angles.

[Solution Video](#)



Question 236: USING A DIAGRAM Use the diagram to determine if the statement is true or false.



$\angle NKJ$ and $\angle JKM$ are supplementary angles.

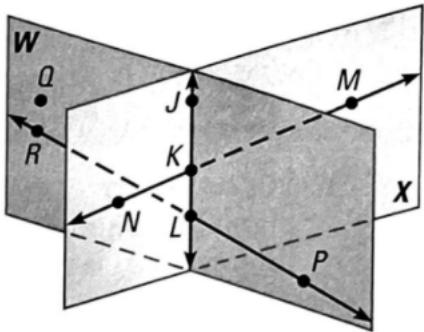
Solution Video



Accompanying lectures for questions 231 - 243



Question 237: USING A DIAGRAM Use the diagram to determine if the statement is true or false.



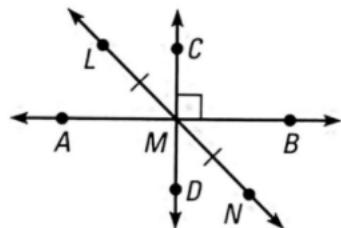
$\angle JKM$ and $\angle KLP$ are congruent angles.

Solution Video

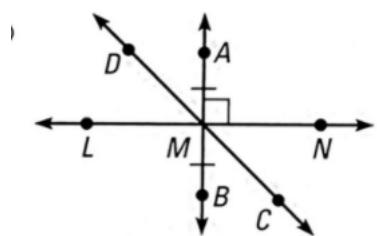


Question 238: Choose the diagram showing \overleftrightarrow{LN} , \overleftrightarrow{AB} , and \overleftrightarrow{DC} intersecting at point M , \overleftrightarrow{AB} bisecting \overleftrightarrow{LN} , and $\overleftrightarrow{DC} \perp \overleftrightarrow{LN}$.

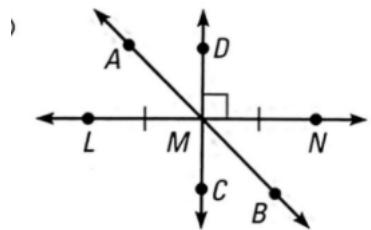
A.



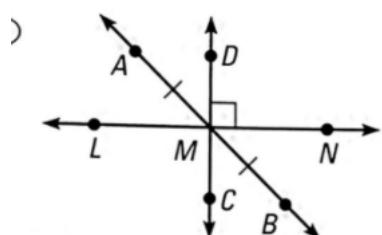
B.



C.



D.



[Solution Video](#)



Question 239: Use Postulates 5 and 9 to explain why every plane contains at least one line.

Solution Video



Accompanying lectures for questions 231 - 243



Question 240: REAL-WORLD SITUATIONS Which postulate is suggested by the photo?



Solution Video



Question 241: REAL-WORLD SITUATIONS Which postulate is suggested by the photo?



Solution Video



Question 242: REAL-WORLD SITUATIONS Which postulate is suggested by the photo?



Solution Video



Accompanying lectures for questions 231 - 243



Question 243: DRAWING DIAGRAMS \overleftrightarrow{AC} and \overleftrightarrow{DB} intersect at point E . Draw one diagram that meets the additional condition(s) and another diagram that does not.

$\angle AED$ and $\angle AEB$ are right angles.

Solution Video



Accompanying lectures for questions 244 - 245



Question 244: Postulate states that through any three noncollinear points there exists exactly one plane.

- a. Rewrite Postulate 8 in if-then form.
- b. Write the converse, inverse, and contrapositive of Postulate 8 .
- c. Which statements in part (b) are true?

Solution Video



Question 245: ERROR ANALYSIS A student made the false statement shown. Change the statement in two different ways to make it true.

Three points are always contained in a line.



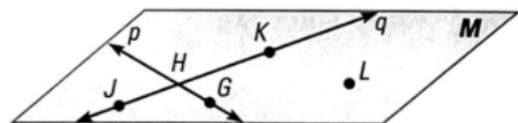
Solution Video



Accompanying lectures for questions 246 - 274



Question 246: Use the diagram to write an example of each postulate.

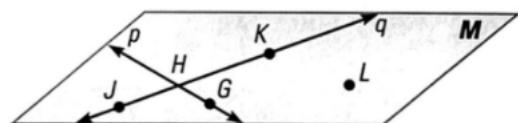


Postulate 6: A line contains at least two points.

Solution Video



Question 247: Use the diagram to write an example of each postulate.

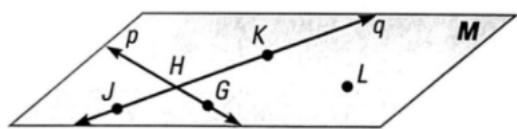


Postulate 7: If two lines intersect, then their intersection is exactly one point.

Solution Video



Question 248: Use the diagram to write an example of each postulate.



Postulate 8:

Through any three noncollinear points there exists exactly one plane.

Solution Video



Accompanying lectures for questions 246 - 274



Question 249: Sketch a diagram showing \overleftrightarrow{XY} intersecting \overleftrightarrow{WV} at point T , so $\overleftrightarrow{XY} \perp \overleftrightarrow{WV}$. In your diagram, does \overline{WT} have to be congruent to \overline{TV} ? Explain your reasoning.

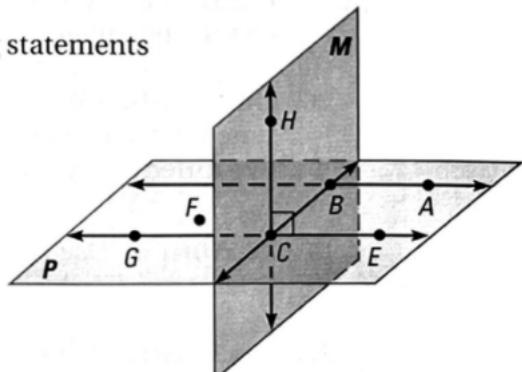
[Solution Video](#)



Question 250: Which of the following statements cannot be assumed from the diagram?

- (A) Points A , B , C , and E are coplanar.
- (B) Points F , B , and G are collinear.
- (C) $\overleftrightarrow{HC} \perp \overleftrightarrow{GE}$
- (D) \overleftrightarrow{EC} intersects plane M at point C .

Using statements



[Solution Video](#)



Question 251: ANALYZING STATEMENTS Decide whether the statement is true or false. If it is false, give a real-world counterexample.

Through any three points, there exists exactly one line.

Solution Video



Accompanying lectures for questions 246 - 274



Question 252: Decide whether the statement is true or false. If it is false, give a real-world counterexample.

A point can be in more than one plane.

Solution Video



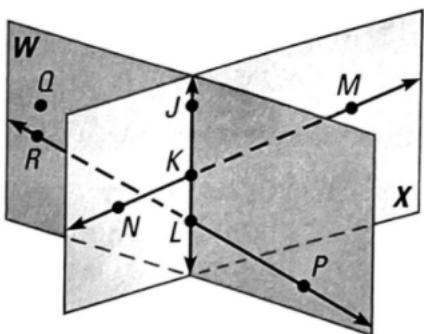
Question 253: Decide whether the statement is true or false. If it is false, give a real-world counterexample.

Any two planes intersect.

Solution Video



Question 254: USING A DIAGRAM Use the diagram to determine if the statement is true or false.



Planes W and X intersect at \overleftrightarrow{KL} .

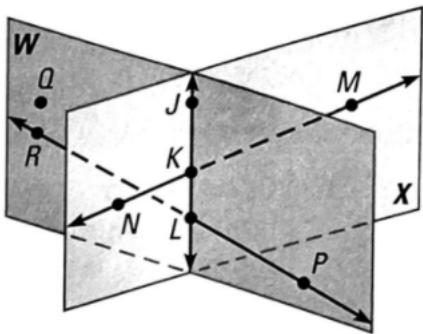
Solution Video



Accompanying lectures for questions 246 - 274



Question 255: USING A DIAGRAM Use the diagram to determine if the statement is true or false.

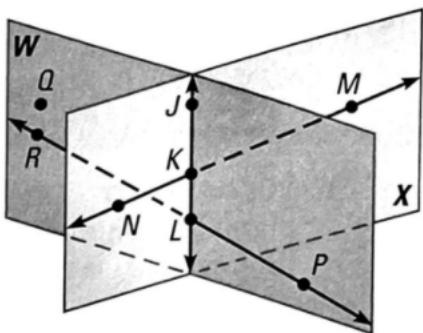


Points Q , J , and M are collinear.

Solution Video



Question 256: USING A DIAGRAM Use the diagram to determine if the statement is true or false.

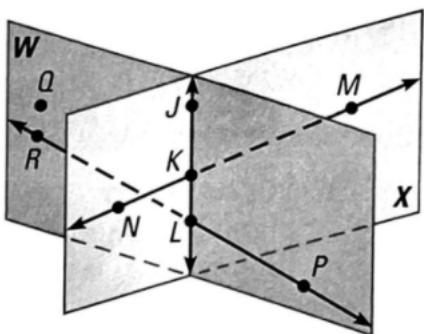


Points K , L , M , and R are coplanar.

Solution Video



Question 257: USING A DIAGRAM Use the diagram to determine if the statement is true or false.



\overleftrightarrow{MN} and \overleftrightarrow{RP} intersect.

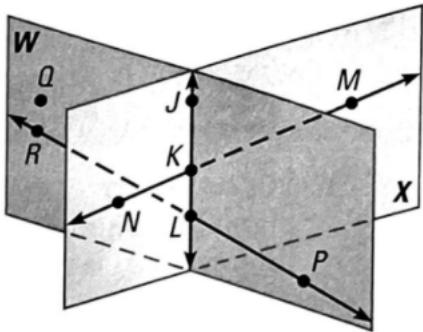
Solution Video



Accompanying lectures for questions 246 - 274



Question 258: USING A DIAGRAM Use the diagram to determine if the statement is true or false.

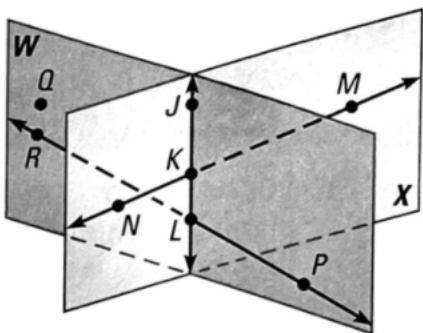


$\overleftrightarrow{RP} \perp \text{plane } W$

[Solution Video](#)



Question 259: USING A DIAGRAM Use the diagram to determine if the statement is true or false.



\overleftrightarrow{JK} lies in plane X.

[Solution Video](#)



Question 260: Sketch a diagram of a real-world object illustrating three of the postulates about points, lines, and planes. List the postulates used.

Solution Video



Accompanying lectures for questions 246 - 274



Question 261: REASONING Point X lies in plane M . Use Postulates 5 and 9 to explain why there are at least two lines in plane M that contain point X .

Solution Video



Question 262: CHALLENGE Sketch a line m and a point C not on line m . Make a conjecture about how many planes can be drawn so that line m and point C lie in the plane. Use postulates to justify your conjecture.

Solution Video



Question 263: ★ SHORT RESPONSE Give a real-world example of Postulate 6 , which states that a line contains at least two points.

Solution Video



Accompanying lectures for questions 246 - 274

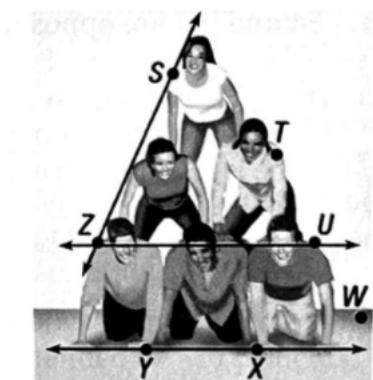


Question 264: DRAW A DIAGRAM Sketch two lines that intersect, and another line that does not intersect either one.

Solution Video



Question 265: USING A DIAGRAM Use the pyramid to write examples of the postulate indicated.

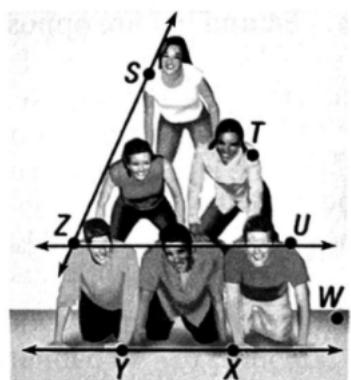


Postulate 5

Solution Video



Question 266: USING A DIAGRAM Use the pyramid to write examples of the postulate indicated.



Postulate 7

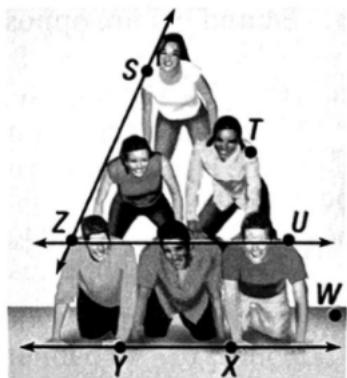
Solution Video



Accompanying lectures for questions 246 - 274



Question 267: USING A DIAGRAM Use the pyramid to write examples of the postulate indicated.

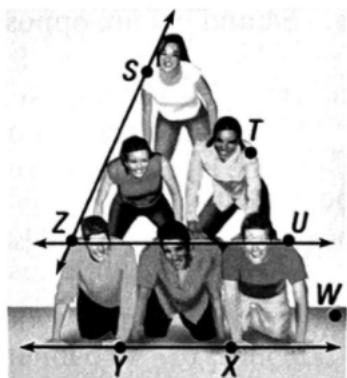


Postulate 9

Solution Video



Question 268: USING A DIAGRAM Use the pyramid to write examples of the postulate indicated.



Postulate 10

Solution Video



Question 269: ★ EXTENDED RESPONSE A friend e-mailed you the following statements about a neighborhood. Use the statements to complete parts (a)-(e).

Subject	Neighborhood
	<p>Building B is due west of Building A.</p> <p>Buildings A and B are on Street 1.</p> <p>Building D is due north of Building A.</p> <p>Buildings A and D are on Street 2.</p> <p>Building C is southwest of Building A.</p> <p>Buildings A and C are on Street 3.</p> <p>Building E is due east of Building B.</p> <p><i>CAE</i> formed by Streets 1 and 3 is obtuse.</p>

- a. Draw a diagram of the neighborhood.
- b. Where do Streets 1 and 2 intersect?
- c. Classify the angle formed by Streets 1 and 2 .
- d. Is Building E between Buildings A and B ? Explain.
- e. What street is Building E on?

Solution Video



Accompanying lectures for questions 246 - 274

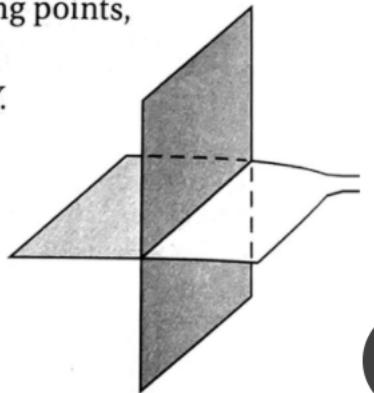


Question 270: Copy the figure and label the following points, lines, and planes appropriately.

- a. Label the horizontal plane as X and the vertical plane as Y .
- b. Draw two points A and B on your diagram so they lie in plane Y , but not in plane X .
- c. Illustrate Postulate 5 on your diagram.
- d. If point C lies in both plane X and plane Y , where would it lie? Draw point C on your diagram.
- e. Illustrate Postulate 9 for plane X on your diagram.

Using points,

Y .



Solution Video



Question 271: ★ SHORT RESPONSE Points E , F , and G all lie in plane P and in plane Q . What must be true about points E , F , and G if P and Q are different planes? What must be true about points E , F , and G to force P and Q to be the same plane? Make sketches to support your answers.

Solution Video



Question 272: DRAWING DIAGRAMS \overleftrightarrow{AC} and \overleftrightarrow{DB} intersect at point E . Draw one diagram that meets the additional condition(s) and another diagram that does not.

Point E is the midpoint of \overline{AC} .

Solution Video



Accompanying lectures for questions 246 - 274



Question 273: \overleftrightarrow{AC} and \overleftrightarrow{DB} intersect at point E . Draw one diagram that meets the additional condition(s) and another diagram that does not.

\overrightarrow{EA} and \overrightarrow{EC} are opposite rays. \overrightarrow{EB} and \overrightarrow{ED} are not opposite rays.

Solution Video



Question 274: Suppose none of the four legs of a chair are the same length. What is the maximum number of planes determined by the lower ends of the legs? Suppose exactly three of the legs of a second chair have the same length. What is the maximum number of planes determined by the lower ends of the legs of the second chair? Explain your reasoning.

Solution Video



2.4.1 Mixed Review

Accompanying lectures for questions 275 - 277



Question 275: The table below shows the time of the sunrise on different days in Galveston, Texas.

Date in 2006	<i>Time of sunrise (Central Standard Time)</i>
Jan.1	7 : 14 A.M.
Feb.1	7 : 08 A.M.
Mar.1	6 : 45 A.M.
Apr.1	6 : 09 A.M.
May 1	5 : 37 A.M.
June 1	5 : 20 A.M.
July 1	5 : 23 A.M.
Aug.1	5 : 40 A.M.

- Describe the pattern, if any, in the times shown in the table.
- Use the times in the table to make a reasonable prediction about the time of the sunrise on September 1, 2006.

[Solution Video](#)



Question 276: SHORT RESPONSE As shown in the table below, hurricanes are categorized by the speed of the wind in the storm. Use the table to determine whether the statement is true or false. If false, provide a counterexample.

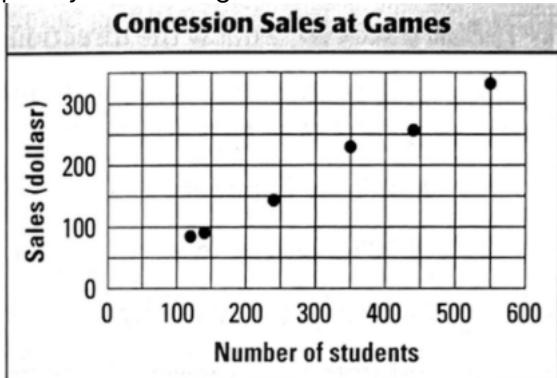
Hurricane category	Wind speed w (mi/h)
1	$74 \leq w \leq 95$
2	$96 \leq w \leq 110$
3	$111 \leq w \leq 130$
4	$131 \leq w \leq 155$
5	$w > 155$

- A hurricane is a category 5 hurricane if and only if its wind speed is greater than 155 miles per hour.
- A hurricane is a category 3 hurricane if and only if its wind speed is less than 130 miles per hour.

[Solution Video](#)



Question 277: EXTENDED RESPONSE The graph shows concession sales at six high school football games. Tell whether each statement is the result of inductive reasoning or deductive reasoning. Explain your thinking.



- a. If 500 students attend a football game, the high school can expect concession sales to reach \$300.
- b. Concession sales were highest at the game attended by 550 students.
- c. The average number of students who come to a game is about 300 .

[Solution Video](#)



Accompanying lectures for questions 278 - 278



Question 278: GRIDDED ANSWER Write the next number in the pattern.

1, 2, 5, 10, 17, 26, ...

Solution Video



Accompanying lectures for questions 279 - 279



Question 279: SHORT RESPONSE Select the phrase that makes the conclusion true. Explain your reasoning.

- a. A person needs a library card to check out books at the public library. You checked out a book at the public library. You (must have, may have, or do not have) a library card.
- b. The islands of Hawaii are volcanoes. Bob has never been to the Hawaiian Islands. Bob (has visited, may have visited, or has never visited) volcanoes.

Solution Video



Accompanying lectures for questions 280 - 280



Question 280: SHORT RESPONSE Sketch a diagram showing \overleftrightarrow{PQ} intersecting \overleftrightarrow{RS} at point N . In your diagram, $\angle PNS$ should be an obtuse angle. Identify two acute angles in your diagram. Explain how you know that these angles are acute.

Solution Video



2.5 Reason Using Properties from Algebra

Accompanying lectures for questions 281 - 287



Question 281: VOCABULARY The following statement is true because of what property? The measure of an angle is equal to itself.

Solution Video



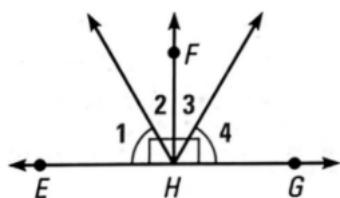
Question 282: ★ MULTIPLE CHOICE Name the property of equality the statement illustrates: If $XY = AB$ and $AB = GH$, then $XY = GH$.

- (A) Substitution
- (B) Reflexive
- (C) Symmetric
- (D) Transitive

Solution Video



Question 283: PROPERTIES OF EQUALITY Copy and complete the table to show $m\angle 2 = m\angle 3$.



Equation	Explanation	Reason
$m\angle 1 = m\angle 4, m\angle EHF = 90^\circ, m\angle GHF = 90^\circ$?	Given
$m\angle EHF = m\angle GHF$?	Substitution Property of Equality
$m\angle EHF = m\angle 1 + m\angle 2$ $m\angle GHF = m\angle 3 + m\angle 4$	Add measures of adjacent angles.	?
$m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	Write expressions equal to the angle measures.	?
?	Substitute $m\angle 1$ for $m\angle 4$.	?
$m\angle 2 = m\angle 3$?	Subtraction Property of Equality

Equation	Explanation
$m\angle 1 = m\angle 4, m\angle EHF = 90^\circ, m\angle GHF = 90^\circ$	given
$m\angle EHF = m\angle GHF$?
$m\angle EHF = m\angle 1 + m\angle 2$ $m\angle GHF = m\angle 3 + m\angle 4$	Add measures of adjacent angles.
$m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	Write expressions equal to the angle measures.
?	Substitute $m\angle 1$ for $m\angle 4$.
$m\angle 2 = m\angle 3$	

Solution Video



Accompanying lectures for questions 281 - 287



Question 284: MULTI-STEP PROBLEM Points A , B , C , and D represent stops, in order, along a subway route. The distance between Stops A and C is the same as the distance between Stops B and D .

- Draw a diagram to represent the situation.
- Use the Segment Addition Postulate to show that the distance between Stops A and B is the same as the distance between Stops C and D .
- Justify part (b) using the Properties of Equality.

Solution Video

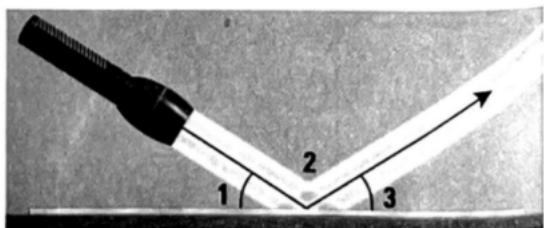


Question 285: ★ SHORT RESPONSE A flashlight beam is reflected off a mirror lying flat on the ground. Use the information given below to find $m\angle 2$.

$$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$$

$$m\angle 1 + m\angle 2 = 148^\circ$$

$$m\angle 1 = m\angle 3$$



Solution Video



Question 286: CHALLENGE In Exercises 37 and 38, decide whether the relationship is reflexive, symmetric, or transitive.

Group: two employees in a grocery store

Relationship: "worked the same hours as"

Example: Yen worked the same hours as Jim.

Solution Video



Accompanying lectures for questions 281 - 287



Question 287: CHALLENGE In Exercises 37 and 38, decide whether the relationship is reflexive, symmetric, or transitive.

Group: negative numbers on a number line

Relationship: "is less than"

Example: -4 is less than -1 .

Solution Video



Accompanying lectures for questions 288 - 295



Question 288: ★ WRITING Explain how to check the answer to Example 3 .

Solution Video



Question 289: COMPLETING STATEMENTS In Exercises 21-25, use the property to copy and complete the statement.

Substitution Property of Equality: If $AB = 20$, then $AB + CD = ?$.

Solution Video



Question 290: COMPLETING STATEMENTS In Exercises 21-25, use the property to copy and complete the statement.

Symmetric Property of Equality: If $m\angle 1 = m\angle 2$, then ?.

Solution Video



Accompanying lectures for questions 288 - 295



Question 291: COMPLETING STATEMENTS In Exercises 21-25, use the property to copy and complete the statement.

Addition Property of Equality: If $AB = CD$, then $\underline{?} + EF = \underline{?} + EF$.

Solution Video



Question 292: COMPLETING STATEMENTS In Exercises 21-25, use the property to copy and complete the statement.

Distributive Property: If $5(x + 8) = 2$, then $\underline{?}x + \underline{?} = 2$.

Solution Video



Question 293: COMPLETING STATEMENTS In Exercises 21-25, use the property to copy and complete the statement.

Transitive Property of Equality: If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then ?.

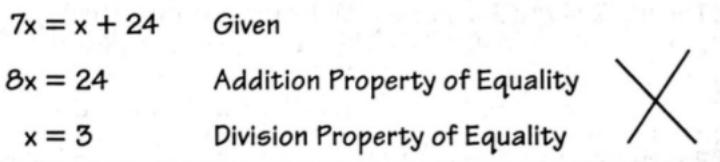
Solution Video



Accompanying lectures for questions 288 - 295



Question 294: ERROR ANALYSIS Describe and correct the error in solving the equation for x .

$$\begin{array}{ll} 7x = x + 24 & \text{Given} \\ 8x = 24 & \text{Addition Property of Equality} \\ x = 3 & \text{Division Property of Equality} \end{array}$$


Solution Video



Question 295: ★ OPEN-ENDED MATH Write examples from your everyday life that could help you remember the Reflexive, Symmetric, and Transitive Properties of Equality.

Solution Video



Accompanying lectures for questions 296 - 305



Question 296: WRITING REASONS Copy the logical argument. Write a reason for each step.

$$3x - 12 = 7x + 8 \quad \text{Given}$$

$$\begin{aligned} -4x - 12 &= 8 & ? \\ -4x &= 20 & ? \\ x &= -5 & ? \end{aligned}$$

Solution Video



Question 297: WRITING REASONS Copy the logical argument. Write a reason for each step.

$$5(x - 1) = 4x + 13 \quad \text{Given}$$

$$\begin{aligned} 5x - 5 &= 4x + 13 & ?? \\ x - 5 &= 13 & ?? \end{aligned}$$

Solution Video



Question 298: WRITING REASONS Solve the equation. Write a reason for each step.

$$4x + 9 = 16 - 3x$$

Solution Video



Accompanying lectures for questions 296 - 305



Question 299: WRITING REASONS Solve the equation. Write a reason for each step.

$$5(3x - 20) = -10$$

Solution Video



Question 300: WRITING REASONS Solve the equation. Write a reason for each step.

$$3(2x + 11) = 9$$

Solution Video



Question 301: WRITING REASONS Solve the equation. Write a reason for each step.

$$2(-x - 5) = 12$$

Solution Video



Accompanying lectures for questions 296 - 305



Question 302: WRITING REASONS Solve the equation. Write a reason for each step.

$$44 - 2(3x + 4) = -18x$$

Solution Video



Question 303: WRITING REASONS Solve the equation. Write a reason for each step.

$$4(5x - 9) = -2(x + 7)$$

Solution Video



Question 304: WRITING REASONS Solve the equation. Write a reason for each step.

$$2x - 15 - x = 21 + 10x$$

Solution Video



Accompanying lectures for questions 296 - 305



Question 305: WRITING REASONS Solve the equation. Write a reason for each step.

$$3(7x - 9) - 19x = -15$$

Solution Video



Accompanying lectures for questions 306 - 306



Question 306: WRITING REASONS Solve the equation. Write a reason for each step.

$$5x - 10 = -40$$

Solution Video



Accompanying lectures for questions 307 - 313



Question 307: xy ALGEBRA Solve the equation for y . Write a reason for each step.

$$5x + y = 18$$

Solution Video



Question 308: xy ALGEBRA Solve the equation for y . Write a reason for each step.

$$12 - 3y = 30x$$

Solution Video



Question 309: xy ALGEBRA Solve the equation for y . Write a reason for each step.

$$3x + 9y = -7$$

Solution Video



Accompanying lectures for questions 307 - 313



Question 310: Solve the equation for y . Write a reason for each step.

$$2y + 0.5x = 16$$

Solution Video



Question 311: PERIMETER The formula for the perimeter P of a rectangle is $P = 2\ell + 2w$ where ℓ is the length and w is the width. Solve the formula for ℓ and write a reason for each step. Then find the length of a rectangular lawn whose perimeter is 55 meters and whose width is 11 meters.

Solution Video



Question 312: AREA The formula for the area A of a triangle is $A = \frac{1}{2}bh$ where b is the base and h is the height. Solve the formula for h and write a reason for each step. Then find the height of a triangle whose area is 1768 square inches and whose base is 52 inches.

Solution Video



Accompanying lectures for questions 307 - 313



Question 313: MULTIPLE REPRESENTATIONS The formula to convert a temperature in degrees Fahrenheit ($^{\circ}\text{F}$) to degrees Celsius ($^{\circ}\text{C}$) is $C = \frac{5}{9}(F - 32)$.

- a. Writing an Equation Solve the formula for F . Write a reason for each step.
- b. Making a Table Make a table that shows the conversion to Fahrenheit for each temperature: 0°C , 20°C , 32°C , and 41°C .
- c. Drawing a Graph Use your table to graph the temperature in degrees Fahrenheit ($^{\circ}\text{F}$) as a function of the temperature in degrees Celsius ($^{\circ}\text{C}$). Is this a linear function?

Solution Video



Accompanying lectures for questions 314 - 315



Question 314: xy ALGEBRA Solve the equation for y . Write a reason for each step.

$$-4x + 2y = 8$$

Solution Video



Question 315: Solve the equation for y . Write a reason for each step.

$$\frac{1}{2}x - \frac{3}{4}y = -2$$

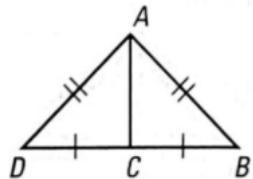
Solution Video



Accompanying lectures for questions 316 - 317



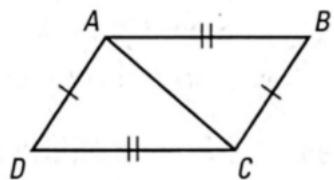
Question 316: PERIMETER In Exercises 28 and 29, show that the perimeter of triangle ABC is equal to the perimeter of triangle ADC .



Solution Video



Question 317: PERIMETER In Exercises 28 and 29, show that the perimeter of triangle ABC is equal to the perimeter of triangle ADC .



Solution Video

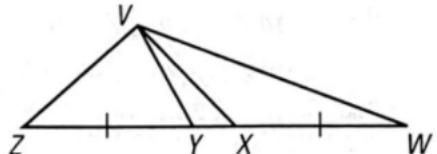


Accompanying lectures for questions 318 - 318



Question 318: CHALLENGE In the figure at the right,

$\overline{ZY} \cong \overline{XW}$, $ZX = 5x + 17$, $YW = 10 - 2x$, and $YX = 3$. Find ZY and XW .



Solution Video



2.6 Prove Statements about Segments and Angles

Accompanying lectures for questions 319 - 327



Question 319: VOCABULARY What is a theorem? How is it different from a postulate?

Solution Video



Question 320: USING PROPERTIES Use the property to copy and complete the statement.

Reflexive Property of Congruence: $? \cong \overline{SE}$

Solution Video



Question 321: USING PROPERTIES Use the property to copy and complete the statement.

Symmetric Property of Congruence: If $? \cong ?$ then $\angle RST \cong \angle JKL$.

Solution Video



Accompanying lectures for questions 319 - 327



Question 322: NAMING PROPERTIES Name the property illustrated by the statement.

$$\angle VWX \cong \angle VWX$$

Solution Video



Question 323: NAMING PROPERTIES Name the property illustrated by the statement.

If $\overline{JK} \cong \overline{MN}$ and $\overline{MN} \cong \overline{XY}$, then $\overline{JK} \cong \overline{XY}$. 11. $YZ = ZY$

Solution Video



Question 324: Name the property illustrated by the statement "If $\overline{CD} \cong \overline{MN}$, then $\overline{MN} \cong \overline{CD}$."

- (A) Reflexive Property of Equality
- (B) Symmetric Property of Equality
- (C) Symmetric Property of Congruence
- (D) Transitive Property of Congruence

Solution Video

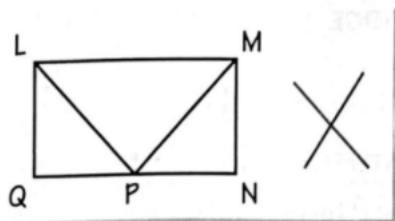


Accompanying lectures for questions 319 - 327



Question 325: ERROR ANALYSIS In the diagram below, $\overline{MN} \cong \overline{LQ}$ and $\overline{LQ} \cong \overline{PN}$. Describe and correct the error in the reasoning.

Because $\overline{MN} \cong \overline{LQ}$ and $\overline{LQ} \cong \overline{PN}$,
then $\overline{MN} \cong \overline{PN}$ by the Reflexive
Property of Segment Congruence.



[Solution Video](#)



Question 326: MAKING A SKETCH In Exercises 14 and 15, sketch a diagram that represents the given information.

CRYSTALS The shape of a crystal can be represented by intersecting lines and planes. Suppose a crystal is cubic, which means it can be represented by six planes that intersect at right angles.

[Solution Video](#)



Question 327: CHALLENGE Point P is the midpoint of \overline{MN} and point Q is the midpoint of \overline{MP} . Suppose \overline{AB} is congruent to \overline{MP} , and \overline{PN} has length x . Write the length of the segments in terms of x . Explain.

- a. \overline{AB}
- b. \overline{MN}
- c. \overline{MQ}
- d. \overline{NQ}

Solution Video



Accompanying lectures for questions 328 - 328



Question 328: ★ WRITING You can use theorems as reasons in a two-column proof. What other types of statements can you use as reasons in a two-column proof? Give examples.

Solution Video



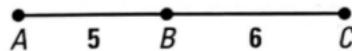
Accompanying lectures for questions 329 - 337



Question 329: Copy and complete the proof.

GIVEN ▶ $AB = 5, BC = 6$

PROVE ▶ $AC = 11$



STATEMENTS	REASONS
1. $AB = 5, BC = 6$	1. Given
2. $AC = AB + BC$	2. Segment Addition Postulate
3. $AC = 5 + 6$	3. <u>?</u>
4. <u>?</u>	4. Simplify.

Solution Video



Question 330: Which property listed is the reason for the last step in the proof?

GIVEN ▶ $m\angle 1 = 59^\circ, m\angle 2 = 59^\circ$

PROVE ▶ $m\angle 1 = m\angle 2$

STATEMENTS	REASONS
1. $m\angle 1 = 59^\circ, m\angle 2 = 59^\circ$	1. Given
2. $59^\circ = m\angle 2$	2. Symmetric Property of Equality
3. $m\angle 1 = m\angle 2$	3. <u>?</u>

- (A) Transitive Property of Equality
- (B) Reflexive Property of Equality
- (C) Symmetric Property of Equality
- (D) Distributive Property

Solution Video

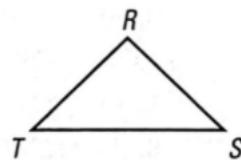


Question 331: DEVELOPING PROOF Copy and complete the proof.

16. DEVELOPING PROOF Copy and complete the proof.

GIVEN ▶ $RT = 5$, $RS = 5$, $\overline{RT} \cong \overline{TS}$

PROVE ▶ $\overline{RS} \cong \overline{TS}$



STATEMENTS

1. $RT = 5$, $RS = 5$, $\overline{RT} \cong \overline{TS}$
2. $RS = RT$
3. $RT = TS$
4. $RS = TS$
5. $\overline{RS} \cong \overline{TS}$

REASONS

1. ?
2. Transitive Property of Equality
3. Definition of congruent segments
4. Transitive Property of Equality
5. ?

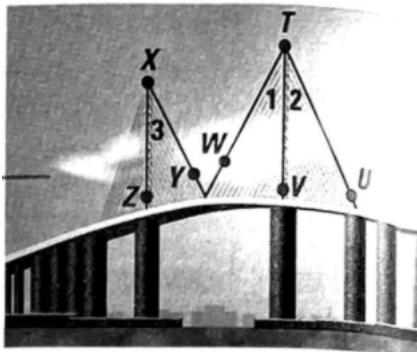
[Solution Video](#)



Accompanying lectures for questions 329 - 337



Question 332: In the bridge in the illustration, it is known that $\angle 2 \cong \angle 3$ and \overrightarrow{TV} bisects $\angle UTW$. Copy and complete the proof to show that $\angle 1 \cong \angle 3$.



STATEMENTS	REASONS
1. \overrightarrow{TV} bisects $\angle UTW$.	1. Given
2. $\angle 1 \cong \angle 2$	2. <u> ?</u>
3. $\angle 2 \cong \angle 3$	3. Given
4. $\angle 1 \cong \angle 3$	4. <u> ?</u>

Solution Video



Question 333: DEVELOPING PROOF Write a complete proof by matching each statement with its corresponding reason.

GIVEN ▶ \overrightarrow{QS} is an angle bisector of $\angle PQR$.

PROVE ▶ $m\angle PQS = \frac{1}{2}m\angle PQR$

STATEMENTS	REASONS
1. \overrightarrow{QS} is an angle bisector of $\angle PQR$.	A. Definition of angle bisector
2. $\angle PQS \cong \angle SQR$	B. Distributive Property
3. $m\angle PQS = m\angle SQR$	C. Angle Addition Postulate
4. $m\angle PQS + m\angle SQR = m\angle PQR$	D. Given
5. $m\angle PQS + m\angle PQS = m\angle PQR$	E. Division Property of Equality
6. $2 \cdot m\angle PQS = m\angle PQR$	F. Definition of congruent angles
7. $m\angle PQS = \frac{1}{2}m\angle PQR$	G. Substitution Property of Equality

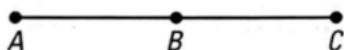
Solution Video



Question 334: PROOF Use the given information and the diagram to prove the statement.

GIVEN $2AB = AC$

PROVE $AB = BC$



Solution Video



Accompanying lectures for questions 329 - 337

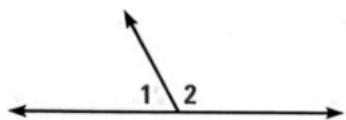


Question 335: PROOF Use the given information and the diagram to prove the statement.

GIVEN $m\angle 1 + m\angle 2 = 180^\circ$

$m\angle 1 = 62^\circ$

PROVE D $m\angle 2 = 118^\circ$



Solution Video

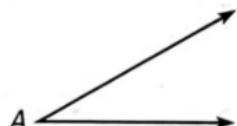


Question 336: PROVING PROPERTIES Prove the indicated property of congruence.

Reflexive Property of Angle Congruence

GIVEN D is an angle.

PROVE $\angle A \cong \angle A$



Solution Video

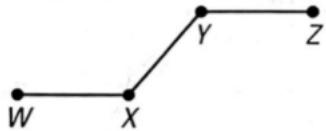


Question 337: PROVING PROPERTIES Prove the indicated property of congruence.

Transitive Property of Segment Congruence

GIVEN $\overline{WX} \cong \overline{XY}$ and $\overline{XY} \cong \overline{YZ}$

PROVE $\overline{WX} \cong \overline{YZ}$



Solution Video



Accompanying lectures for questions 338 - 341



Question 338: USING PROPERTIES Use the property to copy and complete the statement.

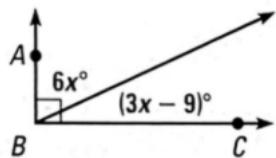
Transitive Property of Congruence: If $\angle F \cong \angle J$ and $\angle J \cong \angle L$ then $\angle F \cong \angle L$.

Solution Video



Question 339: Solve for x using the given information. Explain your steps.

GIVEN $\rightarrow m\angle ABC = 90^\circ$



Solution Video



Question 340: ★ SHORT RESPONSE In the sculpture shown, $\angle 1 \cong \angle 2$ and $\angle 2 \cong \angle 3$. Classify the triangle and justify your reasoning.

Solution Video



Accompanying lectures for questions 338 - 341



Question 341: MULTI-STEP PROBLEM The distance from the restaurant to the shoe store is the same as the distance from the cafe to the florist. The distance from the shoe store to the movie theater is the same as the distance from the movie theater to the cafe, and from the florist to the dry cleaners.



Use the steps below to prove that the distance from the restaurant to the movie theater is the same as the distance from the cafe to the dry cleaners.

- a. Draw and label a diagram to show the mathematical relationships.
- b. State what is given and what is to be proved for the situation.
- c. Write a two-column proof.

Solution Video



Accompanying lectures for questions 342 - 342



Question 342: NAMING PROPERTIES Name the property illustrated by the statement.

If $\overline{DG} \cong \overline{CT}$, then $\overline{CT} \cong \overline{DG}$.

Solution Video



Accompanying lectures for questions 343 - 343



Question 343: MAKING A SKETCH In Exercises 14 and 15, sketch a diagram that represents the given information.

BEACH VACATION You are on vacation at the beach. Along the boardwalk, the bike rentals are halfway between your cottage and the kite shop. The snack shop is halfway between your cottage and the bike rentals. The arcade is halfway between the bike rentals and the kite shop.

Solution Video

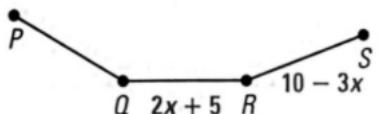


Accompanying lectures for questions 344 - 344



Question 344: Solve for x using the given information. Explain your steps.

GIVEN: $\overline{QR} \cong \overline{PQ}, \overline{RS} \cong \overline{PQ}$



Solution Video



Accompanying lectures for questions 345 - 345



Question 345: Explain why writing a proof is an example of deductive reasoning, not inductive reasoning.

Solution Video



Accompanying lectures for questions 346 - 346



Question 346: ★ SHORT RESPONSE You use a computer drawing program to create a line segment. You copy the segment and paste it. You copy the pasted segment and then paste it, and so on. How do you know all the line segments are congruent?

Solution Video



Accompanying lectures for questions 347 - 347



Question 347: CHALLENGE The distance from Springfield to Lakewood City is equal to the distance from Springfield to Bettsville. Janisburg is 50 miles farther from Springfield than Bettsville is. Moon Valley is 50 miles farther from Springfield than Lakewood City is.

- a. Assume all five cities lie in a straight line. Draw a diagram that represents this situation.
- b. Suppose you do not know that all five cities lie in a straight line. Draw a diagram that is different from the one in part (a) to represent the situation.
- c. Explain the differences in the two diagrams.

Solution Video



2.7 Prove Angle Pair Relationships

Accompanying lectures for questions 348 - 375



Question 348: VOCABULARY Copy and complete: If two lines intersect at a point, then the ? angles formed by the intersecting lines are congruent.

Solution Video

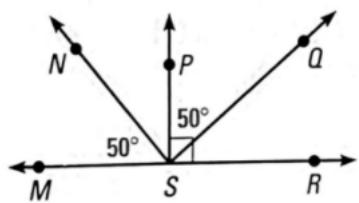


Question 349: ★ WRITING Describe the relationship between the angle measures of complementary angles, supplementary angles, vertical angles, and linear pairs.

Solution Video



Question 350: Identify the pair(s) of congruent angles in the figures below. Explain how you know they are congruent.



Solution Video



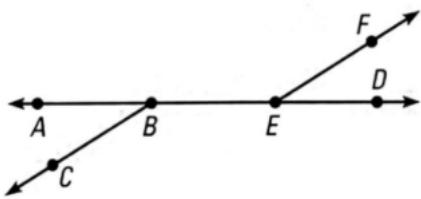
Accompanying lectures for questions 348 - 375



Question 351: Identify the pair(s) of congruent angles in the figures below. Explain how you know they are congruent.

$\angle ABC$ is supplementary to $\angle CBD$.

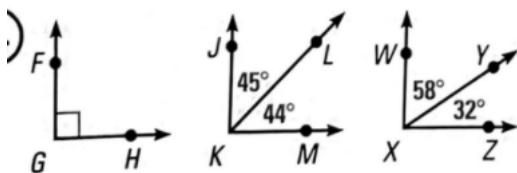
$\angle CBD$ is supplementary to $\angle DEF$.



[Solution Video](#)



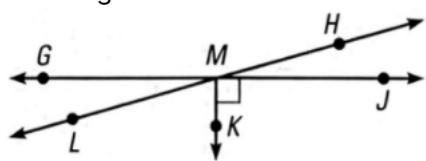
Question 352: Identify the pair(s) of congruent angles in the figures below. Explain how you know they are congruent.



[Solution Video](#)



Question 353: Identify the pair(s) of congruent angles in the figures below. Explain how you know they are congruent.



Solution Video



Accompanying lectures for questions 348 - 375



Question 354: FINDING ANGLE MEASURES In Exercises 8 – 11, use the diagram at the right.



If $m\angle 1 = 155^\circ$, find $m\angle 2$, $m\angle 3$, and $m\angle 4$.

Solution Video



Question 355: FINDING ANGLE MEASURES In Exercises 8 – 11, use the diagram at the right.



If $m\angle 3 = 168^\circ$, find $m\angle 1$, $m\angle 2$, and $m\angle 4$.

Solution Video



Question 356: FINDING ANGLE MEASURES In Exercises 8 – 11, use the diagram at the right.



If $m\angle 4 = 27^\circ$, find $m\angle 1$, $m\angle 2$, and $m\angle 3$.

Solution Video



Accompanying lectures for questions 348 - 375



Question 357: FINDING ANGLE MEASURES In Exercises 8 – 11, use the diagram at the right.

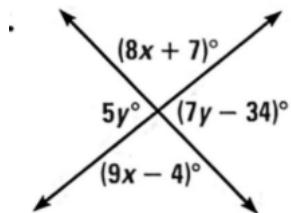


If $m\angle 2 = 32^\circ$, find $m\angle 1$, $m\angle 3$, and $m\angle 4$.

Solution Video



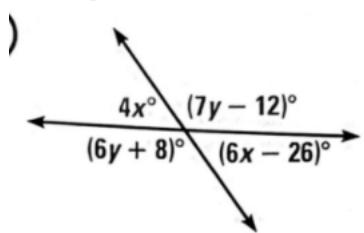
Question 358: xy ALGEBRA Find the values of x and y .



Solution Video



Question 359: xy ALGEBRA Find the values of x and y .



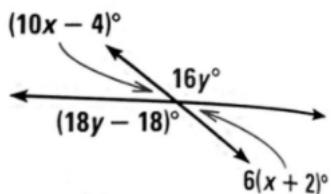
Solution Video



Accompanying lectures for questions 348 - 375



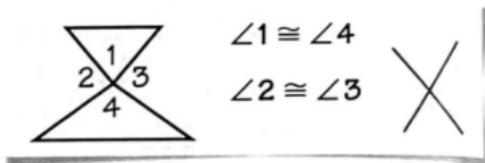
Question 360: xy ALGEBRA Find the values of x and y .



[Solution Video](#)



Question 361: ERROR ANALYSIS Describe the error in stating that $\angle 1 \cong \angle 4$ and $\angle 2 \cong \angle 3$.



[Solution Video](#)



Question 362: ★ MULTIPLE CHOICE In a figure, $\angle A$ and $\angle D$ are complementary angles and $m\angle A = 4x^\circ$. Which expression can be used to find $m\angle D$?

- (A) $(4x + 90)^\circ$
- (B) $(180 - 4x)^\circ$
- (C) $(180 + 4x)^\circ$
- (D) $(90 - 4x)^\circ$

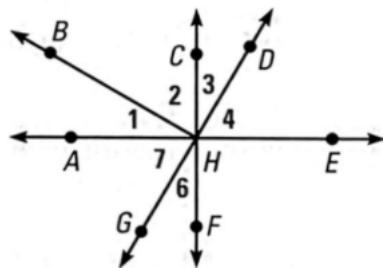
Solution Video



Accompanying lectures for questions 348 - 375



Question 363: FINDING ANGLE MEASURES In Exercises 17-21, copy and complete the statement given that $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$.

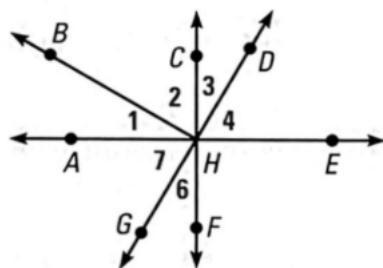


If $m\angle BHF = 115^\circ$, then $m\angle 3 = ?$

[Solution Video](#)



Question 364: FINDING ANGLE MEASURES In Exercises 17-21, copy and complete the statement given that $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$.

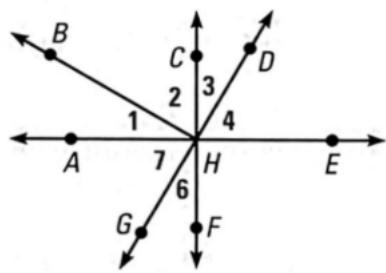


If $m\angle 6 = 27^\circ$, then $m\angle 1 = ?$

[Solution Video](#)



Question 365: FINDING ANGLE MEASURES In Exercises 17-21, copy and complete the statement given that $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$.



If $m\angle DHF = 133^\circ$, then $m\angle CHG = ?$.

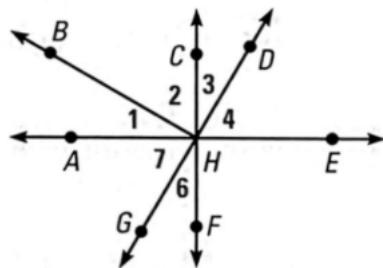
[Solution Video](#)



Accompanying lectures for questions 348 - 375



Question 366: FINDING ANGLE MEASURES In Exercises 17-21, copy and complete the statement given that $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$.



If $m\angle 3 = 32^\circ$, then $m\angle 2 = ?$.

[Solution Video](#)



Question 367: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$\angle 1 \cong \angle 2$$

[Solution Video](#)



Question 368: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$\angle 1 \cong \angle 3$$

Solution Video



Accompanying lectures for questions 348 - 375



Question 369: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$\angle 1 \cong \angle 4$$

Solution Video



Question 370: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$\angle 3 \cong \angle 2$$

Solution Video



Question 371: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$\angle 2 \cong \angle 4$$

Solution Video



Accompanying lectures for questions 348 - 375



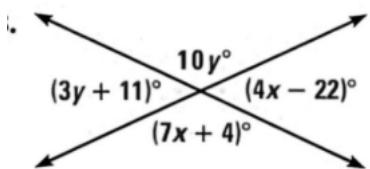
Question 372: ANALYZING STATEMENTS Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

$$m\angle 3 + m\angle 4 = 180^\circ$$

Solution Video



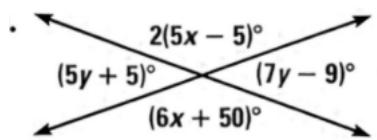
Question 373: Find the measure of each angle in the diagram.



Solution Video



Question 374: xy ALGEBRA Find the measure of each angle in the diagram.



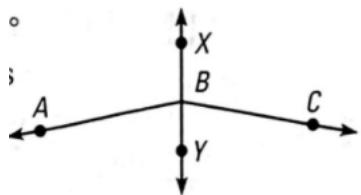
Solution Video



Accompanying lectures for questions 348 - 375



Question 375: ★ OPEN-ENDED MATH In the diagram, $m\angle CBY = 80^\circ$ and \overleftrightarrow{XY} bisects $\angle ABC$. Give two more true statements about the diagram.



Solution Video



Accompanying lectures for questions 376 - 376



Question 376: ★ SHORT RESPONSE The x -axis and y -axis in a coordinate plane are perpendicular to each other. The axes form four angles. Are the four angles congruent right angles? Explain.

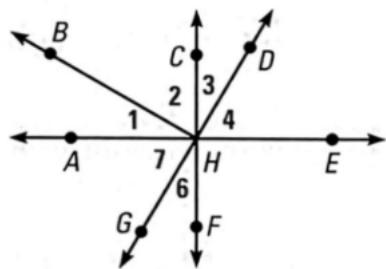
Solution Video



Accompanying lectures for questions 377 - 377



Question 377: Copy and complete the statement given that $m\angle FHE = m\angle BHG = m\angle AHF = 90^\circ$.



If $m\angle 3 = 30^\circ$, then $m\angle 6 = \underline{\hspace{2cm}}$.

Solution Video



Accompanying lectures for questions 378 - 378



Question 378: Use the given statement to name two congruent angles. Then give a reason that justifies your conclusion.

In triangle GFE , \overrightarrow{GH} bisects $\angle EGF$.

Solution Video



Accompanying lectures for questions 379 - 385



Question 379: DRAWING cONCLUSIONS In Exercises 31-34, use the given statement to name two congruent angles. Then give a reason that justifies your conclusion.

$\angle 1$ is a supplement of $\angle 6$, and $\angle 9$ is a supplement of $\angle 6$.

Solution Video



Question 380: DRAWING cONCLUSIONS In Exercises 31-34, use the given statement to name two congruent angles. Then give a reason that justifies your conclusion.

\overline{AB} is perpendicular to \overline{CD} , and \overline{AB} and \overline{CD} intersect at E .

Solution Video



Question 381: DRAWING cONCLUSIONS In Exercises 31-34, use the given statement to name two congruent angles. Then give a reason that justifies your conclusion.

$\angle 5$ is complementary to $\angle 12$, and $\angle 1$ is complementary to $\angle 12$.

Solution Video



Accompanying lectures for questions 379 - 385



Question 382: CHALLENGE Sketch two intersecting lines j and k . Sketch another pair of lines ℓ and m that intersect at the same point as j and k and that bisect the angles formed by j and k . Line ℓ is perpendicular to line m . Explain why this is true.

Solution Video



Question 383: PROVING THEOREM 2.4 Prove the second case of the Congruent Supplements Theorem where two angles are supplementary to congruent angles.



GIVEN $\angle 1$ and $\angle 2$ are supplements.

$\angle 3$ and $\angle 4$ are supplements.

$$\angle 1 \cong \angle 4$$

PROVE $\angle 2 \cong \angle 3$

Solution Video



Question 384: MULTI-STEP PROBLEM Use the photo of the folding table.

- a. If $m\angle 1 = x^\circ$, write expressions for the other three angle measures.
- b. Estimate the value of x . What are the measures of the other angles?
- c. As the table is folded up, $\angle 4$ gets smaller. What happens to the other three angles? Explain your reasoning.



Solution Video



Accompanying lectures for questions 379 - 385



Question 385: PROVING THEOREM 2.5 Write a two-column proof for the second case of Theorem 2.5 where two angles are complementary to congruent angles.

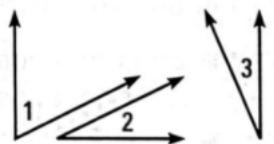
Solution Video



Accompanying lectures for questions 386 - 394



Question 386: PROVING THEOREM 2.5 Copy and complete the proof of the first case of the Congruent Complements Theorem where two angles are complementary to the same angle.



GIVEN $D\angle 1$ and $\angle 2$ are complements.

$\angle 1$ and $\angle 3$ are complements.

PROVE $D\angle 2 \cong \angle 3$

STATEMENTS	REASONS
1. $\angle 1$ and $\angle 2$ are complements. $\angle 1$ and $\angle 3$ are complements.	1. <u>?</u>
2. $m\angle 1 + m\angle 2 = 90^\circ$ $m\angle 1 + m\angle 3 = 90^\circ$	2. <u>?</u>
3. <u>?</u>	3. Transitive Property of Equality
4. <u>?</u>	4. Subtraction Property of Equality
5. $\angle 2 \cong \angle 3$	5. <u>?</u>

Solution Video

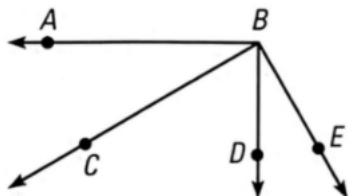


Question 387: PROOF Use the given information and the diagram to prove the statement.

GIVEN $\angle ABD$ is a right angle.

$\angle CBE$ is a right angle.

PROVE $\angle ABC \cong \angle DBE$



[Solution Video](#)

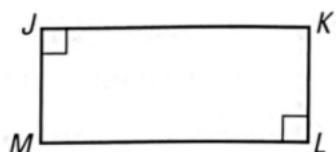


Question 388: PROOF Use the given information and the diagram to prove the statement.

GIVEN $\overline{JK} \perp \overline{JM}$, $\overline{KL} \perp \overline{ML}$,

$\angle J \cong \angle M$, $\angle K \cong \angle L$

PROVE $\overline{JM} \perp \overline{ML}$ and $\overline{JK} \perp \overline{KL}$



[Solution Video](#)



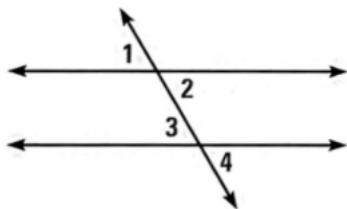
Accompanying lectures for questions 386 - 394



Question 389: WRITING PROOFS Write a two-column proof.

GIVEN $D\angle 1 \cong \angle 3$

PROVE $\angle 2 \cong \angle 4$



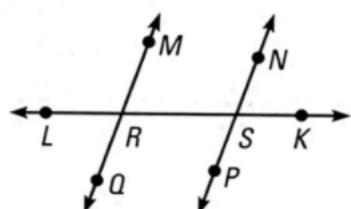
[Solution Video](#)



Question 390: WRITING PROOFS Write a two-column proof.

GIVEN $\angle QRS$ and $\angle PSR$ are supplementary.

PROVE $\angle QRL \cong \angle PSR$



[Solution Video](#)



Question 391: STAIRCASE Use the photo and the given information to prove the statement.

GIVEN $> \angle 1$ is complementary to $\angle 3$.

$\angle 2$ is complementary to $\angle 4$.

PROVE $> \angle 1 \cong \angle 4$



Solution Video



Accompanying lectures for questions 386 - 394



Question 392: $\angle STV$ is bisected by \overrightarrow{TW} , and \overrightarrow{TX} and \overrightarrow{TW} are opposite rays. You want to show $\angle STX \cong \angle VTX$.

- Draw a diagram.
- Identify the GIVEN and PROVE statements for the situation.
- Write a two-column proof.

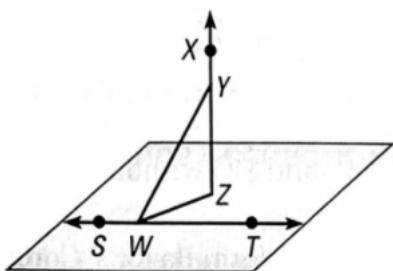
[Solution Video](#)



Question 393: Write a two-column proof.

GIVEN $m\angle WYZ = m\angle TWZ = 45^\circ$

PROVE $\angle SWZ \cong \angle XYW$



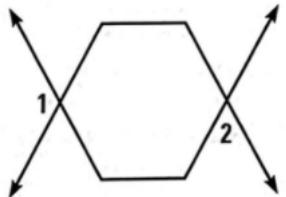
[Solution Video](#)



Question 394: Two-column proof.

GIVEN The hexagon is regular.

PROVE $m\angle 1 + m\angle 2 = 180^\circ$



Solution Video

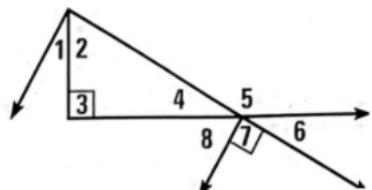


Accompanying lectures for questions 395 - 395



Question 395: Complete the statement with $<$, $>$, or $=$.

- a. $m\angle 3 ? m\angle 7$
- b. $m\angle 4 ? m\angle 6$
- c. $m\angle 8 + m\angle 6 ? 150^\circ$
- d. If $m\angle 4 = 30^\circ$, then $m\angle 5 ? m\angle 4$



Solution Video



Chapter 3 Parallel and Perpendicular Lines

3.0 Prerequisite Skills

Accompanying lectures for questions 396 - 402



Question 396: Copy and complete the statement.

Adjacent angles share a common ? and ?.

Solution Video



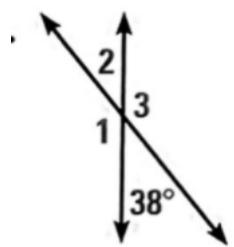
Question 397: Copy and complete the statement.

Two angles are ? angles if the sum of their measures is 180° .

Solution Video



Question 398: Find the measure of each numbered angle.



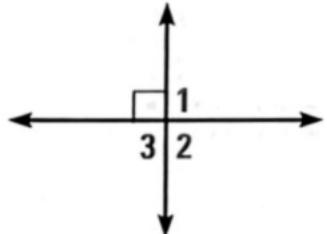
Solution Video



Accompanying lectures for questions 396 - 402



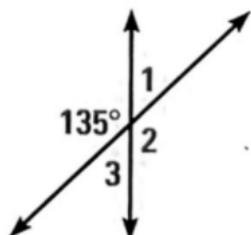
Question 399: Find the measure of each numbered angle.



Solution Video



Question 400: Find the measure of each numbered angle.



Solution Video



Question 401: Sketch a diagram for the statement.

Lines m and n intersect at point P .

Solution Video



Accompanying lectures for questions 396 - 402



Question 402: Sketch a diagram for the statement.

Line g intersects lines p and q .

Solution Video



Accompanying lectures for questions 403 - 406



Question 403: Write the fraction in simplest form.

$$\frac{36}{60}$$

Solution Video



Question 404: Write the fraction in simplest form.

$$\frac{54}{24}$$

Solution Video



Question 405: Write the fraction in simplest form.

$$\frac{16}{88}$$

Solution Video



Accompanying lectures for questions 403 - 406



Question 406: Write the fraction in simplest form.

$$\frac{21}{6}$$

Solution Video



3.1 Identify Pairs of Lines and Angles

Accompanying lectures for questions 407 - 428



Question 407: VoCABULARY Copy and complete: A line that intersects two other lines is a ? .

Solution Video



Question 408: ★ WRITING A table is set for dinner. Can the legs of the table and the top of the table lie in parallel planes? Explain why or why not.

Solution Video



Question 409: IDENTIFYING RELATIONSHIPS Think of each segment in the diagram as part of a line. Which line(s) or plane(s) contain point B and appear to fit the description?



Line(s) parallel to \overleftrightarrow{CD}

Solution Video



Accompanying lectures for questions 407 - 428



Question 410: IDENTIFYING RELATIONSHIPS Think of each segment in the diagram as part of a line. Which line(s) or plane(s) contain point B and appear to fit the description?



Line(s) perpendicular to \overleftrightarrow{CD}

Solution Video



Question 411: IDENTIFYING RELATIONSHIPS Think of each segment in the diagram as part of a line. Which line(s) or plane(s) contain point B and appear to fit the description?



Line(s) skew to \overleftrightarrow{CD}

Solution Video



Question 412: IDENTIFYING RELATIONSHIPS Think of each segment in the diagram as part of a line. Which line(s) or plane(s) contain point B and appear to fit the description?



Plane(s) parallel to plane CDH

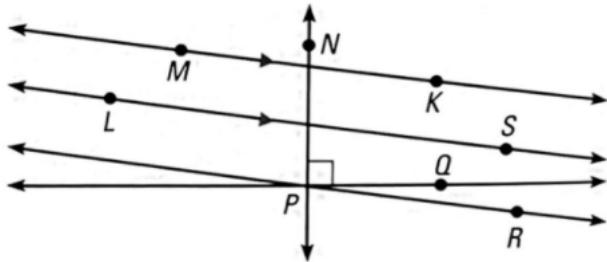
Solution Video



Accompanying lectures for questions 407 - 428



Question 413: PARALLEL AND PERPENDICULAR LINES Use the markings in the diagram.

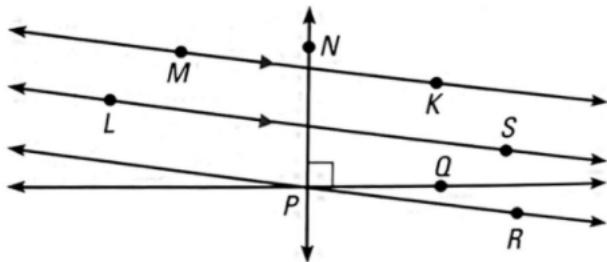


Is $\overleftrightarrow{PN} \parallel \overleftrightarrow{KM}$? Explain

[Solution Video](#)



Question 414: PARALLEL AND PERPENDICULAR LINES Use the markings in the diagram.

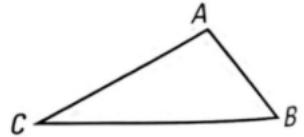


Is $\overleftrightarrow{PR} \perp \overleftrightarrow{NP}$? Explain

[Solution Video](#)



Question 415: APPLYING POSTULATES How many lines can be drawn that fit each description? Copy the diagram and sketch all the lines.



Lines through B and parallel to \overleftrightarrow{AC}

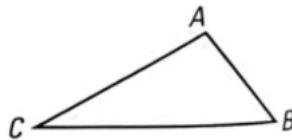
Solution Video



Accompanying lectures for questions 407 - 428



Question 416: APPLYING POSTULATES How many lines can be drawn that fit each description? Copy the diagram and sketch all the lines.



Lines through A and perpendicular to \overleftrightarrow{BC}

Solution Video



Question 417: ANALYZING STATEMENTS Copy and complete the statement with sometimes, always, or never. Sketch examples to justify your answer.

If two lines are parallel, then they are coplanar.

Solution Video



Question 418: ANALYZING STATEMENTS Copy and complete the statement with sometimes, always, or never. Sketch examples to justify your answer.

If two lines are not coplanar, then they ? intersect.

Solution Video



Accompanying lectures for questions 407 - 428



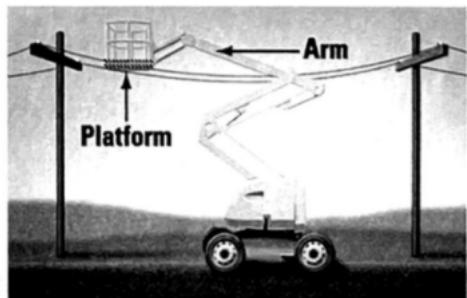
Question 419: ANALYZING STATEMENTS Copy and complete the statement with sometimes, always, or never. Sketch examples to justify your answer.

If three lines intersect at one point, then they are ? coplanar.

Solution Video



Question 420: CONSTRUCTION Use the picture of the cherry-picker for Exercises 34 and 35.

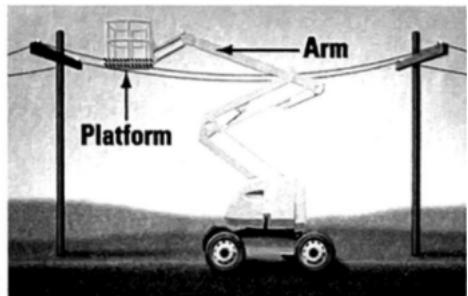


Is the platform perpendicular, parallel, or skew to the ground?

Solution Video



Question 421: CONSTRUCTION Use the picture of the cherry-picker for Exercises 34 and 35.



Is the arm perpendicular, parallel, or skew to a telephone pole?

Solution Video



Accompanying lectures for questions 407 - 428



Question 422: ★ OPEN-ENDED MATH Describe two lines in your classroom that are parallel, and two lines that are skew.

Solution Video



Question 423: ★ MULTIPLE CHOICE What is the best description of the horizontal bars in the photo?

- (A) Parallel
- (B) Perpendicular
- (C) Skew
- (D) Intersecting



Solution Video



Question 424: TREE HOUSE In Exercises 40-42, use the photo to decide whether the statement is true or false.



The plane containing the floor of the tree house is parallel to the ground.

[Solution Video](#)



Accompanying lectures for questions 407 - 428



Question 425: TREE HOUSE In Exercises 40-42, use the photo to decide whether the statement is true or false.



All of the lines containing the railings of the staircase, such as \overleftrightarrow{AB} , are skew to the ground.

[Solution Video](#)



Question 426: TREE HOUSE In Exercises 40-42, use the photo to decide whether the statement is true or false.



All of the lines containing the balusters, such as \overleftrightarrow{CD} , are perpendicular to the plane containing the floor of the tree house.

[Solution Video](#)



Question 427: CHALLENGE Draw the figure described.

Lines ℓ and m are skew, lines ℓ and n are skew, and lines m and n are parallel.

Solution Video



Accompanying lectures for questions 407 - 428



Question 428: CHALLENGE Draw the figure described.

Line ℓ is parallel to plane A , plane A is parallel to plane B , and line ℓ is not parallel to plane B .

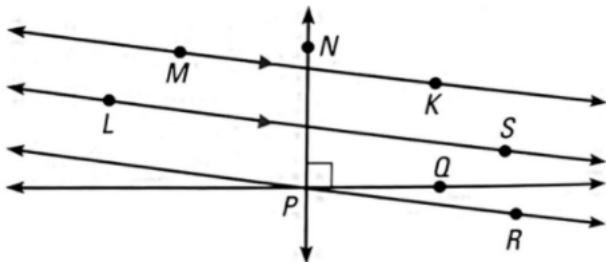
Solution Video



Accompanying lectures for questions 429 - 449



Question 429: PARALLEL AND PERPENDICULAR LINES Use the markings in the diagram.

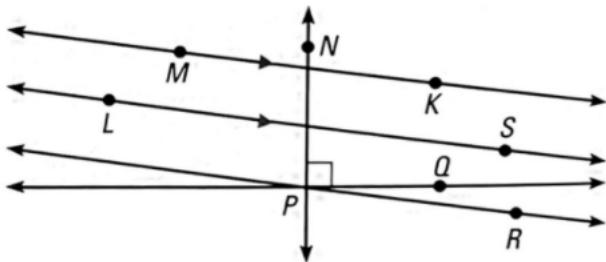


Name a pair of parallel lines.

Solution Video



Question 430: PARALLEL AND PERPENDICULAR LINES Use the markings in the diagram.



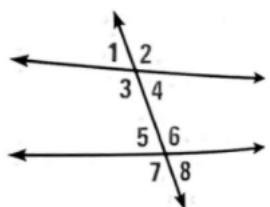
Name a pair of perpendicular lines.

Solution Video



Question 431: ANGLE RELATIONSHIPS Identify all pairs of angles of the given type.

Corresponding



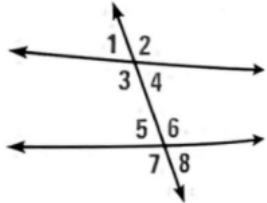
Solution Video



Accompanying lectures for questions 429 - 449



Question 432: ANGLE RELATIONSHIPS Identify all pairs of angles of the given type.



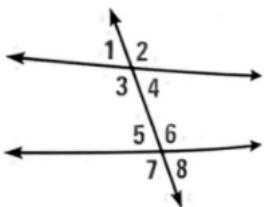
Alternate interior

Solution Video



Question 433: ANGLE RELATIONSHIPS Identify all pairs of angles of the given type.

Alternate exterior

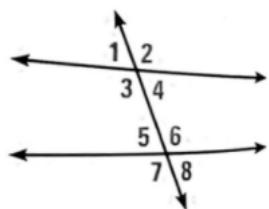


Solution Video



Question 434: ANGLE RELATIONSHIPS Identify all pairs of angles of the given type.

Consecutive interior



Solution Video



Accompanying lectures for questions 429 - 449

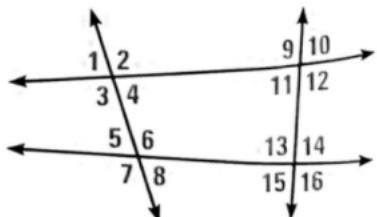


Question 435: ERROR ANALYSIS Describe and correct the error in saying that $\angle 1$ and $\angle 8$ are corresponding angles in the diagram for Exercises 11-14.

Solution Video



Question 436: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.

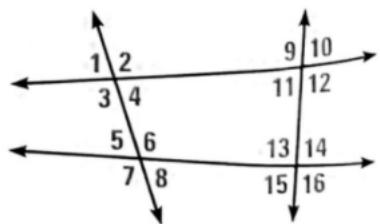


$\angle 5$ and $\angle 1$

Solution Video



Question 437: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.



$\angle 11$ and $\angle 13$

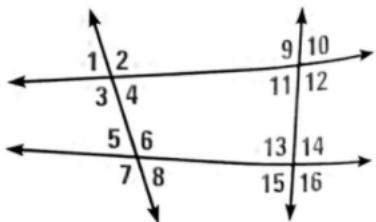
Solution Video



Accompanying lectures for questions 429 - 449



Question 438: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.

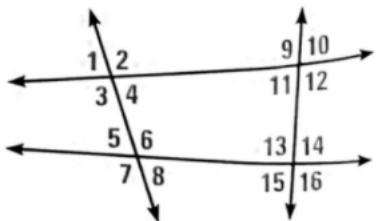


$\angle 6$ and $\angle 13$

Solution Video



Question 439: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.

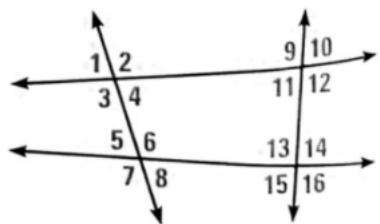


$\angle 10$ and $\angle 15$

Solution Video



Question 440: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.



$\angle 2$ and $\angle 11$

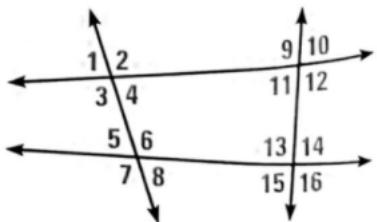
Solution Video



Accompanying lectures for questions 429 - 449



Question 441: USING A DIAGRAM Classify the angle pair as corresponding, alternate interior, alternate exterior, or consecutive interior angles.

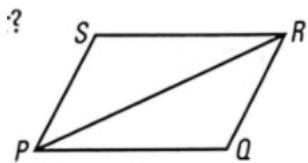


$\angle 8$ and $\angle 4$

[Solution Video](#)



Question 442: ★ MULTIPLE CHOICE $\angle RPQ$ and $\angle PRS$ are what type of angle pair?

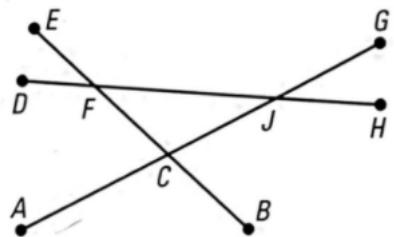


- (A) Corresponding
- (B) Alternate interior
- (C) Alternate exterior
- (D) Consecutive interior

[Solution Video](#)



Question 443: ANGLE RELATIONSHIPS Copy and complete the statement. List all possible correct answers.



$\angle BCG$ and ? are corresponding angles.

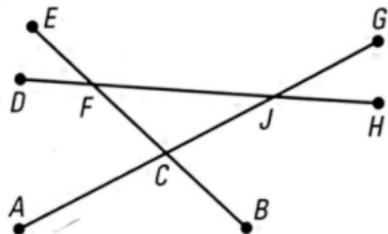
Solution Video



Accompanying lectures for questions 429 - 449



Question 444: ANGLE RELATIONSHIPS Copy and complete the statement. List all possible correct answers.

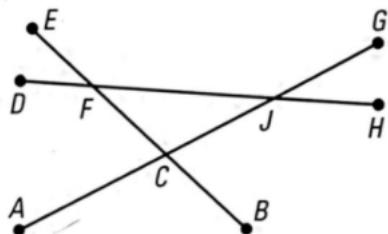


$\angle BCG$ and ? are consecutive interior angles.

Solution Video



Question 445: ANGLE RELATIONSHIPS Copy and complete the statement. List all possible correct answers.

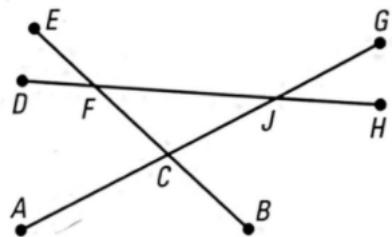


$\angle FCJ$ and ? are alternate interior angles.

Solution Video



Question 446: ANGLE RELATIONSHIPS Copy and complete the statement. List all possible correct answers.



$\angle FCA$ and ? are alternate exterior angles.

Solution Video

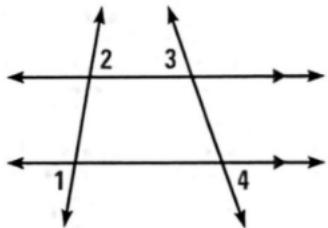


Accompanying lectures for questions 429 - 449



Question 447: CHALLENGE Copy the diagram at the right and extend the lines.

- a. Measure $\angle 1$ and $\angle 2$.
- b. Measure $\angle 3$ and $\angle 4$.
- c. Make a conjecture about alternate exterior angles formed when parallel lines are cut by transversals.

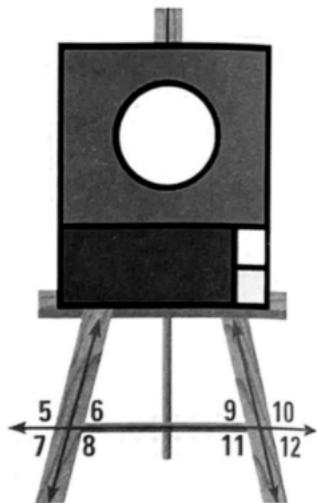


Solution Video



Question 448: EASEL Use the diagram of the easel at the right. An easel is used to display or support an artist's work. The horizontal piece at the bottom that joins the front legs is a transversal.

- a. Name four pairs of corresponding angles.
- b. Name two pairs of alternate interior angles.
- c. Name two pairs of alternate exterior angles.
- d. Name two pairs of consecutive interior angles.
- e. In the diagram, the rear leg of the easel appears perpendicular to the transversal. Is it perpendicular? Explain.



Solution Video



Question 449: ★ SHORT RESPONSE Two lines are cut by a transversal. Suppose the measure of a pair of alternate interior angles is 90° . Explain why the measure of all four interior angles must be 90° .

Solution Video



Accompanying lectures for questions 450 - 450



Question 450: ANALYZING STATEMENTS Copy and complete the statement with sometimes, always, or never. Sketch examples to justify your answer.

If two lines are skew to a third line, then they are ? skew to each other.

Solution Video



3.2 Use Parallel Lines and Transversals

Accompanying lectures for questions 451 - 494



Question 451: VOCABULARY Draw a pair of parallel lines and a transversal. Label a pair of corresponding angles.

Solution Video



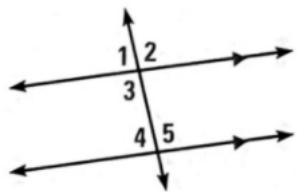
Question 452: ★ WRITING Two parallel lines are cut by a transversal. Which pairs of angles are congruent? Which pairs of angles are supplementary?

Solution Video



Question 453: ★ MULTIPLE CHOICE In the figure at the right, which angle has the same measure as $\angle 1$?

- (A) $\angle 2$
- (B) $\angle 3$
- (C) $\angle 4$
- (D) $\angle 5$



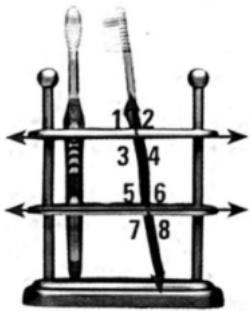
Solution Video



Accompanying lectures for questions 451 - 494



Question 454: USING PARALLEL LINES Find the angle measure. Tell which postulate or theorem you use.

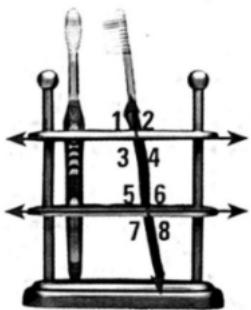


If $m\angle 4 = 65^\circ$, then $m\angle 1 = ?$.

Solution Video



Question 455: USING PARALLEL LINES Find the angle measure. Tell which postulate or theorem you use.

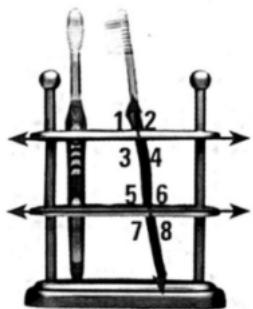


If $m\angle 7 = 110^\circ$, then $m\angle 2 = ?$.

Solution Video



Question 456: USING PARALLEL LINES Find the angle measure. Tell which postulate or theorem you use.



If $m\angle 5 = 71^\circ$, then $m\angle 4 = ?$

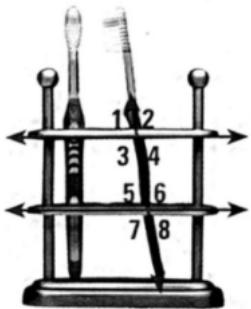
Solution Video



Accompanying lectures for questions 451 - 494



Question 457: USING PARALLEL LINES Find the angle measure. Tell which postulate or theorem you use.

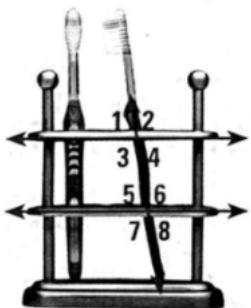


If $m\angle 3 = 117^\circ$, then $m\angle 5 = ?$.

Solution Video



Question 458: USING PARALLEL LINES Find the angle measure. Tell which postulate or theorem you use.

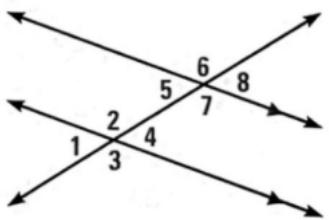


If $m\angle 8 = 54^\circ$, then $m\angle 1 = ?$

Solution Video



Question 459: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?



$$\angle 1 \cong \angle 5$$

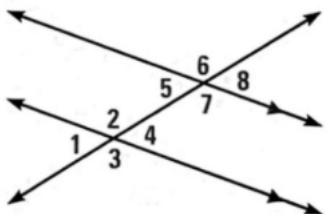
Solution Video



Accompanying lectures for questions 451 - 494



Question 460: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?

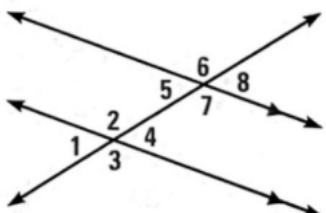


$$\angle 4 \cong \angle 5$$

Solution Video



Question 461: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?

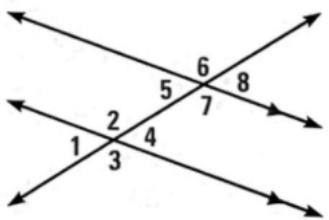


$$\angle 2 \cong \angle 7$$

Solution Video



Question 462: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?



$\angle 2$ and $\angle 5$ are supplementary.

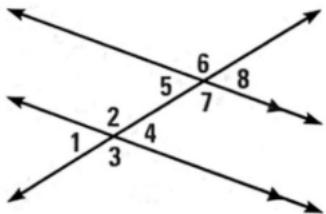
Solution Video



Accompanying lectures for questions 451 - 494



Question 463: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?

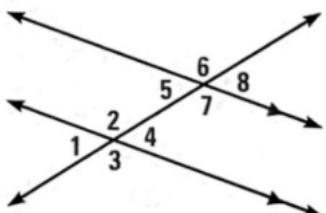


$$\angle 3 \cong \angle 6$$

Solution Video



Question 464: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?

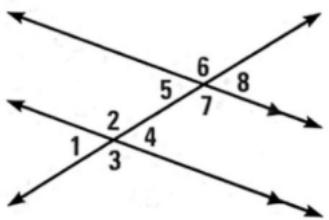


$$\angle 3 \cong \angle 7$$

Solution Video



Question 465: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?



$$\angle 1 \cong \angle 8$$

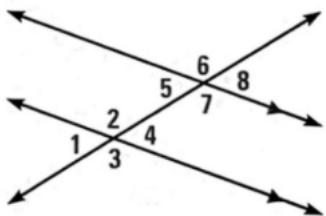
Solution Video



Accompanying lectures for questions 451 - 494



Question 466: USING POSTULATES AND THEOREMS What postulate or theorem justifies the statement about the diagram?

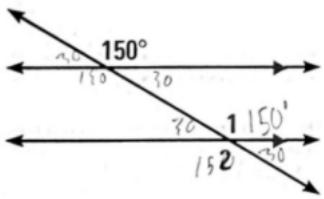


$\angle 4$ and $\angle 7$ are supplementary.

[Solution Video](#)



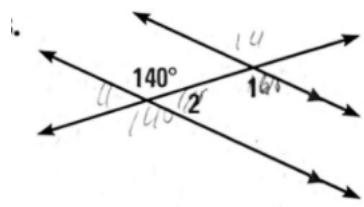
Question 467: USING PARALLEL LINES Find $m\angle 1$ and $m\angle 2$. Explain your reasoning.



[Solution Video](#)



Question 468: USING PARALLEL LINES Find $m\angle 1$ and $m\angle 2$. Explain your reasoning.



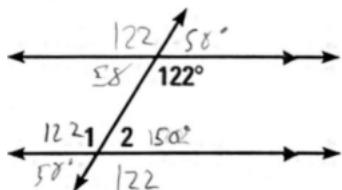
Solution Video



Accompanying lectures for questions 451 - 494



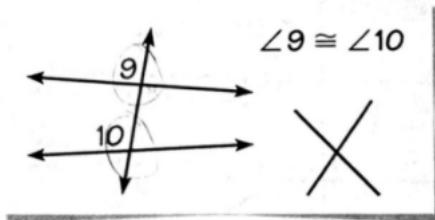
Question 469: USING PARALLEL LINES Find $m\angle 1$ and $m\angle 2$. Explain your reasoning.



[Solution Video](#)



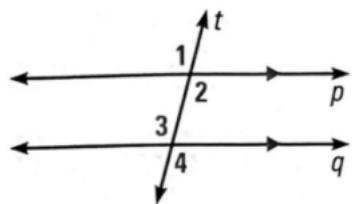
Question 470: ERROR ANALYSIS A student concludes that $\angle 9 \cong \angle 10$ by the Corresponding Angles Postulate. Describe and correct the error in this reasoning.



[Solution Video](#)



Question 471: ★ SHORT RESPONSE Given $p \parallel q$, describe two methods you can use to show that $\angle 1 \cong \angle 4$.



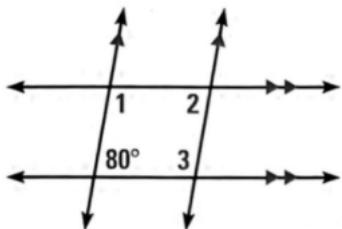
Solution Video



Accompanying lectures for questions 451 - 494



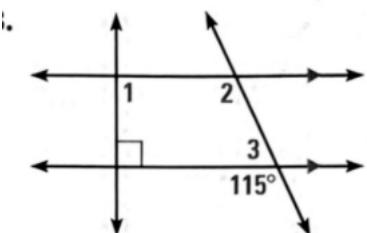
Question 472: Find $m\angle 1$, $m\angle 2$, and $m\angle 3$. Explain your reasoning.



Solution Video



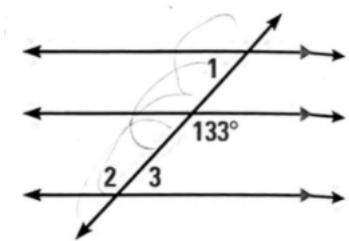
Question 473: Find $m\angle 1$, $m\angle 2$, and $m\angle 3$. Explain your reasoning.



Solution Video



Question 474: Find $m\angle 1$, $m\angle 2$, and $m\angle 3$. Explain your reasoning.



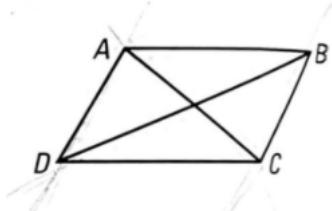
Solution Video



Accompanying lectures for questions 451 - 494



Question 475: Use the diagram at the right.

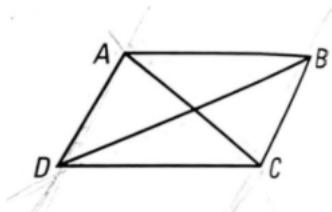


Name two pairs of congruent angles if \overleftrightarrow{AB} and \overleftrightarrow{DC} are parallel.

Solution Video



Question 476: ANGLES Use the diagram at the right.

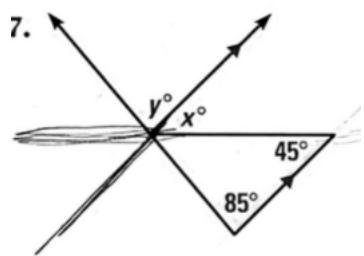


Name two pairs of supplementary angles if \overleftrightarrow{AD} and \overleftrightarrow{BC} are parallel.

Solution Video



Question 477: ALGEBRA Find the values of x and y .



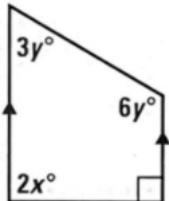
Solution Video



Accompanying lectures for questions 451 - 494



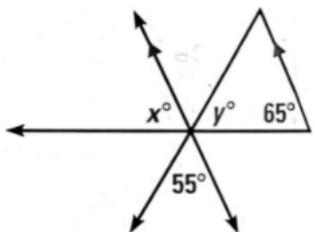
Question 478: ALGEBRA Find the values of x and y .



Solution Video



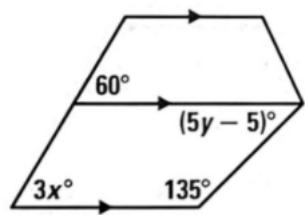
Question 479: ALGEBRA Find the values of x and y .



Solution Video



Question 480: ALGEBRA Find the values of x and y .



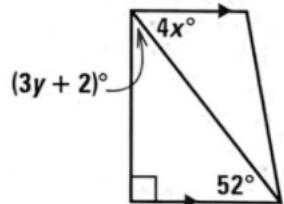
Solution Video



Accompanying lectures for questions 451 - 494



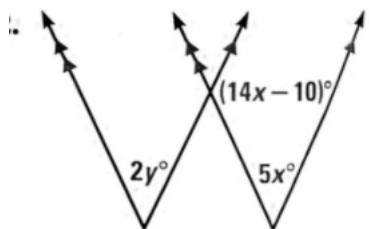
Question 481: ALGEBRA Find the values of x and y .



Solution Video



Question 482: ALGEBRA Find the values of x and y .

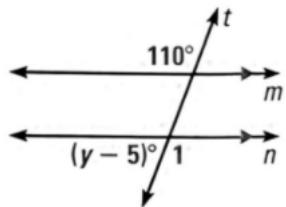


Solution Video



Question 483: What is the value of y in the diagram?

- (A) 70
- (B) 75
- (C) 110
- (D) 115



Solution Video



Accompanying lectures for questions 451 - 494

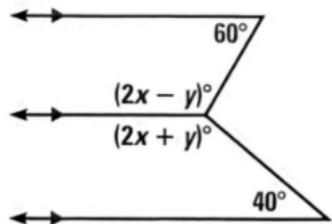


Question 484: DRAWING Draw a four-sided figure with sides \overline{MN} and \overline{PQ} , such that $\overline{MN} \parallel \overline{PQ}$, $\overline{MP} \parallel \overline{NQ}$, and $\angle MNQ$ is an acute angle. Which angle pairs formed are congruent? Explain your reasoning.

Solution Video



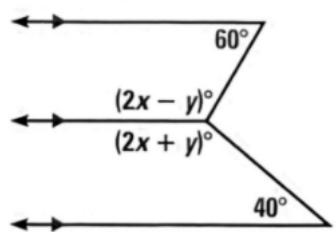
Question 485: CHALLENGE Find the values of x and y .



Solution Video



Question 486: CHALLENGE Find the values of x and y .



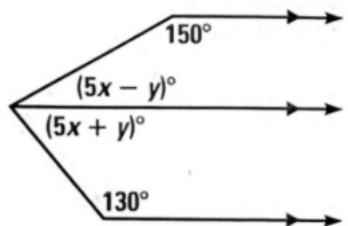
Solution Video



Accompanying lectures for questions 451 - 494



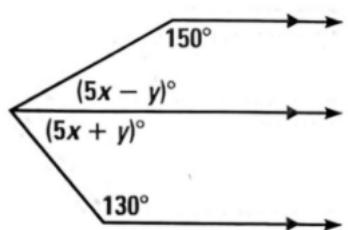
Question 487: CHALLENGE Find the values of x and y .



Solution Video



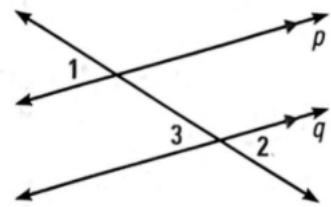
Question 488: CHALLENGE Find the values of x and y .



Solution Video



Question 489: PROVING THEOREM 3.2 If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent. Use the steps below to write a proof of the Alternate Exterior Angles Theorem.



GIVEN $p \parallel q$

PROVE $\angle 1 \cong \angle 2$

- Show that $\angle 1 \cong \angle 3$.
- Then show that $\angle 1 \cong \angle 2$.

[Solution Video](#)



Accompanying lectures for questions 451 - 494



Question 490: PARKING LOT In the diagram, the lines dividing parking spaces are parallel. The measure of $\angle 1$ is 110° .

- Identify the angle(s) congruent to $\angle 1$.
- Find $m\angle 6$.

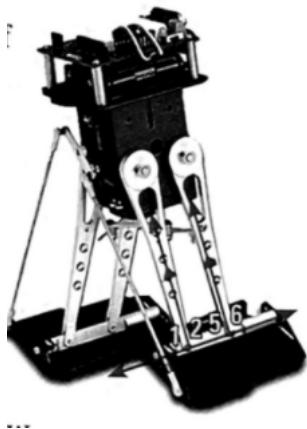


[Solution Video](#)



Question 491:

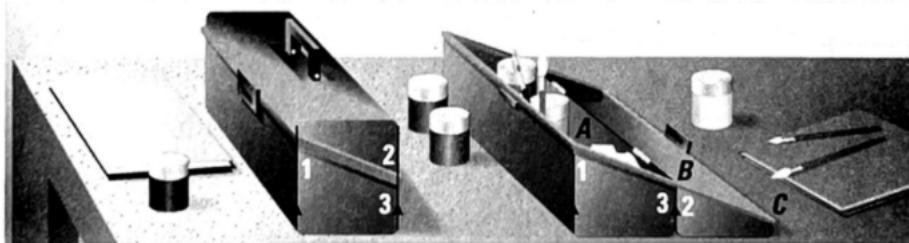
- **SHORT RESPONSE** The Toddler™ is a walking robot. Each leg of the robot has two parallel bars and a foot. When the robot walks, the leg bars remain parallel as the foot slides along the surface.
- As the legs move, are there pairs of angles that are always congruent? always supplementary? If so, which angles?
 - Explain how having parallel leg bars allows the robot's foot to stay flat on the floor as it moves.



[Solution Video](#)



Question 492: ★ EXTENDED RESPONSE You are designing a box like the one below.



- The measure of $\angle 1$ is 70° . What is $m\angle 2$? What is $m\angle 3$?
- Explain why $\angle ABC$ is a straight angle.
- What If? If $m\angle 1$ is 60° , will $\angle ABC$ still be a straight angle? Will the opening of the box be more steep or less steep? Explain.

Solution Video



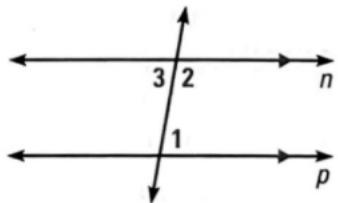
Accompanying lectures for questions 451 - 494



Question 493: If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary. Write a proof of the Consecutive Interior Angles Theorem.

GIVEN $n \parallel p$

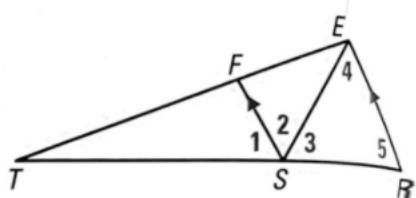
PROVE $\angle 1$ and $\angle 2$ are supplementary.



[Solution Video](#)



Question 494: In the diagram, $\angle 4 \cong \angle 5$. \overline{SE} bisects $\angle RSF$. Find $m\angle 1$. Explain your reasoning.



[Solution Video](#)



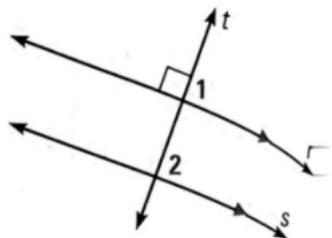
Accompanying lectures for questions 495 - 495



Question 495: PROOF The Perpendicular Transversal Theorem states that if a transversal is perpendicular to one of two parallel lines, then it is perpendicular to the other. Write a proof of the Perpendicular Transversal Theorem.

GIVEN $tr, r \parallel s$

PROVE $t \perp s$



Solution Video

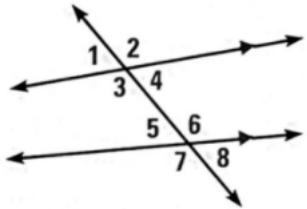


3.2.1 Quiz

Accompanying lectures for questions 496 - 499



Question 496: Copy and complete the statement.

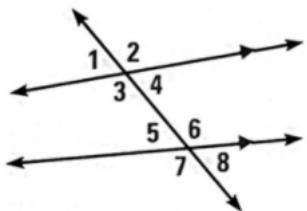


$\angle 2$ and ? are corresponding angles.

Solution Video



Question 497: Copy and complete the statement.

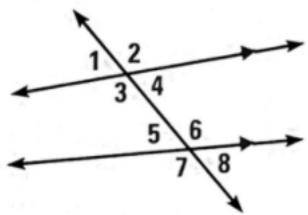


$\angle 3$ and ? are consecutive interior angles.

Solution Video



Question 498: Copy and complete the statement.



$\angle 3$ and ? are alternate interior angles.

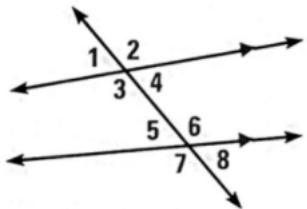
Solution Video



Accompanying lectures for questions 496 - 499



Question 499: Copy and complete the statement.



$\angle 2$ and ? are alternate exterior angles.

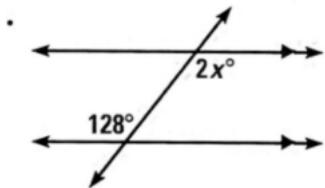
Solution Video



Accompanying lectures for questions 500 - 502



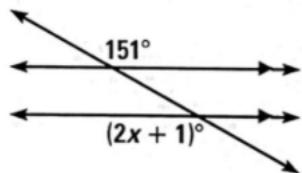
Question 500: Find the value of x .



Solution Video



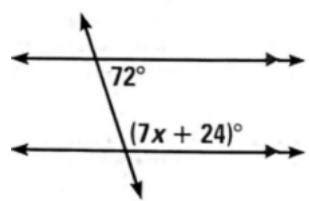
Question 501: Find the value of x .



Solution Video



Question 502: Find the value of x .



Solution Video



3.3 Prove Lines are Parallel

Accompanying lectures for questions 503 - 515



Question 503: Draw a pair of parallel lines with a transversal. Identify all pairs of alternate exterior angles.

Solution Video



Question 504: Use the theorems from the lesson Use Parallel Lines and Transversals and the converses of those theorems in this lesson. Write three biconditionals about parallel lines and transversals.

Solution Video



Question 505: How do you know that the top of the picnic table is parallel to the ground?



Solution Video



Accompanying lectures for questions 503 - 515



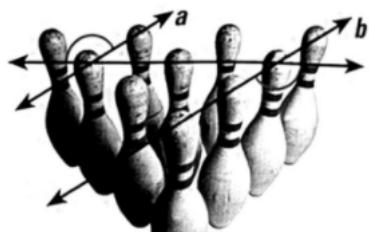
Question 506: KITEBOARDING The diagram of the control bar of the kite shows the angles formed between the control bar and the kite lines. How do you know that n is parallel to m ?



Solution Video



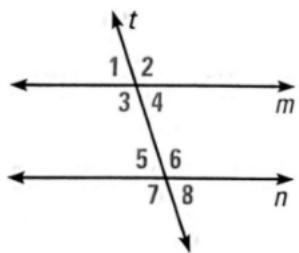
Question 507: BowLING PINS How do you know that the bowling pins are set up in parallel lines?



Solution Video



Question 508: Use the diagram to write a paragraph proof.



In the diagram, assume $\angle 2 \cong \angle 7$. Prove the Alternate Exterior Angles Converse.

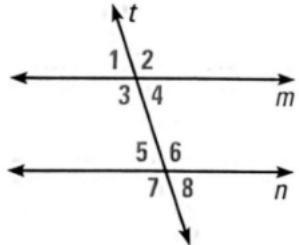
Solution Video



Accompanying lectures for questions 503 - 515



Question 509: PROOF In Exercises 36 and 37, use the diagram to write a paragraph proof.

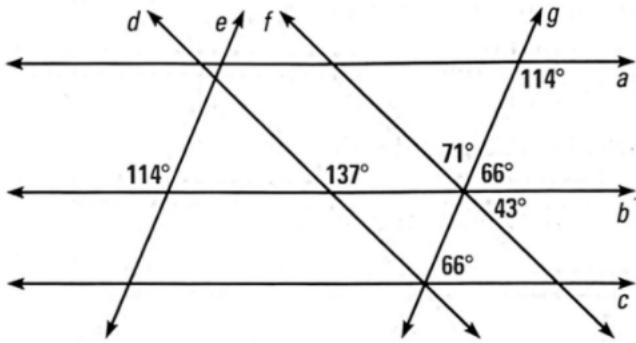


PROVING THEOREM 3.6 In the diagram, assume $\angle 3$ and $\angle 5$ are supplementary. Prove the Consecutive Interior Angles Converse.

[Solution Video](#)



Question 510: REASONING Use the diagram below in Exercises 40 – 44. How would you show that the given lines are parallel?

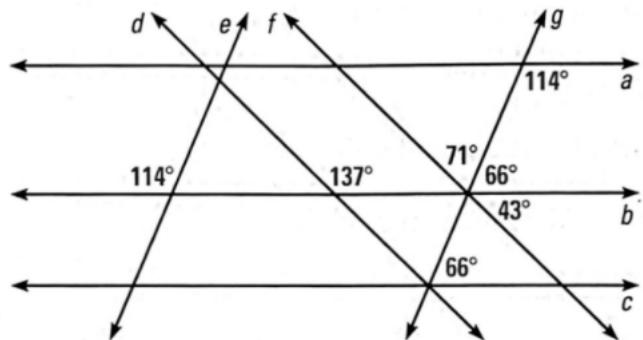


a and b

[Solution Video](#)



Question 511: How would you show that the given lines are parallel?



b and c

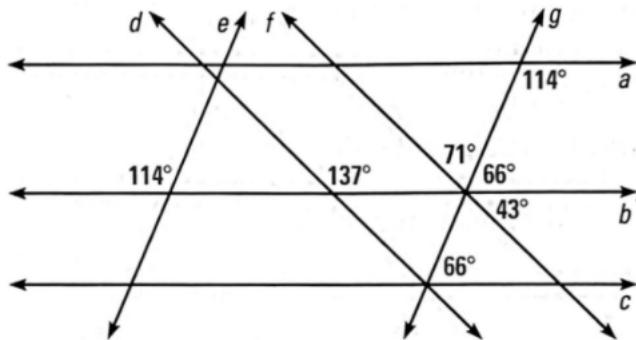
Solution Video



Accompanying lectures for questions 503 - 515



Question 512: REASONING Use the diagram below in Exercises 40 – 44. How would you show that the given lines are parallel?

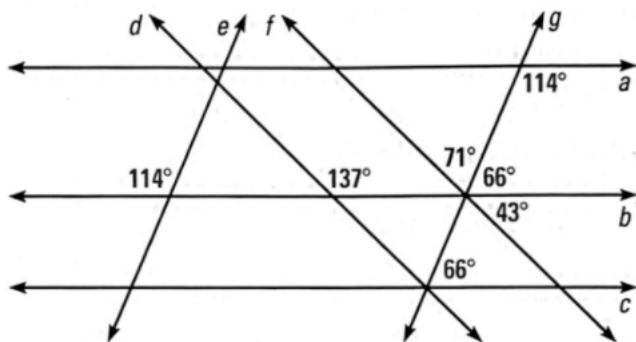


d and *f*

[Solution Video](#)



Question 513: REASONING Use the diagram below in Exercises 40 – 44. How would you show that the given lines are parallel?

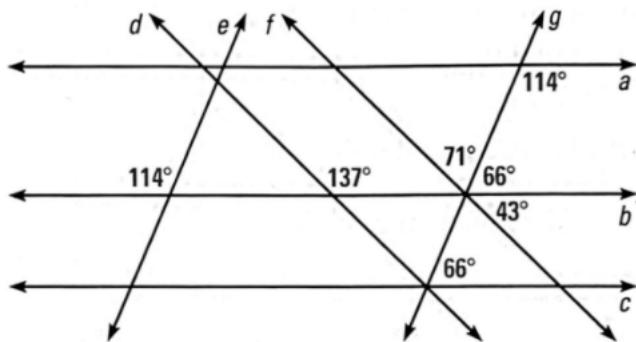


e and *g*

[Solution Video](#)



Question 514: REASONING Use the diagram below in Exercises 40 – 44. How would you show that the given lines are parallel?



a and *c*

[Solution Video](#)



Accompanying lectures for questions 503 - 515



Question 515: CHALLENGE Use these steps to investigate the angle bisectors of angles created by a transversal and parallel lines.

- a. Construction Use geometry drawing software to construct line ℓ , point P not on ℓ , and line n through P parallel to ℓ . Construct point Q on ℓ and construct \overleftrightarrow{PQ} . Choose a pair of alternate interior angles and construct their angle bisectors.
- b. Write a Proof Make a conjecture about the angle bisectors. Write a proof of your conjecture.

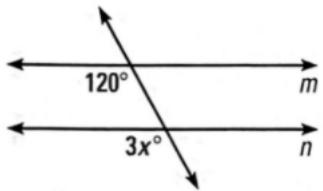
Solution Video



Accompanying lectures for questions 516 - 522



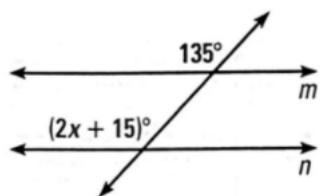
Question 516: Find the value of x that makes $m \parallel n$.



Solution Video



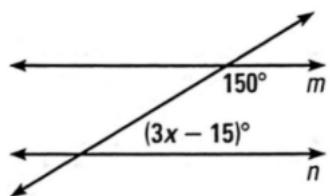
Question 517: Find the value of x that makes $m \parallel n$.



Solution Video



Question 518: Find the value of x that makes $m \parallel n$.



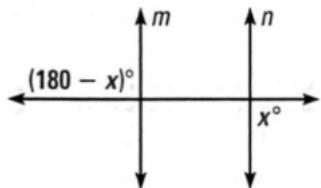
Solution Video



Accompanying lectures for questions 516 - 522



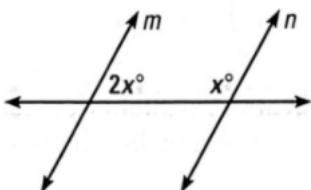
Question 519: Find the value of x that makes $m \parallel n$.



Solution Video



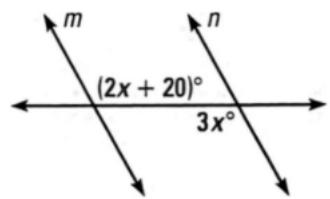
Question 520: Find the value of x that makes $m \parallel n$.



Solution Video



Question 521: Find the value of x that makes $m \parallel n$.



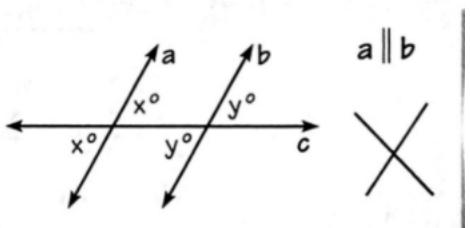
Solution Video



Accompanying lectures for questions 516 - 522



Question 522: A student concluded that lines a and b are parallel. Describe and correct the student's error.



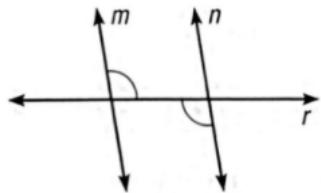
Solution Video



Accompanying lectures for questions 523 - 532



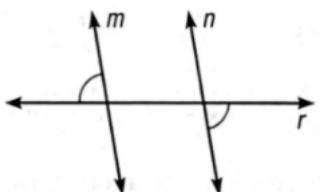
Question 523: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



Solution Video



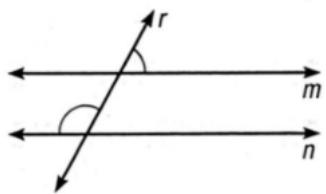
Question 524: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



Solution Video



Question 525: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



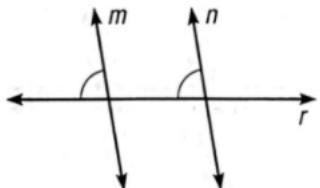
Solution Video



Accompanying lectures for questions 523 - 532



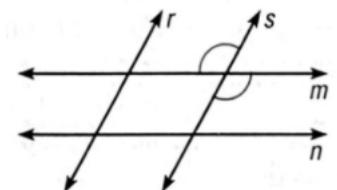
Question 526: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



Solution Video



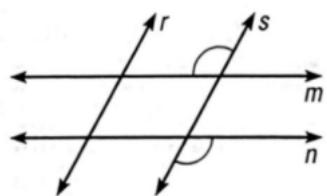
Question 527: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



Solution Video



Question 528: Is there enough information to prove $m \parallel n$? If so, state the postulate or theorem you would use.



Solution Video

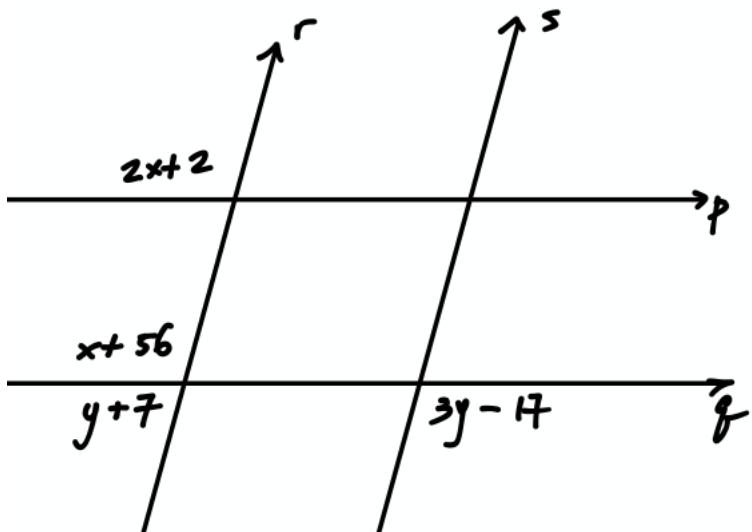


Accompanying lectures for questions 523 - 532



Question 529: Use the diagram.

- a. Find x so that $p \parallel q$.
- b. Find y so that $r \parallel s$.
- c. Can r be parallel to s and p be parallel to q at the same time? Explain.



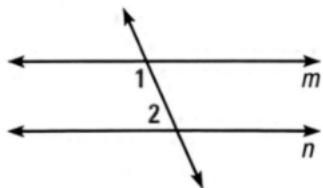
Solution Video



Question 530: Copy and complete the proof.

GIVEN $> m\angle 1 = 115^\circ, m\angle 2 = 65^\circ$

PROVE $> m \parallel n$



STATEMENTS	REASONS
1. $m\angle 1 = 115^\circ$ and $m\angle 2 = 65^\circ$	1. Given
2. $115^\circ + 65^\circ = 180^\circ$	2. Addition
3. $m\angle 1 + m\angle 2 = 180^\circ$	3. <u>?</u>
4. $\angle 1$ and $\angle 2$ are supplementary.	4. <u>?</u>
5. $m \parallel n$	5. <u>?</u>

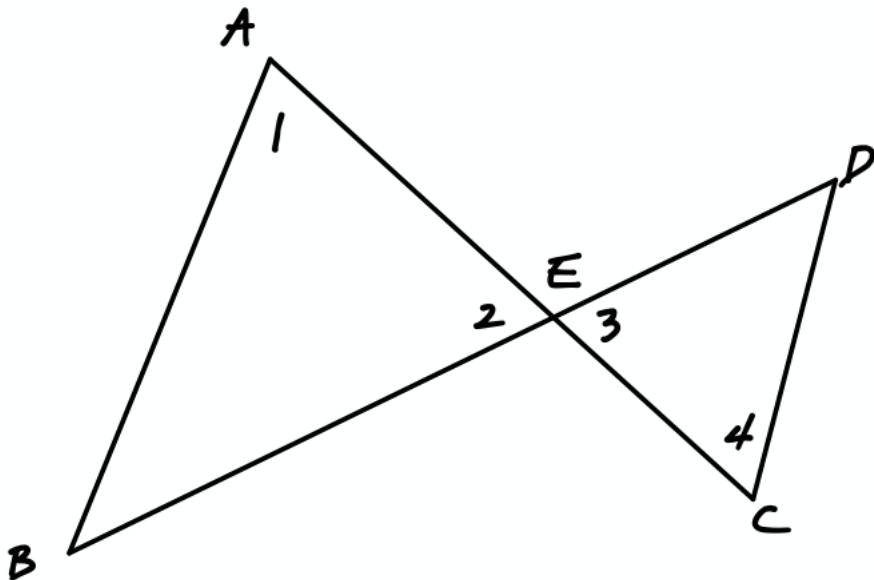
Solution Video



Question 531: PROOF Use the diagram and the given information to write a two-column or paragraph proof.

GIVEN $\angle 1 \cong \angle 2, \angle 3 \cong \angle 4$

PROVE $\overline{AB} \parallel \overline{CD}$



[Solution Video](#)



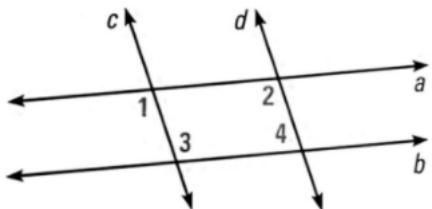
Accompanying lectures for questions 523 - 532



Question 532: Use the diagram and the given information to write a two-column or paragraph proof.

GIVEN $\rightarrow a \parallel b, \angle 2 \cong \angle 3$

PROVE $c \parallel d$



Solution Video



Accompanying lectures for questions 533 - 537



Question 533: ★ OPEN-ENDED MATH Use lined paper to draw two parallel lines cut by a transversal. Use a protractor to measure one angle. Find the measures of the other seven angles without using the protractor. Give a theorem or postulate you use to find each angle measure.

Solution Video



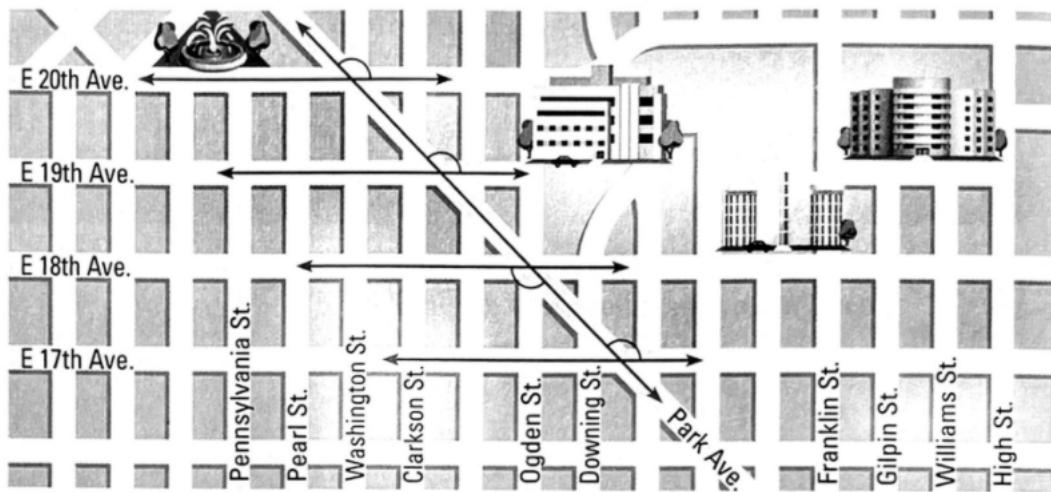
Question 534: A point R is not in plane ABC .

- a. How many lines through R are perpendicular to plane ABC ?
- b. How many lines through R are parallel to plane ABC ?
- c. How many planes through R are parallel to plane ABC ?

Solution Video



Question 535: The map shows part of Denver, Colorado. Use the markings on the map. Are the numbered streets parallel to one another? Explain how you can tell.



[Solution Video](#)



Accompanying lectures for questions 533 - 537



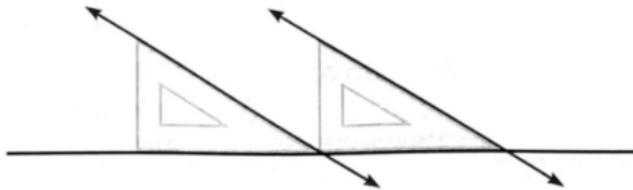
Question 536: MULTI-STEP PROBLEM Use these steps to prove Theorem 3.7, the Transitive Property of Parallel Lines.

- a. Copy the diagram in the Transitive Property of Parallel Lines Theorem box. Draw a transversal through all three lines.
- b. Write the GIVEN and PROVE statements.
- c. Use the properties of angles formed by parallel lines and transversals to prove the theorem.

Solution Video



Question 537: ★ EXTENDED RESPONSE Architects and engineers make drawings using a plastic triangle with angle measures 30° , 60° , and 90° . The triangle slides along a fixed horizontal edge.



- a. Explain why the blue lines shown are parallel.
- b. Explain how the triangle can be used to draw vertical parallel lines.

Solution Video



3.3.1 Mixed Review

3.4 Find and Use Slopes of Lines

Accompanying lectures for questions 538 - 574



Question 538: VOCABULARY Describe what is meant by the slope of a nonvertical line.

Solution Video

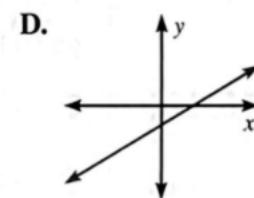
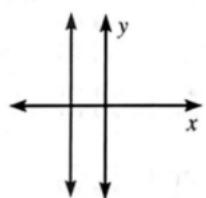
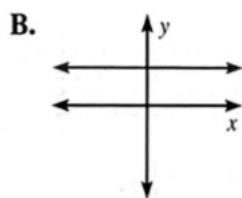
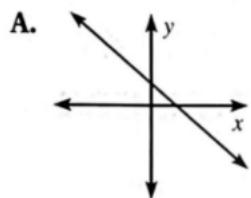


Question 539: ★ WRITING What happens when you apply the slope formula to a horizontal line? What happens when you apply it to a vertical line?

Solution Video



Question 540: MATCHING Match the description of the slope of a line with its graph.



m is positive.

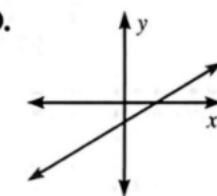
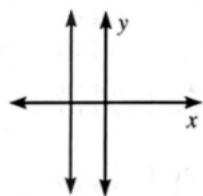
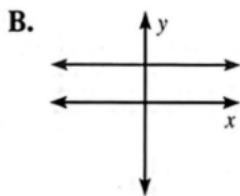
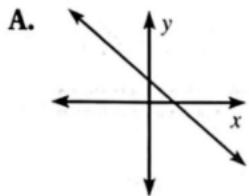
Solution Video



Accompanying lectures for questions 538 - 574



Question 541: MATCHING Match the description of the slope of a line with its graph.

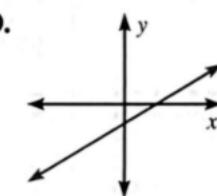
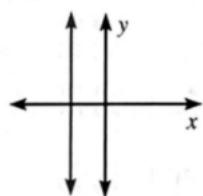
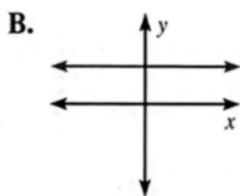
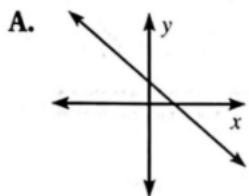


m is negative.

Solution Video



Question 542: MATCHING Match the description of the slope of a line with its graph.

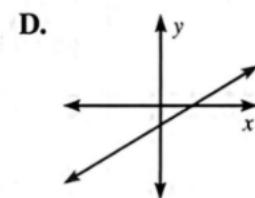
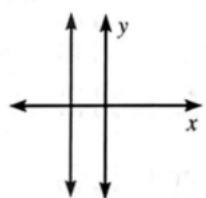
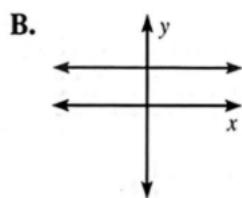
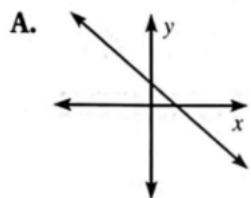


m is zero.

Solution Video



Question 543: MATCHING Match the description of the slope of a line with its graph.



m is undefined.

Solution Video



Accompanying lectures for questions 538 - 574



Question 544: FINDING SLOPE Find the slope of the line that passes through the points.

(3, 5), (5, 6)

Solution Video



Question 545: FINDING SLOPE Find the slope of the line that passes through the points.

(-2, 2), (2, -6)

Solution Video



Question 546: FINDING SLOPE Find the slope of the line that passes through the points.

$(-5, -1), (3, -1)$

Solution Video



Accompanying lectures for questions 538 - 574



Question 547: FINDING SLOPE Find the slope of the line that passes through the points.

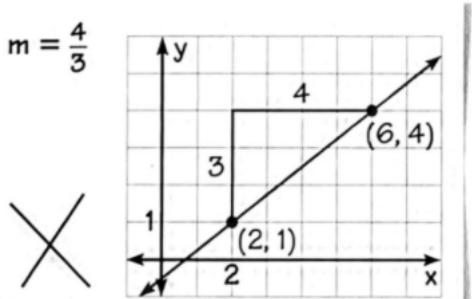
(2, 1), (0, 6)

Solution Video



Question 548: ERROR ANALYSIS Describe and correct the error in finding the slope of the line.

$$m = \frac{4}{3}$$



Solution Video



Question 549: ERROR ANALYSIS Describe and correct the error in finding the slope of the line.

Slope of the line through
(2, 7) and (4, 5)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 5}{4 - 2} = \frac{2}{2} = 1$$



Solution Video



Accompanying lectures for questions 538 - 574



Question 550: TYPES OF LINES Tell whether the lines through the given points are parallel, perpendicular, or neither. Justify your answer.

Line 1 : (1, 0), (7, 4)

Line 2 : (7, 0), (3, 6)

Solution Video



Question 551: TYPES OF LINES Tell whether the lines through the given points are parallel, perpendicular, or neither. Justify your answer.

Line 1: (-3, 1), (-7, -2)

Line 2: (2, -1), (8, 4)

Solution Video



Question 552: TYPES OF LINES Tell whether the lines through the given points are parallel, perpendicular, or neither. Justify your answer.

Line 1: $(-9, 3), (-5, 7)$

Line 2: $(-11, 6), (-7, 2)$

Solution Video



Accompanying lectures for questions 538 - 574



Question 553: GRAPHING Graph the line through the given point with the given slope.

$$P(3, -2), \text{ slope } -\frac{1}{6}$$

Solution Video



Question 554: GRAPHING Graph the line through the given point with the given slope.

$$P(-4, 0), \text{ slope } \frac{5}{2}$$

Solution Video



Question 555: GRAPHING Graph the line through the given point with the given slope.

$$P(0, 5), \text{slope } \frac{2}{3}$$

Solution Video



Accompanying lectures for questions 538 - 574



Question 556: STEEPNESS OF A LINE Tell which line through the given points is steeper.

Line 1: $(-2, 3), (3, 5)$

Line 2: $(3, 1), (6, 5)$

Solution Video



Question 557: STEEPNESS OF A LINE Tell which line through the given points is steeper.

Line 1: $(-2, -1), (1, -2)$

Line 2: $(-5, -3), (-1, -4)$

Solution Video



Question 558: STEEPNESS OF A LINE Tell which line through the given points is steeper.

Line 1: $(-4, 2), (-3, 6)$

Line 2: $(1, 6), (3, 8)$

Solution Video



Accompanying lectures for questions 538 - 574

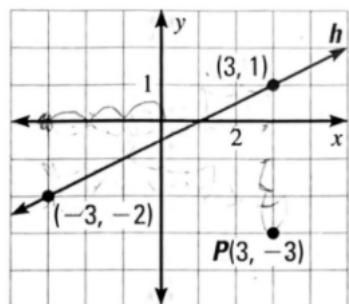


Question 559: REASONING Use your results from Exercises 19 – 21. Describe a way to determine which of two lines is steeper without graphing them.

Solution Video



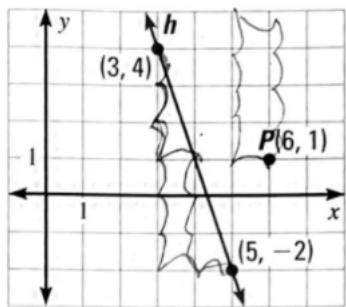
Question 560: PERPENDICULAR LINES Find the slope of line n perpendicular to line h and passing through point P . Then copy the graph and graph line n .



Solution Video



Question 561: PERPENDICULAR LINES Find the slope of line n perpendicular to line h and passing through point P . Then copy the graph and graph line n .



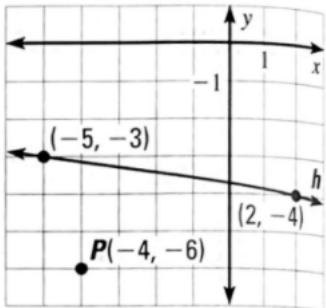
Solution Video



Accompanying lectures for questions 538 - 574



Question 562: PERPENDICULAR LINES Find the slope of line n perpendicular to line h and passing through point P . Then copy the graph and graph line n .



Solution Video



Question 563: REASONING Use the concept of slope to decide whether the points $(-3, 3)$, $(1, -2)$, and $(4, 0)$ lie on the same line. Explain your reasoning and include a diagram.

Solution Video



Question 564: GRAPHING Graph a line with the given description.

Through $(0, 2)$ and parallel to the line through $(-2, 4)$ and $(-5, 1)$

Solution Video



Accompanying lectures for questions 538 - 574



Question 565: GRAPHING Graph a line with the given description.

Through $(1, 3)$ and perpendicular to the line through $(-1, -1)$ and $(2, 0)$

Solution Video



Question 566: GRAPHING Graph a line with the given description.

Through $(-2, 1)$ and parallel to the line through $(3, 1)$ and $\left(4, -\frac{1}{2}\right)$

Solution Video



Question 567: CHALLENGE Find the unknown coordinate so the line through the points has the given slope.

$(-3, 2), (0, y)$; slope -2

Solution Video



Accompanying lectures for questions 538 - 574



Question 568: CHALLENGE Find the unknown coordinate so the line through the points has the given slope.

$$(-7, -4), (x, 0); \text{ slope } \frac{1}{3}$$

Solution Video



Question 569: CHALLENGE Find the unknown coordinate so the line through the points has the given slope.

$$(4, -3), (x, 1); \text{ slope } -4$$

Solution Video



Question 570: WATER SLIDE The water slide is 6 feet tall, and the end of the slide is 9 feet from the base of the ladder. About what slope does the slide have?



Solution Video



Accompanying lectures for questions 538 - 574



Question 571: ★ SHORT RESPONSE Compare the graphs of the three lines described below. Which is most steep? Which is the least steep? Include a sketch in your answer.

Line *a* : through the point $(3, 0)$ with a y -intercept of 4

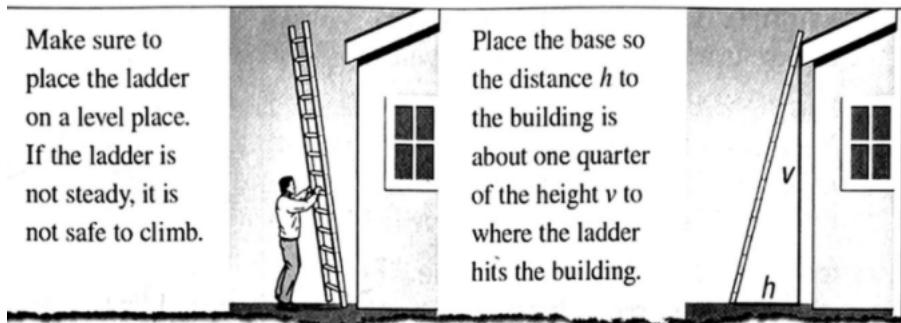
Line *b* : through the point $(3, 0)$ with a y -intercept greater than 4

Line *c* : through the point $(3, 0)$ with a y -intercept between 0 and 4

Solution Video



Question 572: MULTI-STEP PROBLEM Ladder safety guidelines include the following recommendation about ladder placement. The horizontal distance h between the base of the ladder and the object the ladder is resting against should be about one quarter of the vertical distance v between the ground and where the ladder rests against the object.



- Find the recommended slope for a ladder.
- Suppose the base of a ladder is 6 feet away from a building. The ladder has the recommended slope. Find v .
- Suppose a ladder is 34 feet from the ground where it touches a building. The ladder has the recommended slope. Find h .

Solution Video



Question 573: PROVING THEOREM 3.7 Use slopes of lines to write a paragraph proof of the Transitive Property of Parallel Lines: if two lines are parallel to the same line, then they are parallel to each other.

Solution Video



Accompanying lectures for questions 538 - 574



Question 574: CHALLENGE Find two values of k such that the points $(-3, 1)$, $(0, k)$, and $(k, 5)$ are collinear. Explain your reasoning.

Solution Video

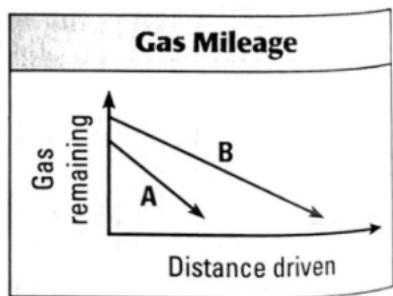


Accompanying lectures for questions 575 - 579



Question 575: ★ MULTIPLE CHOICE Which car has better gas mileage?

- (A) A
- (B) B
- (C) Same rate
- (D) Cannot be determined

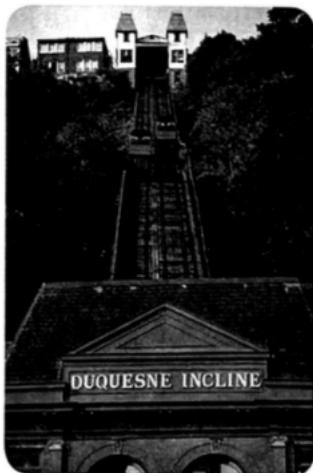


Solution Video



Question 576: MULTIPLE REPRESENTATIONS The Duquesne (pronounced "du-KAYN") Incline was built in 1888 in Pittsburgh, Pennsylvania, to move people up and down a mountain there. On the incline, you move about 29 feet vertically for every 50 feet you move horizontally. When you reach the top of the hill, you have moved a horizontal distance of about 700 feet.

- a. Making a Table Make a table showing the vertical distance that the incline moves for each 50 feet of horizontal distance during its climb. How high is the incline at the top?
- b. Drawing a Graph Write a fraction that represents the slope of the incline's climb path. Draw a graph to show the climb path.
- c. Comparing Slopes The Burgenstock Incline in Switzerland moves about 144 vertical feet for every 271 horizontal feet. Write a fraction to represent the slope of this incline's path. Which incline is steeper, the Burgenstock or the Duquesne?



Solution Video



Question 577: AVERAGE RATE OF CHANGE In Exercises 39 and 40, slope can be used to describe an average rate of change. To write an average rate of change, rewrite the slope fraction so the denominator is one.

BUSINESS In 2000, a business made a profit of \$8500. In 2006 , the business made a profit of \$15,400. Find the average rate of change in dollars per year from 2000 to 2006.

Solution Video



Accompanying lectures for questions 575 - 579



Question 578: AVERAGE RATE OF CHANGE In Exercises 39 and 40, slope can be used to describe an average rate of change. To write an average rate of change, rewrite the slope fraction so the denominator is one.

ROCK CLIMBING A rock climber begins climbing at a point 400 feet above sea level. It takes the climber 45 minutes to climb to the destination, which is 706 feet above sea level. Find the average rate of change in feet per minute for the climber from start to finish.

Solution Video



Question 579: ★ EXTENDED RESPONSE The line graph shows the regular season attendance (in millions) for three professional sports organizations from 1985 to 2000.

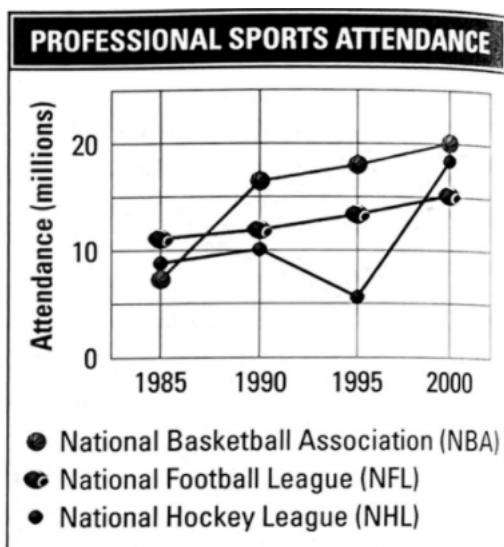
- a. During which five-year period did the NBA attendance increase the most?

Estimate the rate of change for this five-year period in people per year.

- b. During which five-year period did the NHL attendance increase the most?

Estimate the rate of change for this five-year period in people per year.

- c. Interpret The line graph for the NFL seems to be almost linear between 1985 and 2000. Write a sentence about what this means in terms of the real-world situation.



Solution Video



3.4.1 Quiz

3.5 Write and Graph Equations of Lines

Accompanying lectures for questions 580 - 618



Question 580: VOCABULARY What does intercept mean in the expression slope-intercept form?

Solution Video

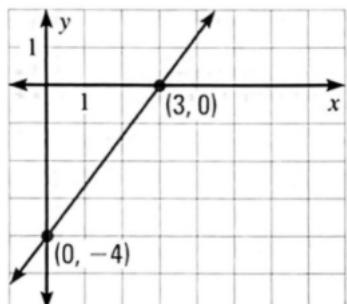


Question 581: ★ WRITING Explain how you can use the standard form of a linear equation to find the intercepts of a line.

Solution Video



Question 582: WRITING EQUATIONS Write an equation of the line shown.



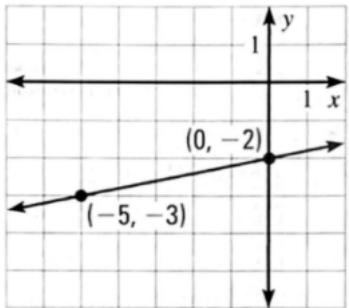
Solution Video



Accompanying lectures for questions 580 - 618



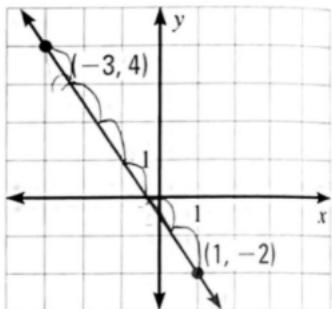
Question 583: WRITING EQUATIONS Write an equation of the line shown.



Solution Video



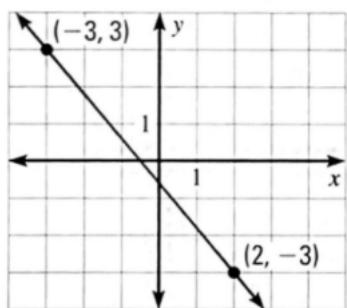
Question 584: WRITING EQUATIONS Write an equation of the line shown.



Solution Video



Question 585: WRITING EQUATIONS Write an equation of the line shown.



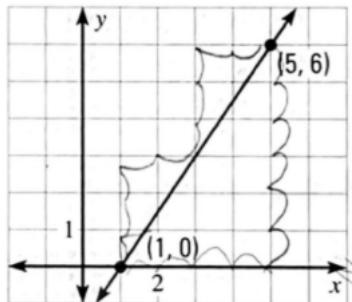
Solution Video



Accompanying lectures for questions 580 - 618



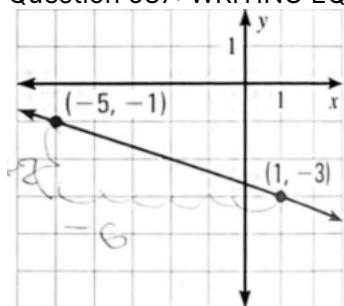
Question 586: WRITING EQUATIONS Write an equation of the line shown.



Solution Video



Question 587: WRITING EQUATIONS Write an equation of the line shown.

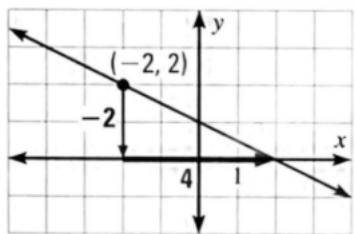


Solution Video



Question 588: ★ MULTIPLE CHOICE Which equation is an equation of the line in the graph?

- (A) $y = -\frac{1}{2}x$
- (B) $y = -\frac{1}{2}x + 1$
- (C) $y = -2x$
- (D) $y = -2x + 1$



Solution Video



Accompanying lectures for questions 580 - 618



Question 589: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = -5, b = -12$$

Solution Video



Question 590: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = 3, b = 2$$

Solution Video



Question 591: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = 4, b = -6$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 592: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = -\frac{5}{2}, b = 0$$

Solution Video



Question 593: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = \frac{4}{9}, b = -\frac{2}{9}$$

Solution Video



Question 594: WRITING EQUATIONS Write an equation of the line with the given slope m and y -intercept b .

$$m = -\frac{11}{5}, b = -12$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 595: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(-1, 0), m = -1$$

Solution Video



Question 596: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(5, 4), m = 4$$

Solution Video



Question 597: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(6, -2), m = 3$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 598: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(-8, -2), m = -\frac{2}{3}$$

Solution Video



Question 599: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(0, -3), m = -\frac{1}{6}$$

Solution Video



Question 600: WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

$$P(-13, 7), m = 0$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 601: WRITING EQUATIONS Write an equation of a line with undefined slope that passes through the point $(3, -2)$.

Solution Video



Question 602: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(0, -1), y = -2x + 3$$

Solution Video



Question 603: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(-7, -4), y = 16$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 604: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(3, 8), y - 1 = \frac{1}{5}(x + 4)$$

Solution Video



Question 605: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(-2, 6), x = -5$$

Solution Video



Question 606: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(-2, 1), 10x + 4y = -8$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 607: PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(4, 0), -x + 2y = 12$$

Solution Video



Question 608: ★ MULTIPLE CHOICE Line a passes through points $(-2, 1)$ and $(2, 9)$. Which equation is an equation of a line parallel to line a ?

- (A) $y = -2x + 5$
- (B) $y = -\frac{1}{2}x + 5$
- (C) $y = \frac{1}{2}x - 5$
- (D) $y = 2x - 5$

Solution Video



Question 609: PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(0, 0), y = -9x - 1$$

Solution Video



Accompanying lectures for questions 580 - 618



Question 610: PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(-1, 1), y = \frac{7}{3}x + 10$$

Solution Video



Question 611: PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(4, -6), y = -3$$

Solution Video



Question 612: PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(2, 3), y - 4 = -2(x + 3) \quad 34. \quad P(0, -5), x = 20$$

Solution Video



Accompanying lectures for questions 580 - 618



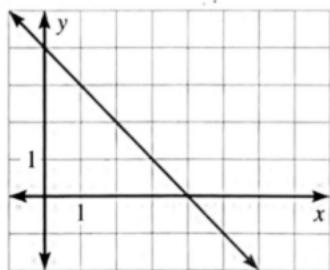
Question 613: PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(-8, 0), 3x - 5y = 6$$

Solution Video



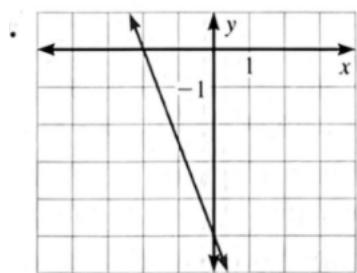
Question 614: USING INTERCEPTS Identify the x - and y -intercepts of the line. Use the intercepts to write an equation of the line.



Solution Video



Question 615: USING INTERCEPTS Identify the x - and y -intercepts of the line. Use the intercepts to write an equation of the line.



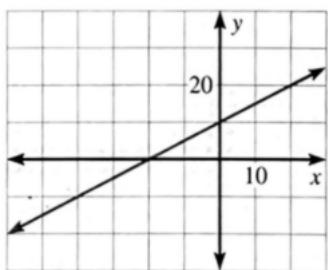
Solution Video



Accompanying lectures for questions 580 - 618



Question 616: USING INTERCEPTS Identify the x - and y -intercepts of the line. Use the intercepts to write an equation of the line.



Solution Video



Question 617: xy ALGeBRA Find a value for k so that the line through $(-1, k)$ and $(-7, -2)$ is parallel to the line with equation $y = x + 1$.

Solution Video



Question 618: **xy**) ALGEBRA Find a value for k so that the line through $(k, 2)$ and $(7, 0)$ is perpendicular to the line with equation $y = x - \frac{28}{5}$.

Solution Video



Accompanying lectures for questions 619 - 629



Question 619: GRAPHING EQUATIONS Graph the equation.

$$8x + 2y = -10$$

Solution Video



Question 620: GRAPHING EQUATIONS Graph the equation.

$$x + y = 1$$

Solution Video



Question 621: GRAPHING EQUATIONS Graph the equation.

$$4x - y = -8$$

Solution Video



Accompanying lectures for questions 619 - 629



Question 622: GRAPHING EQUATIONS Graph the equation.

$$-x + 3y = -9$$

Solution Video



Question 623: GRAPHING EQUATIONS Graph the equation.

$$y - 2 = -1$$

Solution Video



Question 624: GRAPHING EQUATIONS Graph the equation.

$$y + 2 = x - 1$$

Solution Video



Accompanying lectures for questions 619 - 629



Question 625: GRAPHING EQUATIONS Graph the equation.

$$x + 3 = -4$$

Solution Video



Question 626: GRAPHING EQUATIONS Graph the equation.

$$2y - 4 = -x + 1$$

Solution Video



Question 627: GRAPHING EQUATIONS Graph the equation.

$$3(x - 2) = -y - 4$$

Solution Video



Accompanying lectures for questions 619 - 629



Question 628: ERROR ANALYSIS Describe and correct the error in finding the x - and y -intercepts of the graph of $5x - 3y = -15$.

To find the x -intercept,
let $x = 0$:

$$5x - 3y = -15$$

$$5(0) - 3y = -15$$

$$y = 5$$



To find the y -intercept,
let $y = 0$:

$$5x - 3y = -15$$

$$5x - 3(0) = -15$$

$$x = -3$$



[Solution Video](#)



Question 629: SOLUTIONS TO EQUATIONS Graph the linear equations. Then use the graph to estimate how many solutions the equations share.

$$y = -5x + 6$$

$$10x + 2y = 12$$

[Solution Video](#)



Accompanying lectures for questions 630 - 632



Question 630: PERPENDICULAR BISECTORS Find the midpoint of \overline{PQ} . Then write an equation of the line that passes through the midpoint and is perpendicular to \overline{PQ} . This line is called the perpendicular bisector of \overline{PQ} .

$$P(-4, 3), Q(4, -1)$$

Solution Video



Question 631: PERPENDICULAR BISECTORS Find the midpoint of \overline{PQ} . Then write an equation of the line that passes through the midpoint and is perpendicular to \overline{PQ} . This line is called the perpendicular bisector of \overline{PQ} .

$$P(-5, -5), Q(3, 3)$$

Solution Video



Question 632: PERPENDICULAR BISECTORS Find the midpoint of \overline{PQ} . Then write an equation of the line that passes through the midpoint and is perpendicular to \overline{PQ} . This line is called the perpendicular bisector of \overline{PQ} .

$P(0, 2), Q(6, -2)$

Solution Video



Accompanying lectures for questions 633 - 633



Question 633: INTERCEPTS A line passes through the points $(-10, -3)$ and $(6, 1)$. Where does the line intersect the x -axis? Where does the line intersect the y -axis?

Solution Video



Accompanying lectures for questions 634 - 636



Question 634: SOLUTIONS TO EQUATIONS Graph the linear equations. Then use the graph to estimate how many solutions the equations share.

$$y = 4x + 9$$

$$4x - y = 1$$

Solution Video



Question 635: SOLUTIONS TO EQUATIONS Graph the linear equations. Then use the graph to estimate how many solutions the equations share.

$$3y + 4x = 16$$

$$2x - y = 18$$

Solution Video



Question 636: CHALLENGE Graph the points $R(-7, -3)$, $S(-2, 3)$, and $T(10, -7)$. Connect them to make $\triangle RST$. Write an equation of the line containing each side. Explain how you can use slopes to show that $\triangle RST$ has one right angle.

Solution Video



Accompanying lectures for questions 637 - 637



Question 637: xy) ALGEBRA Solve Exercises 53-55 algebraically. (For help, see Skills Review Handbook, p. SR12.) Make a conjecture about how the solution(s) can tell you whether the lines intersect, are parallel, or are the same line.

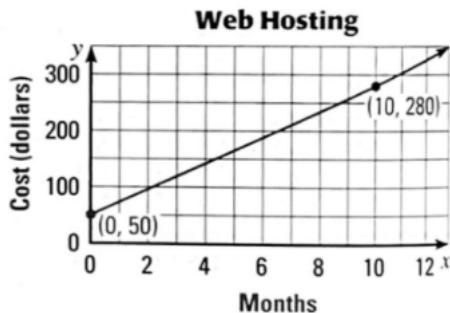
Solution Video



Accompanying lectures for questions 638 - 639



Question 638: WEB HOSTING The graph models the total cost of using a web hosting service for several months. Write an equation of the line. Tell what the slope and y -intercept mean in this situation. Then find the total cost of using the web hosting service for one year.



Solution Video



Question 639: MULTI-STEP PROBLEM A national park has two options: a \$50 pass for all admissions during the year, or a \$4 entrance fee each time you enter.

- a. Model Write an equation to model the cost of going to the park for a year using a pass and another equation for paying a fee each time.
- b. Graph Graph both equations you wrote in part (a).
- c. Interpret How many visits do you need to make for the pass to be cheaper? Explain.

Solution Video



Accompanying lectures for questions 640 - 641



Question 640: SCIENCE Scientists believe that a Tyrannosaurus Rex weighed about 2000 kilograms by age 14 . It then had a growth spurt for four years, gaining 2.1 kilograms per day. Write an equation to model this situation. What are the slope and y -intercept? Tell what the slope and y -intercept mean in this situation.

Solution Video



Question 641: You are buying slices of pizza for you and your friends. A small slice costs \$2 and a large slice costs \$3. You have \$24 to spend. Write an equation in standard form $Ax + By = C$ that models this situation. What do the values of A , B , and C mean in this situation?

Solution Video



Accompanying lectures for questions 642 - 644



Question 642: You run at a rate of 4 miles per hour and your friend runs at a rate of 3.5 miles per hour. Your friend starts running 10 minutes before you, and you run for a half hour on the same path. Will you catch up to your friend? Use a graph to support your answer.

Solution Video



Question 643: → EXTENDED RESPONSE Audrey and Sara are making jewelry. Audrey buys 2 bags of beads and 1 package of clasps for a total of \$13. Sara buys 5 bags of beads and 2 packages of clasps for a total of \$27.50.

- Let b be the price of one bag of beads and let c be the price of one package of clasps. Write equations to represent the total cost for Audrey and the total cost for Sara.
- Graph the equations from part (a).
- Explain the meaning of the intersection of the two lines in terms of the real-world situation.


[Solution Video](#)


Question 644: CHAILeNGe Michael is deciding which gym membership to buy. Points $(2, 112)$ and $(4, 174)$ give the cost of gym membership at one gym after two and four months. Points $(1, 62)$ and $(3, 102)$ give the cost of gym membership at a second gym after one and three months. Write equations to model the cost of each gym membership. At what point do the graphs intersect, if they intersect? Which gym is cheaper? Explain.

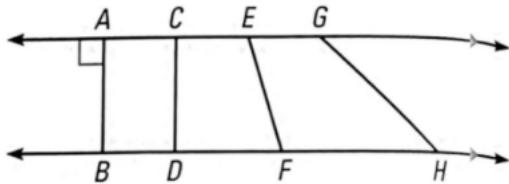
[Solution Video](#)


3.6 Prove Theorems about Perpendicular Lines

Accompanying lectures for questions 645 - 646



Question 645: The length of which segment shown is called the distance between the two parallel lines? Explain.



[Solution Video](#)



Question 646: ★ SHORT RESPONSE The segments that form the path of a crosswalk are usually perpendicular to the crosswalk. Sketch what the segments would look like if they were perpendicular to the crosswalk. Which method requires less paint? Explain.



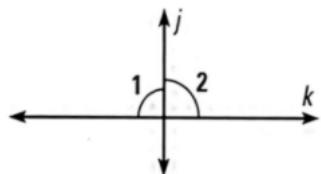
[Solution Video](#)



Accompanying lectures for questions 647 - 671



Question 647: JUSTIFYING STATEMENTS Write the theorem that justifies the statement.



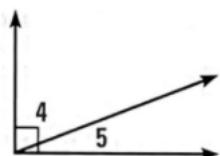
$$j \perp k$$

Solution Video



Question 648: Write the theorem that justifies the statement.

$\angle 4$ and $\angle 5$ are complementary

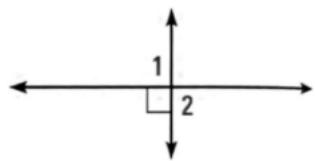


Solution Video



Question 649: Write the theorem that justifies the statement.

$\angle 1$ and $\angle 2$ are right angles.



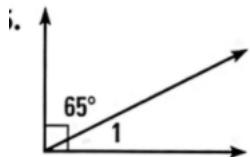
Solution Video



Accompanying lectures for questions 647 - 671



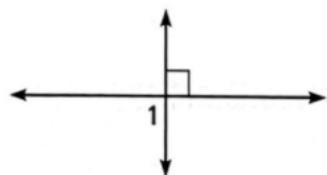
Question 650: APPLYING THEOREMS Find $m\angle 1$.



Solution Video



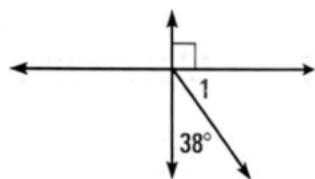
Question 651: APPLYING THEOREMS Find $m\angle 1$.



Solution Video



Question 652: APPLYING THEOREMS Find $m\angle 1$.



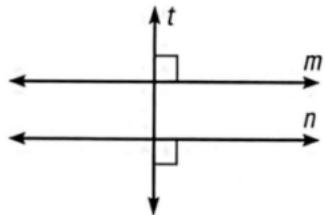
Solution Video



Accompanying lectures for questions 647 - 671



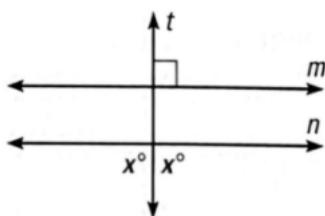
Question 653: Explain how you would show that $m \parallel n$.



Solution Video



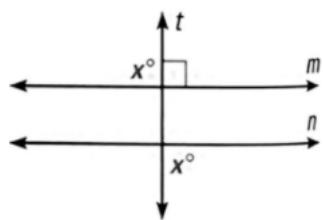
Question 654: SHOWING LINES PARALLEL Explain how you would show that $m \parallel n$.



Solution Video



Question 655: SHOWING LINES PARALLEL Explain how you would show that $m \parallel n$.



Solution Video



Accompanying lectures for questions 647 - 671



Question 656: ★ SHORT RESPONSE Explain how to draw two parallel lines using only a straightedge and a protractor.

Solution Video

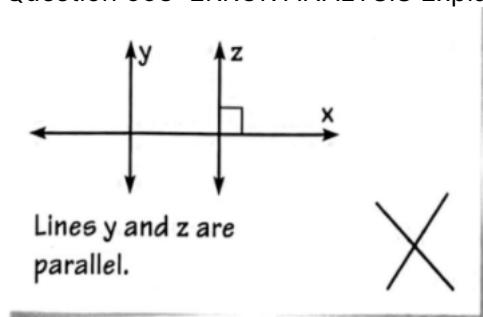


Question 657: Describe how you can fold a sheet of paper to create two parallel lines that are perpendicular to the same line.

Solution Video



Question 658: ERROR ANALYSIS Explain why the statement about the figure is incorrect.



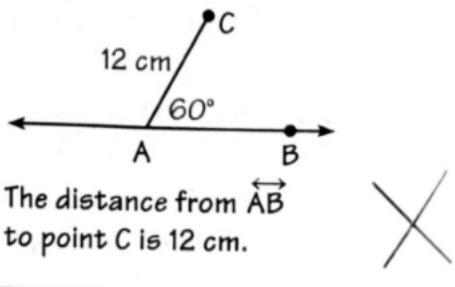
Solution Video



Accompanying lectures for questions 647 - 671



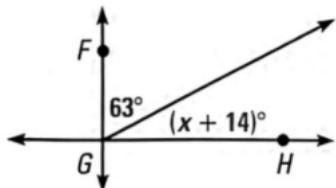
Question 659: ERROR ANALYSIS Explain why the statement about the figure is incorrect.



[Solution Video](#)



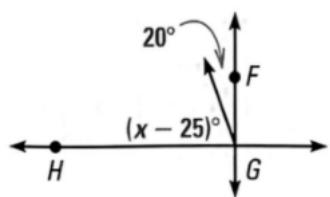
Question 660: FINDING ANGLE MEASURES In the diagram, $\overleftrightarrow{FG} \perp \overleftrightarrow{GH}$. Find the value of x .



[Solution Video](#)



Question 661: FINDING ANGLE MEASURES In the diagram, $\overleftrightarrow{FG} \perp \overleftrightarrow{GH}$. Find the value of x .



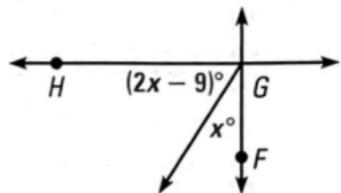
Solution Video



Accompanying lectures for questions 647 - 671



Question 662: In the diagram, $\overleftrightarrow{FG} \perp \overleftrightarrow{GH}$. Find the value of x .



[Solution Video](#)



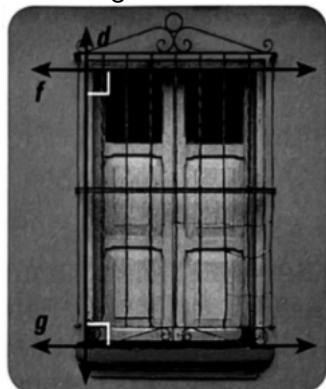
Question 663: Determine which lines, if any, must be parallel. Explain your reasoning.



[Solution Video](#)



Question 664: DRAWING CONCLUSIONS Determine which lines, if any, must be parallel. Explain your reasoning.



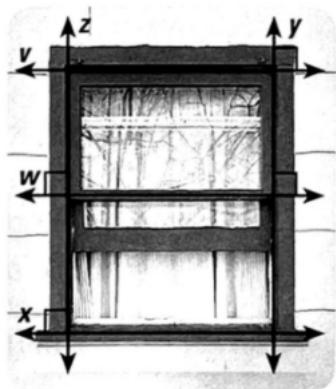
Solution Video



Accompanying lectures for questions 647 - 671



Question 665: DRAWING CONCLUSIONS Determine which lines, if any, must be parallel. Explain your reasoning.

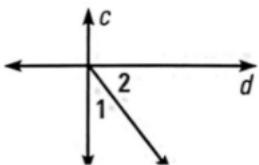


[Solution Video](#)



Question 666: Which statement must be true if $c \perp d$?

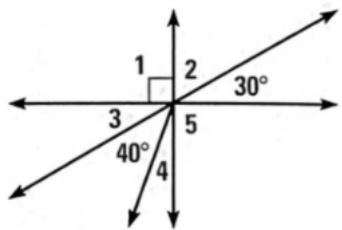
- (A) $m\angle 1 + m\angle 2 = 90^\circ$
- (B) $m\angle 1 + m\angle 2 < 90^\circ$
- (C) $m\angle 1 + m\angle 2 > 90^\circ$
- (D) Cannot be determined



[Solution Video](#)



Question 667: FINDING ANGLES Find all the unknown angle measures in the diagram at the right. Justify your reasoning for each angle measure.



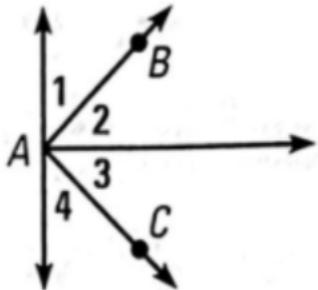
Solution Video



Accompanying lectures for questions 647 - 671



Question 668: Suppose the given statement is true. Determine whether $\overrightarrow{AB} \perp \overrightarrow{AC}$.



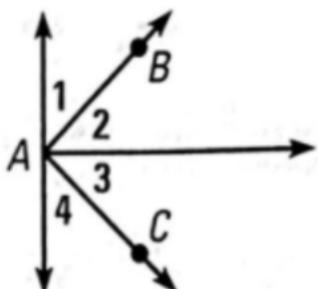
$\angle 1$ and $\angle 2$ are congruent.

Solution Video



Question 669: Suppose the given statement is true. Determine whether $\overrightarrow{AB} \perp \overrightarrow{AC}$.

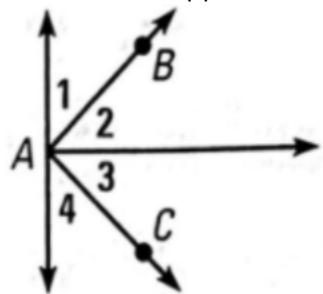
$\angle 3$ and $\angle 4$ are complementary.



Solution Video



Question 670: Suppose the given statement is true. Determine whether $\overrightarrow{AB} \perp \overrightarrow{AC}$.



$$m\angle 1 = m\angle 3 \text{ and } m\angle 2 = m\angle 4$$

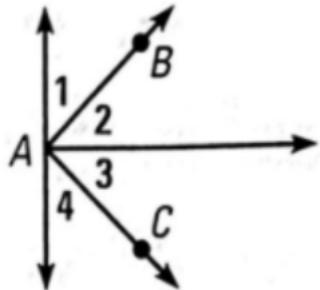
Solution Video



Accompanying lectures for questions 647 - 671



Question 671: Suppose the given statement is true. Determine whether $\overrightarrow{AB} \perp \overrightarrow{AC}$.



$$m\angle 1 = 40^\circ \text{ and } m\angle 4 = 50^\circ$$

Solution Video



Accompanying lectures for questions 672 - 678

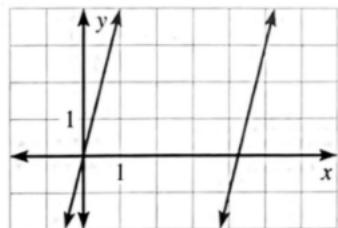


Question 672: Explain why the distance between two lines is only defined for parallel lines.

Solution Video



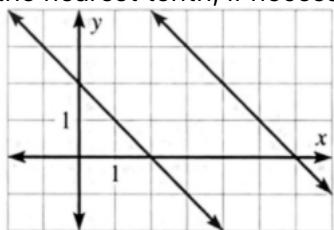
Question 673: FINDING DISTANCES Use the Distance Formula to find the distance between the two parallel lines. Round to the nearest tenth, if necessary.



Solution Video



Question 674: Use the Distance Formula to find the distance between the two parallel lines. Round to the nearest tenth, if necessary.



Solution Video



Accompanying lectures for questions 672 - 678



Question 675: Draw the quadrilateral $ABCD$ with coordinates $A(-4, -1)$, $B(2, 3)$, $C(7, 2)$, and $D(1, -2)$. Find the distance between each pair of parallel sides of $ABCD$. Round to the nearest tenth, if necessary.

Solution Video



Question 676: FINDING DISTANCES Find the distance between the lines with the equations $y = \frac{3}{2}x + 4$ and $-3x + 2y = -1$.

Solution Video



Question 677: CHALLENGE Describe how you would find the distance from a point to a plane. Can you find the distance from a line to a plane? Explain.

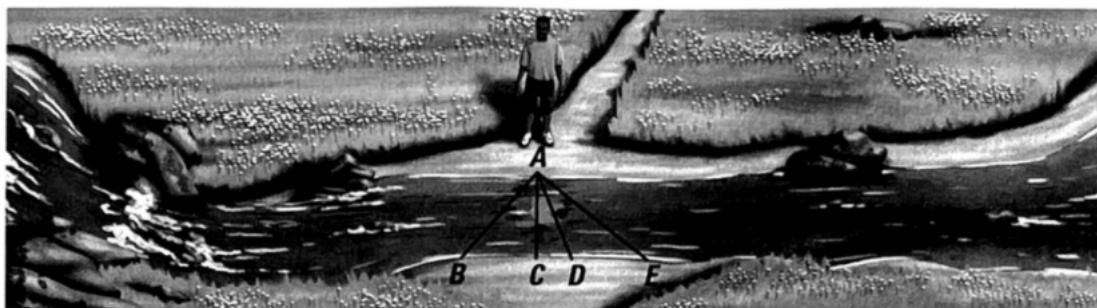
Solution Video



Accompanying lectures for questions 672 - 678



Question 678: STREAMS You are trying to cross a stream from point *A*. Which point should you jump to in order to jump the shortest distance? Explain.



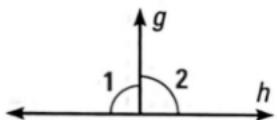
Solution Video



Accompanying lectures for questions 679 - 679



Question 679: PROVING THEOREM 3.8 Copy and complete the proof that if two lines intersect to form a linear pair of congruent angles, then the lines are perpendicular.



GIVEN $\angle 1$ and $\angle 2$ are a linear pair.

$$\angle 1 \cong \angle 2$$

PROVE $\perp h$

STATEMENTS	REASONS
1. $\angle 1$ and $\angle 2$ are a linear pair.	1. Given
2. $\angle 1$ and $\angle 2$ are supplementary.	2. ?
3. ?	3. Definition of supplementary angles
4. $\angle 1 \cong \angle 2$	4. Given
5. $m\angle 1 = m\angle 2$	5. ?
6. $m\angle 1 + m\angle 1 = 180^\circ$	6. Substitution Property of Equality
7. $2(m\angle 1) = 180^\circ$	7. Combine like terms.
8. $m\angle 1 = 90^\circ$	8. ?
9. ?	9. Definition of a right angle
10. $g \perp h$	10. ?

Solution Video



Accompanying lectures for questions 680 - 682



Question 680: PROVING THEOREMS Write a proof of the given theorem.

Theorem 3.9

Solution Video



Question 681: PROVING THEOREMS Write a proof of the given theorem.

Theorem 3.11, Perpendicular Transversal Theorem

Solution Video



Question 682: PROVING THEOREMS Write a proof of the given theorem.

Theorem 3.12, Lines Perpendicular to a Transversal Theorem

Solution Video



3.6.1 Quiz

Accompanying lectures for questions 683 - 688



Question 683: Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(0, 0), y = -3x + 1$$

Solution Video



Question 684: Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(-5, -6), y - 8 = 2x + 10$$

Solution Video



Question 685: Write an equation of the line that passes through point P and is parallel to the line with the given equation.

$$P(1, -2), x = 15$$

Solution Video



Accompanying lectures for questions 683 - 688



Question 686: Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(3, 4), y = 2x - 1$$

Solution Video



Question 687: Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(2, 5), y = -6$$

Solution Video



Question 688: Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

$$P(4, 0), 12x + 3y = 9$$

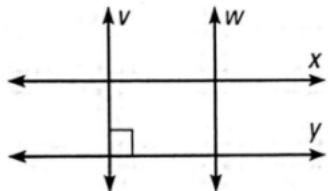
Solution Video



Accompanying lectures for questions 689 - 691



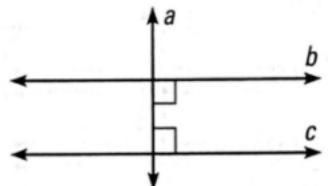
Question 689: Determine which lines, if any, must be parallel. Explain.



Solution Video



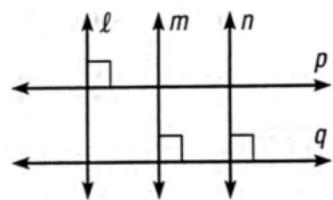
Question 690: Determine which lines, if any, must be parallel. Explain.



Solution Video



Question 691: Determine which lines, if any, must be parallel. Explain.



Solution Video



Chapter 4 Congruent Triangles

4.0 Prerequisite Skills

Accompanying lectures for questions 692 - 695



Question 692: Classify the angle as acute, obtuse, right, or straight.

$$m\angle A = 115^\circ$$

Solution Video



Question 693: Classify the angle as acute, obtuse, right, or straight.

$$m\angle B = 90^\circ$$

Solution Video



Question 694: Classify the angle as acute, obtuse, right, or straight.

$$m\angle C = 35^\circ$$

Solution Video



Accompanying lectures for questions 692 - 695



Question 695: Classify the angle as acute, obtuse, right, or straight.

$$m\angle D = 95^\circ$$

Solution Video



Accompanying lectures for questions 696 - 696



Question 696: Solve the equation.

$$70 + 2y = 180$$

Solution Video



Accompanying lectures for questions 697 - 697



Question 697: Solve the equation.

$$2x = 5x - 54$$

Solution Video



Accompanying lectures for questions 698 - 698



Question 698: Solve the equation.

$$40 + x + 65 = 180$$

Solution Video



Accompanying lectures for questions 699 - 703



Question 699: Find the coordinates of the midpoint of \overline{PQ} .

$$P(2, -5), Q(-1, -2)$$

Solution Video



Question 700: Find the coordinates of the midpoint of \overline{PQ} .

$$P(-4, 7), Q(1, -5)$$

Solution Video



Question 701: Find the coordinates of the midpoint of \overline{PQ} .

$P(-4, 7), Q(1, -5)$

Solution Video



Accompanying lectures for questions 699 - 703



Question 702: Find the coordinates of the midpoint of \overline{PQ} .

$P(h, k), Q(h, 0)$

Solution Video



Question 703: Find the coordinates of the midpoint of \overline{PQ} .

$P(h, k), Q(h, 0)$

Solution Video



Accompanying lectures for questions 704 - 704



Question 704: Find the coordinates of the midpoint of \overline{PQ} .

$P(2, -5), Q(-1, -2)$

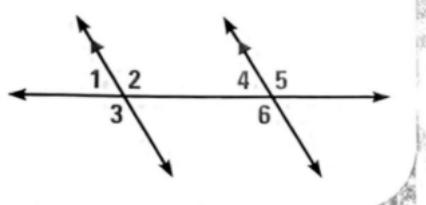
Solution Video



Accompanying lectures for questions 705 - 708



Question 705: Determine whether the angles are congruent. If so, explain why.

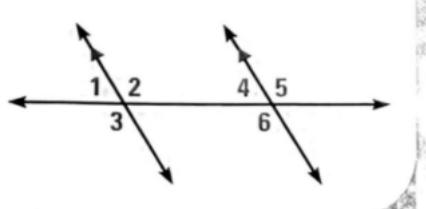


$\angle 2, \angle 3$

Solution Video



Question 706: Determine whether the angles are congruent. If so, explain why.

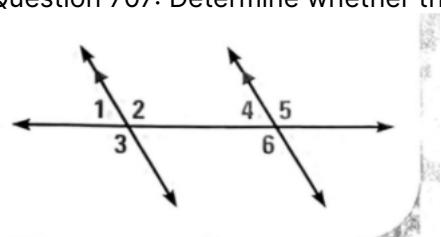


$\angle 1, \angle 4$

Solution Video



Question 707: Determine whether the angles are congruent. If so, explain why.



$\angle 2, \angle 6$

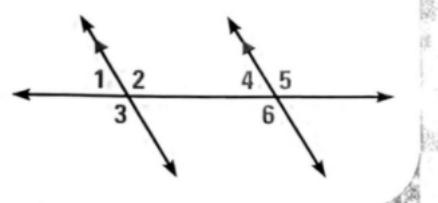
Solution Video



Accompanying lectures for questions 705 - 708



Question 708: Determine whether the angles are congruent. If so, explain why.



$\angle 3, \angle 4$

Solution Video



4.1 Apply Triangle Sum Properties

Accompanying lectures for questions 709 - 724



Question 709: Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Angle measures: $30^\circ, 60^\circ, 90^\circ$

Solution Video



Question 710: voCABULARY Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Angle measures: $60^\circ, 60^\circ, 60^\circ$

Solution Video



Question 711: Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Angle measures: $20^\circ, 125^\circ, 35^\circ$

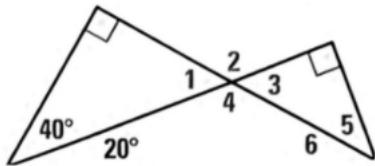
Solution Video



Accompanying lectures for questions 709 - 724



Question 712: Find the measure of the numbered angle.

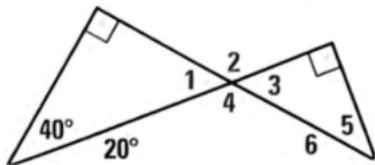


$\angle 1$

Solution Video



Question 713: Find the measure of the numbered angle.

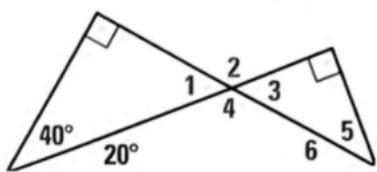


$\angle 2$

Solution Video



Question 714: Find the measure of the numbered angle.



$\angle 3$

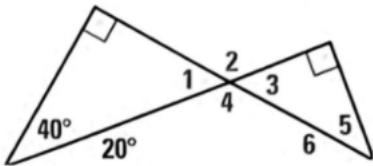
Solution Video



Accompanying lectures for questions 709 - 724



Question 715: Find the measure of the numbered angle.

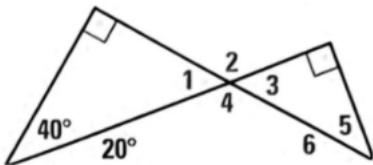


$\angle 4$

Solution Video



Question 716: Find the measure of the numbered angle.



$\angle 5$

Solution Video



Question 717: In $\triangle PQR$, $\angle P \cong \angle R$ and the measure of $\angle Q$ is twice the measure of $\angle R$. Find the measure of each angle.

Solution Video



Accompanying lectures for questions 709 - 724



Question 718: In $\triangle EFG$, $m\angle F = 3(m\angle G)$, and $m\angle E = m\angle F - 30^\circ$. Find the measure of each angle.

Solution Video



Question 719: Which of the following is not possible?

- (A) An acute scalene triangle
- (B) A triangle with two acute exterior angles
- (C) An obtuse isosceles triangle
- (D) An equiangular acute triangle

Solution Video



Question 720: VISUALIZATION Is there an angle measure that is so small that any triangle with that angle measure will be an obtuse triangle? Explain.

Solution Video



Accompanying lectures for questions 709 - 724



Question 721: SLING CHAIRS The brace of a sling chair forms a triangle with the seat and legs of the chair. Suppose $m\angle 2 = 50^\circ$ and $m\angle 3 = 65^\circ$.



Find $m\angle 6$.

Solution Video



Question 722: SLING CHAIRS The brace of a sling chair forms a triangle with the seat and legs of the chair. Suppose $m\angle 2 = 50^\circ$ and $m\angle 3 = 65^\circ$.



Find $m\angle 5$.

Solution Video



Question 723: SLING CHAIRS The brace of a sling chair forms a triangle with the seat and legs of the chair. Suppose $m\angle 2 = 50^\circ$ and $m\angle 3 = 65^\circ$.



Find $m\angle 1$.

Solution Video



Accompanying lectures for questions 709 - 724



Question 724: SLING CHAIRS The brace of a sling chair forms a triangle with the seat and legs of the chair. Suppose $m\angle 2 = 50^\circ$ and $m\angle 3 = 65^\circ$.



Find $m\angle 4$.

Solution Video



Accompanying lectures for questions 725 - 731



Question 725: Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Side lengths: 2 cm, 2 cm, 2 cm

Solution Video



Question 726: Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Side lengths: 6 m, 3 m, 6 m

Solution Video



Question 727: Match the triangle description with the most specific name.

- A. Isosceles
- B. Scalene
- C. Right
- D. Obtuse
- E. Equilateral
- F. Equiangular

Side lengths: 5ft, 7ft, 9ft

Solution Video



Accompanying lectures for questions 725 - 731

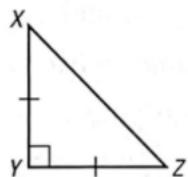


Question 728: Can a right triangle also be obtuse? Explain why or why not.

Solution Video



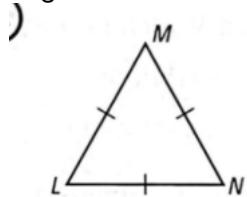
Question 729: Copy the triangle and measure its angles. Classify the triangle by its sides and by its angles.



Solution Video



Question 730: Copy the triangle and measure its angles. Classify the triangle by its sides and by its angles.



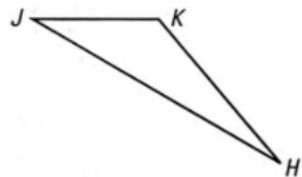
Solution Video



Accompanying lectures for questions 725 - 731



Question 731: Copy the triangle and measure its angles. Classify the triangle by its sides and by its angles.



Solution Video



Accompanying lectures for questions 732 - 739



Question 732: A triangle has the given vertices. Graph the triangle and classify it by its sides. Then determine if it is a right triangle.

$A(2, 3), B(6, 3), C(2, 7)$

Solution Video



Question 733: Describe and correct the error.

All equilateral triangles
are also isosceles. So, if
 $\triangle ABC$ is isosceles, then
it is equilateral as well.

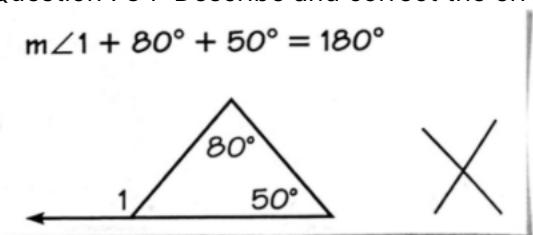


Solution Video



Question 734: Describe and correct the error.

$$m\angle 1 + 80^\circ + 50^\circ = 180^\circ$$



Solution Video



Accompanying lectures for questions 732 - 739



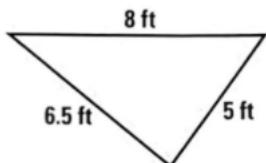
Question 735: Suppose you have the equations $y = ax + b$, $y = cx + d$, and $y = ex + f$.

- When will these three lines form a triangle?
- Let $c = 1$, $d = 2$, $e = 4$, and $f = -7$. Find values of a and b so that no triangle is formed by the three equations.
- Draw the triangle formed when $a = \frac{4}{3}$, $b = \frac{1}{3}$, $c = -\frac{4}{3}$, $d = \frac{41}{3}$, $e = 0$, and $f = -1$. Then classify the triangle by its sides.

Solution Video



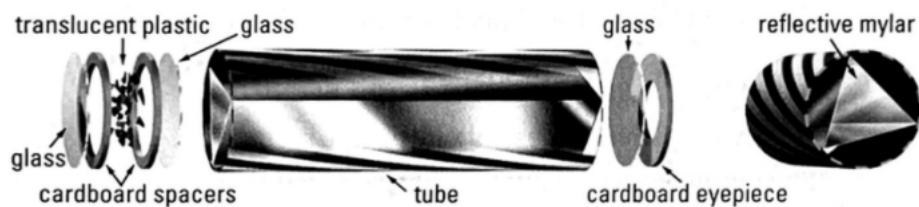
Question 736: Three people are standing on a stage. The distances between the three people are shown in the diagram. Classify the triangle formed by its sides. Then copy the triangle, measure the angles, and classify the triangle by its angles.



Solution Video



Question 737: KALEIDOSCOPES You are making a kaleidoscope. The directions state that you are to arrange three pieces of reflective mylar in an equilateral and equiangular triangle. You must cut three strips from a piece of mylar 6 inches wide. What are the side lengths of the triangle used to form the kaleidoscope? What are the measures of the angles? Explain.



Solution Video



Accompanying lectures for questions 732 - 739

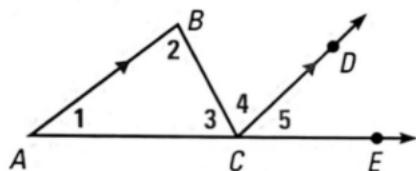


Question 738: You are bending a strip of metal into an isosceles triangle for a sculpture. The strip of metal is 20 inches long. The first bend is made 6 inches from one end. Describe two ways you could complete the triangle.

Solution Video



Question 739: Use the diagram to write a proof of the Triangle Sum Theorem. Your proof should be different than the proof of the Triangle Sum Theorem shown in this lesson.



Solution Video



Accompanying lectures for questions 740 - 741



Question 740: A triangle has the given vertices. Graph the triangle and classify it by its sides. Then determine if it is a right triangle.

$$A(3, 3), B(6, 9), C(6, -3)$$

Solution Video



Question 741: A triangle has the given vertices. Graph the triangle and classify it by its sides. Then determine if it is a right triangle.

$$A(1, 9), B(4, 8), C(2, 5)$$

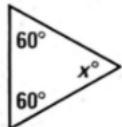
Solution Video



Accompanying lectures for questions 742 - 748



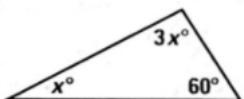
Question 742: Find the value of x . Then classify the triangle by its angles.



Solution Video



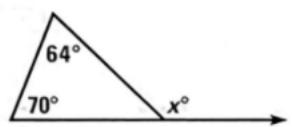
Question 743: FINDING ANGLE MEASURES Find the value of x . Then classify the triangle by its angles.



Solution Video



Question 744: FINDING ANGLE MEASURES Find the value of x . Then classify the triangle by its angles.



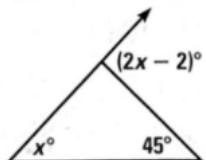
Solution Video



Accompanying lectures for questions 742 - 748



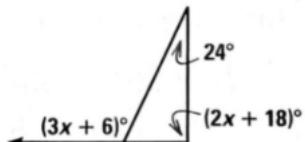
Question 745: ALGEBRA Find the measure of the exterior angle shown.



Solution Video



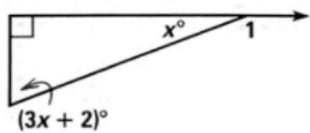
Question 746: ALGEBRA Find the measure of the exterior angle shown.



Solution Video



Question 747: ALGEBRA Find the measure of the exterior angle shown.



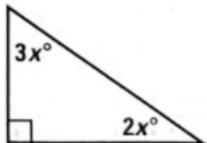
Solution Video



Accompanying lectures for questions 742 - 748



Question 748: ★ SHORT RESPONSE Explain how to use the Corollary to the Triangle Sum Theorem to find the measure of each angle.



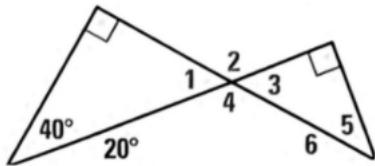
Solution Video



Accompanying lectures for questions 749 - 755



Question 749: Find the measure of the numbered angle.

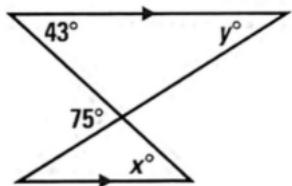


$\angle 6$

Solution Video



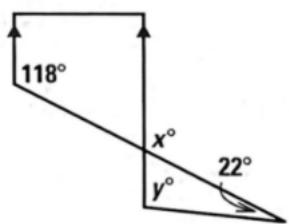
Question 750: xy ALGEBRA In Exercises 32-37, find the values of x and y .



Solution Video



Question 751: Find the values of x and y .



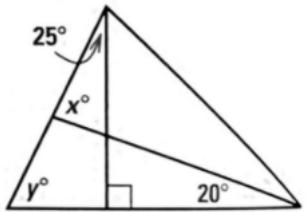
Solution Video



Accompanying lectures for questions 749 - 755



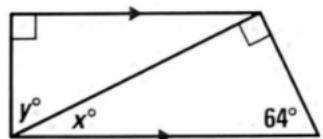
Question 752: Find the values of x and y .



Solution Video



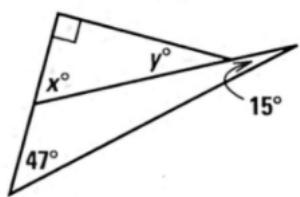
Question 753: Find the values of x and y .



Solution Video



Question 754: Find the values of x and y .



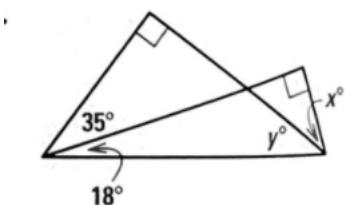
Solution Video



Accompanying lectures for questions 749 - 755



Question 755: Find the values of x and y .



Solution Video



Accompanying lectures for questions 756 - 756



Question 756: Which inequality describes the possible measures of an angle of a triangle?

- (A) $0^\circ \leq x^\circ \leq 180^\circ$
- (B) $0^\circ \leq x^\circ < 180^\circ$
- (C) $0^\circ < x^\circ < 180^\circ$
- (D) $0^\circ < x^\circ \leq 180^\circ$

Solution Video



Accompanying lectures for questions 757 - 757



Question 757: PROOF Prove the Corollary to the Triangle Sum Theorem.

Solution Video



Accompanying lectures for questions 758 - 758



Question 758: The measures of the angles of a triangle are $(2\sqrt{2x})^\circ$, $(5\sqrt{2x})^\circ$, and $(2\sqrt{2x})^\circ$.

- a. Write an equation to show the relationship of the angles.
- b. Find the measure of each angle.
- c. Classify the triangle by its angles.

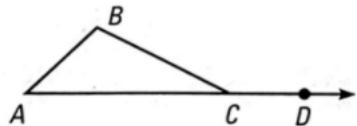
Solution Video



Accompanying lectures for questions 759 - 760



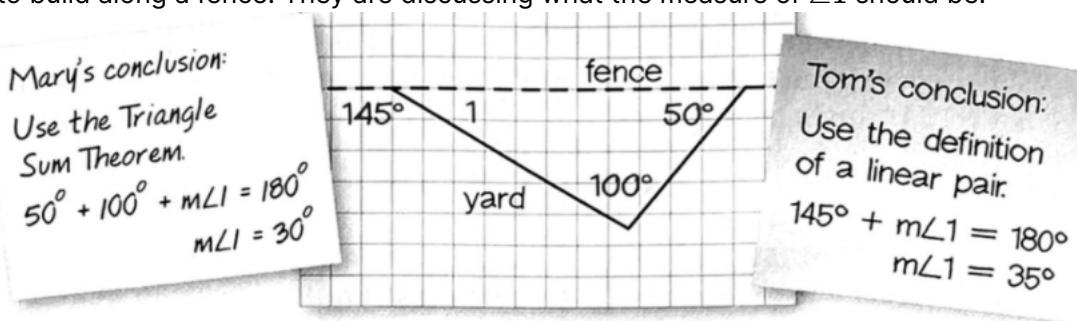
Question 759: Prove the Exterior Angle Theorem. (Hint: Find two equations involving $m\angle ACB$.)



[Solution Video](#)



Question 760: The figure below shows an initial plan for a triangular flower bed that Mary and Tom plan to build along a fence. They are discussing what the measure of $\angle 1$ should be.



Did Mary and Tom both reason correctly? If not, who made a mistake and what mistake was made? If they did both reason correctly, what can you conclude about their initial plan? Explain.

[Solution Video](#)



Accompanying lectures for questions 761 - 761



Question 761: $\triangle ABC$ is isosceles. $AB = x$ and $BC = 2x - 4$.

- a. Find two possible values for x if the perimeter of $\triangle ABC$ is 32 .
- b. How many possible values are there for x if the perimeter of $\triangle ABC$ is 12 ?

Solution Video

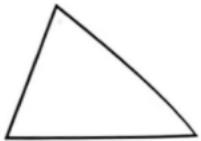
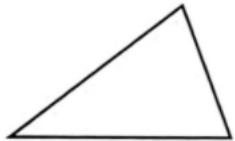


4.2 Apply Congruence and Triangles

Accompanying lectures for questions 762 - 786



Question 762: VOCABULARY Copy the congruent triangles shown. Then label the vertices of the triangles so that $\triangle JKL \cong \triangle RST$. Identify all pairs of congruent corresponding angles and corresponding sides.



Solution Video



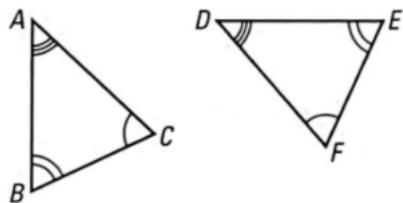
Question 763: Based on this lesson, what information do you need to prove that two triangles are congruent? Explain.

Solution Video



Question 764: Identify all pairs of congruent corresponding parts. Then write another congruence statement for the figures.

$$\triangle ABC \cong \triangle DEF$$



Solution Video

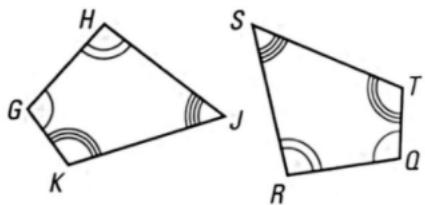


Accompanying lectures for questions 762 - 786



Question 765: USING CONGRUENCE Identify all pairs of congruent corresponding parts. Then write another congruence statement for the figures.

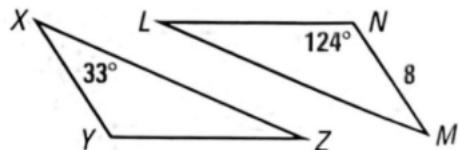
$$GHJK \cong QRST$$



[Solution Video](#)



Question 766: In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.

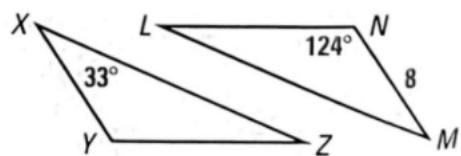


$$m\angle Y = ?$$

[Solution Video](#)



Question 767: READING A DIAGRAM In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.



$$m\angle M = ?$$

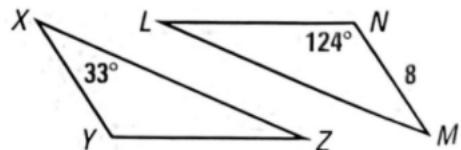
Solution Video



Accompanying lectures for questions 762 - 786



Question 768: READING A DIAGRAM In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.

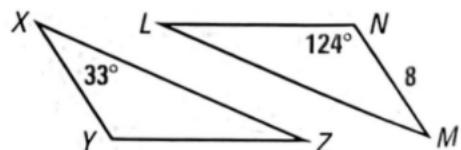


$$YX = ?$$

[Solution Video](#)



Question 769: READING A DIAGRAM In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.

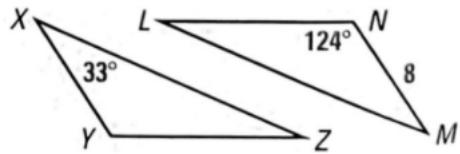


$$\overline{YZ} \cong ?$$

[Solution Video](#)



Question 770: In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.



$\triangle LNM \cong ?$

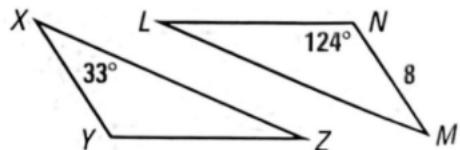
Solution Video



Accompanying lectures for questions 762 - 786



Question 771: READING A DIAGRAM In the diagram, $\triangle XYZ \cong \triangle MNL$. Copy and complete the statement.

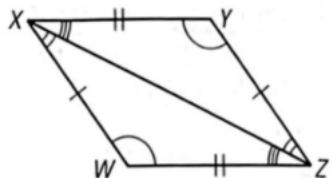


$$\triangle YXZ \cong ?$$

[Solution Video](#)



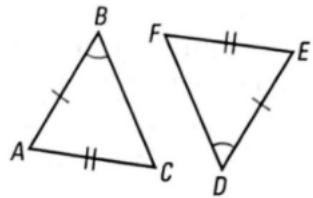
Question 772: NAMING CONGRUENT FIGURES Write a congruence statement for any figures that can be proved congruent. Explain your reasoning.



[Solution Video](#)



Question 773: NAMING CONGRUENT FIGURES Write a congruence statement for any figures that can be proved congruent. Explain your reasoning.



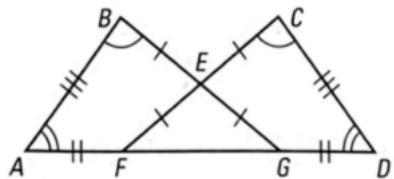
Solution Video



Accompanying lectures for questions 762 - 786



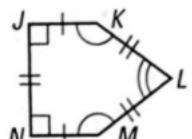
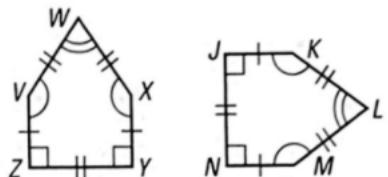
Question 774: NAMING CONGRUENT FIGURES Write a congruence statement for any figures that can be proved congruent. Explain your reasoning.



[Solution Video](#)



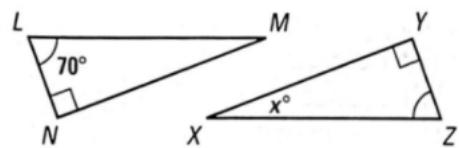
Question 775: NAMING CONGRUENT FIGURES Write a congruence statement for any figures that can be proved congruent. Explain your reasoning.



[Solution Video](#)



Question 776: THIRD ANGLES THEOREM Find the value of x .



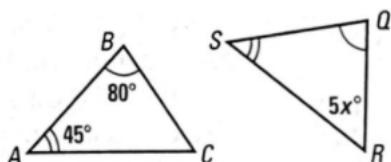
Solution Video



Accompanying lectures for questions 762 - 786



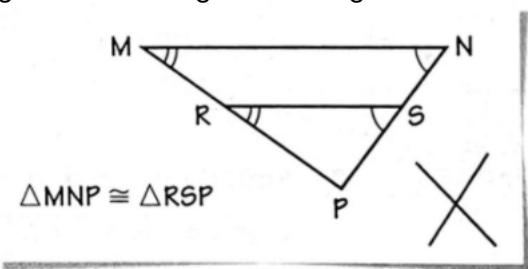
Question 777: THIRD ANGLES THEOREM Find the value of x .



[Solution Video](#)



Question 778: ERROR ANALYSIS A student says that $\triangle MNP \cong \triangle RSP$ because the corresponding angles of the triangles are congruent. Describe the error in this statement.



[Solution Video](#)



Question 779: ★ OPEN-ENDED MATH Graph the triangle with vertices $L(3, 1)$, $M(8, 1)$, and $N(8, 8)$. Then graph a triangle congruent to $\triangle LMN$.

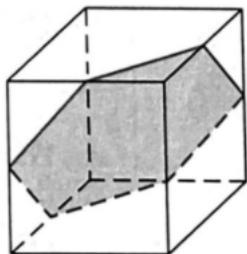
Solution Video



Accompanying lectures for questions 762 - 786



Question 780: CHALLENGE A hexagon is contained in a cube, as shown. Each vertex of the hexagon lies on the midpoint of an edge of the cube. This hexagon is equiangular. Explain why it is also regular.



Solution Video



Question 781: The rug design is made of congruent triangles. One triangular shape is used to make all of the triangles in the design. Which property guarantees that all the triangles are congruent?



Solution Video



Question 782: Create a design for a rug made with congruent triangles that is different from the one in the photo above.

Solution Video



Accompanying lectures for questions 762 - 786



Question 783: CAR STEREO A car stereo fits into a space in your dashboard. You want to buy a new car stereo, and it must fit in the existing space. What measurements need to be the same in order for the new stereo to be congruent to the old one?

Solution Video

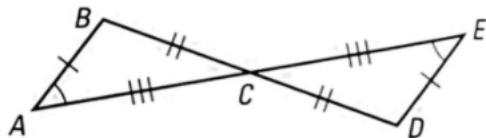


Question 784: Copy and complete the proof.

GIVEN $\overline{AB} \cong \overline{ED}$, $\overline{BC} \cong \overline{DC}$, $\overline{CA} \cong \overline{CE}$,

$\angle BAC \cong \angle DEC$

PROVE $\triangle ABC \cong \triangle EDC$



STATEMENTS

1. $\overline{AB} \cong \overline{ED}$, $\overline{BC} \cong \overline{DC}$, $\overline{CA} \cong \overline{CE}$
 $\angle BAC \cong \angle DEC$
2. $\angle BCA \cong \angle DCE$
3. ?
4. $\triangle ABC \cong \triangle EDC$

REASONS

1. Given
2. ?
3. Third Angles Theorem
4. ?

Solution Video



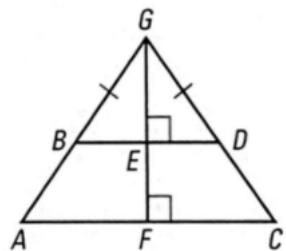
Question 785: Suppose $\triangle ABC \cong \triangle DCB$, and the triangles share vertices at points B and C. Draw a figure that illustrates this situation. Is $\overline{AC} \parallel \overline{BD}$? Explain.

Accompanying lectures for questions 762 - 786



Question 786: In the diagram, quadrilateral $ABEF \cong$ quadrilateral $CDEF$.

- a. Explain how you know that $\overline{BE} \cong \overline{DE}$ and $\angle ABE \cong \angle CDE$.
- b. Explain how you know that $\angle GBE \cong \angle GDE$.
- c. Explain how you know that $\angle GEB \cong \angle GED$.
- d. Do you have enough information to prove that $\triangle BEG \cong \triangle DEG$? Explain.



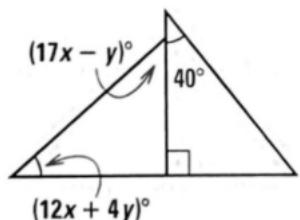
Solution Video



Accompanying lectures for questions 787 - 789



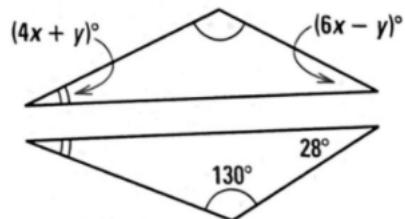
Question 787: Find the values of x and y if the two triangles are congruent.



[Solution Video](#)



Question 788: Find the values of x and y if the two triangles are congruent.



[Solution Video](#)



Question 789: Suppose $\triangle ABC \cong \triangle EFD$, $\triangle EFD \cong \triangle GIH$, $m\angle A = 90^\circ$, and $m\angle F = 20^\circ$. What is $m\angle H$?

- (A) 20°
- (B) 70°
- (C) 90°
- (D) Cannot be determined

Solution Video



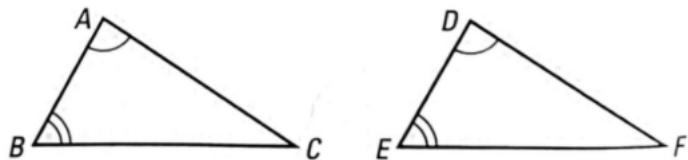
Accompanying lectures for questions 790 - 790



Question 790: PROVING THEOREM 4.3 Use the plan to prove the Third Angles Theorem.

GIVEN $\angle A \cong \angle D, \angle B \cong \angle E$

PROVE $\angle C \cong \angle F$



Plan for Proof Use the Triangle Sum Theorem to show that the sums of the angle measures are equal. Then use substitution to show $\angle C \cong \angle F$.

Solution Video



Accompanying lectures for questions 791 - 791



Question 791: Given that $\triangle AFC \cong \triangle DFE$, must F be the midpoint of \overline{AD} and \overline{EC} ? Include a drawing with your answer.

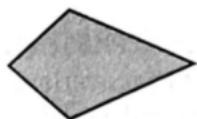
Solution Video



Accompanying lectures for questions 792 - 792



Question 792: ★ SHORT RESPONSE You have a set of tiles that come in two different shapes, as shown. You can put two of the triangular tiles together to make a quadrilateral that is the same size and shape as the quadrilateral tile.



Explain how you can find all of the angle measures of each tile by measuring only two angles.

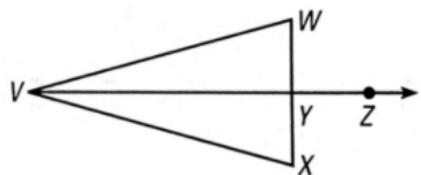
Solution Video



Accompanying lectures for questions 793 - 793



Question 793: CHALLENGE Use the diagram to write a proof. GIVEN $\overline{WX} \perp \overrightarrow{VZ}$ at Y , Y is the midpoint of \overline{WX} , $\overline{VW} \cong \overline{VX}$ and \overrightarrow{VZ} bisects $\angle WVX$. PROVE $\triangle VWY \cong \triangle VXY$ PROVE $\triangle VWY \cong \triangle VXY$



Solution Video

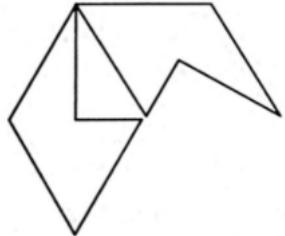


4.3 Relate Transformations and Congruence

Accompanying lectures for questions 794 - 814



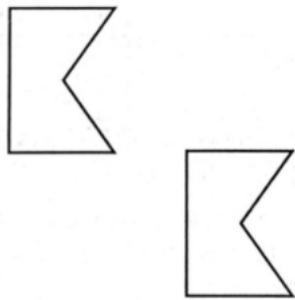
Question 794: Identify the transformation you can use to move the blue figure onto the red figure.



Solution Video



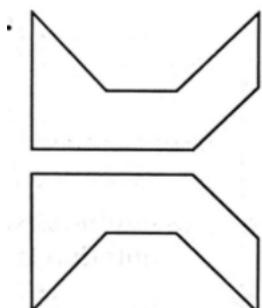
Question 795: Identify the transformation you can use to move the blue figure onto the red figure.



Solution Video



Question 796: IDENTIFYING TRANSFORMATIONS Identify the transformation you can use to move the blue figure onto the red figure.



• A reflection across the vertical line of symmetry.
• A rotation of 180°.
• A translation.
• A dilation.

Solution Video

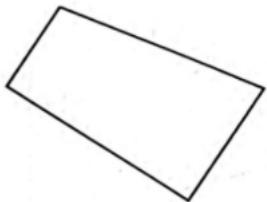


Accompanying lectures for questions 794 - 814



Question 797: OPEN-ENDED MATH Copy the figure. Draw an example of the effect of the given transformation on the figure.

translation

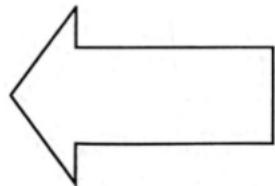


Solution Video



Question 798: Copy the figure. Draw an example of the effect of the given transformation on the figure.

reflection



Solution Video



Question 799: Copy the figure. Draw an example of the effect of the given transformation on the figure.

rotation



Solution Video



Accompanying lectures for questions 794 - 814



Question 800: ★ MULTIPLE CHOICE Which is not an example of a rigid motion?

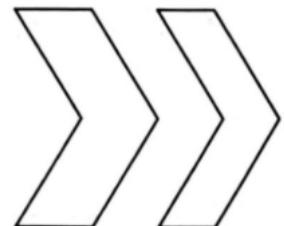
A.



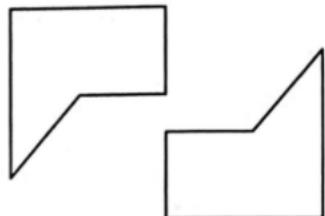
B.



C.



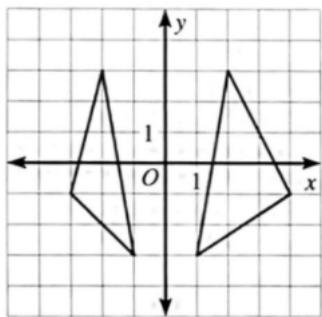
D.



Solution Video



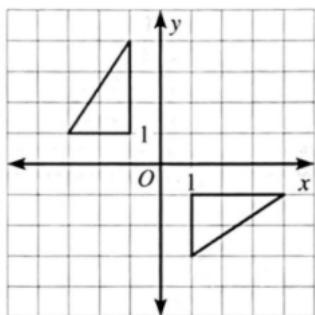
Question 801: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



[Solution Video](#)



Question 802: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



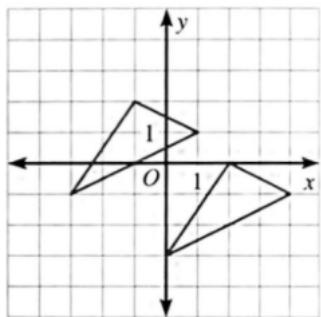
[Solution Video](#)



Accompanying lectures for questions 794 - 814



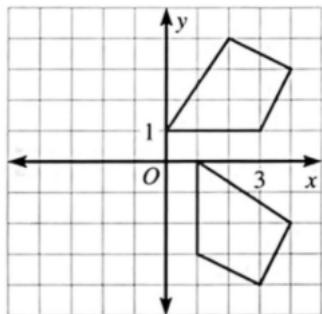
Question 803: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



[Solution Video](#)



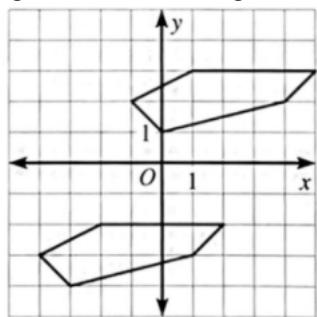
Question 804: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



[Solution Video](#)



Question 805: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



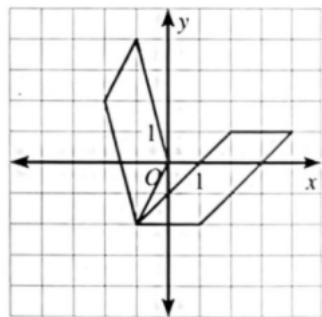
Solution Video



Accompanying lectures for questions 794 - 814



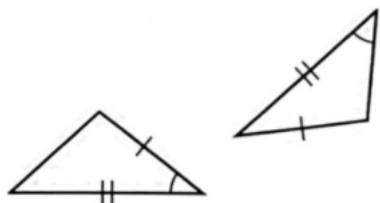
Question 806: SHOWING FIGURES CONGRUENT Tell whether a rigid motion can move the blue figure onto the red figure. If so, describe the transformation(s) that you can use. If not, explain why the figures are not congruent.



Solution Video



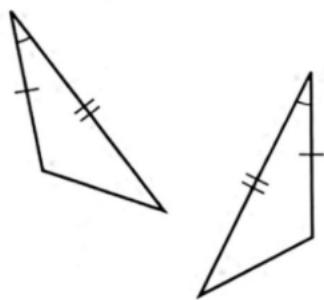
Question 807: Determine whether a rigid motion can move one triangle onto the other. Justify your answer.



Solution Video



Question 808: Determine whether a rigid motion can move one triangle onto the other. Justify your answer.



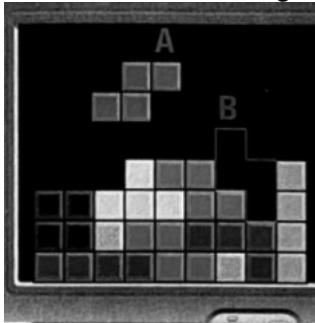
Solution Video



Accompanying lectures for questions 794 - 814



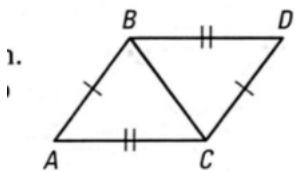
Question 809: GAME SOFTWARE In a game, the goal is to move shapes into congruent spaces where they will fit so that completed rows can be eliminated. Describe a combination of transformations that can be used to move game piece A into congruent space B.



[Solution Video](#)



Question 810: ★ SHORT RESPONSE Describe a way in which $\triangle ABC$ can be moved onto $\triangle DCB$ using just one transformation. Then describe a way in which $\triangle ABC$ can be moved onto $\triangle DCB$ using exactly two transformations.



[Solution Video](#)



Question 811: Designs for floor tiles are shown below. Describe a rigid motion or combination of rigid motions that can be used to move the blue figure onto the red figure.



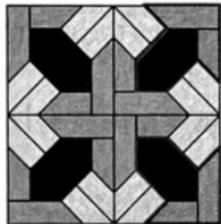
Solution Video



Accompanying lectures for questions 794 - 814



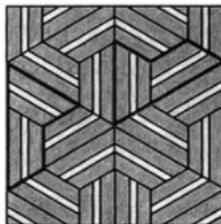
Question 812: Designs for floor tiles are shown below. Describe a rigid motion or combination of rigid motions that can be used to move the blue figure onto the red figure.



Solution Video



Question 813: FLOORING Designs for floor tiles are shown below. Describe a rigid motion or combination of rigid motions that can be used to move the blue figure onto the red figure.



Solution Video



Question 814: Draw examples of two congruent triangles that can be mapped onto each other by the given transformation(s). Show the lines(s) of reflection you use.

- a. exactly one reflection
- b. exactly two reflections
- c. exactly three reflections

Solution Video



Accompanying lectures for questions 815 - 815



Question 815: Jerome describes a transformation in the coordinate plane using the notation $(x, y) \rightarrow (x + 3, y - 1)$. Explain why this is a rigid motion.

Solution Video



Accompanying lectures for questions 816 - 816



Question 816: Jen describes a transformation in the coordinate plane using the notation $(x, y) \rightarrow (x - 1, 2y)$. Explain why this is not a rigid motion.

Solution Video

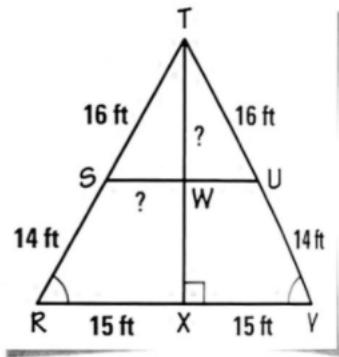


Accompanying lectures for questions 817 - 817



Question 817: The diagram shows an architect's preliminary design for an A-frame house.

- Interpret Use rigid motions to explain how the architect knows $\triangle RTX \cong \triangle VTX$.
- Reason Explain how the architect can use rigid motions to conclude that $SW = UW$.
- Calculate The architect knows that the proportion $\frac{TS}{SW} = \frac{TR}{RX}$ is true. Find the lengths SW and TW .



[Solution Video](#)

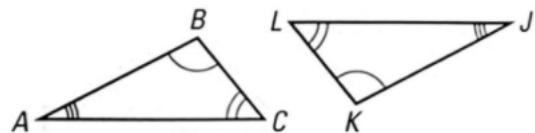


4.4 Prove Triangles Congruent by SSS

Accompanying lectures for questions 818 - 828



Question 818: Tell whether the angles or sides are corresponding angles, corresponding sides, or neither.

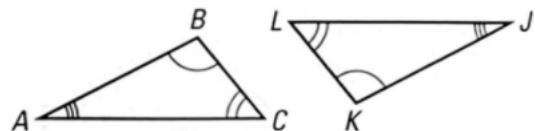


$\angle C$ and $\angle L$

Solution Video



Question 819: Tell whether the angles or sides are corresponding angles, corresponding sides, or neither.

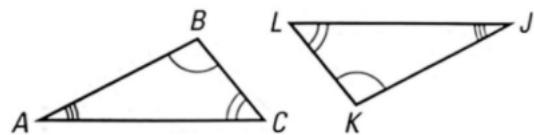


\overline{AC} and \overline{JK}

Solution Video



Question 820: Tell whether the angles or sides are corresponding angles, corresponding sides, or neither.



\overline{BC} and \overline{KL}

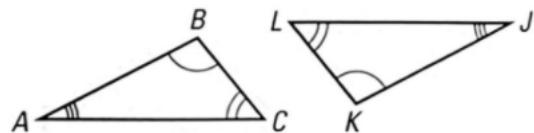
Solution Video



Accompanying lectures for questions 818 - 828



Question 821: Tell whether the angles or sides are corresponding angles, corresponding sides, or neither.



$\angle B$ and $\angle L$

Solution Video



Question 822: Decide whether the figure is stable. Explain.



Solution Video



Question 823: Let $ABCD$ be a rectangle separated into two triangles by \overline{DB} . Which of the statements below is not true?

- (A) $\overline{AD} \cong \overline{CB}$
- (B) $\overline{AB} \cong \overline{AD}$
- (C) $\overline{AB} \cong \overline{CD}$
- (D) $\triangle DAB \cong \triangle BCD$

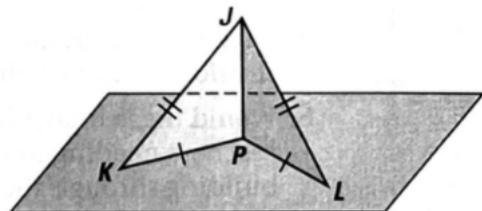
Solution Video



Accompanying lectures for questions 818 - 828



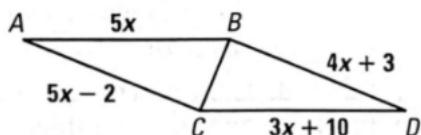
Question 824: 3-D FIGURES In the diagram, $\overline{PK} \cong \overline{PL}$ and $\overline{JK} \cong \overline{JL}$. Show that $\triangle JPK \cong \triangle JPL$.



[Solution Video](#)



Question 825: Find all values of x that make the triangles congruent. Explain.

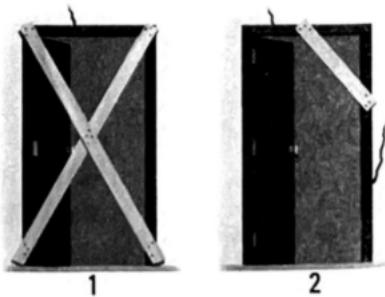


[Solution Video](#)



Question 826: When rescuers enter a partially collapsed building they often have to reinforce damaged doors for safety.

- a. Diagonal braces are added to Door 1 as shown below. Explain why the door is more stable with the braces.
- b. Would these braces be a good choice for rescuers needing to enter and exit the building through this doorway?
- c. In the diagram, Door 2 has only a corner brace. Does this solve the problem from part (b)?
- d. Explain why the corner brace makes the door more stable.



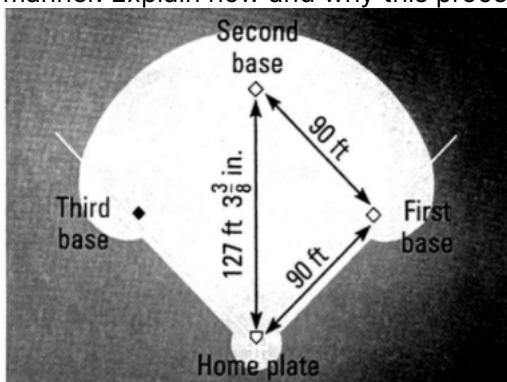
Solution Video



Accompanying lectures for questions 818 - 828



Question 827: To create a baseball field, start by placing home plate. Then, place second base $127 \frac{3}{8}$ inches from home plate. Then, you can find first base using two tape measures. Stretch one from second base toward first base and the other from home plate toward first base. The point where the two tape measures cross at the 90 foot mark is first base. You can find third base in a similar manner. Explain how and why this process will always work.



[Solution Video](#)



Question 828: Draw and label the figure described below. Then, identify what is given and write a two-column proof.

In an isosceles triangle, if a segment is added from the vertex between the congruent sides to the midpoint of the third side, then two congruent triangles are formed.

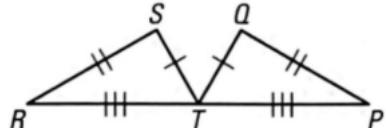
[Solution Video](#)



Accompanying lectures for questions 829 - 835



Question 829: Decide whether the congruence statement is true. Explain your reasoning.



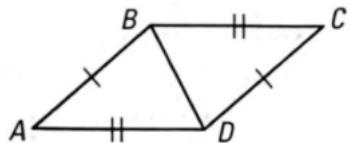
$$\triangle RST \cong \triangle TQP$$

[Solution Video](#)



Question 830: Decide whether the congruence statement is true. Explain your reasoning.

$$\triangle ABD \cong \triangle CDB$$



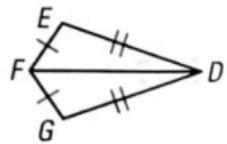
[Solution Video](#)



Question 831: Decide whether the congruence statement is true. Explain your reasoning.

$$\triangle DEF \cong \triangle DGF$$

✓



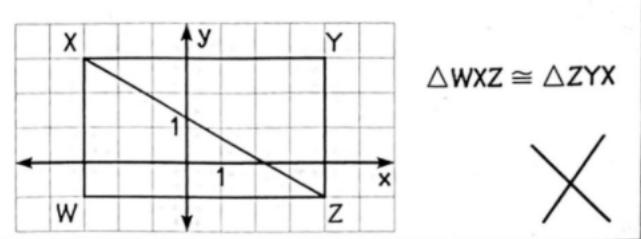
Solution Video



Accompanying lectures for questions 829 - 835



Question 832: ERROR ANALYSIS Describe and correct the error in writing a congruence statement for the triangles in the coordinate plane.



[Solution Video](#)



Question 833: Let $\triangle FGH$ be an equilateral triangle with point J as the midpoint of \overline{FG} . Which of the statements below is not true?

- (A) $\overline{FH} \cong \overline{GH}$
- (B) $\overline{FJ} \cong \overline{FH}$
- (C) $\overline{FJ} \cong \overline{GJ}$
- (D) $\triangle FHJ \cong \triangle GHJ$

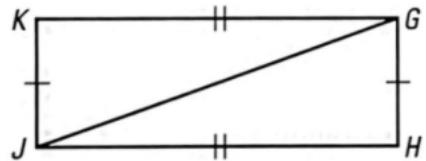
[Solution Video](#)



Question 834: PROOF Write a proof.

GIVEN $\overline{GH} \cong \overline{JK}$, $\overline{HJ} \cong \overline{KG}$

PROVE $\triangle GHJ \cong \triangle JKG$



Solution Video



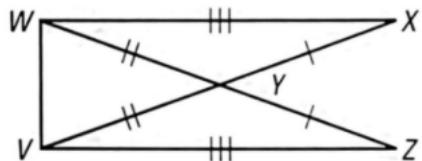
Accompanying lectures for questions 829 - 835



Question 835: PROOF Write a proof.

GIVEN $\overline{WX} \cong \overline{VZ}$, $\overline{WY} \cong \overline{VY}$, $\overline{YZ} \cong \overline{YX}$

PROVE $\triangle VWX \cong \triangle WVZ$



Solution Video



Accompanying lectures for questions 836 - 839



Question 836: Use the given coordinates to determine if $\triangle ABC \cong \triangle DEF$.

$$A(-2, -2), B(4, -2), C(4, 6), D(5, 7), E(5, 1), F(13, 1)$$

Solution Video



Question 837: Use the given coordinates to determine if $\triangle ABC \cong \triangle DEF$.

$$A(-2, 1), B(3, -3), C(7, 5), D(3, 6), E(8, 2), F(10, 11)$$

Solution Video



Question 838: Use the given coordinates to determine if $\triangle ABC \cong \triangle DEF$.

$A(0, 0), B(6, 5), C(9, 0), D(0, -1), E(6, -6), F(9, -1)$

Solution Video



Accompanying lectures for questions 836 - 839



Question 839: Use the given coordinates to determine if $\triangle ABC \cong \triangle DEF$.

$A(-5, 7), B(-5, 2), C(0, 2), D(0, 6), E(0, 1), F(4, 1)$

Solution Video



Accompanying lectures for questions 840 - 841

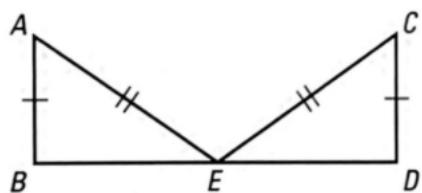


Question 840: Write a proof.

GIVEN $\overline{AE} \cong \overline{CE}$, $\overline{AB} \cong \overline{CD}$,

E is the midpoint of \overline{BD} .

PROVE $\triangle EAB \cong \triangle ECD$



[Solution Video](#)

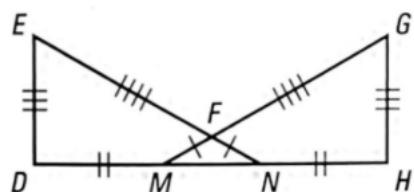


Question 841: Write a proof.

GIVEN $\overline{FM} \cong \overline{FN}$, $\overline{DM} \cong \overline{HN}$,

$\overline{EF} \cong \overline{GF}$, $\overline{DE} \cong \overline{HG}$

PROVE $\triangle DEN \cong \triangle HGM$



[Solution Video](#)



4.5 Prove Triangles Congruent by SAS and AAS

Accompanying lectures for questions 842 - 882



Question 842: VOCABULARY Copy and complete: The angle between two sides of a triangle is called the ? angle.

Solution Video

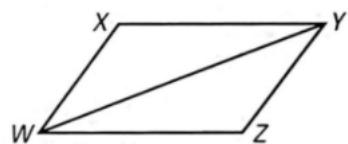


Question 843: ★ WRITING Explain the difference between proving triangles congruent using the SAS and SSS Congruence Postulates.

Solution Video



Question 844: Use the diagram to name the included angle between the given pair of sides.



\overline{XY} and \overline{YW}

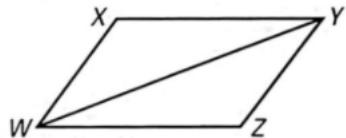
Solution Video



Accompanying lectures for questions 842 - 882



Question 845: Use the diagram to name the included angle between the given pair of sides.

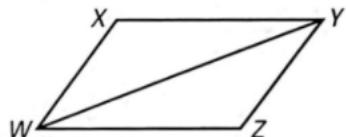


\overline{WZ} and \overline{ZY}

Solution Video



Question 846: Use the diagram to name the included angle between the given pair of sides.

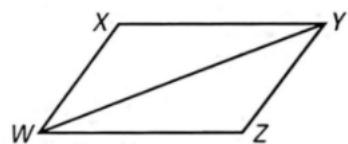


\overline{ZW} and \overline{YW}

Solution Video



Question 847: Use the diagram to name the included angle between the given pair of sides.



\overline{WX} and \overline{YX}

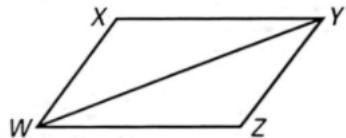
Solution Video



Accompanying lectures for questions 842 - 882



Question 848: Use the diagram to name the included angle between the given pair of sides.

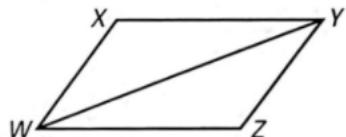


\overline{XY} and \overline{YZ}

Solution Video



Question 849: Use the diagram to name the included angle between the given pair of sides.



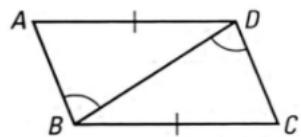
\overline{WX} and \overline{WZ}

Solution Video



Question 850: Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle ABD, \triangle CDB$



Solution Video

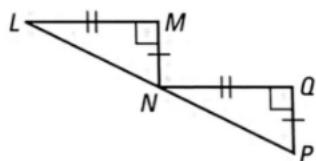


Accompanying lectures for questions 842 - 882



Question 851: REASONING Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle LMN, \triangle NQP$

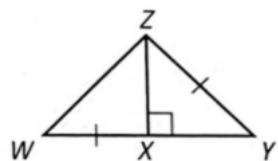


[Solution Video](#)



Question 852: Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle YXZ, \triangle WXZ$

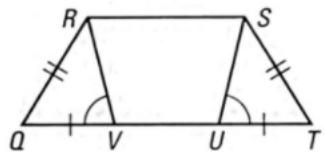


[Solution Video](#)



Question 853: REASONING Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle QRV, \triangle TSU$



Solution Video

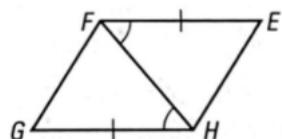


Accompanying lectures for questions 842 - 882



Question 854: REASONING Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle EFH, \triangle GHF$

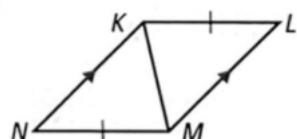


[Solution Video](#)



Question 855: REASONING Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.

$\triangle KLM, \triangle MNK$



[Solution Video](#)



Question 856: Which of the following sets of information does not allow you to conclude that $\triangle ABC \cong \triangle DEF$?

- (A) $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\angle B \cong \angle E$
- (B) $\overline{AB} \cong \overline{DF}$, $\overline{AC} \cong \overline{DE}$, $\angle C \cong \angle E$
- (C) $\overline{AC} \cong \overline{DF}$, $\overline{BC} \cong \overline{EF}$, $\overline{BA} \cong \overline{DE}$
- (D) $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, $\angle A \cong \angle D$

Solution Video

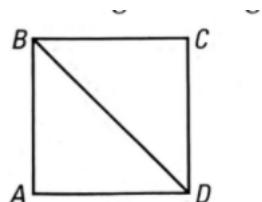


Accompanying lectures for questions 842 - 882



Question 857: APPLYING SAS In Exercises 16-18, use the given information to name two triangles that are congruent. Explain your reasoning.

$ABCD$ is a square with four congruent sides and four congruent angles.

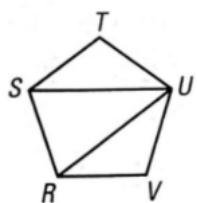


Solution Video



Question 858: APPLYING SAS In Exercises 16-18, use the given information to name two triangles that are congruent. Explain your reasoning.

$RSTUV$ is a regular pentagon.

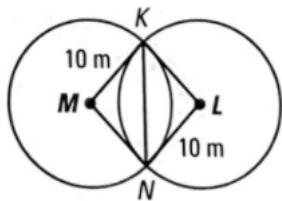


Solution Video



Question 859: APPLYING SAS In Exercises 16-18, use the given information to name two triangles that are congruent. Explain your reasoning.

$\overline{MK} \perp \overline{MN}$ and $\overline{KL} \perp \overline{NL}$.



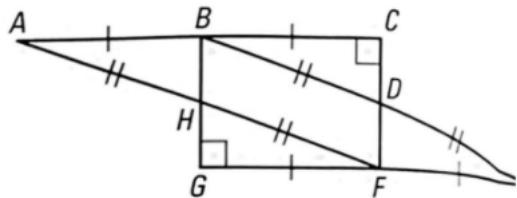
Solution Video



Accompanying lectures for questions 842 - 882



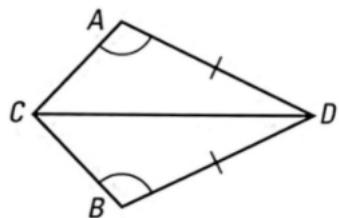
Question 860: OVERLAPPING TRIANGLES Redraw $\triangle ACF$ and $\triangle EGB$ so they are side by side with corresponding parts in the same position. Explain how you know that $\triangle ACF \cong \triangle EGB$.



[Solution Video](#)



Question 861: REASONING Decide whether enough information is given to prove that the triangles are congruent. If there is enough information, state the congruence postulate or theorem you would use.

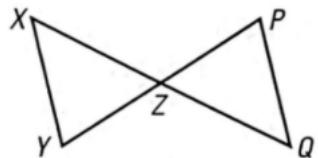


[Solution Video](#)



Question 862: APPLYING SAS In Exercises 16-18, use the given information to name two triangles that are congruent. Explain your reasoning.

Z is the midpoint of \overline{PY} and \overline{XQ} .



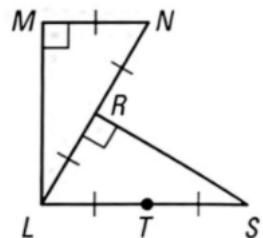
Solution Video



Accompanying lectures for questions 842 - 882



Question 863: APPLYING SAS In Exercises 16-18, use the given information to name two triangles that are congruent. Explain your reasoning.



Solution Video

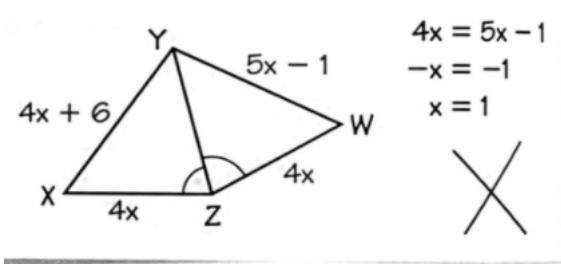


Question 864: ★ WRITING Suppose both pairs of corresponding legs of two right triangles are congruent. Are the triangles congruent? Explain.

Solution Video



Question 865: ERROR ANALYSIS Describe and correct the error in finding the value of x .



$$\begin{aligned}4x &= 5x - 1 \\-x &= -1 \\x &= 1\end{aligned}$$



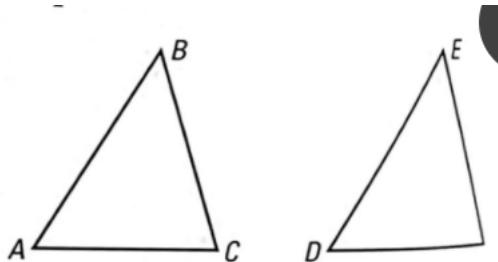
Solution Video



Accompanying lectures for questions 842 - 882



Question 866: USING DIAGRAMS In Exercises 25-27, state the third congruence that must be given to prove that $\triangle ABC \cong \triangle DEF$ using the indicated postulate.

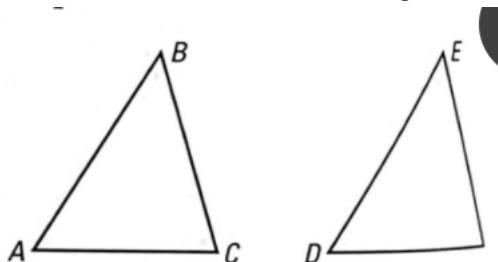


GIVEN $\overline{AB} \cong \overline{DE}$, $\overline{CB} \cong \overline{FE}$, ? \cong ? Use the SSS Congruence Postulate.

[Solution Video](#)



Question 867: USING DIAGRAMS In Exercises 25-27, state the third congruence that must be given to prove that $\triangle ABC \cong \triangle DEF$ using the indicated postulate.

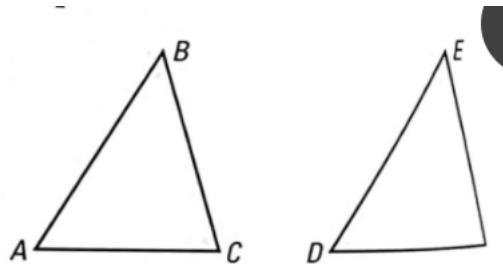


GIVEN $D\angle A \cong \angle D$, $\overline{CA} \cong \overline{FD}$, ? \cong Use the SAS Congruence Postulate.

[Solution Video](#)



Question 868: USING DIAGRAMS In Exercises 25-27, state the third congruence that must be given to prove that $\triangle ABC \cong \triangle DEF$ using the indicated postulate.



GIVEN | $\angle B \cong \angle E$, $\overline{AB} \cong \overline{DE}$, ? \cong Use the SAS Congruence Postulate.

Solution Video



Accompanying lectures for questions 842 - 882



Question 869: USING ISOSCELES TRIANGLES Suppose $\triangle KLN$ and $\triangle MLN$ are isosceles triangles with $\overline{KL} \cong \overline{LN}$ and $\overline{ML} \cong \overline{LN}$, and \overline{NL} bisects $\angle KLM$. Is there enough information to prove that $\triangle KLN \cong \triangle MLN$? Explain.



Solution Video

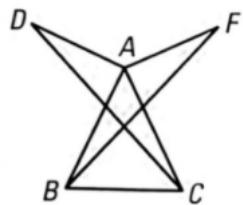


Question 870: REASONING Suppose M is the midpoint of \overline{PQ} in $\triangle PQR$. If $\overline{RM} \perp \overline{PQ}$, explain why $\triangle RMP \cong \triangle RMQ$.

Solution Video



Question 871: CHALLENGE Suppose $\overline{AB} \cong \overline{AC}$, $\overline{AD} \cong \overline{AF}$, $\overline{AD} \perp \overline{AB}$, and $\overline{AF} \perp \overline{AC}$. Explain why you can conclude that $\triangle ACD \cong \triangle ABF$.



Solution Video



Accompanying lectures for questions 842 - 882



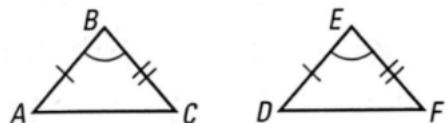
Question 872: CONGRUENT TRIANGLES In Exercises 31 and 32, identify the theorem or postulate you would use to prove the triangles congruent.



Solution Video



Question 873: CONGRUENT TRIANGLES In Exercises 31 and 32, identify the theorem or postulate you would use to prove the triangles congruent.



Solution Video



Question 874: SAILBOATS Suppose you have two sailboats. What information do you need to know to prove that the triangular sails are congruent using SAS? using HL?

Solution Video



Accompanying lectures for questions 842 - 882



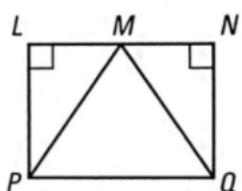
Question 875: DEVELOPING PROOF Copy and complete the proof.

GIVEN - Point M is the midpoint of \overline{LN} .

$\triangle PMQ$ is an isosceles triangle with $\overline{MP} \cong \overline{MQ}$.

$\angle L$ and $\angle N$ are right angles.

PROVE D $\triangle LMP \cong \triangle NMQ$



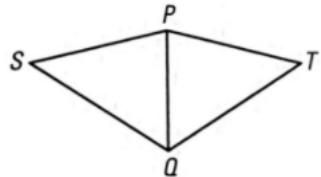
STATEMENTS	REASONS
1. $\angle L$ and $\angle N$ are right angles.	1. Given
2. $\triangle LMP$ and $\triangle NMQ$ are right triangles.	? 2. Given
3. Point M is the midpoint of \overline{LN} .	3.? 3. Definition of midpoint
4.?	4.?
5. $\overline{MP} \cong \overline{MQ}$	5. Given
6. $\triangle LMP \cong \triangle NMQ$	6.?

Solution Video



Question 876: GIVEN \overline{PQ} bisects $\angle SPT$, $\overline{SP} \cong \overline{TP}$

PROVE $\triangle SPQ \cong \triangle TPQ$

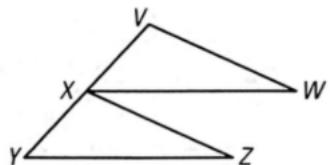


[Solution Video](#)



Question 877: GIVEN $\overline{VX} \cong \overline{XY}$, $\overline{XW} \cong \overline{YZ}$, $\overline{XW} \parallel \overline{YZ}$

PROVE $\triangle VXXW \cong \triangle XYZ$



[Solution Video](#)

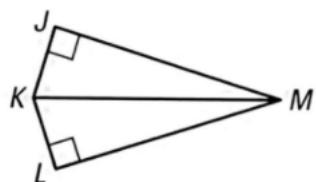


Accompanying lectures for questions 842 - 882



Question 878: GIVEN $DJM \cong LM$

PROVE $\triangle JKM \cong \triangle LKM$

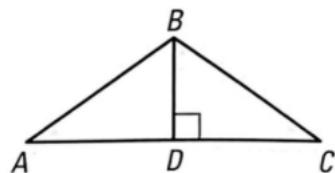


[Solution Video](#)



Question 879: GIVEN is the midpoint of \overline{AC} .

PROVE $\triangle ABD \cong \triangle CBD$



[Solution Video](#)



Question 880: Which triangle congruence can you prove, then use to prove that $\angle FED \cong \angle ABF$?

- (A) $\triangle ABE \cong \triangle ABF$
- (B) $\triangle AED \cong \triangle ABD$
- (C) $\triangle ACD \cong \triangle ADF$
- (D) $\triangle AEC \cong \triangle ABD$



Solution Video



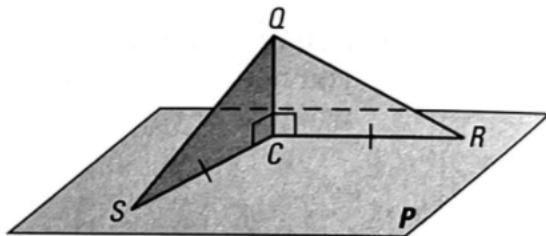
Accompanying lectures for questions 842 - 882



Question 881: Write a two-column proof.

GIVEN > $\overline{CR} \cong \overline{CS}$, $\overline{QC} \perp \overline{CR}$, $\overline{QC} \perp \overline{CS}$

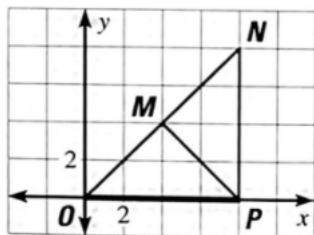
PROVE - $\triangle QCR \cong \triangle QCS$



[Solution Video](#)



Question 882: Describe how to show that $\triangle PMO \cong \triangle PMN$ using the SSS Congruence Postulate. Then show that the triangles are congruent using the SAS Congruence Postulate without measuring any angles. Compare the two methods.



[Solution Video](#)



4.5.1 Mixed Review

Accompanying lectures for questions 883 - 883



Question 883: MULTI-STEP PROBLEM In the diagram, $\overline{AC} \cong \overline{CD}$, $\overline{BC} \cong \overline{CG}$, $\overline{EC} \cong \overline{CF}$, and $\angle ACE \cong \angle DCF$.



- a. Classify each triangle in the figure by angles.
- b. Classify each triangle in the figure by sides.

Solution Video



Accompanying lectures for questions 884 - 884



Question 884: GRIDDED ANSWER In the diagram below, find the measure of $\angle 1$ in degrees.



Solution Video



Accompanying lectures for questions 885 - 885



Question 885: SHORT RESPONSE A rectangular "diver down" flag is used to indicate that scuba divers are in the water. On the flag,

$\overline{AB} \cong \overline{FE}$, $\overline{AH} \cong \overline{DE}$, $\overline{CE} \cong \overline{AG}$, and $\overline{EG} \cong \overline{AC}$. Also, $\angle A$, $\angle C$, $\angle E$, and $\angle G$ are right angles. Is $\triangle BCD \cong \triangle FGH$? Explain.



Solution Video



Accompanying lectures for questions 886 - 887



Question 886: EXTENDED RESPONSE A roof truss is a network of pieces of wood that forms a stable structure to support a roof, as shown below.



- a. Prove that $\triangle FGB \cong \triangle HGB$.
- b. Is $\triangle BDF \cong \triangle BEH$? If so, prove it.

Solution Video



Question 887: GRIDDED ANSWER In the diagram below, $BAFC \cong DEFC$. Find the value of x .



Solution Video



4.6 Prove Triangles Congruent by ASA and AAS

Accompanying lectures for questions 888 - 915



Question 888: VOCABULARY Name one advantage of using a flow proof rather than a two-column proof.

Solution Video



Question 889: ★ WRITING You know that a pair of triangles has two pairs of congruent corresponding angles. What other information do you need to show that the triangles are congruent?

Solution Video



Question 890: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate or theorem you would use.



$\triangle ABC, \triangle QRS$

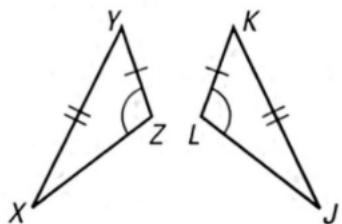
Solution Video



Accompanying lectures for questions 888 - 915



Question 891: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate or theorem you would use.



$\triangle XYZ, \triangle JKL$

Solution Video



Question 892: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate or theorem you would use.



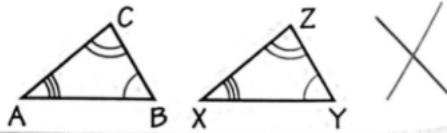
$\triangle PQR, \triangle RSP$

Solution Video



Question 893: ERROR ANALYSIS Describe the error in concluding that $\triangle ABC \cong \triangle XYZ$.

By AAA,
 $\triangle ABC \cong \triangle XYZ$.



Solution Video



Accompanying lectures for questions 888 - 915



Question 894: ★ MULTIPLE CHOICE Which postulate or theorem can you use to prove that $\triangle ABC \cong \triangle HJK$?

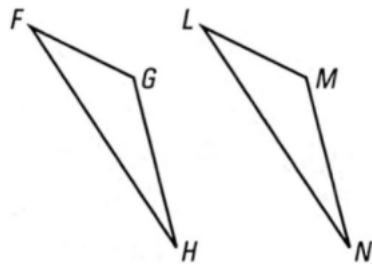
- (A) HL
- (B) AAS
- (C) SAS
- (D) Not enough information



[Solution Video](#)



Question 895: DEVELOPING PROOF State the third congruence that is needed to prove that $\triangle FGH \cong \triangle LMN$ using the given postulate or theorem.



GIVEN $\overline{GH} \cong \overline{MN}$, $\angle G \cong \angle M$, ? \cong ?

Use the AAS Congruence Theorem.

[Solution Video](#)



Question 896: DEVELOPING PROOF State the third congruence that is needed to prove that $\triangle FGH \cong \triangle LMN$ using the given postulate or theorem.



GIVEN $D\overline{FG} \cong \overline{LM}$, $\angle G \cong \angle M$, ? \cong ?

Use the ASA Congruence Postulate.

Solution Video



Accompanying lectures for questions 888 - 915



Question 897: DEVELOPING PROOF State the third congruence that is needed to prove that $\triangle FGH \cong \triangle LMN$ using the given postulate or theorem.



GIVEN $\overline{FH} \cong \overline{LN}$, $\angle H \cong \angle N$, ? \cong

Use the SAS Congruence Postulate.

Solution Video



Question 898: OVERLAPPING TRIANGLES Explain how you can prove that the indicated triangles are congruent using the given postulate or theorem.



$\triangle AED \cong \triangle BDE$ by AAS

Solution Video



Question 899: DETERMINING CONGRUENCE Tell whether you can use the given information to determine whether $\triangle ABC \cong \triangle DEF$. Explain your reasoning.

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

Solution Video



Accompanying lectures for questions 888 - 915



Question 900: DETERMINING CONGRUENCE Tell whether you can use the given information to determine whether $\triangle ABC \cong \triangle DEF$. Explain your reasoning.

$$\angle B \cong \angle E, \angle C \cong \angle F, \overline{AC} \cong \overline{DE}$$

Solution Video



Question 901: DETERMINING CONGRUENCE Tell whether you can use the given information to determine whether $\triangle ABC \cong \triangle DEF$. Explain your reasoning.

$$\overline{AB} \cong \overline{EF}, \overline{BC} \cong \overline{FD}, \overline{AC} \cong \overline{DE}$$

Solution Video



Question 902: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate(s) or theorem(s) you would use.



$\triangle ABC, \triangle DEC$

Solution Video



Accompanying lectures for questions 888 - 915



Question 903: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate(s) or theorem(s) you would use.



$\triangle TUV, \triangle TWV$

Solution Video



Question 904: IDENTIFY CONGRUENT TRIANGLES Is it possible to prove that the triangles are congruent? If so, state the postulate(s) or theorem(s) you would use.



$\triangle QML, \triangle LPN$

Solution Video



Question 905: ★ EXTENDED RESPONSE Use the graph at the right.

- a. Show that $\angle CAD \cong \angle ACB$. Explain your reasoning.
- b. Show that $\angle ACD \cong \angle CAB$. Explain your reasoning.
- c. Show that $\triangle ABC \cong \triangle CDA$. Explain your reasoning.



Solution Video



Accompanying lectures for questions 888 - 915



Question 906: CHALLENGE Use a coordinate plane.

- a. Graph the lines $y = 2x + 5$, $y = 2x - 3$, and $x = 0$ in the same coordinate plane.
- b. Consider the equation $y = mx + 1$. For what values of m will the graph form two triangles if added to your graph? For what values of m will those triangles be congruent right triangles? Explain.

Solution Video



Question 907: CONGRUENCE IN BICYCLES Explain why the triangles are congruent.



Solution Video



Question 908: CONGRUENCE IN BICYCLES Explain why the triangles are congruent.



Solution Video



Accompanying lectures for questions 888 - 915



Question 909: FLOW PROOF Copy and complete the flow proof. GIVEN $\overline{AD} \parallel \overline{CE}$, $\overline{BD} \cong \overline{BC}$ PROVE $\triangle ABD \cong \triangle EBC$



Solution Video



Question 910: ★ SHORT RESPONSE You are making a map for an orienteering race. Participants start at a large oak tree, find a boulder 250 yards due east of the oak tree, and then find a maple tree that is 50° west of north of the boulder and 35° east of north of the oak tree. Sketch a map. Can you locate the maple tree? Explain.

Solution Video



Question 911: AIRPLANE In the airplane at the right, $\angle C$ and $\angle F$ are right angles, $\overline{BC} \cong \overline{EF}$, and $\angle A \cong \angle D$. What postulate or theorem allows you to conclude that $\triangle ABC \cong \triangle DEF$?



Solution Video



Accompanying lectures for questions 888 - 915



Question 912: RIGHT TRIANGLES In the lesson Prove Triangles Congruent by SAS and *HL*, you learned the Hypotenuse-Leg Theorem for right triangles. In Exercises 28-30, write a paragraph proof for these other theorems about right triangles.

Leg-Leg (LL) Theorem If the legs of two right triangles are congruent, then the triangles are congruent.

Solution Video



Question 913: RIGHT TRIANGLES In the lesson Prove Triangles Congruent by SAS and *HL*, you learned the Hypotenuse-Leg Theorem for right triangles. In Exercises 28-30, write a paragraph proof for these other theorems about right triangles.

Angle-Leg (AL) Theorem If an angle and a leg of a right triangle are congruent to an angle and a leg of a second right triangle, then the triangles are congruent.

Solution Video



Question 914: RIGHT TRIANGLES In the lesson Prove Triangles Congruent by SAS and *HL*, you learned the Hypotenuse-Leg Theorem for right triangles. In Exercises 28-30, write a paragraph proof for these other theorems about right triangles.

Hypotenuse-Angle (HA) Theorem If an angle and the hypotenuse of a right triangle are congruent to an angle and the hypotenuse of a second right triangle, then the triangles are congruent.

Solution Video



Accompanying lectures for questions 888 - 915



Question 915: PROOF Write a two-column proof.

GIVEN $\overline{AK} \cong \overline{CJ}$, $\angle BJK \cong \angle BKJ$

$\angle A \cong \angle C$

PROVE $D\triangle ABK \cong \triangle CBJ$



Solution Video



Accompanying lectures for questions 916 - 922



Question 916: OVERLAPPING TRIANGLES Explain how you can prove that the indicated triangles are congruent using the given postulate or theorem.



$\triangle AFE \cong \triangle DFB$ by SAS

Solution Video



Question 917: OVERLAPPING TRIANGLES Explain how you can prove that the indicated triangles are congruent using the given postulate or theorem.



$\triangle AED \cong \triangle BDC$ by ASA

Solution Video



Question 918: DETERMINING CONGRUENCE Tell whether you can use the given information to determine whether $\triangle ABC \cong \triangle DEF$. Explain your reasoning.

$$\angle A \cong \angle D, \overline{AB} \cong \overline{DE}, \overline{AC} \cong \overline{DF}$$

Solution Video



Accompanying lectures for questions 916 - 922



Question 919: PROOF Write a flow proof.

GIVEN $D\bar{V}\bar{W} \cong \bar{U}\bar{W}$, $\angle X \cong \angle Z$

PROVE $\triangle \triangle XWV \cong \triangle ZWU$



Solution Video



Question 920: PROOF Write a proof.

GIVEN $- \angle NKM \cong \angle LMK$, $\angle L \cong \angle N$

PROVE - $\triangle NMK \cong \triangle LKM$



Solution Video



Question 921: PROOF Write a proof.

GIVEN DX is the midpoint of \overline{VY} and \overline{WZ} .

PROVE $\triangle VWX \cong \triangle YZX$



Solution Video



Accompanying lectures for questions 916 - 922



Question 922: CHALLENGE Write a proof.

GIVEN $\triangle \triangle ABF \cong \triangle DFB$, F is the midpoint of \overline{AE} , B is the midpoint of \overline{AC} .

PROVE $\triangle FDE \cong \triangle BCD \cong \triangle ABF$



Solution Video



4.7 Use Congruent Triangles

Accompanying lectures for questions 923 - 931



Question 923: VOCABULARY Copy and complete: Corresponding parts of congruent triangles are ?

Solution Video



Question 924: ★ WRITING Explain why you might choose to use congruent triangles to measure the distance across a river. Give another example where it may be easier to measure with congruent triangles rather than directly.

Solution Video



Question 925: CONGRUENT TRIANGLES Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\angle A \cong \angle D$$

Solution Video



Accompanying lectures for questions 923 - 931



Question 926: CONGRUENT TRIANGLES Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\angle Q \cong \angle T$$

Solution Video



Question 927: CONGRUENT TRIANGLES Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\overline{JM} \cong \overline{LM}$$

Solution Video



Question 928: CONGRUENT TRIANGLES Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\overline{AC} \cong \overline{BD}$$

Solution Video



Accompanying lectures for questions 923 - 931



Question 929: CONGRUENT TRIANGLES Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\overline{GK} \cong \overline{HJ}$$

Solution Video



Question 930: PENTAGONS Explain why segments connecting any pair of corresponding vertices of congruent pentagons are congruent. Make a sketch to support your answer.

Solution Video



Question 931: Given that $\triangle ABC \cong \triangle DEF$, $m\angle A = 70^\circ$, $m\angle B = 60^\circ$, $m\angle C = 50^\circ$, $m\angle D = (3x + 10)^\circ$, $m\angle E = \left(\frac{y}{3} + 20\right)^\circ$, and $m\angle F = (z^2 + 14)^\circ$, find the values of x , y , and z .

Solution Video



Accompanying lectures for questions 932 - 953



Question 932: Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?



$$\overline{QW} \cong \overline{TV}$$

Solution Video



Question 933: ERROR ANALYSIS Describe the error in the statement.



Solution Video



Question 934: PLANNING FOR PROOF Use the diagram to write a plan for proof.



PROVE $D\angle S \cong \angle U$

Solution Video



Accompanying lectures for questions 932 - 953



Question 935: PLANNING FOR PROOF Use the diagram to write a plan for proof.

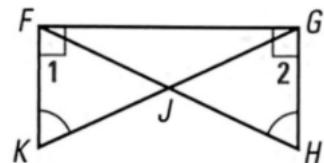
PROVE $\overline{LM} \cong \overline{LQ}$



Solution Video



Question 936: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



Question 937: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



Accompanying lectures for questions 932 - 953



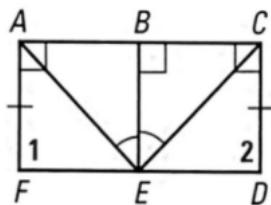
Question 938: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



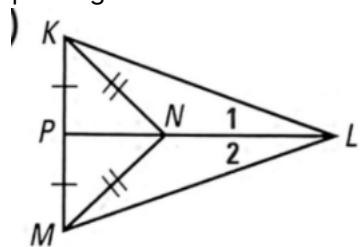
Question 939: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



Question 940: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



Accompanying lectures for questions 932 - 953



Question 941: PLANNING FOR PROOF Use the information given in the diagram to write a plan for proving that $\angle 1 \cong \angle 2$.



Solution Video



Question 942: PROOF Use the information given in the diagram to write a proof.

PROVE $D\angle VYX \cong \angle WYZ$



Solution Video



Question 943: PROOF Use the information given in the diagram to write a proof.

PROVE $\triangleright \overline{FL} \cong \overline{HN}$



Solution Video



Accompanying lectures for questions 932 - 953



Question 944: PROOF Use the information given in the diagram to write a proof.

PROVE D $\triangle PUX \cong \triangle QSY$



Solution Video



Question 945: PROOF Use the information given in the diagram to write a proof.

PROVE $\overline{AC} \cong \overline{GE}$



Solution Video



Question 946: Which of the triangles below are congruent?



Solution Video



Accompanying lectures for questions 932 - 953



Question 947: PROOF Use the given information and the diagram to write a two-column proof.

GIVEN $\triangleright PQ \parallel VS, QU \parallel ST, PQ \cong VS$

PROVE $\angle Q \cong \angle S$



Solution Video



Question 948: SNOWBOARDING In the diagram of the half pipe below, C is the midpoint of \overline{BD} . If $EC \approx 11.5$ m, and $CD \approx 2.5$ m, find the approximate distance across the half pipe. Explain your reasoning.



Solution Video



Question 949: Using the information in the diagram, you can prove that $\overline{WY} \cong \overline{ZX}$. Which reason would not appear in the proof?

- (A) SAS Congruence Postulate
- (B) AAS Congruence Theorem
- (C) Alternate Interior Angles Theorem
- (D) Right Angles Congruence Theorem



Solution Video



Accompanying lectures for questions 932 - 953



Question 950: GIVEN $\overline{MN} \cong \overline{KN}$, $\angle PMN \cong \angle NKL$

PROVE $\angle 1 \cong \angle 2$



Solution Video



Question 951: GIVEN $\overline{TS} \cong \overline{TV}$, $\overline{SR} \cong \overline{VW}$

PROVE $\angle 1 \cong \angle 2$



Solution Video



Question 952: PROOF Use the given information and the diagram to write a proof.

GIVEN $\overline{BA} \cong \overline{BC}$, D and E are midpoints, $\angle A \cong \angle C$, $\overline{DF} \cong \overline{EF}$ PROVE $\overline{FG} \cong \overline{FH}$



Solution Video



Accompanying lectures for questions 932 - 953



Question 953: In the diagram of pentagon $ABCDE$, $\overline{AB} \parallel \overline{EC}$, $\overline{AC} \parallel \overline{ED}$, $\overline{AB} \cong \overline{ED}$, and $\overline{AC} \cong \overline{EC}$. Write a proof that shows $\overline{AD} \cong \overline{EB}$.



Solution Video



Accompanying lectures for questions 954 - 955



Question 954: Which set of given information does not allow you to conclude that $\overline{AD} \cong \overline{CD}$?



- (A) $\overline{AE} \cong \overline{CE}$, $m\angle BEA = 90^\circ$
- (B) $\overline{BA} \cong \overline{BC}$, $\angle BDC \cong \angle BDA$
- (C) $\overline{AB} \cong \overline{CB}$, $\angle ABE \cong \angle CBE$
- (D) $\overline{AE} \cong \overline{CE}$, $\overline{AB} \cong \overline{CB}$

Solution Video



Question 955: CANYON Explain how you can find the distance across the canyon.



Solution Video



Accompanying lectures for questions 956 - 957



Question 956: Use the vertices of $\triangle ABC$ and $\triangle DEF$ to show that $\angle A \cong \angle D$. Explain your reasoning.

$$A(3, 7), B(6, 11), C(11, 13), D(2, -4), E(5, -8), F(10, -10)$$

Solution Video



Question 957: Use the vertices of $\triangle ABC$ and $\triangle DEF$ to show that $\angle A \cong \angle D$. Explain your reasoning.

$$A(3, 8), B(3, 2), C(11, 2), D(-1, 5), E(5, 5), F(5, 13)$$

Solution Video



4.8 Use Isosceles and Equilateral Triangles

Accompanying lectures for questions 958 - 1008



Question 958: VOCABULARY Define the vertex angle of an isosceles triangle.

Solution Video



Question 959: ★ WRITING What is the relationship between the base angles of an isosceles triangle? Explain.

Solution Video



Question 960: USING DIAGRAMS In Exercises 3-6, use the diagram. Copy and complete the statement. Tell what theorem you used.



If $\overline{AE} \cong \overline{DE}$, then $\angle ? \cong \angle ?$.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 961: USING DIAGRAMS In Exercises 3-6, use the diagram. Copy and complete the statement. Tell what theorem you used.



If $\overline{AB} \cong \overline{EB}$, then $\angle ? \cong \angle ?$

Solution Video



Question 962: USING DIAGRAMS In Exercises 3-6, use the diagram. Copy and complete the statement. Tell what theorem you used.



If $\angle D \cong \angle CED$, then $? \cong ?$

Solution Video



Question 963: USING DIAGRAMS In Exercises 3-6, use the diagram. Copy and complete the statement. Tell what theorem you used.



If $\angle EBC \cong \angle ECB$, then ? ?

Solution Video



Accompanying lectures for questions 958 - 1008



Question 964: REASONING Find the unknown measure.



Solution Video



Question 965: REASONING Find the unknown measure.



Solution Video



Question 966: REASONING Find the unknown measure.



Solution Video



Accompanying lectures for questions 958 - 1008



Question 967: DRAWING DIAGRAMS A base angle in an isosceles triangle measures 37° . Draw and label the triangle. What is the measure of the vertex angle?

Solution Video



Question 968: xy ALGEBRA Find the value of x .



Solution Video



Question 969: xy ALGEBRA Find the value of x .



Solution Video



Accompanying lectures for questions 958 - 1008



Question 970: xy ALGEBRA Find the value of x .



Solution Video



Question 971: ERROR ANALYSIS Describe and correct the error made in finding BC in the diagram shown.



Solution Video



Question 972: xy ALGEBRA Find the values of x and y .



Solution Video



Accompanying lectures for questions 958 - 1008



Question 973: xy ALGEBRA Find the values of x and y .



Solution Video



Question 974: xy ALGEBRA Find the values of x and y .



Solution Video



Question 975: ★ SHORT RESPONSE Are isosceles triangles always acute triangles? Explain your reasoning.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 976: ★ MULTIPLE CHOICE What is the value of x in the diagram?

- (A) 5
- (B) 6
- (C) 7
- (D) 9



Solution Video



Question 977: xy ALGEBRA Find the values of x and y , if possible. Explain your reasoning.



Solution Video



Question 978: xy ALGEBRA Find the values of x and y , if possible. Explain your reasoning.



Solution Video



Accompanying lectures for questions 958 - 1008



Question 979: xy ALGEBRA Find the values of x and y , if possible. Explain your reasoning.



Solution Video



Question 980: xy ALGEBRA Find the perimeter of the triangle.



Solution Video



Question 981: xy ALGEBRA Find the perimeter of the triangle.



Solution Video



Accompanying lectures for questions 958 - 1008



Question 982: xy ALGEBRA Find the perimeter of the triangle.



Solution Video



Question 983: REASONING In Exercises 26-29, use the diagram. State whether the given values for x , y , and z are possible or not. If not, explain.

$$x = 90, y = 68, z = 42$$



Solution Video



Question 984: REASONING In Exercises 26–29, use the diagram. State whether the given values for x , y , and z are possible or not. If not, explain.

$$x = 40, y = 72, z = 36$$



Solution Video



Accompanying lectures for questions 958 - 1008



Question 985: REASONING In Exercises 26-29, use the diagram. State whether the given values for x , y , and z are possible or not. If not, explain.

$$x = 25, y = 25, z = 15$$



Solution Video



Question 986: REASONING In Exercises 26-29, use the diagram. State whether the given values for x , y , and z are possible or not. If not, explain.

$$x = 42, y = 72, z = 33$$



Solution Video



Question 987: ★ SHORT RESPONSE In $\triangle DEF$, $m\angle D = (4x + 2)^\circ$, $m\angle E = (6x - 30)^\circ$, and $m\angle F = 3x^\circ$. What type of triangle is $\triangle DEF$? Explain your reasoning.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 988: ★ SHORT RESPONSE In $\triangle ABC$, D is the midpoint of \overline{AC} , and \overline{BD} is perpendicular to \overline{AC} . Explain why $\triangle ABC$ is isosceles.

Solution Video



Question 989: xy) ALGEBRA Find the value(s) of the variable(s). Explain your reasoning.



Solution Video



Question 990: xy) ALGEBRA Find the value(s) of the variable(s). Explain your reasoning.



Solution Video



Accompanying lectures for questions 958 - 1008



Question 991: xy) ALGEBRA Find the value(s) of the variable(s). Explain your reasoning.



Solution Video



Question 992: REASONING The measure of an exterior angle of an isosceles triangle is 130° . What are the possible angle measures of the triangle? Explain.

Solution Video



Question 993: PROOF Let $\triangle ABC$ be isosceles with vertex angle $\angle A$. Suppose $\angle A$, $\angle B$, and $\angle C$ have integer measures. Prove that $m\angle A$ must be even.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 994: CHALLENGE The measure of an exterior angle of an isosceles triangle is x° . What are the possible angle measures of the triangle in terms of x ? Describe all the possible values of x .

Solution Video



Question 995: SPORTS The dimensions of a sports pennant are given in the diagram. Find the values of x and y .



Solution Video



Question 996: ADVERTISING A logo in an advertisement is an equilateral triangle with a side length of 5 centimeters. Sketch the logo and give the measure of each side and angle.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 997: ARCHITECTURE The Transamerica Pyramid building shown in the photograph has four faces shaped like isosceles triangles. The measure of a base angle of one of these triangles is about 85° . What is the approximate measure of the vertex angle of the triangle?



Solution Video



Question 998: MULTI-STEP PROBLEM To make a zig-zag pattern, a graphic designer sketches two parallel line segments. Then the designer draws blue and green triangles as shown below.

- a. Prove that $\triangle ABC \cong \triangle BCD$.
- b. Name all the isosceles triangles in the diagram.
- c. Name four angles that are congruent to $\angle ABC$.



Solution Video



Question 999: ★ VISUAL REASONING In the pattern below, each small triangle is an equilateral triangle with an area of 1 square unit.



- a. Reasoning Explain how you know that any triangle made out of equilateral triangles will be an equilateral triangle.
- b. Area Find the areas of the first four triangles in the pattern.
- c. Make a Conjecture Describe any patterns in the areas. Predict the area of the seventh triangle in the pattern. Explain your reasoning.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 1000: REASONING Let $\triangle PQR$ be an isosceles right triangle with hypotenuse \overline{QR} . Find $m\angle P$, $m\angle Q$, and $m\angle R$.

Solution Video



Question 1001: REASONING Explain how the Corollary to the Base Angles Theorem follows from the Base Angles Theorem.

Solution Video



Question 1002: PROVING THEOREM 4.8 Write a proof of the Converse of the Base Angles Theorem.

Solution Video



Accompanying lectures for questions 958 - 1008



Question 1003: ★ EXTENDED RESPONSE Sue is designing fabric purses that she will sell at the school fair. Use the diagram of one of her purses.

- a. Prove that $\triangle ABE \cong \triangle DCE$.
- b. Name the isosceles triangles in the purse.
- c. Name three angles that are congruent to $\angle EAD$.
- d. What If? If the measure of $\angle BEC$ changes, does your answer to part (c) change? Explain.



Solution Video



Question 1004: REASONING FROM DIAGRAMS Use the information in the diagram to answer the question. Explain your reasoning.

Is $p \parallel q$?



Solution Video



Question 1005: REASONING FROM DIAGRAMS Use the information in the diagram to answer the question. Explain your reasoning.

Is $\triangle ABC$ isosceles?



Solution Video



Accompanying lectures for questions 958 - 1008



Question 1006: PROOF Write a proof.

GIVEN $\triangle ABC$ is equilateral,

$\angle CAD \cong \angle ABE \cong \angle BCF$.

PROVE $\triangle DEF$ is equilateral.



Solution Video



Question 1007: COORDINATE GEOMETRY The coordinates of two vertices of $\triangle TUV$ are $T(0, 4)$ and $U(4, 0)$. Explain why the triangle will always be an isosceles triangle if V is any point on the line $y = x$ except $(2, 2)$.

Solution Video



Question 1008: CHALLENGE The lengths of the sides of a triangle are $3t$, $5t - 12$, and $t + 20$. Find the values of t that make the triangle isosceles. Explain.

Solution Video



4.9 Perform Congruence Transformations

Accompanying lectures for questions 1009 - 1052



Question 1009: VOCABULARY Describe the translation $(x, y) \rightarrow (x - 1, y + 4)$ in words.

Solution Video



Question 1010: ★ WRITING Explain why the term congruence transformation is used in describing translations, reflections, and rotations.

Solution Video



Question 1011: IDENTIFYING TRANSFORMATIONS Name the type of transformation shown.



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1012: IDENTIFYING TRANSFORMATIONS Name the type of transformation shown.



Solution Video



Question 1013: IDENTIFYING TRANSFORMATIONS Name the type of transformation shown.



Solution Video



Question 1014: WINDOWs Decide whether the moving part of the window is a translation.

Double hung



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1015: WINDOWs Decide whether the moving part of the window is a translation.

Casement



Solution Video



Question 1016: WINDOWs Decide whether the moving part of the window is a translation.

Sliding



Solution Video



Question 1017: DRAWING A TRANSLATION Copy figure $ABCD$ and draw its image after the translation.



$$(x, y) \rightarrow (x + 2, y - 3)$$

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1018: DRAWING A TRANSLATION Copy figure $ABCD$ and draw its image after the translation.



$$(x, y) \rightarrow (x - 1, y - 5)$$

Solution Video



Question 1019: DRAWING A TRANSLATION Copy figure $ABCD$ and draw its image after the translation.



$$(x, y) \rightarrow (x + 4, y + 1)$$

Solution Video



Question 1020: DRAWING A TRANSLATION Copy figure $ABCD$ and draw its image after the translation.



$$(x, y) \rightarrow (x - 2, y + 3)$$

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1021: COORDINATE NOTATION Use coordinate notation to describe the translation.

4 units to the left, 2 units down

Solution Video



Question 1022: COORDINATE NOTATION Use coordinate notation to describe the translation.

6 units to the right, 3 units up

Solution Video



Question 1023: COORDINATE NOTATION Use coordinate notation to describe the translation.

2 units to the right, 1 unit down

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1024: COORDINATE NOTATION Use coordinate notation to describe the translation.

7 units to the left, 9 units up

Solution Video



Question 1025: DRAWING Use a reflection in the x -axis to draw the other half of the figure.



Solution Video



Question 1026: DRAWING Use a reflection in the x -axis to draw the other half of the figure.



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1027: DRAWING Use a reflection in the x -axis to draw the other half of the figure.



Solution Video



Question 1028: ROTATIONS Use the coordinates to graph \overline{AB} and \overline{CD} . Tell whether \overline{CD} is a rotation of \overline{AB} about the origin. If so, give the angle and direction of rotation.

$A(1, 2), B(3, 4), C(2, -1), D(4, -3)$

Solution Video



Question 1029: ROTATIONS Use the coordinates to graph \overline{AB} and \overline{CD} . Tell whether \overline{CD} is a rotation of \overline{AB} about the origin. If so, give the angle and direction of rotation.

$$A(-2, -4), B(-1, -2), C(4, 3), D(2, 1)$$

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1030: ROTATIONS Use the coordinates to graph \overline{AB} and \overline{CD} . Tell whether \overline{CD} is a rotation of \overline{AB} about the origin. If so, give the angle and direction of rotation.

$$A(-4, 0), B(-4, -4), C(4, 4), D(0, 4)$$

Solution Video



Question 1031: ROTATIONS Use the coordinates to graph \overline{AB} and \overline{CD} . Tell whether \overline{CD} is a rotation of \overline{AB} about the origin. If so, give the angle and direction of rotation.

$$A(1, 2), B(3, 0), C(2, -1), D(2, -3)$$

Solution Video



Question 1032: ERROR ANALYSIS A student says that the red triangle is a 120° clockwise rotation of the blue triangle about the origin. Describe and correct the error.



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1033: ★ WRITING Can a point or a line segment be its own image under a transformation? Explain and illustrate your answer.

Solution Video



Question 1034: APPLYING TRANSLATIONS Complete the statement using the description of the translation. In the description, points $(0, 3)$ and $(2, 5)$ are two vertices of a hexagon.

If $(0, 3)$ translates to $(0, 0)$, then $(2, 5)$ translates to ?

Solution Video



Question 1035: APPLYING TRANSLATIONS Complete the statement using the description of the translation. In the description, points $(0, 3)$ and $(2, 5)$ are two vertices of a hexagon.

If $(0, 3)$ translates to $(1, 2)$, then $(2, 5)$ translates to ?

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1036: APPLYING TRANSLATIONS Complete the statement using the description of the translation. In the description, points $(0, 3)$ and $(2, 5)$ are two vertices of a hexagon.

If $(0, 3)$ translates to $(-3, -2)$, then $(2, 5)$ translates to ?.

Solution Video



Question 1037: xy ALGEBRA A point on an image and a transformation are given. Find the corresponding point on the original figure.

Point on image: $(4, 0)$; transformation: $(x, y) \rightarrow (x + 2, y - 3)$

Solution Video



Question 1038: xy ALGEBRA A point on an image and a transformation are given. Find the corresponding point on the original figure.

Point on image: $(-3, 5)$; transformation: $(x, y) \rightarrow (-x, y)$

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1039: xy ALGEBRA A point on an image and a transformation are given. Find the corresponding point on the original figure.

Point on image: $(6, -9)$; transformation: $(x, y) \rightarrow (x - 7, y - 4)$

Solution Video



Question 1040: CONGRUENCE Show that the transformation in Exercise 3 is a congruence transformation.

Solution Video



Question 1041: DESCRIBING AN IMAGE State the segment or triangle that represents the image. You can use tracing paper to help you see the rotation.



90° clockwise rotation of \overline{ST} about E

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1042: DESCRIBING AN IMAGE State the segment or triangle that represents the image. You can use tracing paper to help you see the rotation.



90° counterclockwise rotation of \overline{BX} about E

Solution Video



Question 1043: DESCRIBING AN IMAGE State the segment or triangle that represents the image. You can use tracing paper to help you see the rotation.



180° rotation of $\triangle BWX$ about E

Solution Video



Question 1044: DESCRIBING AN IMAGE State the segment or triangle that represents the image. You can use tracing paper to help you see the rotation.



180° rotation of $\triangle TUA$ about E

Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1045: CHALLENGE Solve for the variables in the transformation of \overline{AB} to \overline{CD} and then to \overline{EF} .



Solution Video



Question 1046: KITES The design for a kite shows the layout and dimensions for only half of the kite.

- a. What type of transformation can a designer use to create plans for the entire kite?
- b. What is the maximum width of the entire kite?



Solution Video



Question 1047: STENCILING You are stenciling a room in your home. You want to use the stencil pattern below on the left to create the design shown. Give the angles and directions of rotation you will use to move the stencil from A to B and from A to C .



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1048: ★ OPEN-ENDED MATH Some words reflect onto themselves through a vertical line of reflection. An example is shown.

- a. Find two other words with vertical lines of reflection. Draw the line of reflection for each word.
- b. Find two words with horizontal lines of reflection. Draw the line of reflection for each word.



Solution Video



Question 1049: ★ SHORT RESPONSE In chess, six different kinds of pieces are moved according to individual rules. The Knight (shaped like a horse) moves in an "L" shape. It moves two squares horizontally or vertically and then one additional square perpendicular to its original direction. When a knight lands on a square with another piece, it captures that piece.

- a. Describe the translation used by the Black Knight to capture the White Pawn.
- b. Describe the translation used by the White Knight to capture the Black Pawn.
- c. After both pawns are captured, can the Black Knight capture the White Knight? Explain.



Solution Video



Question 1050: VERIFYING CONGRUENCE Show that $\triangle ABC$ and $\triangle DEF$ are right triangles and use the HL Congruence Theorem to verify that $\triangle DEF$ is a congruence transformation of $\triangle ABC$.



Solution Video



Accompanying lectures for questions 1009 - 1052



Question 1051: ★ MULTIPLE CHOICE A piece of paper is folded in half and some cuts are made, as shown. Which figure represents the unfolded piece of paper?



A.



B.



C.



D.



Solution Video



Question 1052: CHALLENGE A triangle is rotated 90° counterclockwise and then translated three units up. The vertices of the final image are $A(-4, 4)$, $B(-1, 6)$, and $C(-1, 4)$. Find the vertices of the original triangle. Would the final image be the same if the original triangle was translated 3 units up and then rotated 90° counterclockwise? Explain your reasoning.

Solution Video



Chapter 5 Relationships within Triangles

5.0 Prerequisite Skills

Accompanying lectures for questions 1053 - 1053



Question 1053: Is the distance from point P to line AB equal to the length of \overline{PQ} ? Explain why or why not.



Solution Video



Accompanying lectures for questions 1054 - 1057



Question 1054: Plot the point in a coordinate plane.

(4, -3)

Solution Video



Question 1055: Plot the point in a coordinate plane.

(-2, 3)

Solution Video



Question 1056: Plot the point in a coordinate plane.

(0, 1)

Solution Video



Accompanying lectures for questions 1054 - 1057



Question 1057: Plot the point in a coordinate plane.

($-4, -1$)

Solution Video



Accompanying lectures for questions 1058 - 1059



Question 1058: $\triangle PQR$ has the given vertices. Find the length of each side. Then classify the triangle by its sides.

$P(2, 0)$, $Q(6, 6)$, and $R(12, 2)$

Solution Video



Question 1059: $\triangle PQR$ has the given vertices. Find the length of each side. Then classify the triangle by its sides.

$P(2, 3)$, $Q(4, 7)$, and $R(11, 3)$

Solution Video



Accompanying lectures for questions 1060 - 1061



Question 1060: In the diagram, $CE = EB$ and $m\angle CAD = m\angle BAD$. Find the specified measurement.



CE

Solution Video



Question 1061: In the diagram, $CE = EB$ and $m\angle CAD = m\angle BAD$. Find the specified measurement.



$m\angle BAC$

Solution Video



Accompanying lectures for questions 1062 - 1064



Question 1062: Solve.

$$43 > x + 35$$

Solution Video



Question 1063: Solve.

$$-14 < x + 9$$

Solution Video



Question 1064: Solve.

$$x + 26 \leq 54$$

Solution Video



5.1 Midsegment Theorem and Coordinate Proof

Accompanying lectures for questions 1065 - 1087



Question 1065: Copy and complete: In $\triangle ABC$, D is the midpoint of \overline{AB} and E is the midpoint of \overline{AC} . \overline{DE} is a ? of $\triangle ABC$.

Solution Video



Question 1066: \overline{DE} is a midsegment of $\triangle ABC$. Find the value of x .



Solution Video



Question 1067: \overline{DE} is a midsegment of $\triangle ABC$. Find the value of x .



Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1068: \overline{DE} is a midsegment of $\triangle ABC$. Find the value of x .



Solution Video



Question 1069: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$\overline{JK} \parallel ?$

Solution Video



Question 1070: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$\overline{JL} \parallel ?$

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1071: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$$\overline{XY} \parallel ?$$

Solution Video



Question 1072: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$$\overline{YJ} \cong ? \cong ?$$

Solution Video



Question 1073: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$$\overline{JL} \cong ? \cong ?$$

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1074: In $\triangle XYZ$, $\overline{XJ} \cong \overline{JY}$, $\overline{YL} \cong \overline{LZ}$, and $\overline{XK} \cong \overline{KZ}$. Copy and complete the statement.



$$\overline{JK} \cong ? \cong ?$$

Solution Video



Question 1075: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Right triangle: leg lengths are 3 units

Solution Video



Question 1076: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Isosceles right triangle: leg length is and 2 units 7 units

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1077: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Square: side length is 3 units

Solution Video



Question 1078: PLACING FIGURES Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Scalene triangle: one side length is $2m$

Solution Video



Question 1079: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Rectangle: length is a and width is b

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1080: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Isosceles right triangle: leg length is p

Solution Video



Question 1081: Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Right triangle: leg lengths are r and s

Solution Video



Question 1082: Find the length of the hypotenuse in Exercise 19. Then place the triangle another way and use the new coordinates to find the length of the hypotenuse. Do you get the same result?

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1083: Sketch $\triangle ABC$. Find the length and the slope of each side. Then find the coordinates of each midpoint. Is $\triangle ABC$ a right triangle? Is it isosceles? Explain. (Assume all variables are positive, $p \neq q$, and $m \neq n$.)

$$A(0, 0), B(p, q), C(2p, 0)$$

Solution Video



Question 1084: Sketch $\triangle ABC$. Find the length and the slope of each side. Then find the coordinates of each midpoint. Is $\triangle ABC$ a right triangle? Is it isosceles? Explain. (Assume all variables are positive, $p \neq q$, and $m \neq n$.)

$$A(0, 0), B(h, h), C(2h, 0)$$

Solution Video



Question 1085: Sketch $\triangle ABC$. Find the length and the slope of each side. Then find the coordinates of each midpoint. Is $\triangle ABC$ a right triangle? Is it isosceles? Explain. (Assume all variables are positive, $p \neq q$, and $m \neq n$.)

$$A(0, n), B(m, n), C(m, 0)$$

Solution Video



Accompanying lectures for questions 1065 - 1087



Question 1086: Use $\triangle GHJ$, where A , B , and C are midpoints of the sides.



If $AB = 3x + 8$ and $GJ = 2x + 24$, what is AB ?

Solution Video



Question 1087: Use $\triangle GHJ$, where A , B , and C are midpoints of the sides.



If $AC = 3y - 5$ and $HJ = 4y + 2$, what is HB ?

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1088: Explain why it is convenient to place a right triangle on the grid as shown when writing a coordinate proof. How might you want to relabel the coordinates of the vertices if the proof involves midpoints?



Solution Video



Question 1089: PLACING FIGURES Place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex.

Square: side length is s

Solution Video



Question 1090: xy ALGEBRA Use $\triangle GHJ$, where A , B , and C are midpoints of the sides.



If $GH = 7z - 1$ and $BC = 4z - 3$, what is GH ?

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1091: ERROR ANALYSIS Explain why the conclusion is incorrect.



Solution Video



Question 1092: FINDING PERIMETER The midpoints of the three sides of a triangle are $P(2, 0)$, $Q(7, 12)$, and $R(16, 0)$. Find the length of each midsegment and the perimeter of $\triangle PQR$. Then find the perimeter of the original triangle.

Solution Video



Question 1093: APPLYING VARIABLE COORDINATES Find the coordinates of the red point(s) in the figure. Then show that the given statement is true.



$$\triangle OPQ \cong \triangle RSQ$$

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1094: APPLYING VARIABLE COORDINATES Find the coordinates of the red point(s) in the figure. Then show that the given statement is true.



slope of $\overline{HE} = -(\text{ slope of } \overline{DG})$

Solution Video



Question 1095: ★ MULTIPLE CHOICE A rectangle with side lengths $3h$ and k has a vertex at $(-h, k)$. Which point cannot be a vertex of the rectangle?

- (A) (h, k)
- (B) $(-h, 0)$
- (C) $(2h, 0)$
- (D) $(2h, k)$

Solution Video



Question 1096: The points $T(2, 1)$, $U(4, 5)$, and $V(7, 4)$ are the midpoints of the sides of a triangle. Graph the three midsegments. Then show how to use your graph and the properties of midsegments to draw the original triangle. Give the coordinates of each vertex.

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1097: Points A, B, C , and D are the vertices of a tetrahedron (a solid bounded by four triangles). \overline{EF} is a midsegment of $\triangle ABC$, \overline{GE} is a midsegment of $\triangle ABD$, and \overline{FG} is a midsegment of $\triangle ACD$.

Show that Area of $\triangle EFG = \frac{1}{4}$ · Area of $\triangle BCD$.



Solution Video



Question 1098: CHALLENGE In $\triangle PQR$, the midpoint of \overline{PQ} is $K(4, 12)$, the midpoint of \overline{QR} is $L(5, 15)$, and the midpoint of \overline{PR} is $M(6.4, 10.8)$. Show how to find the vertices of $\triangle PQR$.

Solution Video



Question 1099: A floodlight on the edge of the stage shines upward onto the backdrop as shown. Constance is 5 feet tall. She stands halfway between the light and the backdrop, and the top of her head is at the midpoint of \overline{AC} . The edge of the light just reaches the top of her head. How tall is her shadow?



Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1100: Write a coordinate proof.

GIVEN $D(0, k)$, $Q(h, 0)$, $R(-h, 0)$ PROVE D $\triangle PQR$ is isosceles.



Solution Video



Question 1101: Write a coordinate proof.

GIVEN $O(0, 0)$, $G(6, 6)$, $H(8, 0)$, WV is a midsegment.

PROVE $\square \overline{WV} \parallel \overline{OH}$ and $WV = \frac{1}{2} OH$



Solution Video



Question 1102: In the set of shelves shown, the third shelf, labeled \overline{CD} , is closer to the bottom shelf, \overline{EF} , than midsegment \overline{AB} is. If \overline{EF} is 8 feet long, is it possible for \overline{CD} to be 3 feet long? 4 feet long? 6 feet long? 8 feet long? Explain.



Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1103: Use the information in the diagram at the right. What is the length of side \overline{AC} of $\triangle ABC$? Explain your reasoning.



Solution Video



Question 1104: Copy and complete the plan for proof. GIVEN $\triangleright \overline{ST}$, \overline{TU} , and \overline{SU} are midsegments of $\triangle PQR$.

PROVE - $\triangle PST \cong \triangle SQU$

Use ? to show $\overline{PS} \cong \overline{SQ}$. Use ? $\angle QSU \cong \angle SPT$. Use ? to show that $\angle ? \cong \angle ?$.

Use ? to show that $\triangle PST \cong \triangle SQU$.



Solution Video



Question 1105: Use the figure in Example 5. Draw the midpoint F of \overline{OC} . Prove that \overline{DF} is parallel to \overline{BC} and $DF = \frac{1}{2}BC$.

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1106: Write a coordinate proof.

GIVEN $\triangleright \triangle ABD$ is a right triangle, with the right angle at vertex A . Point C is the midpoint of hypotenuse BD .

PROVE \triangleright Point C is the same distance from each vertex of $\triangle ABD$.

Solution Video



Question 1107: To create the design below, shade the triangle formed by the three midsegments of a triangle. Then repeat the process for each unshaded triangle. Let the perimeter of the original triangle be 1.



- a. What is the perimeter of the triangle that is shaded in Stage 1?
- b. What is the total perimeter of all the shaded triangles in Stage 2 ?
- c. What is the total perimeter of all the shaded triangles in Stage 3 ?

Solution Video



Question 1108: Write a coordinate proof.

Any right isosceles triangle can be subdivided into a pair of congruent right isosceles triangles. (Hint: Draw the segment from the right angle to the midpoint of the hypotenuse.)

Solution Video



Accompanying lectures for questions 1088 - 1110



Question 1109: Write a coordinate proof.

Any two congruent right isosceles triangles can be combined to form a single right isosceles triangle.

Solution Video



Question 1110: CHALLENGE XY is a midsegment of $\triangle LMN$. Suppose \overline{DE} is called a "quarter-segment" of $\triangle LMN$. What do you think an "eighth-segment" would be? Make a conjecture about the properties of a quarter-segment and of an eighth-segment. Use variable coordinates to verify your conjectures.



Solution Video



5.2 Use Perpendicular Bisectors

Accompanying lectures for questions 1111 - 1143



Question 1111: VOCABULARY Suppose you draw a circle with a compass. You choose three points on the circle to use as the vertices of a triangle. Copy and complete: The center of the circle is also the ? of the triangle.

Solution Video



Question 1112: ★ WRITING Consider \overline{AB} . How can you describe the set of all points in a plane that are equidistant from A and B ?

Solution Video



Question 1113: Find the length of \overline{AB} .



Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1114: Find the length of \overline{AB} .



Solution Video



Question 1115: Find the length of \overline{AB} .



Solution Video



Question 1116: REASONING Tell whether the information in the diagram allows you to conclude that C is on the perpendicular bisector of \overline{AB} .



Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1117: REASONING Tell whether the information in the diagram allows you to conclude that C is on the perpendicular bisector of \overline{AB} .



Solution Video



Question 1118: REASONING Tell whether the information in the diagram allows you to conclude that C is on the perpendicular bisector of \overline{AB} .



Solution Video



Question 1119: Point P is inside $\triangle ABC$ and is equidistant from points A and B . On which of the following segments must P be located?

- (A) \overline{AB}
- (B) The perpendicular bisector of \overline{AB}
- (C) The midsegment opposite \overline{AB}
- (D) The perpendicular bisector of \overline{AC}

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1120: ERROR ANALYSIS Explain why the conclusion is not correct given the information in the diagram.



Solution Video



Question 1121: PERPENDICULAR BISECTORS In Exercises 11-15, use the diagram. \overleftrightarrow{JN} is the perpendicular bisector of \overline{MK} .



Find NM.

Solution Video



Question 1122: PERPENDICULAR BISECTORS In Exercises 11-15, use the diagram. \overleftrightarrow{JN} is the perpendicular bisector of \overline{MK} .



Find JK .

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1123: Use the diagram. \overleftrightarrow{JN} is the perpendicular bisector of \overline{MK} .



Find KL .

Solution Video



Question 1124: Use the diagram. \overleftrightarrow{JN} is the perpendicular bisector of \overline{MK} .



Find ML .

Solution Video



Question 1125: Use the diagram. \overleftrightarrow{JN} is the perpendicular bisector of \overline{MK} .


Is L on \overleftrightarrow{JP} ? Explain your reasoning.

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1126: USING CONCURRENCY In the diagram, the perpendicular bisectors of $\triangle ABC$ meet at point G and are shown in blue. Find the indicated measure.

Find BG .



Solution Video



Question 1127: USING CONCURRENCY In the diagram, the perpendicular bisectors of $\triangle ABC$ meet at point G and are shown in blue. Find the indicated measure.

Find GA .



Solution Video



Question 1128: CONSTRUCTING PERPENDICULAR BISECTORS Construct the bisector of a segment. Explain why the bisector you constructed is perpendicular to the segment.

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1129: CONSTRUCTION Draw a right triangle. Use a compass and straightedge to find its circumcenter. Use a compass to draw the circumscribed circle.

Solution Video



Question 1130: ANALYZING STATEMENTS Copy and complete the statement with always, sometimes, or never. Justify your answer.

The circumcenter of a scalene triangle is ? inside the triangle.

Solution Video



Question 1131: ANALYZING STATEMENTS Copy and complete the statement with always, sometimes, or never. Justify your answer.

If the perpendicular bisector of one side of a triangle goes through the opposite vertex, then the triangle is ? isosceles.

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1132: ANALYZING STATEMENTS Copy and complete the statement with always, sometimes, or never. Justify your answer.

The perpendicular bisectors of a triangle intersect at a point that is ? equidistant from the midpoints of the sides of the triangle.

Solution Video



Question 1133: CHALLENGE Prove the statements in parts (a) - (c).

GIVEN - Plane P is a perpendicular bisector of \overline{XZ} at Y .

PROVE

- a. $\overline{XW} \cong \overline{ZW}$
- b. $\overline{XY} \cong \overline{ZY}$
- c. $\angle VZW \cong \angle VZW$



Solution Video



Question 1134: BRIDGE A cable-stayed bridge is shown below. Two cable lengths are given. Find the lengths of the blue cables. Justify your answer.



Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1135: ★ SHORT RESPONSE You and two friends plan to walk your dogs together. You want your meeting place to be the same distance from each person's house. Explain how you can use the diagram to locate the meeting place.



Solution Video



Question 1136: PROVING THEOREM 5.2 Prove the Perpendicular Bisector Theorem.

GIVEN \overleftrightarrow{CP} is the perpendicular bisector of \overline{AB}

PROVE $CA = CB$

Plan for Proof Show that right triangles $\triangle APC$ and $\triangle BPC$ are congruent. Then show that $\overline{CA} \cong \overline{CB}$.



Solution Video



Question 1137: PROVING THEOREM 5.3 Prove the converse of the Perpendicular Bisector Theorem.
(Hint: Construct a line through C perpendicular to \overline{AB} at P .)

GIVEN $-CA = CB$

PROVE DC is on the perpendicular bisector of \overline{AB} .



Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1138: ★ EXTENDED RESPONSE Archaeologists find three stones. They believe that the stones were once part of a circle of stones with a community firepit at its center. They mark the locations of Stones A , B , and C on a graph where distances are measured in feet.

- a. Explain how the archaeologists can use a sketch to estimate the center of the circle of stones.
- b. Copy the diagram and find the approximate coordinates of the point at which the archaeologists should look for the firepit.



Solution Video



Question 1139: TECHNOLOGY Use geometry drawing software to construct \overline{AB} . Find the midpoint C . Draw the perpendicular bisector of \overline{AB} through C . Construct a point D along the perpendicular bisector and measure \overline{DA} and \overline{DB} . Move D along the perpendicular bisector. What theorem does this construction demonstrate?

Solution Video



Question 1140: COORDINATE PROOF Where is the circumcenter located in any right triangle? Write a coordinate proof of this result.

Solution Video



Accompanying lectures for questions 1111 - 1143



Question 1141: PROOF Use the information in the diagram to prove the given statement.

$\overline{AB} \cong \overline{BC}$ if and only if D, E , and B



Solution Video



Question 1142: PROOF Use the information in the diagram to prove the given statement.

\overline{PV} is the perpendicular bisector are collinear. of \overline{TQ} for regular polygon $PQRST$.



Solution Video



Question 1143: CHALLENGE The four towns on the map are building a common high school. They have agreed that the school should be an equal distance from each of the four towns. Is there a single point where they could agree to build the school? If so, find it. If not, explain why not. Use a diagram to explain your answer.



Solution Video



5.2.1 Quiz

5.3 Use Angle Bisectors of Triangles

Accompanying lectures for questions 1144 - 1181



Question 1144: VOCABULARY Copy and complete: Point C is in the interior of $\angle ABD$. If $\angle ABC$ and $\angle DBC$ are congruent, then \overrightarrow{BC} is the ? of $\angle ABD$.

Solution Video



Question 1145: ★ WRITING How are perpendicular bisectors and angle bisectors of a triangle different?
How are they alike?

Solution Video



Question 1146: FINDING MEASURES Use the information in the diagram to find the measure.

Find $m\angle ABD$.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1147: FINDING MEASURES Use the information in the diagram to find the measure.

Find PS .



Solution Video



Question 1148: FINDING MEASURES Use the information in the diagram to find the measure.

$m\angle YXW = 60^\circ$. Find WZ .



Solution Video



Question 1149: ANGLE BISECTOR THEOREM Is $DB = DC$? Explain.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1150: ANGLE BISECTOR THEOREM Is $DB = DC$? Explain.



Solution Video



Question 1151: ANGLE BISECTOR THEOREM Is $DB = DC$? Explain.



Solution Video



Question 1152: REASONING Can you conclude that \overrightarrow{EH} bisects $\angle FEG$? Explain.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1153: REASONING Can you conclude that \overrightarrow{EH} bisects $\angle FEG$? Explain.



Solution Video



Question 1154: REASONING Can you conclude that \overrightarrow{EH} bisects $\angle FEG$? Explain.



Solution Video



Question 1155: xy ALGEBRA Find the value of x .



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1156: xy ALGEBRA Find the value of x .



Solution Video



Question 1157: xy ALGEBRA Find the value of x .



Solution Video



Question 1158: RECOGNIZING MISSING INFORMATION Can you find the value of x ? Explain.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1159: RECOGNIZING MISSING INFORMATION Can you find the value of x ? Explain.



Solution Video



Question 1160: RECOGNIZING MISSING INFORMATION Can you find the value of x ? Explain.



Solution Video



Question 1161: ★ MULTIPLE CHOICE What is the value of x in the diagram?

- (A) 13
- (B) 18
- (C) 33
- (D) Not enough information



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1162: USING INCENTERS Find the indicated measure.

Point D is the incenter of $\triangle XYZ$.



Solution Video



Question 1163: USING INCENTERS Find the indicated measure.

Point L is the incenter of $\triangle EGH$.



Solution Video



Question 1164: ERROR ANALYSIS Describe the error in reasoning. Then state a correct conclusion about distances that can be deduced from the diagram.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1165: ERROR ANALYSIS Describe the error in reasoning. Then state a correct conclusion about distances that can be deduced from the diagram.



Solution Video



Question 1166: ★ MULTIPLE CHOICE In the diagram, N is the incenter of $\triangle GHJ$. Which statement cannot be deduced from the given information?

- (A) $\overline{NM} \cong \overline{NK}$
- (B) $\overline{NL} \cong \overline{NM}$
- (C) $\overline{NG} \cong \overline{NJ}$
- (D) $\overline{HK} \cong \overline{HM}$



Solution Video



Question 1167: xy ALGEBRA Find the value of x that makes N the incenter of the triangle.



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1168: xy ALGEBRA Find the value of x that makes N the incenter of the triangle.



Solution Video



Question 1169: CONSTRUCTION Use a compass and a straightedge to draw $\triangle ABC$ with incenter D . Label the angle bisectors and the perpendicular segments from D to each of the sides of $\triangle ABC$. Measure each segment. What do you notice? What theorem have you verified for your $\triangle ABC$?

Solution Video



Question 1170: CHALLENGE Point D is the incenter of $\triangle ABC$. Write an expression for the length x in terms of the three side lengths AB , AC , and BC .



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1171: FIELD HOCKEY In a field hockey game, the goalkeeper is at point G and a player from the opposing team hits the ball from point B . The goal extends from left goalpost L to right goalpost R . Will the goalkeeper have to move farther to keep the ball from hitting L or R ? Explain.



Solution Video



Question 1172: KOI POND You are constructing a fountain in a triangular koi pond. You want the fountain to be the same distance from each edge of the pond. Where should you build the fountain? Explain your reasoning. Use a sketch to support your answer.



Solution Video



Question 1173: ★ SHORT RESPONSE What congruence postulate or theorem would you use to prove the Angle Bisector Theorem? to prove the Converse of the Angle Bisector Theorem? Use diagrams to show your reasoning.

Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1174: ★ EXTENDED RESPONSE Suppose you are given a triangle and are asked to draw all of its perpendicular bisectors and angle bisectors.

- a. For what type of triangle would you need the fewest segments? What is the minimum number of segments you would need? Explain.
- b. For what type of triangle would you need the most segments? What is the maximum number of segments you would need? Explain.

Solution Video



Question 1175: CHOOSING A METHOD In Exercises 32 and 33, tell whether you would use perpendicular bisectors or angle bisectors. Then solve the problem.



BANNER To make a banner, you will cut a triangle from an $8\frac{1}{2}$ inch by 11 inch sheet of white paper and paste a red circle onto it as shown. The circle should just touch each side of the triangle. Use a model to decide whether the circle's radius should be more or less than $2\frac{1}{2}$ inches. Can you cut the circle from a 5 inch by 5 inch red square? Explain.

Solution Video



Question 1176: CHOOSING A METHOD In Exercises 32 and 33, tell whether you would use perpendicular bisectors or angle bisectors. Then solve the problem.



CAMP A map of a camp shows a pool at $(10, 20)$, a nature center at $(16, 2)$, and a tennis court at $(2, 4)$. A new circular walking path will connect the three locations. Graph the points and find the approximate center of the circle. Estimate the radius of the circle if each unit on the grid represents 10 yards. Then use the formula $C = 2\pi r$ to estimate the length of the path.

Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1177: PROVING THEOREMS 5.5 AND 5.6 Use Exercise 30 to prove the theorem.

Angle Bisector Theorem

Solution Video



Question 1178: PROVING THEOREMS 5.5 AND 5.6 Use Exercise 30 to prove the theorem.

Converse of the Angle Bisector Theorem

Solution Video



Question 1179: PROVING THEOREM 5.7 Write a proof of the Concurrency of Angle Bisectors of a Triangle Theorem.

GIVEN $\triangle ABC$, \overline{AD} bisects $\angle CAB$, \overline{BD} bisects $\angle CBA$, $\overline{DE} \perp \overline{AB}$, $\overline{DF} \perp \overline{BC}$, $\overline{DG} \perp \overline{CA}$

PROVE D The angle bisectors intersect at D , which is equidistant from \overline{AB} , \overline{BC} , and \overline{CA} .



Solution Video



Accompanying lectures for questions 1144 - 1181



Question 1180: CELEBRATION You are planning a graduation party in the triangular courtyard shown. You want to fit as large a circular tent as possible on the site without extending into the walkway.

- a. Copy the triangle and show how to place the tent so that it just touches each edge. Then explain how you can be sure that there is no place you could fit a larger tent on the site. Use sketches to support your answer.
- b. Suppose you want to fit as large a tent as possible while leaving at least one foot of space around the tent. Would you put the center of the tent in the same place as you did in part (a)? Justify your answer.



Solution Video



Question 1181: CHALLENGE You have seen that there is a point inside any triangle that is equidistant from the three sides of the triangle. Prove that if you extend the sides of the triangle to form lines, you can find three points outside the triangle, each of which is equidistant from those three lines.



Solution Video



5.3.1 Mixed Review

5.4 Use Medians and Altitudes

Accompanying lectures for questions 1182 - 1207



Question 1182: Name the four types of points of concurrency. When is each type inside the triangle? outside the triangle?

Solution Video



Question 1183: ★ OPEN-ENDED MATH Draw a large right triangle and find its centroid.

Solution Video



Question 1184: ★ OPEN-ENDED MATH Draw a large obtuse, scalene triangle and find its orthocenter.

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1185: IDENTIFYING SEGMENTS Is \overline{BD} a perpendicular bisector of $\triangle ABC$? Is \overline{BD} a median? an altitude?



Solution Video



Question 1186: IDENTIFYING SEGMENTS Is \overline{BD} a perpendicular bisector of $\triangle ABC$? Is \overline{BD} a median? an altitude?



Solution Video



Question 1187: IDENTIFYING SEGMENTS Is \overline{BD} a perpendicular bisector of $\triangle ABC$? Is \overline{BD} a median? an altitude?



Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1188: ERROR ANALYSIS A student uses the fact that T is a point of concurrency to conclude that $NT = \frac{2}{3}NQ$. Explain what is wrong with this reasoning.



Solution Video



Question 1189: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\overline{YW} \perp \overline{XZ}$$

Solution Video



Question 1190: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\angle XYW \cong \angle ZYW$$

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1191: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\overline{XW} \cong \overline{ZW}$$

Solution Video



Question 1192: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\overline{YW} \perp \overline{XZ} \text{ and } \overline{XW} \cong \overline{ZW}$$

Solution Video



Question 1193: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\triangle XYW \cong \triangle ZYW$$

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1194: REASONING Use the diagram shown and the given information to decide whether \overline{YW} is a perpendicular bisector, an angle bisector, a median, or an altitude of $\triangle XYZ$. There may be more than one right answer.



$$\overline{YW} \perp \overline{XZ} \text{ and } \overline{XY} \cong \overline{ZY}$$

Solution Video



Question 1195: ISOSCELES TRIANGLES Find the measurements. Explain your reasoning.



Given that $\overline{DB} \perp \overline{AC}$, find DC and $m\angle ABD$.

Solution Video



Question 1196: ISOSCELES TRIANGLES Find the measurements. Explain your reasoning.



Given that $AD = DC$, find $m\angle ADB$ and $m\angle ABD$.

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1197: RELATING LENGTHS Copy and complete the statement for $\triangle DEF$ with medians \overline{DH} , \overline{EJ} , and \overline{FG} , and centroid K .

$$EJ = ? KJ$$

Solution Video



Question 1198: Any isosceles triangle can be placed in the coordinate plane with its base on the x -axis and the opposite vertex on the y -axis as in Guided Practice Exercise 6 in this lesson. Explain why.

Solution Video



Question 1199: Verify the Concurrency of Altitudes of a Triangle by drawing a triangle of the given type and constructing its altitudes.

Equilateral triangle

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1200: Verify the Concurrency of Altitudes of a Triangle by drawing a triangle of the given type and constructing its altitudes.

Right scalene triangle

Solution Video



Question 1201: CONSTRUCTION Verify the Concurrency of Altitudes of a Triangle by drawing a triangle of the given type and constructing its altitudes.

Obtuse isosceles triangle

Solution Video



Question 1202: VERIFYING THEOREM 5.8 Use Example 2 in this lesson. Verify that Theorem 5.8, the Concurrency of Medians of a Triangle, holds for the median from vertex F and for the median from vertex H .

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1203: CHALLENGE \overline{KM} is a median of $\triangle JKL$. Find the areas of $\triangle JKM$ and $\triangle LKM$. Compare the areas. Do you think that the two areas will always compare in this way, regardless of the shape of the triangle? Explain.



Solution Video



Question 1204: MOBILES To complete the mobile, you need to balance the red triangle on the tip of a metal rod. Copy the triangle and decide if you should place the rod at *A* or *B*. Explain.



Solution Video



Question 1205: DEVELOPING PROOF Show two different ways that you can place an isosceles triangle with base $2n$ and height h on the coordinate plane. Label the coordinates for each vertex.

Solution Video



Accompanying lectures for questions 1182 - 1207



Question 1206: PAPER AIRPLANE Find the area of the triangular part of the paper airplane wing that is outlined in red. Which special segment of the triangle did you use?



Solution Video



Question 1207: ★ SHORT RESPONSE In what type(s) of triangle can a vertex of the triangle be one of the points of concurrency of the triangle? Explain.

Solution Video



Accompanying lectures for questions 1208 - 1222



Question 1208: ★ WRITING Compare a perpendicular bisector and an altitude of a triangle. Compare a perpendicular bisector and a median of a triangle.

Solution Video



Question 1209: G is the centroid of $\triangle ABC$, $BG = 6$, $AF = 12$, and $AE = 15$. Find the length of the segment.



\overline{FC}

Solution Video



Question 1210: FINDING LENGTHS G is the centroid of $\triangle ABC$, $BG = 6$, $AF = 12$, and $AE = 15$.
Find the length of the segment.



\overline{BF}

Solution Video



Accompanying lectures for questions 1208 - 1222



Question 1211: FINDING LENGTHS G is the centroid of $\triangle ABC$, $BG = 6$, $AF = 12$, and $AE = 15$. Find the length of the segment.



\overline{AG}

Solution Video



Question 1212: FINDING LENGTHS G is the centroid of $\triangle ABC$, $BG = 6$, $AF = 12$, and $AE = 15$. Find the length of the segment.



\overline{GE}

Solution Video



Question 1213: In the diagram, M is the centroid of $\triangle ACT$, $CM = 36$, $MQ = 30$, and $TS = 56$. What is AM ?

- (A) 15
- (B) 30
- (C) 36
- (D) 60



Solution Video



Accompanying lectures for questions 1208 - 1222



Question 1214: Copy and complete the statement for $\triangle DEF$ with medians \overline{DH} , \overline{EJ} , and \overline{FG} , and centroid K .

$$DK = ? KH$$

Solution Video



Question 1215: Copy and complete the statement for $\triangle DEF$ with medians \overline{DH} , \overline{EJ} , and \overline{FG} , and centroid K .

$$FG = ? KF$$

Solution Video



Question 1216: Point D is the centroid of $\triangle ABC$. Use the given information to find the value of x .



$$BD = 4x + 5 \text{ and } BF = 9x$$

Solution Video



Accompanying lectures for questions 1208 - 1222



Question 1217: Point D is the centroid of $\triangle ABC$. Use the given information to find the value of x .



$$GD = 2x - 8 \text{ and } GC = 3x + 3$$

Solution Video



Question 1218: xy ALGEBRA Point D is the centroid of $\triangle ABC$. Use the given information to find the value of x .



$$AD = 5x \text{ and } DE = 3x - 2$$

Solution Video



Question 1219: PROOF Write proofs using different methods.

GIVEN $\triangle ABC$ is equilateral.

\overline{BD} is an altitude of $\triangle ABC$.

PROVE \overline{BD} is also a perpendicular bisector of \overline{AC} .

- a. Write a proof using congruent triangles.
- b. Write a proof using the Perpendicular Postulate.



Solution Video



Accompanying lectures for questions 1208 - 1222



Question 1220: TECHNOLOGY Use geometry drawing software.

- a. Construct a triangle and its medians. Measure the areas of the blue, green, and red triangles.
- b. What do you notice about the triangles?
- c. If a triangle is of uniform thickness, what can you conclude about the weight of the three interior triangles? How does this support the idea that a triangle will balance on its centroid?



Solution Video



Question 1221: ★ EXTENDED ReSPONSE Use $P(0, 0)$, $Q(8, 12)$, and $R(14, 0)$.

- a. What is the slope of the altitude from R to \overline{PQ} ?
- b. Write an equation for each altitude of $\triangle PQR$. Find the orthocenter by finding the ordered pair that is a solution of the three equations.
- c. How would your steps change if you were finding the circumcenter?



Solution Video



Question 1222: CHALLENGE Prove the results in parts (a) - (c).

Given $\triangleright \overline{LP}$ and \overline{MQ} are medians of scalene $\triangle LMN$. Point R is on \overrightarrow{LP} such that $\overline{LP} \cong \overline{PR}$. Point S is on \overrightarrow{MQ} such that $\overline{MQ} \cong \overline{QS}$.

PROVE D a. $\overline{NS} \cong \overline{NR}$

b. \overline{NS} and \overline{NR} are both parallel to \overline{LM} .

c. R , N , and S are collinear.

Solution Video



Accompanying lectures for questions 1223 - 1226



Question 1223: FINDING A CENTROID Use the graph shown.

- a. Find the coordinates of P , the midpoint of \overline{ST} . Use the median \overline{UP} to find the coordinates of the centroid Q .
- b. Find the coordinates of R , the midpoint of \overline{TU} . Verify that $SQ = \frac{2}{3}SR$.



Solution Video



Question 1224: Find the coordinates of the centroid P of $\triangle ABC$.

$$A(-1, 2), B(5, 6), C(5, -2)$$

Solution Video



Question 1225: GRAPHING CENTROIDS Find the coordinates of the centroid P of $\triangle ABC$.

$A(0, 4), B(3, 10), C(6, -2)$

Solution Video



Accompanying lectures for questions 1223 - 1226



Question 1226: Graph the lines on the same coordinate plane and find the centroid of the triangle formed by their intersections.

$$y_1 = 3x - 4$$

$$y_2 = \frac{3}{4}x + 5$$

$$y_3 = -\frac{3}{2}x - 4$$

Solution Video



5.4.1 Quiz

5.5 Use Inequalities in a Triangle

5.6 Inequalities in Two Triangles and Indirect Proof

5.6.1 Quiz

