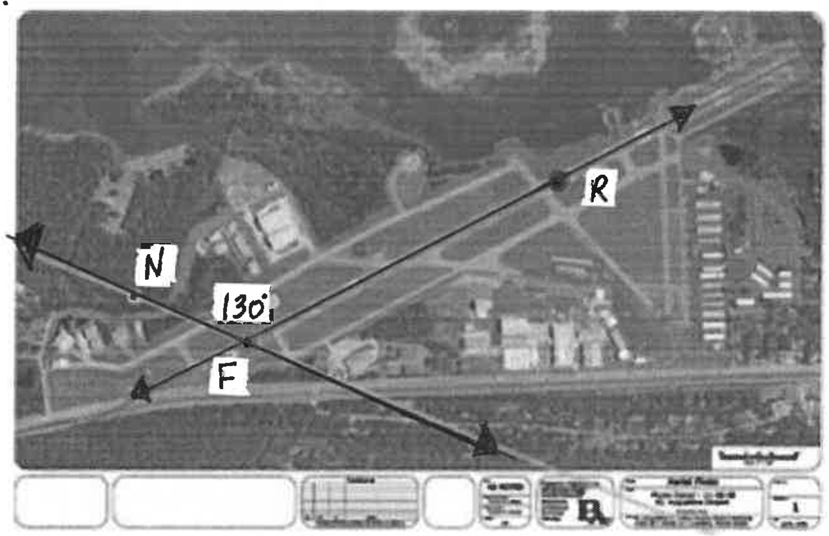
GEOMETRY B.E.S.T. Instructional Tasks 2024-25

Instructional Task 1 (MTR.7.1)

1. Runways are identified by their orientation relative to Magnetic North as viewed by an approaching aircraft. Runway directions are always rounded to the nearest ten degrees and the zero in the "ones" column is never depicted (i.e., 170 degrees would be viewed as "17" and 20 degrees would be seen as "2"). The same runway has two names which are dependent on the direction of approach.

Use the aerial of Northeast Florida Regional Airport in St. Augustine, FL to answer the questions below.



Part A. Flying to the runway from point *F*, the runway is Runway 13. This means the heading is 130° off magnetic north. Draw a line through point *R* to that goes to magnetic north, what is true about that line and line *NF*?

Part B. On the line drawn in Part A, draw and label a point, *A*.

Part C. Measure angle *FRA*.

Part D. How does your answer from Part C support you answer from Part A?

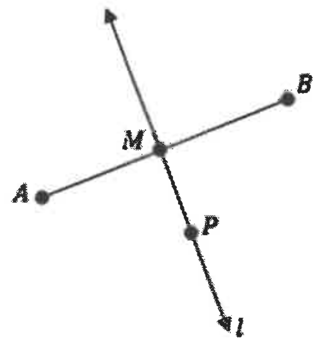
Part E. What is the name of the runway when approaching from point *R*?

Instructional Task 2 (MTR.2.1, MTR.4.1, MTR.5.1)

2

Part A. Given $\overline{AB}$, use a compass and straightedge to construct line l such that line l and $\overline{AB}$ form 90° and the point of intersection, M, is the midpoint of $\overline{AB}$.

Part B. Suppose that point P lies on line l as shown below. What conjecture can be made about point P? Which endpoint of $\overline{AB}$ is closest to point P? Use a compass to test your conjecture.

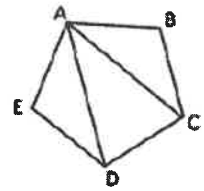


Part C. What if a point, Q, was added to line l? Which endpoint of $\overline{AB}$ is closest to point Q? How does this compare with your conjecture in Part B?

Part D. How can the construction from Part A and the conjectures from Part B and Part C be used to prove that $AP = BP$ given that line l is the perpendicular bisector of $\overline{AB}$ and point P lies on line l?

Instructional Task 1 (MTR.4.1, MTR.5.1)

3 Pentagon $ABCDE$, as shown below, is a regular pentagon.



Part A. Can you identify two possible congruent triangles in the figure?
Part B. Write a congruence statement for the two triangles that are congruent.
Part C. What theorem or postulate can be used to prove the two triangles congruent?
Part D. Prove that the two triangles chosen in Part A are congruent to one another.
Part E. Determine a triangle that is congruent to triangle ACD.
Part F. Repeat Parts B through D with the new pair of triangles.

4 *Instructional Task 2 (MTR.4.1, MTR.5.1)*

Part A. Draw a triangle with side lengths 6 inches, 7 inches and 10 inches. Compare your triangle with a partner.
Part B. Draw a triangle with side lengths 4 inches and 6 inches, and with a $70°$ angle in between those side lengths. Compare your triangle with a partner.
Part C. Draw a triangle with angle measures of $40°$ and $60°$, and a side length of 5 inches between those angle measures. Compare your triangle with a partner.
Part D. Based on the comparison of triangles created from Parts A, B and C, what can you conclude about criteria for determining triangle congruence?

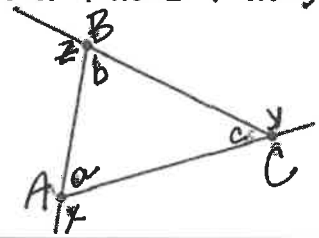
Instructional Task 1 (MTR.4.1)

5 Directions: Print and cut apart the given information, statements and reasons for the proof and provide to students. Students can work individually or in groups. Additionally, students can develop the proof with or without all of the intermediate steps.

Complete the proof

Given: ΔABC with exterior angles x, y and z.

Prove: $m\angle x + m\angle z + m\angle y = 360$.



	Statements	Reasons
1	ΔABC with exterior angles x, y and z	1 Given
2	$\angle a$ and $\angle x$ form a linear pair $\angle b$ and $\angle z$ form a linear pair $\angle c$ and $\angle y$ form a linear pair	2 Definition of linear pair
3	$\angle a$ and $\angle x$ are supplementary $\angle b$ and $\angle z$ are supplementary $\angle c$ and $\angle y$ are supplementary	3 Angles that form a linear pair are supplementary
4	$m\angle a + m\angle x = 180°$ $m\angle b + m\angle z = 180°$ $m\angle c + m\angle y = 180°$	4
5	$m\angle a = 180° - m\angle x$ $m\angle b = 180° - m\angle z$ $m\angle c = 180° - m\angle y$	5 Subtraction property of equality
6	$m\angle a + m\angle b + m\angle c = 180°$	6
7	$180° - m\angle x + 180° - m\angle z + 180° - m\angle y = 180°$	7
8	$540° - m\angle x - m\angle z - m\angle y = 180°$	8 Commutative and Associative Properties of Addition and Subtraction
9	$-m\angle x - m\angle z - m\angle y = -360°$	9
10	$m\angle x + m\angle z + m\angle y = 360°$	10 Multiplication property of equality

6 *Instructional Task 2 (MTR.2.1, MTR.4.1, MTR.5.1)*

Provide students with various sizes and types of triangles cut from a paper; large enough for students to tear off the vertices of the triangles. Additionally, provide students tape, glue stick and blank piece of paper.

Part A. Using one of the triangles provided, tear off the vertices.

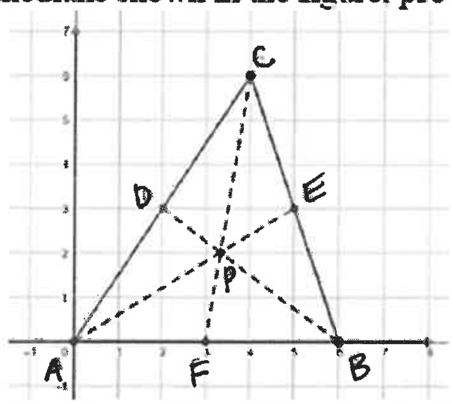
Part B. Place the three vertices in such a way that they are adjacent and create a straight line. If necessary, use tape or glue to keep the vertices in place on the straight line.

Part C. What do you notice about the type of angle the three vertices create? If each of the angle measured are added together, how many degrees does it sum to?

Part D. How does this relate to the Triangle Sum Theorem?

7 *Instructional Task 3 (MTR.2.1, MTR.4.1, MTR.5.1)*

Given triangle ABC and its medians shown in the figure, prove that they meet in a point, P.



Part A. Find the midpoints of the three sides of the triangle ABC (D, E and F).

Part B. Write the equations of the lines containing two of the medians of the triangle.

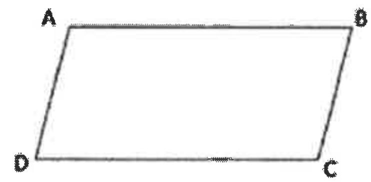
Part C. Find the solution of the system of equations created from Part B. Compare your solution with a partner.

Part D. Write the equation of the line containing the third median of the triangle.

Part E. Check that the solution found from Part C satisfies the equation from Part D. If so, what can you conclude about the three medians of the triangle?

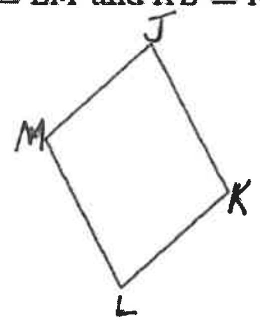
(8) *Instructional Task 1 (MTR.3.1)*

Given parallelogram $ABCD$, prove that angle A and angle B are supplementary.



(9) *Instructional Task 2 (MTR.4.1)*

Given quadrilateral $JKLM$ with $\overline{JK} \cong \overline{LM}$ and $\overline{KL} \cong \overline{MJ}$.



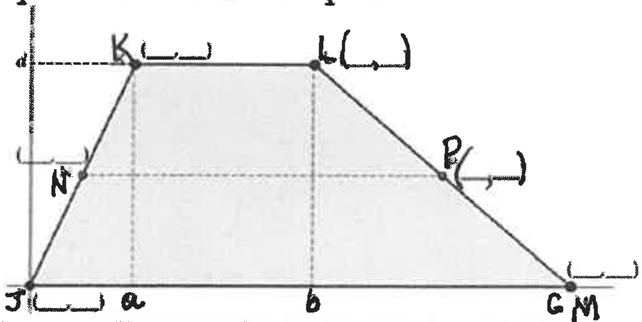
Part A. Draw the diagonal connecting points M and K. Determine and prove that two triangles are congruent.

Part B. Using the congruent triangles from Part A, what is true about segments MJ and LK?

Part C. Prove that quadrilateral $JKLM$ is a parallelogram.

10 *Instructional Task 1 (MTR.3.1)*

Trapezoid $JKLM$ is graphed on a coordinate plane.



Part A. What are the coordinates of points J, K, L and M?

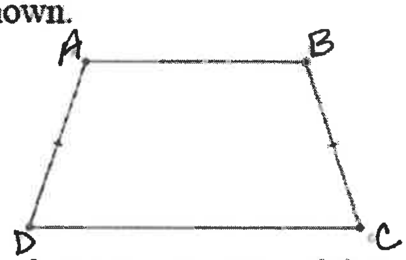
Part B. N is the midpoint of segment JK and P is the midpoint of segment LM. What are the coordinates of points N and P?

Part C. What are the lengths of segments KL, JK and NP?

Part D. Use your answers from Parts A through C to prove the Trapezoid Midsegment Theorem.

11 *Instructional Task 2 (MTR.5.1)*

Isosceles trapezoid $ABCD$ is shown.



Part A. Prove that $\angle A$ is supplementary to $\angle D$ and that $\angle B$ is supplementary to $\angle C$.

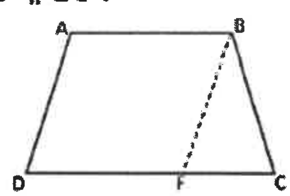
Part B. Prove that $\angle A \cong \angle B$.

Part C. Prove that $\angle A$ is supplementary to $\angle C$ and that $\angle B$ is supplementary to $\angle D$.

Part D. What do you know about isosceles trapezoid $ABCD$ based on the proofs from Parts A to C?

12 *Instructional Task 3 (MTR.3.1)*

Quadrilateral $ABCD$ is shown with a base that is parallel to its opposite side and has a pair of non-parallel sides. Assume that $\overline{AD} \parallel \overline{BF}$.



Part A. Prove that if non-parallel sides are congruent, then triangle BFC is an isosceles triangle.

Part B. Prove that if the base angles, $\angle C$ and $\angle D$, are congruent, then triangle BFC is an isosceles triangle.

Part C. Prove that the base angles are congruent if and only if the non-parallel opposite sides are congruent.

Part D. Classify the quadrilateral.

13 *Instructional Task 1 (MTR.7.1)*

An artist rendering for the Hapbee Honey Company logo is on a 24" x 36" canvas. The company wants to use the logo on a postcard and is determining the size of the logo based on the different mailing costs. According to the United States Postal Service, mailing costs are determined using the following information.

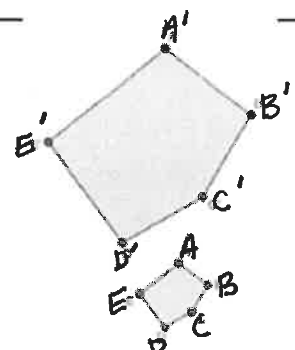
Postcard Size	Price
First-Class Mail® Postcards Maximum size: 6 inches long by 4.25 inches high by 0.016 inch thick	\$0.40
First-Class Mail® Stamped Large Postcards Maximum size: 11.5 inches long by 6.125 inches high by 0.25 inch thick	\$0.58

Part A. What is the maximum length of the postcard if it is similar to the original rendering and falls within the First-Class Mail® Postcards dimensions?

Part B. What is the maximum width of the postcard if it is similar to the original rendering and falls within the First-Class Mail® Stamped Large Postcards dimensions?

14 *Instructional Task 2 (MTR.3.1)*

Polygons $ABCDE$ and $A'B'C'D'E'$ are similar and shown.



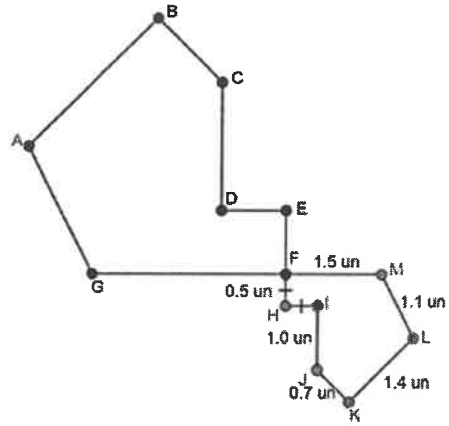
Part A. If $m\angle A' = 103°$, what is the measure of angle A?

Part B. If $m\angle D = 97°$, what other angle has a measure of $97°$?

Part C. Find the value of x if $DC = 2x + 1.5$, $D'C' = 5.1$ and $\frac{BC}{B'C'} = \frac{1}{3}$.

15 *Instructional Task 3 (MTR.5.1)*

Figure $ABCDEFG$ is similar to Figure $LKJIHFM$ with a scale factor of 0.5. Assume that the measure of angle B within Figure $ABCDEFG$ is $90°$.



Part A. If point F is located at the origin and line segments EF and CD are vertical and line segments GF and DE are horizontal, determine possible coordinates of each of the points, except points A and B, on Figure $ABCDEFG$.

Part B. What is the perimeter of Figure $ABCDEFG$?

Part C. What is the length of segment DE?

Part D. What is the perimeter of triangle AGC?

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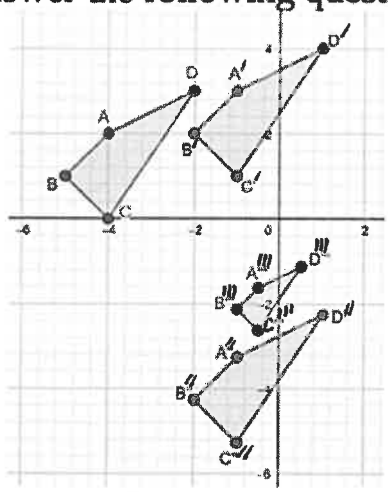
16 *Instructional Task 1 (MTR.3.1)*

Use the graph to the below to answer the following questions.



Part A. Describe the transformation that maps $ABCD$ to $A'B'C'D'$.

Part B. Represent the transformation described in Part A algebraically.

Part C. Algebraically represent the transformation needed to map $A''B''C''D''$ onto $ABCD$.

Part D. Describe the transformation that maps $A''B''C''D''$ onto $A'''B'''C'''D'''$.

Part E. How is the transformation described in Part D related to the transformation needed to map $A'''B'''C'''D'''$ onto $A''B''C''D''$?

17 *Instructional Task 2 (MTR.5.1)*

Preimage	**Transformation**	**Image**
$A(-1.0.5)$		$A'(1,0.5)$
$B(2,0)$	?	$B'(-2,0)$
$C(3,-3)$		$C'(-3,-3)$

Part A. Ask students to plot A, B and C and A', B' and C'on the coordinate plane. What do you notice?

Part B. How can you describe the transformation using words? Explore the patterns among the coordinates of the points of the preimages and the images.

Part C. How can you describe the transformation using coordinate notation?

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18 *Instructional Task 1 (MTR.4.1)*

Penelope made the following statement in Geometry class, "Figure A is a rotation of Figure B about the origin." Chalita disagreed because distance and angle measures are not preserved between the two figures.

- Figure A has the coordinate points $(1,-1)$, $(3,-1)$ and $(1,-2)$.
- Figure B has the coordinate points $(0.8,1)$, $(1,3)$ and $(2,0.8)$.

Part A. What does "distance and angle measures are not preserved" mean in relation to the two figures?

Part B. Determine whether angle measures were preserved from Figure A to Figure B.

Part C. Determine whether distance measures were preserved from Figure A to Figure B.

Part D. Based on your answers from Part B and Part C, determine which student is correct.

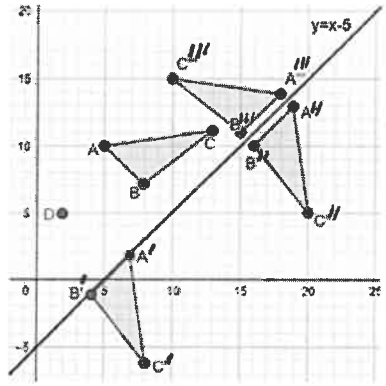
19 *Instructional Task 2 (MTR.3.1)*

Sort the following transformations into preserves distance and does not preserve distance.

Counter-clockwise rotation about the origin.	A translation that moves a figure to the right and up.	A reflection over the line $x = 0$.
A dilation of $\frac{1}{2}$.	Clockwise rotation about the point $(2, -1)$.	A translation that moves a figure to the left and up.
A translation that moves a figure from quadrant I to quadrant III.	A dilation of -3.	Reflection over the x-axis.

Instructional Task 1 (MTR.2.1)

(20)



Part A. From the list provided, choose and order transformations that could be used to map ΔABC onto $\Delta A'''B'''C'''$.

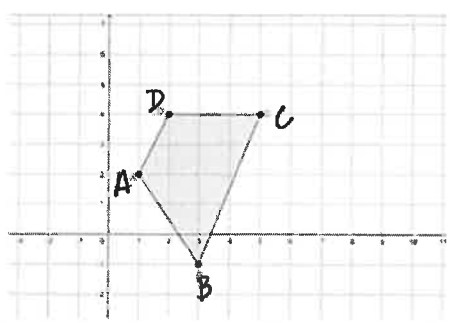
Translate vertically 11 units and horizontally 12 units	Rotate 270° counterclockwise about point D
Rotate 90°counterclockwise about the origin	Reflect over $y = x$
Reflect over $y = x - 5$	Translate vertically 12 units and horizontally 11 units

Part B. Describe the transformation that maps $\Delta A''B''C''$ onto $\Delta A'''B'''C'''$.

Instructional Task 1 (MTR.3.1, MTR.5.1)

(21) Part A. On the coordinate plane, draw the resulting figure after transforming quadrilateral $ABCD$ through the following sequence below.

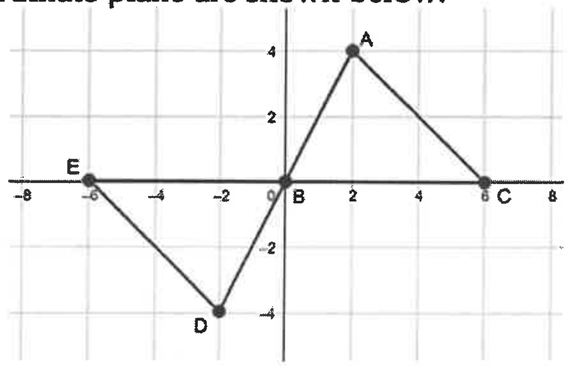
- Reflect quadrilateral $ABCD$ over the line $y = x$.
- Translate horizontally and vertically the resulting figure using $(x, y) \rightarrow (x + 3, y - 2)$.



Part B. Would the resulting figure be the same if the transformations were reversed? How did you come to your conclusion?

Instructional Task 1 (MTR.3.1, MTR.4.1)

22 Two triangles on the coordinate plane are shown below.

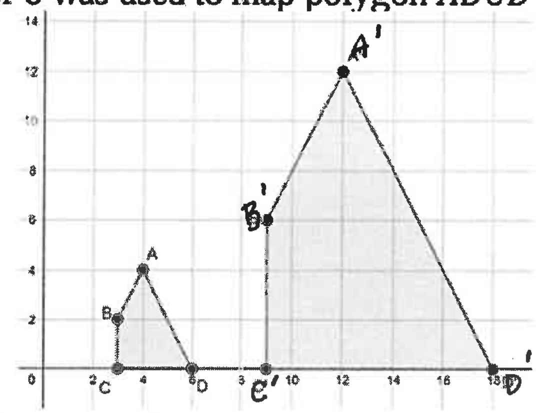


Part A. What transformation(s) could be applied to map triangle EBD onto triangle CBA?

Part B. Once the transformation is completed, how can you determine if the two triangles are congruent?

Instructional Task 1 (MTR.3.1)

23 A dilation with scale factor 3 was used to map polygon $ABCD$ onto polygon $A'B'C'D'$.



Part A. Fill in the blanks with either *congruent* or *proportional.*

If the figures are similar, the corresponding sides are _______ and corresponding angles are_________.

Part B. Identify the sequence of rigid and non-rigid transformations that maps polygon $ABCD$ onto polygon $A'B'C'D'$.

Part B. Use the definition of similarity to prove that polygon $ABCD$ is similar to polygon $A'B'C'D'$. You may need to decompose the polygon into triangles and rectangles.

24 *Instructional Task 1 (MTR.2.1, MTR.4.1, MTR.5.1)*

Three numbers are provided below. Use these numbers to answer each question below.

0, 1, 2

Part A. What is the mean (m_1) of the three numbers?

Part B. Choose two of the numbers and determine their mean (m_2).

Part C. Determine the weighted average of m_2 and the third number using the weights $\frac{2}{3}$ and $\frac{1}{3}$. What do you notice?

Part D. Repeat Parts B and C with a different choice of the two numbers.

Part E. Repeat Parts A, B and C with any three real numbers, x, y and z. Share your answers with a partner. What do you notice?

25 *Instructional Task 1 (MTR.2.1, MTR.4.1)*

Part A. What are the coordinates of P if PQR is a right triangle and $Q(-1,2)$ and $R(3,0)$?

Part B. Show that $PQ^2 + QR^2 = PR^2$.

Part C. Compare your right triangle with a partner.

26 *Instructional Task 2 (MTR.3.1)*

Three vertices of quadrilateral $PQRS$ are at the points $Q(-2,1)$, $R(3,-1)$ and $S(-2,-3)$.

Part A. What are possible coordinates of P if $PQRS$ is a parallelogram?

Part B. Show that $\overline{PR}$ bisects $\overline{QS}$.

Part C. Justify that $PQRS$ is a parallelogram.

27 *Instructional Task 3 (MTR.3.1, MTR.4.1)*

Coordinates for three two-dimensional figures are given.

Figure A $(2,3)$, $(3,-4)$, $(3,-2)$

Figure B $(3,3)$, $(2,-1)$, $(-2,0)$, $(-1,4)$

Figure C $(-2,3)$, $(-3,1)$, $(0,-4)$, $(3,2)$

Part A. Plot the points on the coordinate plane.

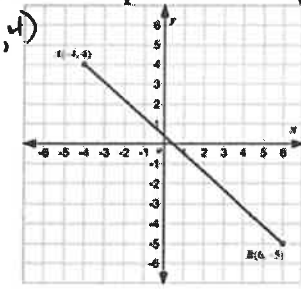
Part B. Write a conjecture about the specific name of each two-dimensional figure. What would you need to determine your conjectures are true?

Part C. Classify each figure.

28 *Instructional Task 1 (MTR.3.1)*

What are the coordinates of the point that partitions segment AB in the ratio $2:3$?

A(-4,4)



B (6,-5)

29 *Instructional Task 2 (MTR.5.1)*

Circle A has center located at $(2,2)$ and contains the point $(4,4)$.

Part A. Write the equation that describes circle A.

Part B. Write the equation of a line tangent to Circle A at $(4,4)$.

Part C. Find the equation of a vertical tangent line and of a horizontal tangent line.

30 *Instructional Task 3 (MTR.3.1)*

Triangle ABC has two of its the vertices located at $(-4,-1)$ and $(3,-3)$.

Part A. Triangle ABC has a centroid located at $\left(-1,\frac{1}{3}\right)$. What is the third vertex of the triangle?

Part B. Determine whether triangle ABC is a right triangle based on its angle measures and side lengths.

Part C. If triangle ABC is not a right triangle, can you classify what type of triangle ABC is?

31 *Instructional Task 1 (MTR.3.1, MTR.6.1)*

Given parallelogram $EFGH$ with vertices $E(-1,5)$, $F(2,8)$, $G(4,4)$ and $H(1,1)$.

Part A. Find the exact perimeter and area of the parallelogram.

Part B. Find the perimeter and area of the parallelogram to the nearest tenth.

32 *Instructional Task 2 (MTR.2.1, MTR.4.1)*

Joe's commute to work can be represented in the coordinate plane as follows:

- His house is at $H(0,0)$.
- His favorite coffee shop is at $C(7,6)$ where he stops every morning.
- His office is at $W(4,13)$.
- He goes back home from his office every day without stopping.

Part A. Assume that Joe lives in a city where the roads are parallel to the coordinate axes and each intersection occurs at integer coordinates. Represent his route on the coordinate plane where each city block is one coordinate unit by one coordinate unit, which measures 175 yards by 175 yards.

Part B. What is the total distance, in yards, that Joe commutes every day, assuming that he stays on the roads?

Part C. If Joe could take the most direct route (cutting across city blocks) for his commute, what would be his total distance, in yards, that he commutes every day?

33 *Instructional Task 1 (MTR.3.1, MTR.4.1)*

Part A. Draw and name right three-dimensional figures that could have a triangular cross-section.

Part B. Draw and name right three-dimensional figures that could have a circular cross-section.

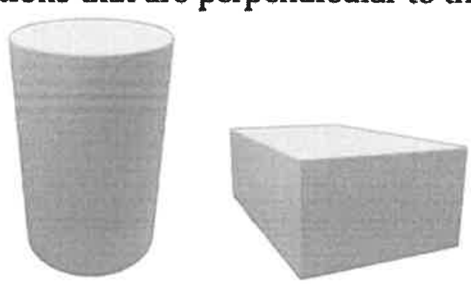
Part C. Compare your answers from Parts A and B with a partner.

34 *Instructional Task 2 (MTR.3.1)*

Part A. Fill in the blank below.

Both a right cylinder and a right prism have ________ cross-sections when cut perpendicular to the base.

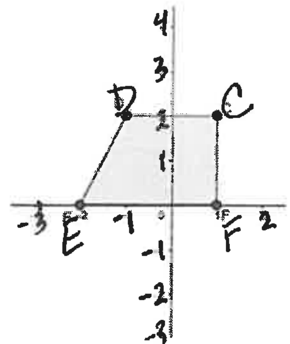
Part B. Draw some cross-sections that are perpendicular to the base for each figure below.



35 *Instructional Task 1 (MTR.4.1, MTR.5.1)*

Trapezoid $DCFE$ is shown on the coordinate plane below.

35



Part A. If the trapezoid is extended to create right triangle EFB, what are the coordinates of point B?

Part B. If triangle EFB is rotated about line $x = 1$, what figure will it generate?

Part C. Determine the volume of the generated from Part B.

Part D. If trapezoid $DCFE$ is rotated about line $x = 1$, describe the figure that is generated.

Part E. Determine the volume of the generated from Part D.

Part F. If trapezoid $DCFE$ is rotated about line $x = 3$, what figure will it generate?

Part G. Determine the volume of the generated from Part F.

Instructional Task 2 (MTR.3.1)

36 Describe the figure that would be generated from the result of rotating a circle about a line outside the circle.

Instructional Task 1 (MTR.4.1, MTR.5.1)

37 Use the table below to answer the following questions.

Original Square Pyramid	Dilation with scale factor k	New Surface Area	New Volume
Length of the base is 4 inches Width of the base is 4 inches Height of the pyramid is 2 inches Surface Area = _______ sq. inches Volume = _______ cubic inches	$k = 2$		
	$k = 3$		
	$k = \frac{1}{2}$		

Part A. Determine the surface area and volume of the square pyramid.

Part B. Given the three different dilations, or scale factors, determine the new surface areas and volumes.

Part C. Compare each of the new surface areas to the original surface area. Compare each of the new volumes to the original volume.

Part D. Predict the surface area and volume of the square pyramid resulting from a dilation with a scale factor of 5? Explain the method you choose.

Instructional Task 1 (MTR.7.1)

38 In 2019, the population of Leon County was 293,582 and the population of Sarasota County was 433,742. The area of Sarasota County is 752 square miles, while the area of Leon County is 702 square miles.

Part A. Which county has a higher population density?

Part B. If the physical shape of the county identified in Part A was a rectangle, what are possible dimensions of the county if the length is greater than the width?

Part C. If the county identified in Part A was the physical shape of a right triangle, what are possible dimensions of the base and height of the county?

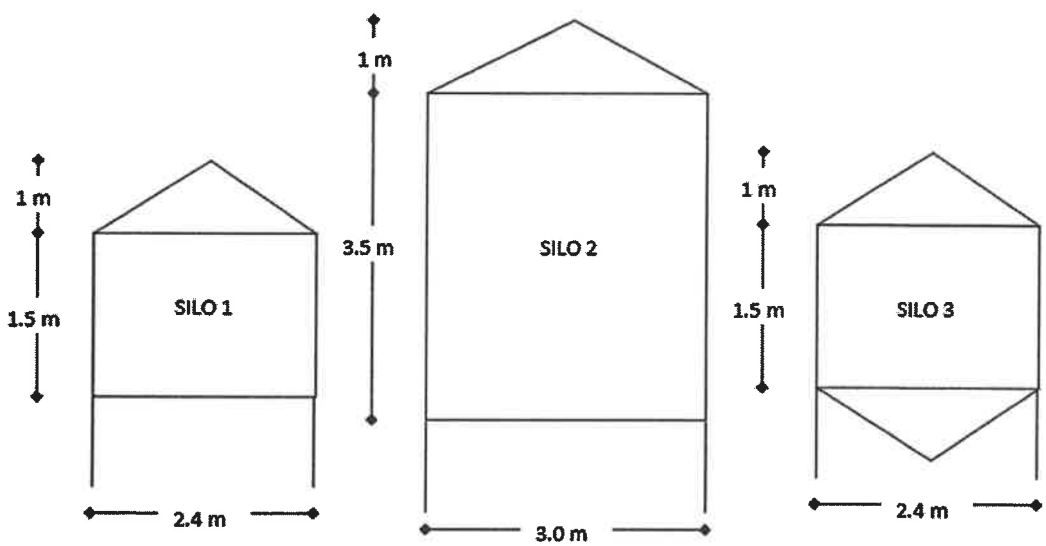
Part D. Does changing the shape of the tract of land change the population density of the county?

Instructional Task 2 (MTR.3.1)

39 The area of a regular decagon is 24.3 square meters. Determine the side length, in meters, of the regular decagon.

Instructional Task 1 (MTR.7.1)

40 When filling cylindrical silos, the top cone is not filled. However, if the silo has a bottom cone, it is filled. Three different silos are shown in the image below.



Part A. In silo 3, the top and bottom cones are congruent. How much more grain could silo 3 hold than silo 1?

Part B. The diameter of silo 1 is 80% the diameter of silo 2. Is the capacity of silo 1 80% the capacity of silo 2?

Instructional Task 2 (MTR.4.1)

41 The radius of a sphere is 4 units so its volume is $\frac{256}{3}\pi$ cubic units.

Part A. Discuss the value of this kind of answer for its accuracy and precision.

Part B. Discuss the effect of replacing π in the formulas with 3.14, 3.1416, $\frac{22}{7}$ and other approximations. What happens with the answer, the volume of the figure, in each case?

Instructional Task 1 (MTR.7.1)

42 There are three Pyramids of Giza. The largest, the Great Pyramid, has an approximately square base with side lengths averaging 230 meters and a lateral surface area of 85,836 square meters. What is the height of the Great Pyramid?

Instructional Task 2 (MTR.4.1)

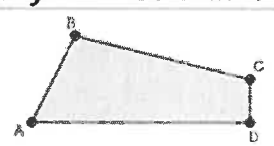
43 The surface area of a sphere with radius 10 is 400π square units.

Part A. Discuss the value of this kind of answer for its accuracy and precision.

Part B. Discuss the effect of replacing π in the formulas with 3.14, 3.1416, $\frac{22}{7}$ and other approximations. What happens with the answer, the surface area of the figure, in each case?

Instructional Task 1 (MTR.2.1, MTR.3.1)

44 Create a construction of quadrilateral $JKLM$ so that it is congruent to quadrilateral $ABCD$.

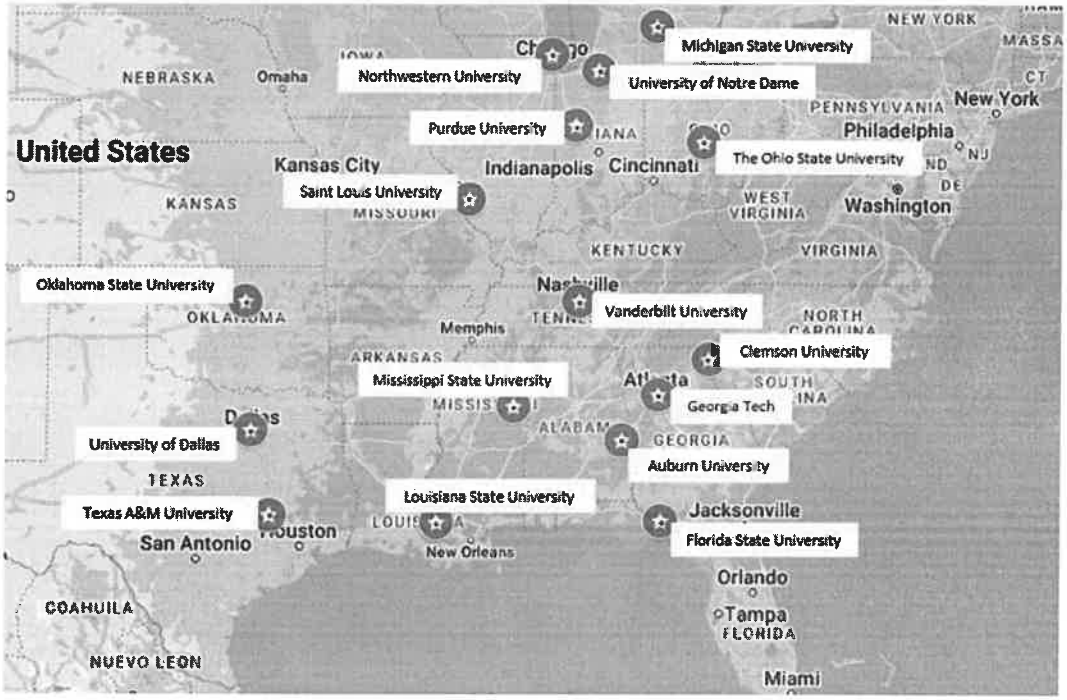


Instructional Task 2 (MTR.2.1, MTR.5.1)

45 Given angle EFG below, create a copy so that it creates parallelogram $EFGH$.

Instructional Task 1 (MTR.7.1)

(46) A map of some popular universities is shown below.



Part A. Prove that Georgia Tech is approximately equidistant from Clemson University and Auburn University.

Part B. Find one or more universities that are approximately equidistant from Florida State University and Oklahoma State University?

Instructional Task 1 (MTR.2.1, MTR.4.1)

(47) Part A. Construct angle bisectors for the three interior angles of a triangle using folding paper, a compass and straightedge and geometric software. What do you notice about each method of construction?

Part B. Repeat Part A with a triangle that is obtuse, isosceles, acute and right. Describe your findings.

Part C. Using the incenter as the center, a circle can be constructed inscribed in the triangle. How can you determine the radius of that circle, the inscribed circle?

Part D. Construct the inscribed circle of one of the triangles from Part B.

Instructional Task 2 (MTR.2.1, MTR.4.1)

(48) Part A. Construct perpendicular bisector for the three sides of a triangle using folding paper, a compass and straightedge and geometric software. What do you notice about each method of construction?

Part B. Repeat Part A with a triangle that is obtuse, isosceles, acute and right. Describe your findings.

Part C. Using the circumcenter as the center, a circle can be constructed circumscribed about the triangle. How can you determine the radius of that circle, the circumscribed circle?

Part D. Construct the circumscribed circle of one of the triangles from Part B.

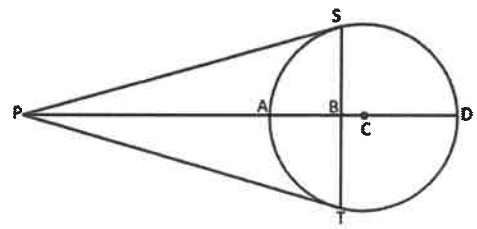
(49) *Instructional Task 3 (MTR.5.1)*

Part A. Given the line l and the point P external to the line l, construct a perpendicular line, m, through point P.

Part B. Use the construction from Part A to construct a line, n, that is parallel to the line l and contains the point P.

Instructional Task 1 (MTR.4.1, MTR.5.1)

(50) Circle C is shown below with various lines and line segments. $\overline{PS}$ and $\overline{PT}$ are tangent to Circle C.



Part A. Write a statement of equality that involves the length of a tangent and the length of a secant.

Part B. Write a statement of equality that involves the lengths of two tangents.

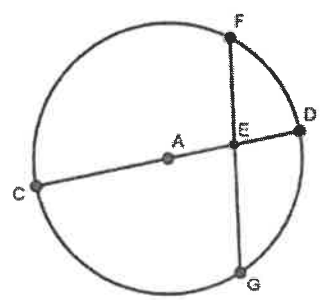
Part C. Write a statement of equality based on the relationship between a chord and a diameter.

Part D. Write a statement of equality that involves the length of a tangent, the length of a line from the center to the external point and the length of a radius.

Part E. Compare your statements from Parts A, B, C and D with a partner.

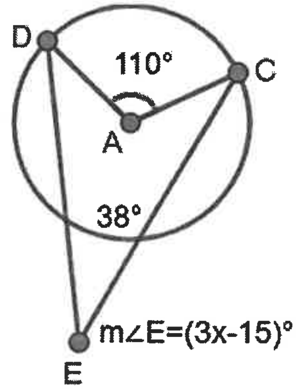
Instructional Task 2 (MTR.3.1)

(51) In Circle A, $AE = DE$, $FE = 6$ inches and $GE = 10$ inches. What is the length of the radius of Circle A?



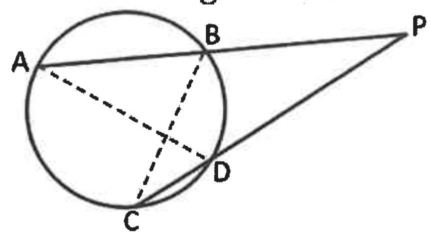
Instructional Task 1 (MTR.3.1)

(52) Find the measure of angle E in circle A.



Instructional Task 2 (MTR.2.1, MTR.4.1, MTR.5.1)

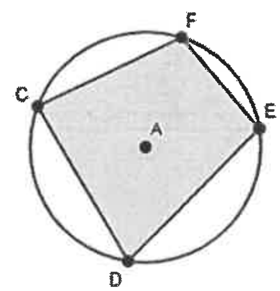
53 A circle is given below with two intersecting secants, $\overline{PA}$ and $\overline{PC}$.



Part A. What is the sum of the measures of angle BCP, angle CPB and angle PBC?
Part B. What is the sum of the measures of angle PBC and angle ABC?
Part C. What can you conclude about the relationship between the sum of the measures of the three angles from Part A and the sum of the measures of the two angles from Part B?
Part D. Using the information from Part C, what can you conclude about the measure of angle CPB? State your conclusion algebraically as an equation where $\measuredangle CPB =?$.
Part E. How can you use the information from Part D, to justify the Secant-Secant Angle Theorem which states that $\measuredangle CPB = \frac{m\widehat{AC} - m\widehat{BD}}{2}$?

Instructional Task 1 (MTR.3.1)

54 Quadrilateral $DCFE$ is inscribed in Circle A and the measure of angle D is 75°.



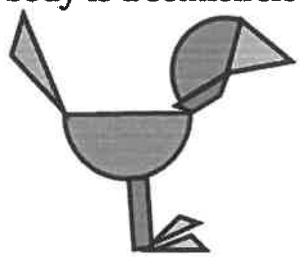
Part A. What is the measure of angle CAE? What is the measure of angle CFE?
Part B. What is the measure of arc CDE?
Part C. What can you determine about the measures of angle DCF and angle FED?

Instructional Task 2 (MTR.4.1)

55 Given a quadrilateral is inscribed in a circle and one of the diagonals is a diameter of the circle. Classify the possible types of quadrilaterals it could be.

Instructional Task 1 (MTR.7.1)

56 De'Veon must create an animal using geometric shapes for his Geometry class. He has decided to use construction paper scraps from his mom's crafting box to create a bird, like the one shown below. The head is a made from a sector with radius 1.5 centimeters and central angle measuring 130°. The body is a semicircle with radius 1.9 centimeters.



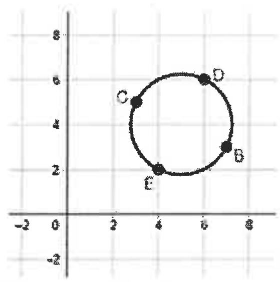
Part A. What fraction of the whole circle is the head?

Part B. How much glitter string will he need to outline the part of the bird's head that is not touching the beak or neck?

Part C. What is the total area of light blue construction paper used to create the bird (i.e., the area of the head and the body)?

Instructional Task 1 (MTR.4.1)

57 A circle on the coordinate plane is given. Segments CB and ED are diameters of circle A. Point C is located at (3,5), point D is located at (6,6), point B is located at (7,3) and point E is located at (4,2).



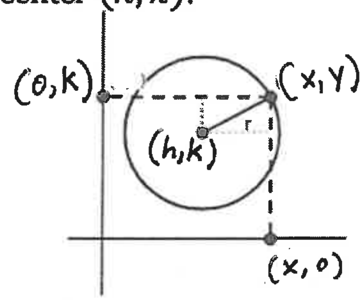
Part A. Determine the center of the circle. Explain your method.

Part B. Find the length of the radius of circle A. Explain your method.

Part C. Write the equation of the circle and check that the points B, C, D and E satisfy the equation.

Instructional Task 2 (MTR.2.1, MTR.5.1)

58 Point (x, y) is on a circle with center (h, k).



Part A. The horizontal distance between point (x, y) and center (h, k) can be represented as ______. The vertical distance between the point (x, y) and center (h, k) can be represented as ______.

Part B. Using Pythagorean Theorem, write an equation for the radius in terms of (x, y) and (h, k).

Part C. Because (x, y) could be any point on the circle, this is the equation of a circle where (h, k) is the ________________ of the circle and r is the ______________ of the circle.

Instructional Task 3 (MTR.7.1)

59 A school's campus is designed in the shape of a circle. The architect would like to place the cafeteria equidistant from the Freshman building and from the Senior building. On a coordinate plane, the Freshman building is located at the point $(431, 219)$ and the Senior building is located at the point $(0,0)$, where the coordinates are given in feet. Assume that the endpoints of the diameter of circle are the Freshman building and the Senior building and that the cafeteria is on the line connecting the two buildings.

Part A. Determine the location of the cafeteria.

Part B. How far is it from the cafeteria to the Freshman building?

Part C. Write an equation that represents the boundary of the circular campus.

Part D. If the campus were to have a circular fence along its boundary, what is the total length of the fence, in feet?

Instructional Task 1 (MTR.4.1, MTR.7.1)

60 Nikita is trying to determine which sprinkler to buy for her backyard. One rotating sprinkler has a throwing radius of 32 feet, which costs \$13.99, and the other rotating sprinkler has a throwing radius of 42 feet, which costs \$16.99. Note that the sprinkler throwing radius refers to the radius of the spray when the sprinkler is being used.

Part A. Write an equation that describes the region each sprinkler will cover if centered at the position (h, k).

Part B. Nikita's backyard is approximately a rectangle with dimensions 80 feet by 110 feet. Nikita would like to place her sprinklers so that she waters the majority of her backyard, doubling coverage with two or more sprinklers when necessary. Develop a pattern of sprinklers that would cover the backyard.

Part C. Compare your sprinkler pattern and cost with a partner. Can you and your partner determine a better, and cheaper, solution?

Instructional Task 1 (MTR.2.1)

61 Provide students with a set of similar right triangles and their side lengths.

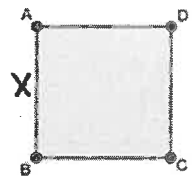
Part A. Identify corresponding angles and label them as $\angle A$, $\angle B$ and $\angle C$, with $\angle C$ denoting the right angle.

Part B. Write the following ratios for each one of the right triangles with respect to $\angle A$: $opposite\ leg : hypotenuse$, $adjacent\ leg : hypotenuse$ and $opposite\ leg : adjacent\ leg$. What do you notice?

Part C. How do your ratios created in Part B relate to sine, cosine and tangent?

Instructional Task 1 (MTR.3.1)

62 $ABCD$ is a square.



Part A. What is the measure of segment BD?

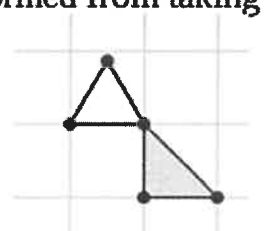
Part B. What is the measure of segment AC?

Part C. If the measure of segment BD is 14 units, what is the measure of segment BC?

Instructional Task 2 (MTR.7.1)

63 Part A. A company is requesting equilateral tiles to be made for their new office floor. If the height of the tile is approximately 10.4 inches, what is the length of the sides of the triangle?

Part B. The same company decides they also want to use half of a square with the side the same length as the height of the equilateral triangle. What is the length of the hypotenuse of the triangle formed from taking half of the square?



Instructional Task 1 (MTR.7.1)

64 Use the statements below to identify the converse, inverse and contrapositive of the statement "If I can run a 5K race in under 27 minutes, then I can start the race at the front of the pack."

- If I cannot run a 5K race in under 27 minutes, then I can start the race at the front of the pack.
- If I cannot run a 5K race in under 27 minutes, then I cannot start the race at the front of the pack.
- If I can run a 5K race in under 27 minutes, then I cannot start the race at the front of the pack.
- If I cannot start the race at the front of the pack, then I cannot run a 5K race in under 27 minutes.
- If I can start the race at the front of the pack, then I can run a 5K race in under 27 minutes.

Instructional Task 2 (MTR.4.1)

65 Part A. Write an "if…then" statement involving a quadrilateral.

Part B. Rewrite the statement as an "if and only if" statement. How are the two statements different in their meaning?

Instructional Task 1 (MTR.3.1)

66 Part A. Which of the following statements are true?

- If a quadrilateral is a square, then it is a rectangle.
- All trapezoids are parallelograms.
- Any quadrilateral can be inscribed in a circle.

Part B. Provide counterexamples to prove the invalid statements from Part A are not true.