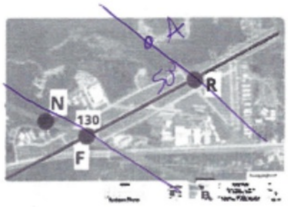
Key

GEOMETRY BEST INSTRUCTIONAL TASKS (FROM ITEM SPECS) 2022-2023

(1)



***From Point F to Point N is heading magnetic North.**

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? Parallel Lines
Make sure it is Magnetic North from Point R.

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

Part C. **Find m<FRA** 180 − 50 = 130°

Part D: What is the name of the angle pair m<NFR and m<FRA?

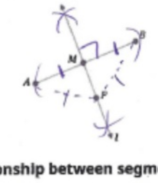
Consecutive (same side) interior angles
& always supplementary (180°)

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

(2)

Part A. **Draw in the markings when using a compass and straightedge to construct line l so that AB is 90 degrees with the intersection of point M, which is the midpoint of AB, what construction is completed?** perpendicular bisector

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?



Point P is on the perpendicular bisector
Both endpoints A & B are Equal Distance to point P

Part C: What is the relationship between segment AM and MB? Congruent M is the midpoint (segment bisector)

Part D: What if a point, Q, was added to line l? Which endpoint of $\overline{AB}$ is closest to point Q?

Equal distant!

Part E: Any point on a perpendicular bisector is
a) equal or b.) not equal to the endpoints of the segment bisector.

3

Instructional Tasks

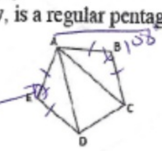
all ∠'s and sides are ≅

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

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

$\frac{180(n-2)}{n}$ $\frac{180(5-2)}{5}$

$\frac{540}{5} = 108^\circ$



$\triangle AED \cong \triangle ABC$

Part A. Can you identify two possible congruent triangles in the figure? yes

SAS Part B. Write a congruence statement for the two triangles that are congruent.

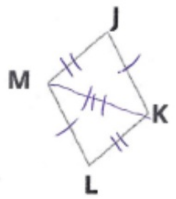
Part C. What theorem or postulate can be used to prove the two triangles congruent?

SAS

4

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.

Make your markings to show which segments are congruent.

Part B. Write a triangle congruency statement, which triangles are congruent. $\triangle KML \cong \triangle KMJ$

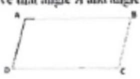
Part C. Which triangle congruency proves the two triangles are congruent? SSS

5

Instructional Tasks

Instructional Task 1 (MTR.3.1)

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



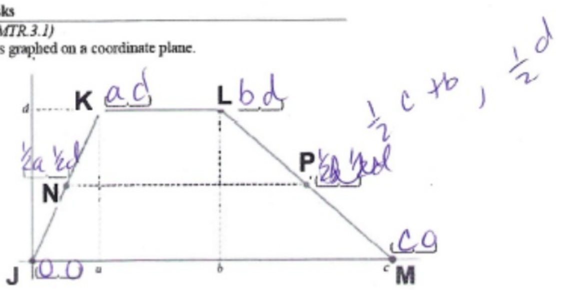
STATEMENTS	REASONS
1.) Quadrilateral ABCD is a parallelogram.	1.) Given
2.) AB||DC and AD||BC	2.) Definition of a parallelogram.
3.) <A and <B are same side (consecutive) interior angles	3.) Same side (consecutive interior) angles of a parallelogram are of 180°
4.) ∠A & ∠B are supplementary	4.) definition of supplementary

6

Instructional Tasks

Instructional Task 1 (MTR.3.1)

Trapezoid *JKLM* is graphed on a coordinate plane.



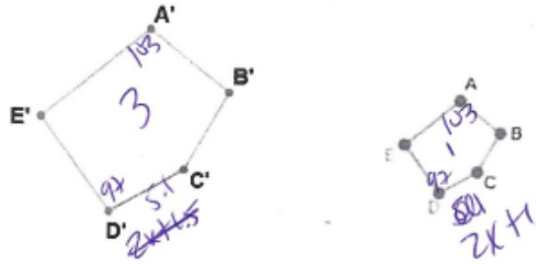
Part A. What are the coordinates of points *J*, *K*, *L* and *M*?

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*?

7

Instructional Task 2 (MTR.3.1)

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



Scale factor is 1/3

$2x+1.5 = 5.1/3$

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

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

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

$5.1 \times 3 = 15.3$ for D'C'

1.7

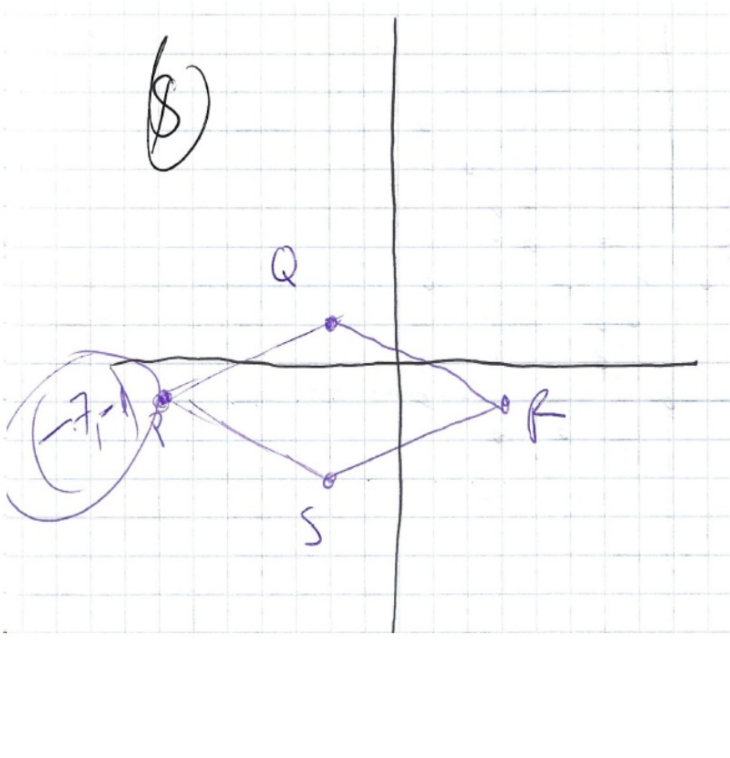
#7 $2x+1.5 = 1.7$ because $5.1/3 = 1.7$

$\frac{2x}{2} = \frac{0.2}{2}$ $x = 0.1$

Instructional Task 2 (MTR.3.1)

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

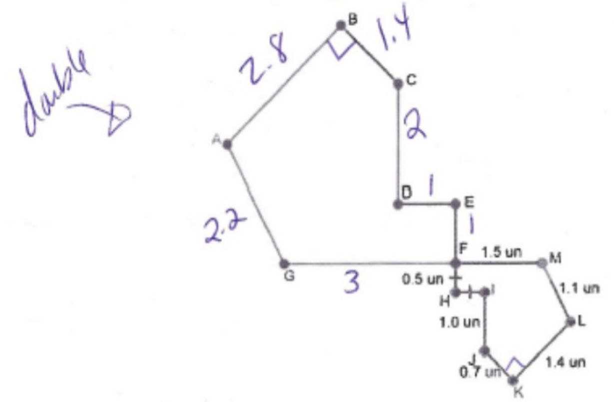
Part A. What are possible coordinates of P if $PQRS$ is a parallelogram?



9

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°.



$P = 6.7$
$\times 2$

Part **A**. What is the perimeter of Figure $ABCDEFG$? 13.4

Part **B**. What is the length of segment DE? 1

Instructional Task 2 (MTR.5.1)

10

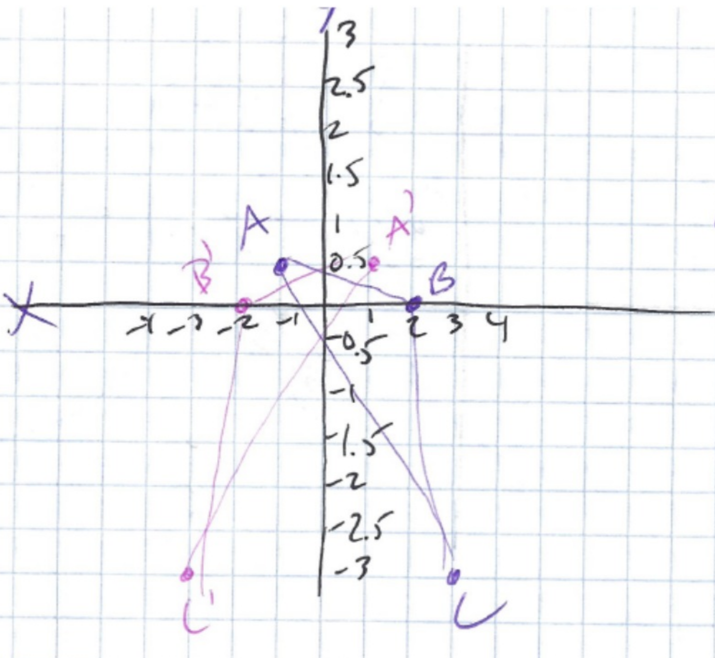
Preimage	Transformation	Image
$A(-1.0.5)$		$A'(1, 0.5)$
$B(2, 0)$	?	$B'(-2, 0)$
$C(3, -3)$		$C'(-3, -3)$

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

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. $(-x, y)$

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

10



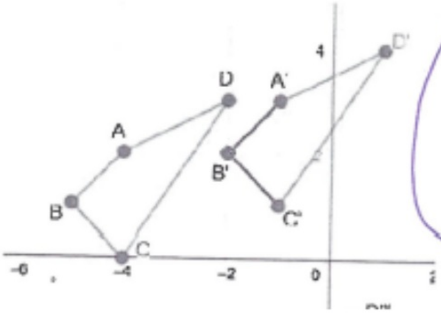
reflection across the y-axis

(11) √ (coordinates))

Instructional Tasks

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 $A'B'C'D'$. 3 Right 1 up

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

(X+3, Y+1)

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

(11) A, B, C, D A' B' C' D'

(-4,2) (-7,1) (-4,0) (-2,3) (-1,3) (-2,2) (~~-1,1~~) (1,4)

(-1,1)

(x+3, y+1)

Part A|B

(12) $(x+.6, y-1)$

Instructional Tasks

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? not similar & not congruent

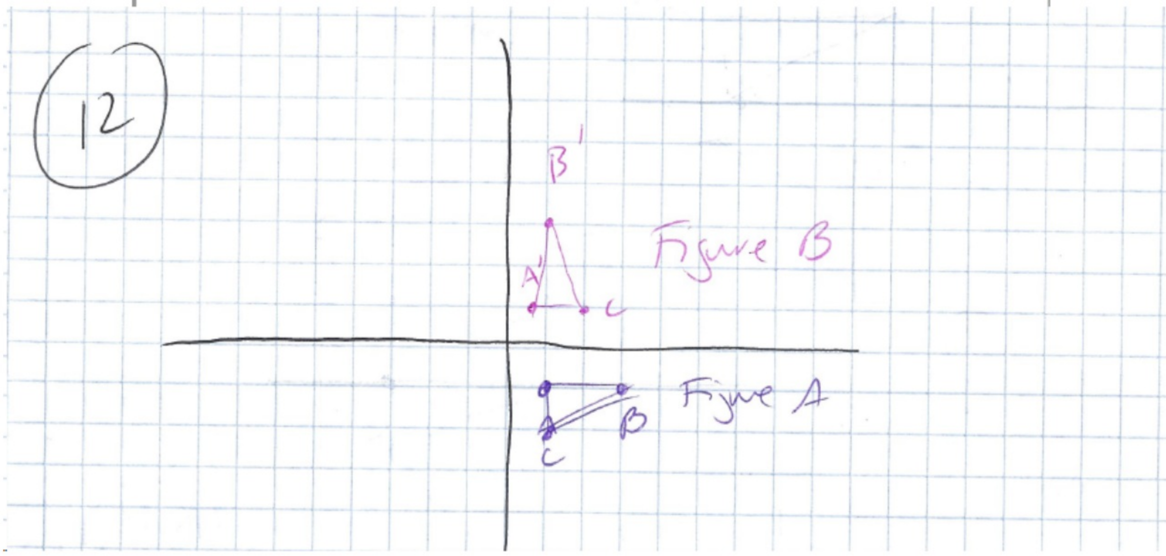
no Part B. Determine whether angle measures were preserved from Figure A to Figure B.

no 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.

prove by slope

(12)



13

(RM)
Rigid Motion

Instructional Task 2 (MTR.3.1)

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

Counter-clockwise rotation about the origin. RM	A translation that moves a figure to the right and up. RM	A reflection over the line $x = 0$. RM
A dilation of $\frac{1}{2}$. Doesn't preserve distance	Clockwise rotation about the point $(2, -1)$. RM	A translation that moves a figure to the left and up. RM
A translation that moves a figure from quadrant I to quadrant III. RM	A dilation of -3. doesn't preserve distance	Reflection over the x-axis. RM

Instructional Tasks

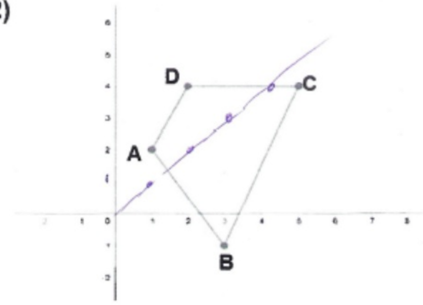
Instructional Task 1 (MTR.3.1, MTR.5.1)

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

14

- Reflect quadrilateral $ABCD$ over the line $y = x$.
- Translate horizontally and vertically the resulting figure using $(x, y) \rightarrow$ from orig or new ?

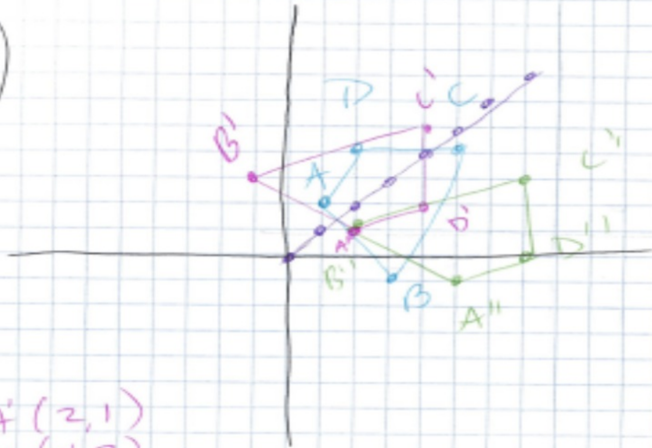
(x + 3, y-2)



Part B. Would the resulting figure be the same if the transformations were reversed? How did you come to your conclusion? ? no ?

NO

14



A' (2, 1)
B' (-1, 3)
C' (4, 5)
D' (4, 2)

(x+3, y-2)

A'' (5, -1)
B'' (2, 1)
C'' (7, 3)
D'' (7, 0)

15

(0,4)

(-1,0) or (8)

Instructional Tasks

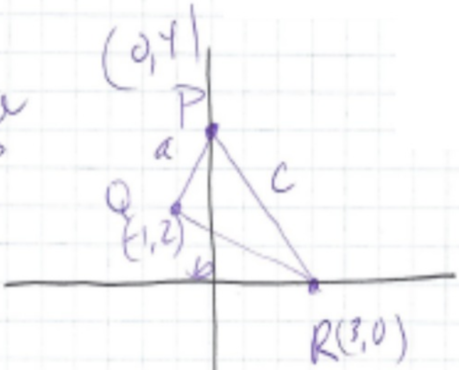
Instructional Task 1 (MTR.2.1, MTR.4.1)

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 $PQ^2 + QR^2 = PR^2$.

See graph!

PQ is a
PQ is b



PR $\sqrt{(3-0)^2+(0-4)^2}$

3^2+4^2

$9+16$

$\sqrt{25}$

$=5$

Slope $= -\frac{1}{2}$

perp $\frac{2}{1}$ from Q

$a^2+b^2=c^2$

$(\sqrt{5})^2+(\sqrt{20})^2=c^2$

$5+20=c^2$

$25=c^2$

$5=c$

PQ $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$(-1-0)^2+(2-4)^2$

$1+4$

$\sqrt{5}$

QR $\sqrt{(-1-3)^2+(2-0)^2}$

-4^2+2^2

$16+4$

$\sqrt{20}$

See graph!

16

Instructional Tasks

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 $\frac{0+1+2}{3} = \frac{3}{3} = 1$

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

$\frac{0+2}{2} = 1$ 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?

ore 1 deps.

$1 \cdot \frac{2}{3} + 2 \cdot \frac{1}{3}$

$\frac{2}{3} + \frac{2}{3} \quad \frac{4}{3} = \frac{4}{3}$

Instructional Task 1 (MTR.3.1)

16 Part A: $\frac{0+1+2}{3} = 1$

Part B $\frac{0+2}{2} = 1$

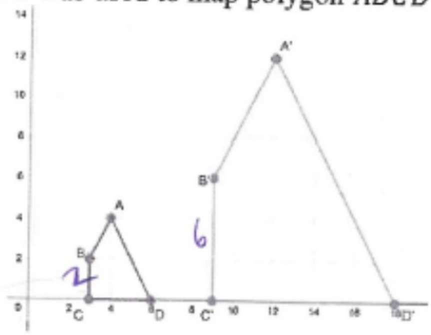
Part C: $1 \cdot \frac{2}{3} \quad 2 \cdot \frac{1}{3}$

$\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$

Instructional Task 1 (MTR.3.1)

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

17



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

If the figures are similar, the corresponding sides are proportional and corresponding angles are congruent

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

dilation

Scale factor

$K=3$

18

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

Coordinates for three two-dimensional figures are given.

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

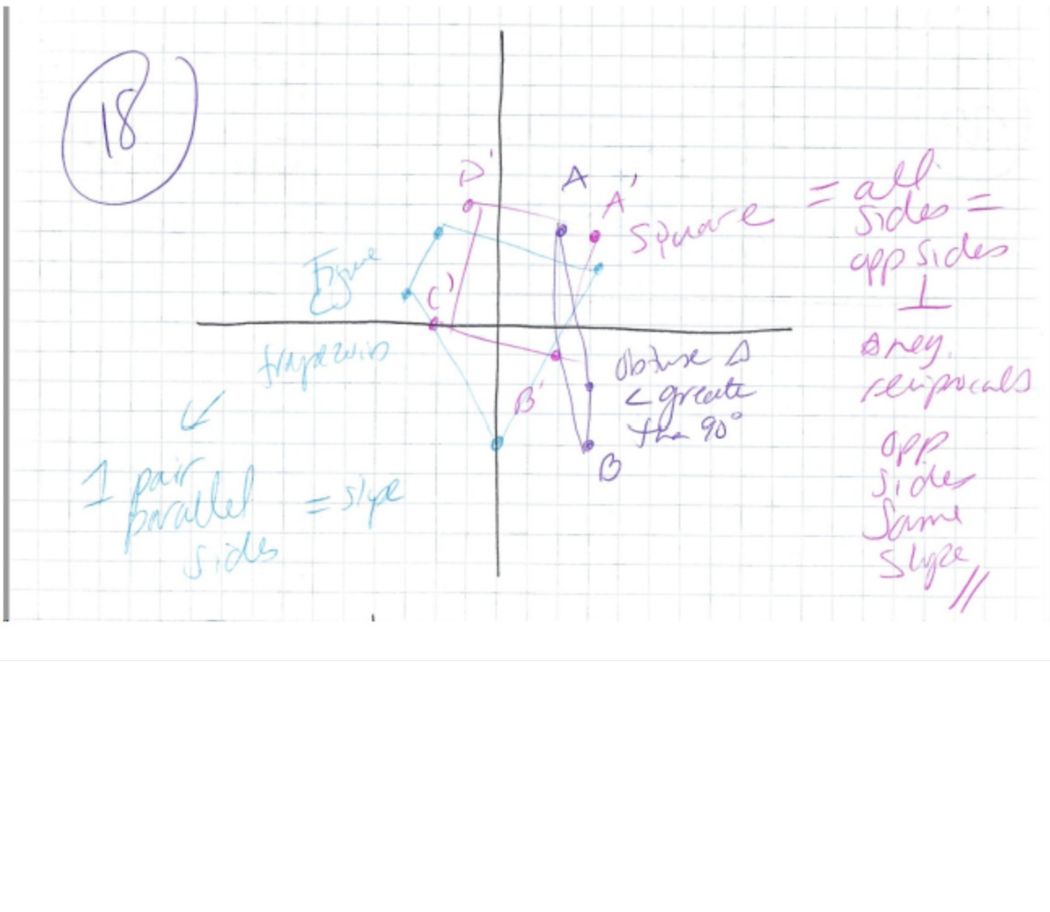
Figure B $(3,3)$, $(2,-1)$, $(-2,0)$, $(-1,4)$

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

Part A. Plot the points on the coordinate plane. Obtuse square trapezoid

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.



19

Instructional Task 1 (MTR.3.1)

What are the coordinates of the point that partitions segment AB in the ratio 2:3?
Point A is located at (-4,4) and Point B is at (6,-5)

19

$-4 \quad 6$ / $2:3$ $\qquad$ $4, \ -5$ / $2:3$

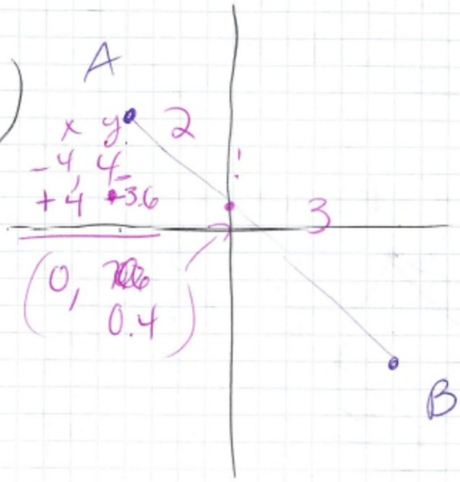
$\frac{-12+12}{5} = \frac{0}{5}$ $\qquad$ $\frac{-10+12}{5} = \frac{2}{5}$

$(0, \ \frac{2}{5})$

19

x y
-4 4
+4 -3.6

(0, 0.4)



Slope of AB $\frac{9}{10}$

2:3
5 total parts
going $\frac{2}{5}$ of the way

$\frac{y \ 9 \cdot \frac{2}{5} = \frac{18}{5} = 3.6}{x \ 10 \cdot \frac{2}{5} = \frac{20}{5} = 4}$

20

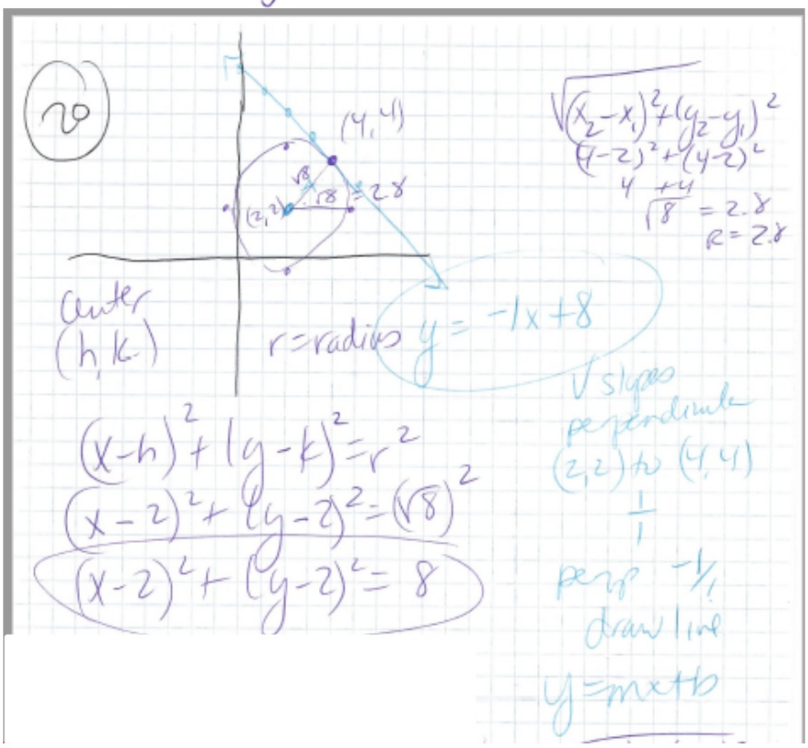
Instructional Task 2 (MTR.5.1)

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 $(4,4)$.

$(x-2)^2 + (y-2)^2 = 8$ $\quad y = -1x+8$ $\quad y = -x+8$



(21)

$6\sqrt{2}+4\sqrt{5}$ 17.4 see smp

Instructional Tasks

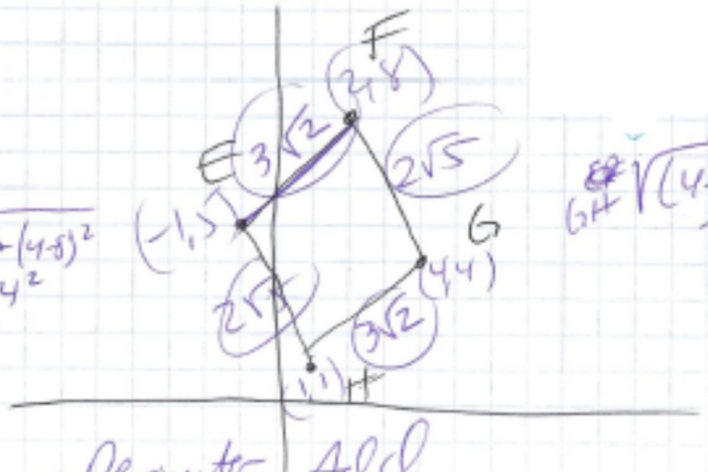
Instructional Task 1 (MTR.3.1, MTR.6.1)

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.

(21)



FG $\sqrt{(4-2)^2+(4-8)^2}$

2^2+4^2

$4+16$

20

$\sqrt{20}$

$\sqrt{4}\cdot\sqrt{5}$

$2\sqrt{5}$

GH $\sqrt{(4-1)^2+(4-1)^2}$

3^2+3^2

$9+9$

$\sqrt{18}$

$\sqrt{9}\cdot\sqrt{2}$

$3\sqrt{2}$

Perimeter | Add

$3\sqrt{2}+3\sqrt{2}+2\sqrt{5}+2\sqrt{5}$ $8.485+8.94$

$(6\sqrt{2}+4\sqrt{5})$ or (17.4)

area L·W

$(3\sqrt{2})(2\sqrt{5})$

$6\sqrt{10}$

(19) 18.97

the perimeter and area of the parallelogram to the nearest tenth.

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

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

22

- 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.

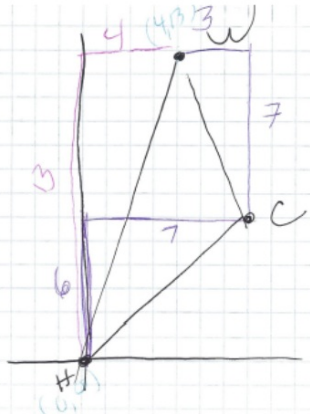
Part A. Assume that Joe lives in a city where the roads are parallel to the coordinate axes and each intersection occurs at integer coordinates. Represent his route on the coordinate plane where each city block is one coordinate unit by one coordinate unit, which measures 175 yards by 175 yards.

Part B. What is the total distance, in yards, that Joe commutes every day, assuming that he stays on the roads? 7000

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?

2380.26

22



$$6 + 7 + 7 + 3 = 23$$

$$23 \times 175 = 4{,}025$$

4,025 yds to work

$$4 + 13 = 17$$

$$17 \times 175 = 2975$$

7,000

distance of $\overline{WH}$

$(4, 13)$ $(0, 0)$

$x_1\ y_1$ $x_2\ y_2$

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$(0-4)^2+(0-13)^2$$

$$(-4)^2+(-13)^2$$

$$16+169$$

$$\sqrt{185}$$

$$13.6 \times 175 = \boxed{2{,}380.26}$$

23

Instructional Tasks

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

***Use the choices below to answer part** A,B, and C 2,5,8

1,3 **Part A. Name three-dimensional figures that could have a triangular cross-section.**

Part B. Name three-dimensional figures that could have a circular cross-section.

4,6,7 **Part C: Name three-dimensional figures that could have a rectangular cross-section.**

1. **Horizontal Cross Section of a Cone**
2. **Vertical Cross Section of a Cone**
3. **Horizontal Cross Section of a Cylinder**
4. **Vertical Cross Section of a Cylinder**
5. **Horizontal Cross Section of a Triangular Prism**
6. **Vertical Cross Section of a Triangular Prism**
7. **Horizontal Cross Section of a Square Pyramid**
8. **Vertical Cross Section of a Square Pyramid**

match these with Parts A,B,C.

(23) Look up images on google for better understanding of cross sections

Part A - triangular

(2) Vertical cross section of a cone
(5) Horizontal cross section of a triangular prism
(8) Vertical cross section of a square pyramid

Part B - circular

(1) - Horizontal cross section of a cone
(3) - Horizontal cross section of a cylinder

Part C - rectangular

(4) - Vertical cross section of a cylinder
(6) - Vertical cross section of a triangular prism
(7) - horizontal cross section of a square pyramid

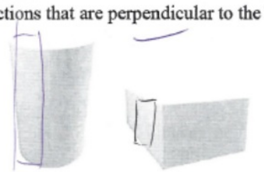
24

Instructional Task 2 (MTR.3.1)

Part A. Fill in the blank below.

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

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

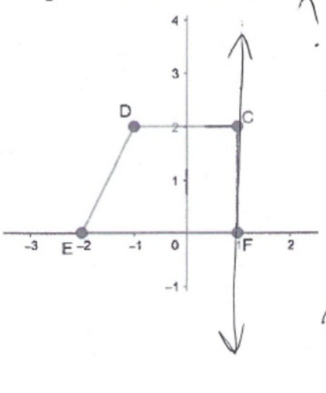


25

Instructional Tasks

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

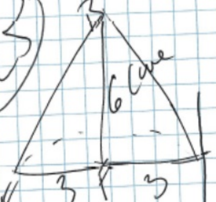
Trapezoid $DCFE$ is shown on the coordinate plane below.



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

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

23



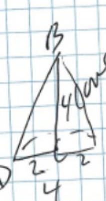
$\frac{1}{3} Bh / 2$

$\frac{1}{3} (\pi r^2) h$

$\frac{1}{3} \pi \cdot 3^2 (6)$

$\frac{1}{3} \pi (9)(6) = \frac{18\pi}{2}$

9π



= about 20

$\frac{1}{3} Bh / 2$

$\frac{1}{3} \pi r^2 h$

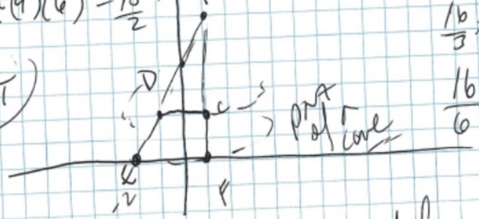
$\frac{1}{3} \pi 2^2 (4) = \frac{1}{3} 4(4) \pi$

$\frac{16}{3} \pi / 2$

$\frac{16}{3} \div \frac{2}{1}$

$\frac{16}{3} \times \frac{1}{2} = \frac{16}{6}$

$\frac{16}{6} = \frac{8}{3} \pi$



part of cone

truncated cone

$\frac{9}{1} \quad \frac{27}{3}$

$- \frac{8}{3} \quad \frac{8}{3}$

$\frac{19}{3} \pi$ or $6\frac{1}{3} \pi$ or $\boxed{19.9}$

26

Instructional Tasks

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

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 = 38.64 sq. inches Volume = 10.67 cubic inches	$k = 2$	$\cdot 2^2$	$\cdot 2^3$
	$k = 3$	$\cdot 3^2$	$\cdot 3^3$
	$k = \frac{1}{2}$	$\cdot \left(\frac{1}{2}\right)^2$	$\left(\cdot \frac{1}{2}\right)^3$

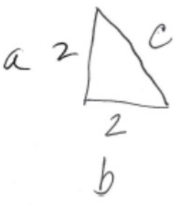
Part A. Determine the surface area and volume of the square pyramid.

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.

26

SA =



$2^2+2^2=c^2$

$4+4=c^2$

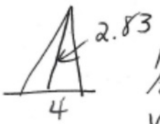
$8=c^2$

$\sqrt{8}=c$

Slant height $=2.83$

$= l \times w$

$4 \times 4 = 16$



$\frac{1}{2}bh$

$\frac{1}{2}(4)(2.83) = 5.66$

$\times 4$

22.64

Surface Area

$22.64+16 = \boxed{38.64}$

area of base

Volume $= \frac{1}{3}Bh$

$\frac{1}{3}(4\times4)(2) = \frac{32}{3} = 10.67$

26

Scale Factor	(Squared) $\boxed{2D}$ New Surface Area	(cubed) 3-D New Volume
$k = 2$	$(38.64) \cdot 2^2 =$ 154.56	$\cancel{38.64}$ $10.67 \cdot 2^3 = 85.36$
$k = 3$	$(38.64) \cdot 3^2$ 347.76	$10.67 \cdot 3^3 =$ 288.09
$k = \frac{1}{2}$	$(38.64) \cdot \left(\frac{1}{2}\right)^2$ $38.64 \cdot \frac{1}{4} = 9.66$	$(38.64) \cdot \left(\frac{1}{2}\right)^3 =$ $38.64 \cdot \left(\frac{1}{8}\right) = 4.83$

27

Instructional Tasks

Instructional Task 1 (MTR.7.1)

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? Sarasota

47x16
752

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?

752 = 1/2 bh

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?

No

Same

$\frac{1}{2}(32)(47)$

(27) Population Density $= \frac{\# \text{People}}{\text{Area}}$

Sarasota:

$$\frac{433742}{752}$$

576.78

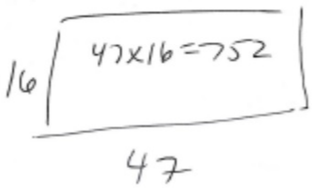
Part A

Leon:

$$\frac{293{,}582}{702}$$

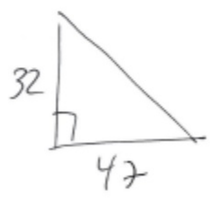
418.20

Part B:



$= A = lw = 752$

Part C:



$A = \frac{1}{2} bh$

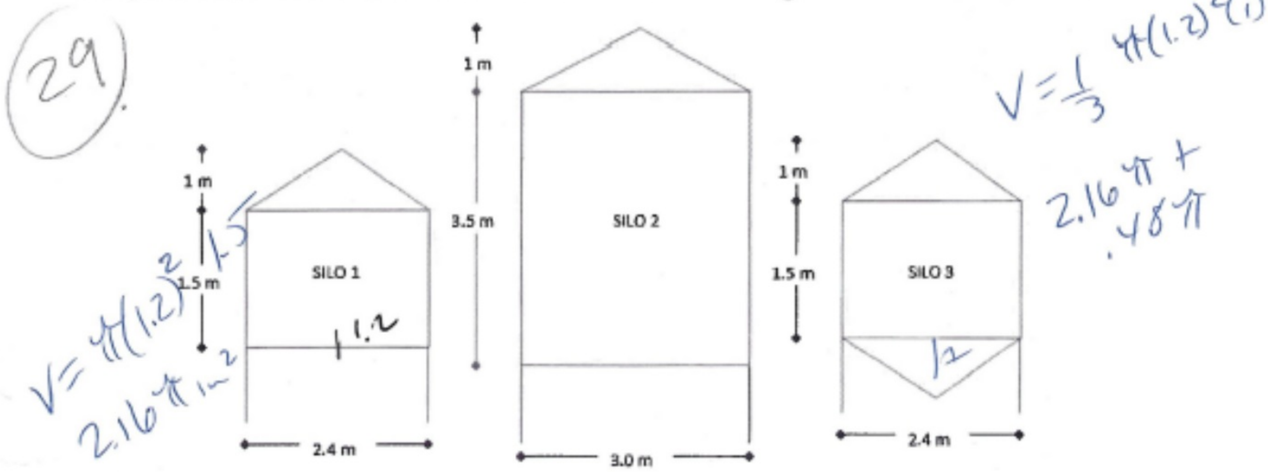
$752 = \frac{1}{2}(47)(32)$

Part D: No Same area 752

Instructional Tasks

Instructional Task 1 (MTR.7.1)

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? $.48\pi$ more 22%

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?

$\frac{4}{5} = \frac{4^3}{5^3} = 51.2\%$

(29) Silo 1

$V = Bh$ (cylinder)

$V = \pi r^2 h$

$V = \pi(1.2)^2 \cdot 1.5$

$V = 2.16\pi$

Silo 3

 2.16π

+ bottom cone

$V = \frac{1}{3}(\underset{\pi r^2}{B})(h)$

$V = \frac{1}{3}\pi(1.2)^2(1)$

$V = \frac{1}{3}\pi(1.44)$

$V = .48\pi$

add $2.16\pi + .48\pi =$

2.64π

Part A: $2.64\pi - 2.16\pi = .48\pi$ more

or $\frac{.48\pi}{2.16} =$ 22% more

Part B: $80\% = \frac{80}{100} = \frac{4}{5}$

direct 1 dimension

volume (capacity)

3-D

$\left(\frac{4}{5}\right)^3 = \frac{64}{125}$

51.2%

Instructional Task 2 (MTR.4.1)

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.

30

30 $V = \frac{4}{3}\pi r^3$ $\frac{4}{3}\pi(4)^3 = \frac{256\pi}{3}$

4

$\frac{256\pi}{3} = \frac{4}{3}\pi(4)^3$

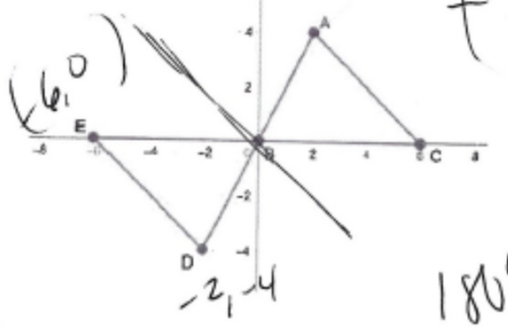
$\frac{256\pi}{3} = \frac{4\cdot(4\cdot4\cdot4)}{3}\pi$ ✓ using π is Exact

(31)

Instructional Tasks

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

Two triangles on the coordinate plane are shown below. (x, -y)



180° rotation

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?

(31) rule (-x, -y)

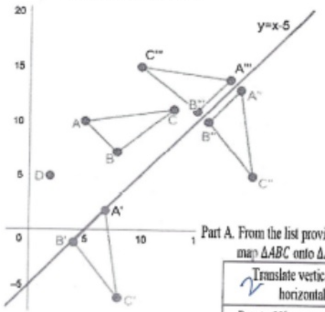
or 180° Rotation

check distance / slope

(32)

Instructional Items

Instructional Item 1



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

2 Translate vertically 11 units and horizontally 12 units	1 Rotate 270° counterclockwise about point D
Rotate 90° counterclockwise about the origin	Reflect over $y = x$
Reflect over $y = x - 5$ 3	Translate vertically 12 units and horizontally 11 units

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

(32) 1st Step:

Rotate 270° counter clockwise about point D

2nd Step

Translate Vertically 11 units and Horizontally 12 units

3rd Step

Reflect over $y = \cancel{x}-5$

Ø go backward to ✓

33

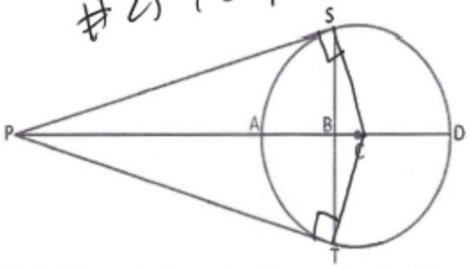
Instructional Tasks

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

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

Draw as many markings as you can about all the congruent segements and angles that you know in the figure below.

#25 i St pa



Name the following segments:
Secant: PD
Tangent: PS
Radius: CD
Diameter: AD
Chord: ST

Part A. Write a statement of equality that involves the length of a tangent and the length of a secant. Write the formula for the rule. $RS^2 = \cancel{PB}\ PA(PD)$

Part B. Write a statement of equality that involves the lengths of two tangents. $PS = PT$

Part C. Write a statement of equality based on the relationship between a chord that instersects the diameter. (Include which segments are congruent & degrees of the intersecting angles. $SB = TB$ $\perp$ 90°

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

$PS^2 + SC^2 = PC^2$

33 drawing on #25 from 1st packet

Secant: $\overline{PD}$

Tangent: $\overline{PS}$ and $\overline{PT}$

Radius: $\overline{CD}$, $\overline{CA}$, $\overline{CS}$, $\overline{CT}$

Diameter: $\overline{AD}$

Chord: $\overline{ST}$ and $\overline{AD}$

Part A: $(\overline{RS})^2 = (PA)(PD)$

Part B $\overline{PS} = \overline{PT}$

Part C: $\overline{SB} \cong \overline{TB}$ and $\overline{AB} \perp \overline{ST}$

$\overset{\frown}{AT} \cong \overset{\frown}{AS}$ and $\overset{\frown}{DT} \cong \overset{\frown}{DS}$ 90°

Part D: $(\overline{PS})^2 + (SC)^2 = (PC)^2$

34

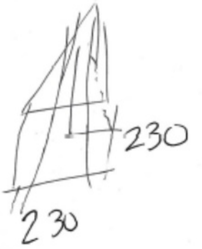
Instructional Tasks

Instructional Task 1 (MTR.7.1)

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?

146.95

34



$LA = 85{,}836$ h?

$\overline{4}$

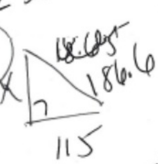
$A = \frac{1}{2}bh$

$21459 = \frac{1}{2}\,230(h)$

$\frac{21459}{115} = \frac{115h}{115}$

$186.6 = h$ (slant height)

146.95



$x^2 + 115^2 = 186.6^2$

$x^2 + 13225 = 34819.56$

$-13225 \quad -13225$

$x^2 = 21594.56$

$\sqrt{21594.56}$

$x = 146.95$

(35)

Instructional Task 2 (MTR.4.1)

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?

(35) $SA = 4\pi r^2$

$400\pi = 4(10^2)\pi$

$400\pi = 4(100)\pi$

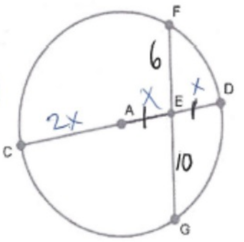
$400\pi = 400\pi$ ✓

Instructional Task 2 (MTR.3.1)

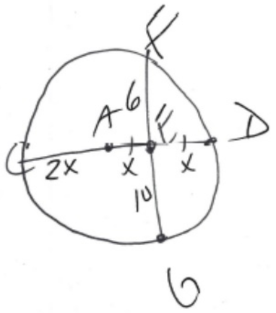
36

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

$6(10) = x(3x)$



36



$6(10) = x(2x+x)$

$60 = 2x^2 + x^2$

$\frac{60}{3} = \frac{3x^2}{3}$

$20 = x^2$

$\sqrt{20} = x$

$\sqrt{20}$

$\sqrt{4} \cdot \sqrt{5}$

$x = 2\sqrt{5}$

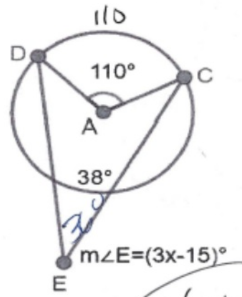
37

? Side? for x?

Instructional Tasks

Instructional Task 1 (MTR.3.1)

Find the measure of angle E in circle A.



$\frac{1}{2}(110-38)$

$\frac{1}{2}(72) = 36$

$\angle E = 36$

$3x-15 = 36$
$+15 \quad +15$

$3x/3 = 51/3 \quad x = 17$

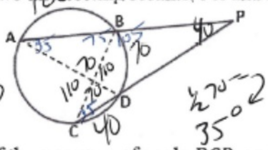
$x = 17$

38

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

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

Quest?



Arc AC = 150 degrees
Arc BD = 70 degrees
Arc AB = 100 degrees

$\frac{1}{2}70 = 35°$

$\angle B = 75 \; (\frac{1}{2})150$

$180-75$

105

Part A. What is the sum of the measures of angle BCP, angle CPB and angle PBC? 180

Part B. What is the sum of the measures of angle PBC and angle ABC? 180

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?

$\angle BCP + \angle BPC = ABC$

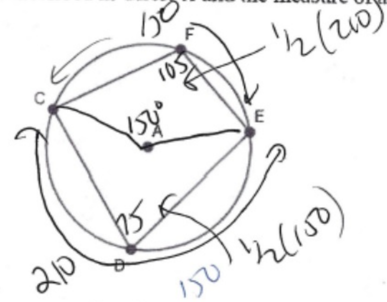
Same

39

Instructional Tasks

Instructional Task 1 (MTR.3.1)

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? 105

Part B. What is the measure of arc CDE? 360-150 = 210

Part C. What can you determine about the measures of angle DCF and angle FED?

90+90 =180 opp ∠'s are supplem

40

Instructional Task 2 (MTR.4.1)

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. ?

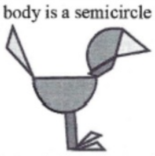
Kite
Square
Rectangle

41

Instructional Tasks

Instructional Task 1 (MTR.7.1)

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.

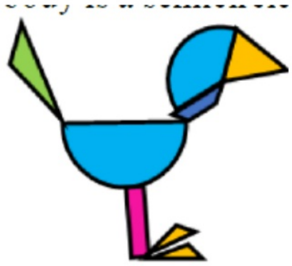


Part A. What fraction of the whole circle is the head? $\frac{130}{360} = \frac{13}{36}$

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? $\frac{130}{360} \cdot 2\pi 1.5 = 3.4$

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)? $\frac{1}{2}(\pi 1.9^2) + \frac{130}{360}(\pi 1.5^2)$

$5.671 + 2.553 = 8.224$



41 Part A $\frac{130}{360} = \frac{13}{36}$

Part B: $\frac{130}{360} \cdot 2\pi(1.5) = 3.4$

Part C

Body

$\frac{1}{2}\pi r^2 = \frac{1}{2}(3.14)(1.9)^2 = 5.67$

$+ \frac{130}{360}\pi(1.5)^2 = 2.55$

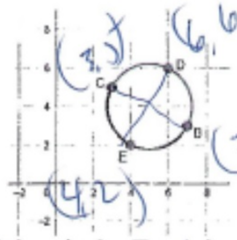
8.22

42

Instructional Tasks

Instructional Task 1 (MTR.4.1)

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).



$d = r = \sqrt{5}$

midpt $(5,4)$

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. $\sqrt{5}$

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

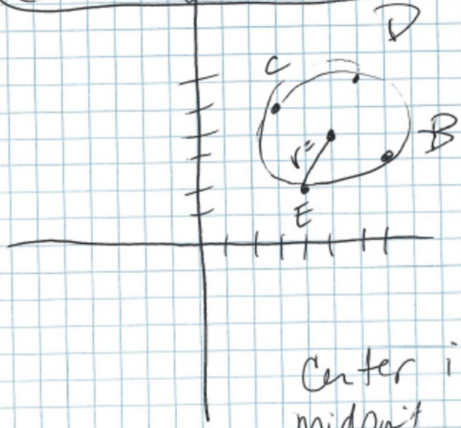
$(x-5)^2 + (y-4)^2 = 5$

(42)

$(x-h)^2+(y-k)^2=r^2$ $(\sqrt{5})^2$

Center
h, k
5, 4

$\boxed{(x-5)^2+(y-4)^2=5}$



Center is midpoint

$(3,5)$ $(7,3)$
$x_1\ y_1$ $x_2\ y_2$

$\frac{3+7}{2}, \frac{5+3}{2}$

$\frac{10}{2}, \frac{8}{2}$

(5, 4)
Center

E
(4, 2)
$x_1\ y_1$

Center
(5, 4)
$x_2\ y_2$

radius

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$(5-4)^2+(4-2)^2$

1^2+2^2

$1+4$

$\sqrt{5}$

radius $=\sqrt{5}$

43

Instructional Task 3 (MTR.7.1)

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. midpoint (215.5, 109.5)

Part B. How far is it from the cafeteria to the Freshman building? d = 241.72

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

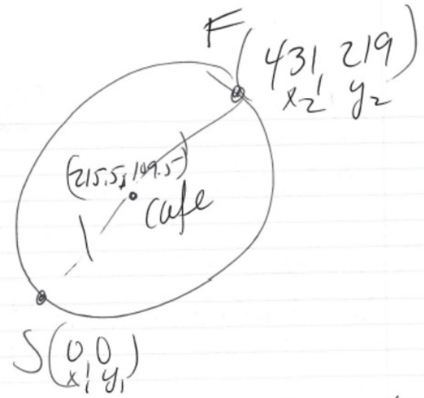
Part D. If the campus were to have a circular fence along its boundary, what is the total length of the fence, in feet?

$C = 2\pi(241.72)$

1518.77

$(x-215.5)^2+(y-109.5)^2 = 58430.5$

43



Part A: midpoint is the cafe

$\frac{0+431}{2}$, $\frac{0+219}{2}$

(215.5, 109.5)

Part B: Distance Form

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$(431-0)^2 + (219-0)^2$

$185,761 + 47,961$

$48\sqrt{233,722} = \frac{483.4}{2}$

241.72

44

$-\$9430.5$

Instructional Tasks

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

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.

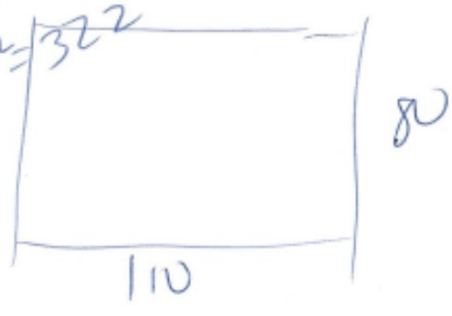
Part A. Write an equation that describes the region each sprinkler will cover if centered at the position (h, k).

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.

$(x-h)^2+(y-k)^2=42^2$

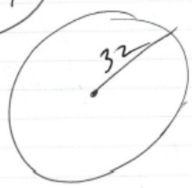
$(x-h)^2+(y-k)^2=32^2$

$(x-h)^2+$



44

$13.99



16.99

$(x-h)^2+(y-k)^2=1024$

$(x-h)^2+(y-k)^2=1764$

Part B

diameter
64
:
84

$110/64 \approx 2$ so 4 of 32

$80/64 = 2$ or $4 \times 14 = 56$

$110/84 \approx 2$ so 2 of 42

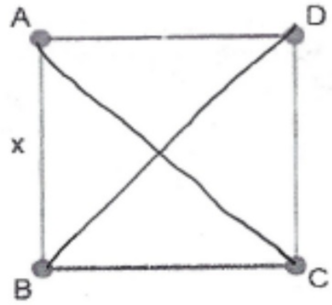
9 charge $2 \times 17 = \$34$

45

Instructional Tasks

Instructional Task 1 (MTR.3.1)

$ABCD$ is a square.



Part A. What is the measure of segment BD? $x\sqrt{2}$

Part B. What is the measure of segment AC? $x\sqrt{2}$

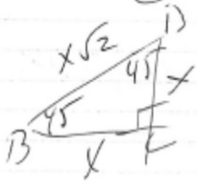
Part C. If the measure of segment BD is 14 units, what is the measure of segment BC?

$\frac{14}{\sqrt{2}}=\frac{x\sqrt{2}}{\sqrt{2}}$ $\frac{14}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{14\sqrt{2}}{2}=7\sqrt{2}$

45

Part A $= x\sqrt{2}$

Part B $= x\sqrt{2}$



Part C $\frac{14}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$

$x = \frac{14}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$

$\sqrt{4}$

Part C

Center = 215.5, 109.5 –
radius 241.72

Equation of a Circle

$(x-h)^2+(y-k)^2=r^2$

$(x-215.5)^2+(y-109.5)^2 = 58,430.5$

Part D

$C = \pi d$ or $C = 2\pi r$

$2 \cdot \pi \cdot 241.72 = 1,518.77$

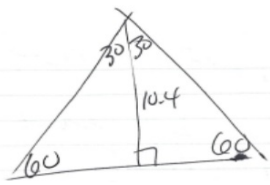
(46)

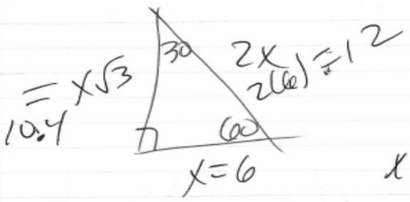
Instructional Task 2 (MTR.7.1)

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?

12

(46)





$$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{10.4}{\sqrt{3}}$$

$$x = \frac{10.4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{10.4\sqrt{3}}{3}$$

$\sqrt{9}$

$x = 6$

So each side of the tringle is 12

47

Instructional Tasks

Instructional Task 1 (MTR.3.1)

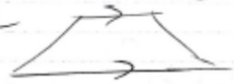
Part A. Which of the following statements are valid?

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

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

47 True – all squares are rectangles

False



only 1 side parallel

False

only if opposite angles are supplementary

48

Instructional Task 1 (MTR.7.1) $q \to p$ $\sim p \to \sim q$

Part A: Use the statement below to write the converse, inverse and contrapositive of the statement. Then write it as an "if and only if" statement.

$\sim q \to \sim p$

"If a quadrilateral has diagonals that bisect each other, then it is a parallelogram."

p q

Part B: Which of the following statements will always have the same truth value?

Conditional, Converse, Inverse, Contrapositive

48 Converse $q \to p$

If its a parallelogram, then a quadrilateral has diagonals that bisect each other

inverse $\sim p \to \sim q$

If ~~its not~~ a quadrilateral doesn't have diagonals that bisect each other, then its not a parallelogram

Contrapositive $\sim q \to \sim p$

If its not a parallelogram then the quadrilateral doesnt have diagnols that bisect each other.