# Geometry B.E.S.T. Instructional Items 2024-2025 (Key)

*Instructional Item 1*

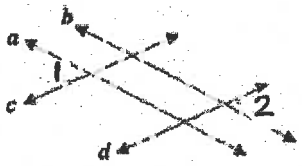
(1) What value of $x$ will make $M$ the midpoint of $\overline{PQ}$ if $PM = 3x - 1$ and $PQ = 5x + 3$?

*Instructional Item 2*

(2) Two lines intersect at point $P$. If the measures of a pair of vertical angles are $(2x - 7)^\circ$ and $(x + 13)^\circ$. determine $x$ and the measures of the other two angles?

*Instructional Item 3*

(3) Based on the figure below. complete a proof to prove that $\angle 1 \cong \angle 2$ given that $a \parallel b$ and $c \parallel d$

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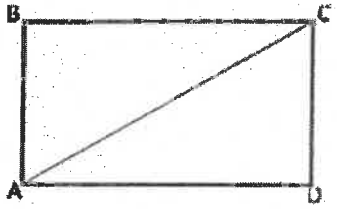
*Instructional Item 1*

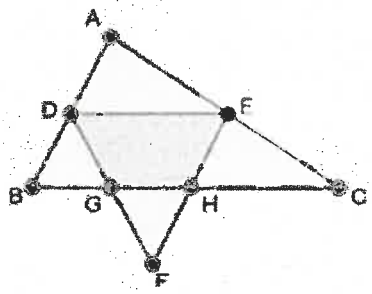
(4) Use rectangle $ABCD$ to fill in the blanks.




In a rectangle opposite sides are _____ which means $\overline{\quad} \cong \overline{\quad}$. Triangles $ABC$ and $CDA$ can be proven congruent by Hypotenuse-Leg because _____ is the hypotenuse for both triangles.

(5) *Instructional Item 1*

$\overline{GH}$ is a midsegment of triangle $DEF$ and $\overline{DE}$ is a midsegment of triangle $ABC$. If $GH = 1.5$ cm. what is the length of segment $BC$?

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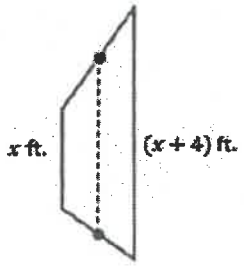
(6) *Instructional Item 1*

Given parallelogram $WXYZ$. where $WX = 2x + 15$, $XY = x + 27$ and $YZ = 4x - 21$, determine the length of $ZW$. in inches.

#1-5 15-17 23-25 32-34 45-48
#6-9 18-20 26-28 35-37
10-14 21-22 29-31 38-40
41-44

*Instructional Item 1*

(7) Tulips should be planted three inches apart to give a full look. The Starlings have a trapezoidal plot for a flower garden. as shown in the figure. They are going to put tulips along the parallel sides of the garden. The midsegment to the garden is 10 feet long. Tulips are sold in bags of 25 bulbs.

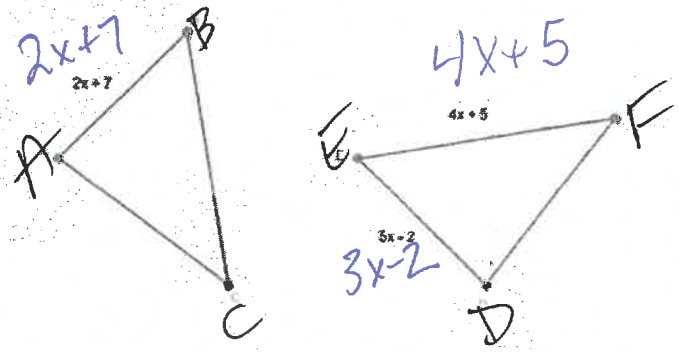



Part A. What are the lengths of the parallel sides of the garden?
Part B. How many tulips are needed to line the parallel sides?
Part C. What is the minimum number of bags the Starlings need to purchase to have enough bulbs to line the parallel sides of the garden?

*Instructional Item 1*

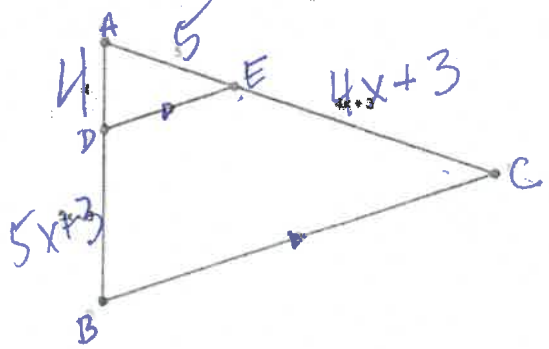
(8) Triangles $ABC$ and $DEF$ are shown where $\angle A \cong \angle D$, $\angle C \cong \angle F$ and $\overline{AC} \cong \overline{DF}$,

Part A. Determine whether the triangles are congruent.
Part B. If the triangles are congruent, find $EF$, in units.

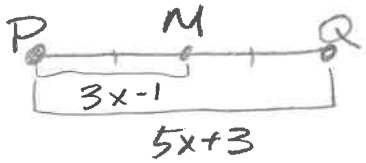



*Instructional Item 2*

(9) If $\Delta ADE$ and $\Delta ABC$ are similar, what is the length of $\overline{AC}$, in units?



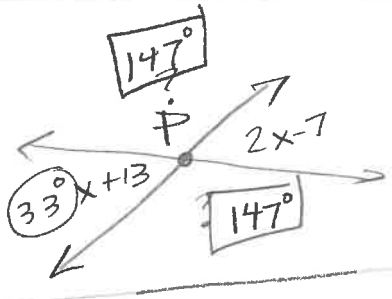
# BEST Items 2024-25

① 


$3x-1+3x-1 = 5x+3$

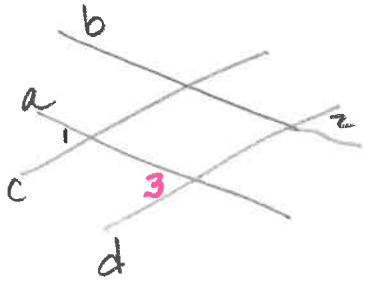
$6x-2 = 5x+3$

$\boxed{x = 5}$

② 


$2x-7 = x+13$

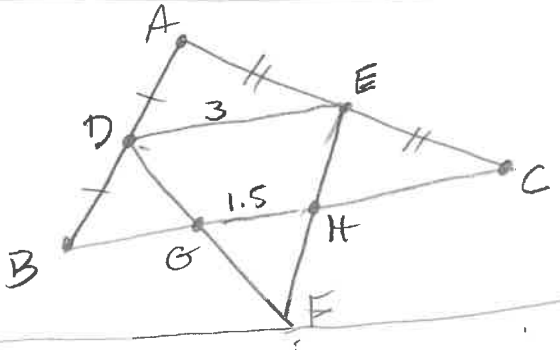
$\boxed{x = 20}$

③ 

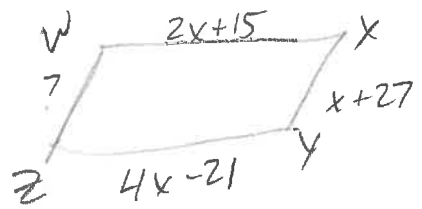

| Statement | Reason |
|---|---|
| ① $a \parallel b$, $c \parallel d$ | ① given |
| ② $\angle 1 \cong \angle 3$ | ② $\parallel \rightarrow$ corr $\angle$s $\cong$ |
| ③ $\angle 3 \cong \angle 2$ | ③ $\parallel \rightarrow$ AEA $\cong$ |
| ④ $\angle 1 \cong \angle 2$ | ④ Transitive POC |

④ opposite sides are <u>congruent</u> which means $\overline{AB} \cong \overline{CD}$

$\triangle ABC \cong \triangle CDA$ by HL b/c $\overline{AC}$ is the hypotenuse for both $\triangle$s.

⑤ 


$BC = 6$

⑥ 


$2x+15 = 4x-21$

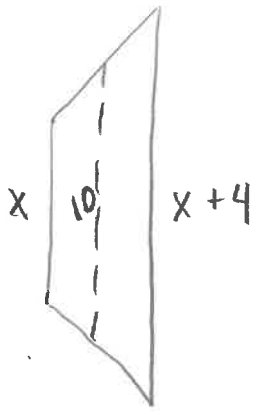
$36 = 2x$

$18 = x$

$27+18 = 45$

$\boxed{ZW = 45}$

(7)




(a) $x + x + 4 = 20$

$2x + 4 = 20$

$2x = 16$

$x = 8$

(a) 8 ft and 12 ft

(b)


$8\text{ft} = \frac{96\text{ in}}{3\text{ in}} = 32$ bulbs + 1 end

33 bulbs

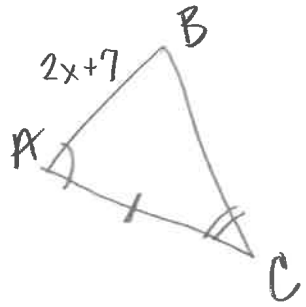
$12\text{ft} = \frac{144\text{ in}}{3\text{ in}} = 48 + 1$ end

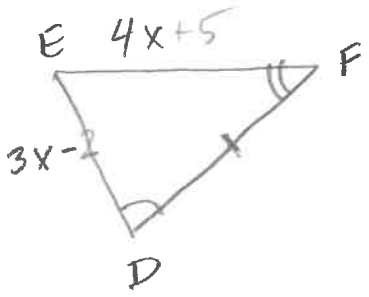
49 bulbs

(b) 82 bulbs total

(c) 25/bag | 4 bags

(8)




(a) Yes $\cong$ by ASA $\cong$

(b) $2x + 7 = 3x - 2$

$9 = x$

$EF = 4(9) + 5 = 41$ units

(9) $\frac{4}{5} = \frac{5x+3}{4x+3}$

$4(4x+3) = 5(5x+3)$

$16x + 12 = 25x + 15$

$27 = 9x$

$3 = x$

$AC = 5 + 4(3) + 3$

$5 + 12 + 3$

$AC = 20$

(10) (a)

$(\frac{2}{7}, -1) \rightarrow (2\frac{2}{7}, -1)$

$(-4, -\frac{14}{5}) \rightarrow (-2, -\frac{14}{5})$

$(3, 1) \rightarrow (5, 1)$

(b) $(x, y) \rightarrow (x+2, y)$

(11) Preserve $\angle$ measure ALL

(12) " distance ALL but dilations

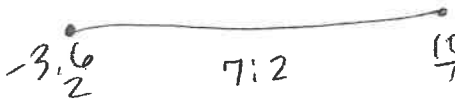
(13) $(x, y) \rightarrow (2x, 3y)$

(14) center of rotation Point B.

90° CCW

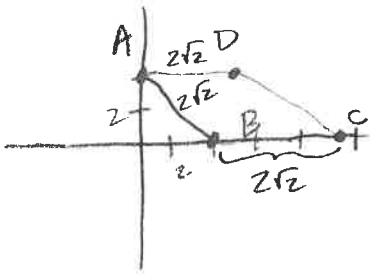
270° CW

(19)




$$\frac{-3.6(2)+10(7)}{9} = \frac{-7.2+70}{9} = \frac{62.8}{9} = \frac{628}{90} = \frac{314}{45}$$

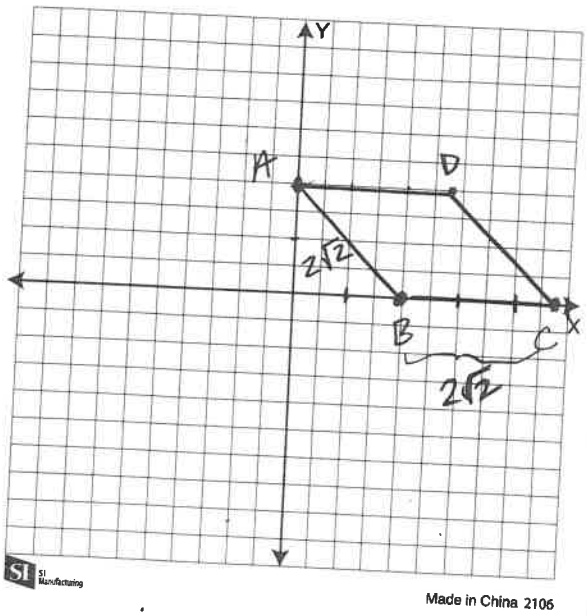
(20)



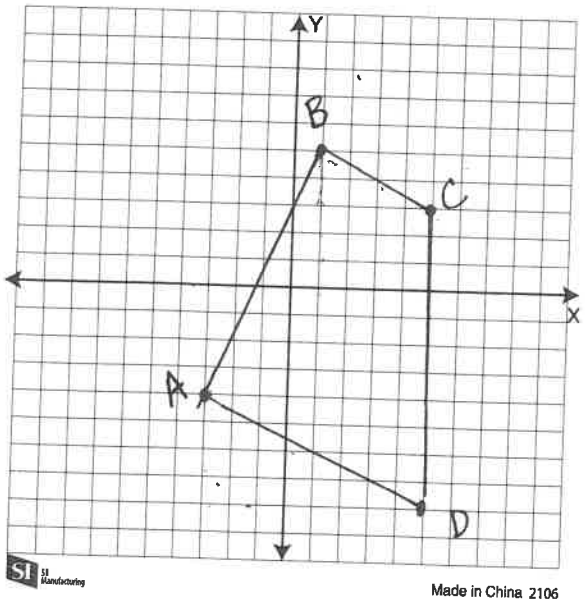

Rhombus not square

C(2+2√2, 0)

D(2√2, 2)




(21)




$m_{\overline{BC}} = \frac{-2}{4} = \frac{-1}{2}$

$m_{\overline{AD}} = \frac{-4}{8} = \frac{-1}{2}$

$\overline{BC} \parallel \overline{AD}$ ∴ Trapezoid

Trapezoid

↓

Parallelogram

$\left(\frac{16}{7}, -1\right)$ $\left(-2, \frac{-14}{5}\right)$ $(5,1)$

*Instructional Item 1*

(10) A triangle whose vertices are located at $\left(\frac{2}{7}, -1\right)$, $\left(-4, -\frac{14}{5}\right)$ and (3,1) is shifted to the right 2 units.

Part A. What are the coordinates of the triangle after the translation?

Part B. Describe the transformation that would map the preimage to the image algebraically. $(x, y) \rightarrow (x+2, y)$

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*Instructional Item 1*

(11) Circle the transformations that can be used when it is important to preserve angle measure.

Horizontal Translations Reflections Clockwise Rotations

Dilations Vertical Translations Counterclockwise Rotations

*Instructional Item 2*

(12) Circle the transformations that can be used when it is important to preserve distance.

Horizontal Translations Reflections Clockwise Rotations

Dilations Vertical Translations Counterclockwise Rotations

*Instructional Item 3*

(13) Write a transformation, or sequence of transformations, that preserves angle measure but does not preserve distance. $(x, y) \rightarrow (kx, ky)$ Dilations

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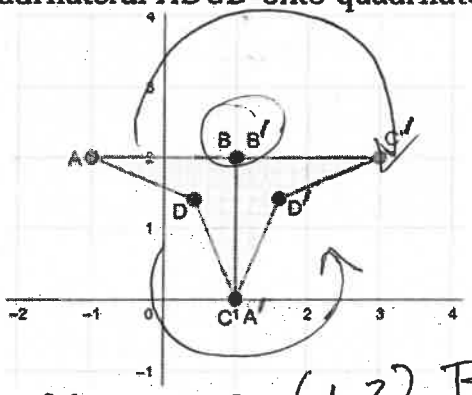
*Instructional Item 1*

(14) A single rotation mapped quadrilateral $ABCD$ onto quadrilateral $A'B'C'D'$.




Part A. What is the center of the rotation? (1, 2) B

Part B. If the rotation is counterclockwise, how many degrees is the rotation? 90°

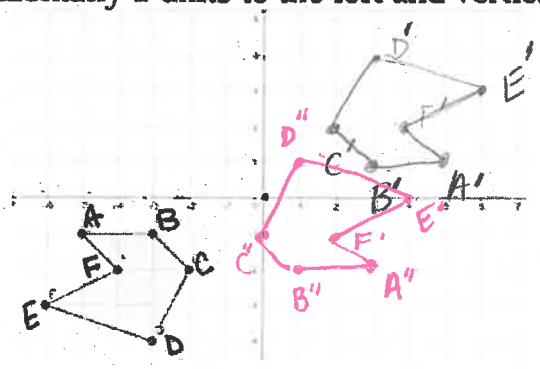
Part C. Describe another transformation that maps quadrilateral $ABCD$ onto quadrilateral $A'B'C'D'$.

clockwise 270°

*Instructional Item 1*

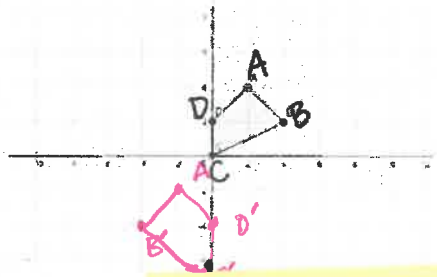
(15) Perform the following sequence of transformations on the polygon $ABCDEF$ on the coordinate plane.

- Rotate 180° counterclockwise about the origin.
- Then, translate horizontally 2 units to the left and vertically 3 units down.




*Instructional Item 2*

(16) Draw the resulting figure after quadrilateral $ABCD$ is transformed using $(x, y) \rightarrow (-x, y-3)$

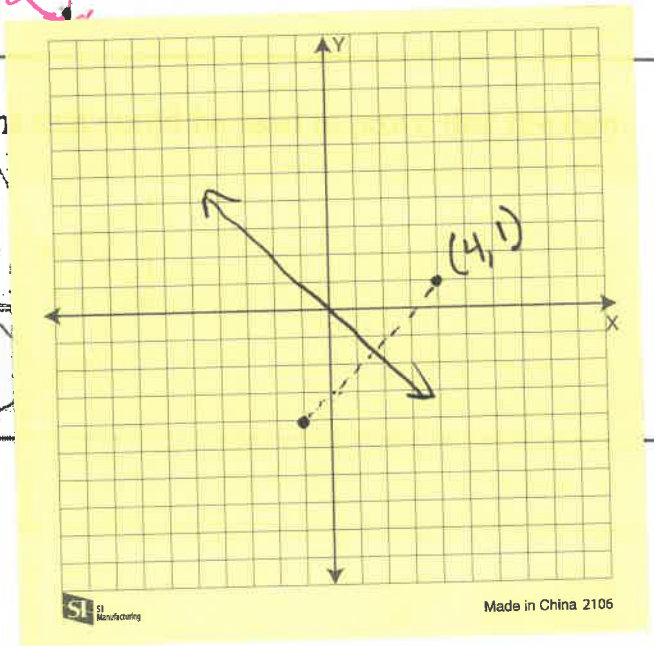



$A(1,2) \rightarrow (-1,-1)$
$B(2,1) \rightarrow (-2,-2)$
$C(0,0) \rightarrow (0,-3)$
$D(0,1) \rightarrow (0,-2)$

*Instructional Item 1*

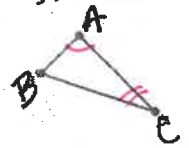
(17) Describe the sequence of transformation quadrilaterals shown are congruent.

Double Reflection over intersecting lines



*Instructional Item 1*

(18) In triangles $ABD$ and $JKL$, $m\angle A = m\angle J$, $m\angle C = m\angle L$, and $\overline{AC} = 2\overline{JL}$.





Rotation & Dilation, by $k=\frac{1}{2}$

Part A. Describe a sequence of transformations that maps $\Delta ABC$ onto $\Delta JKL$.

Part B. Based on the transformations chosen, determine whether $\Delta ABC$ is congruent or similar to $\Delta JKL$. dilation

*Instructional Item 1*

(19) What point on the number line is $\frac{7}{9}$ the way from the point -3.6 to the point 10?

*Instructional Item 1*

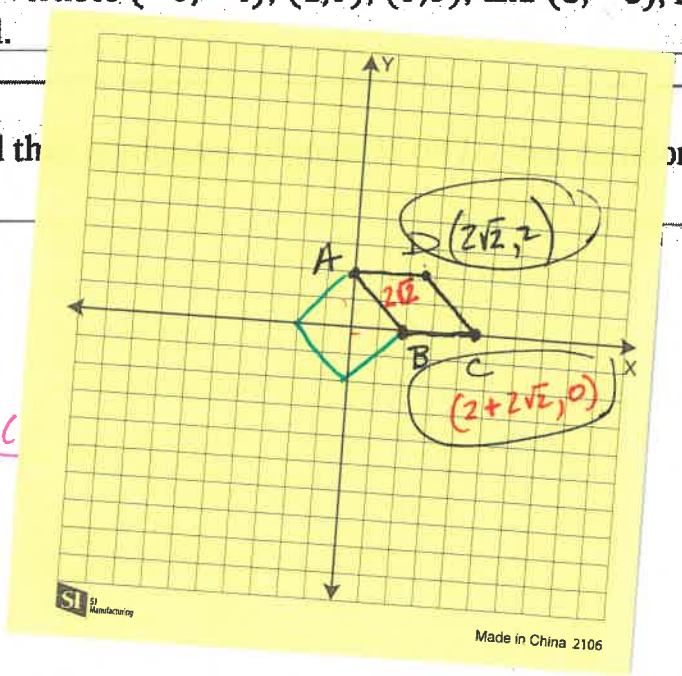
(20) Points $A$ (0,2) and $B$ (2,0) are endpoints of segment $AB$, the side of quadrilateral $ABCD$. List possible coordinates for points $C$ and $D$ if quadrilateral $ABCD$ is a rhombus, not a square.

*Instructional Item 2*

(21) Given quadrilateral $ABCD$ with vertices $(-3,-4)$, $(1,5)$, $(5,3)$, and $(5,-8)$, respectively, classify the type of quadrilateral.

*Instructional Item 1*

(22) Given $J(-4,2)$ and $K(2,1)$, find th ons the segment into the ratio 1:2.




J M K

(-4, 2) 1:2 (2, 1)

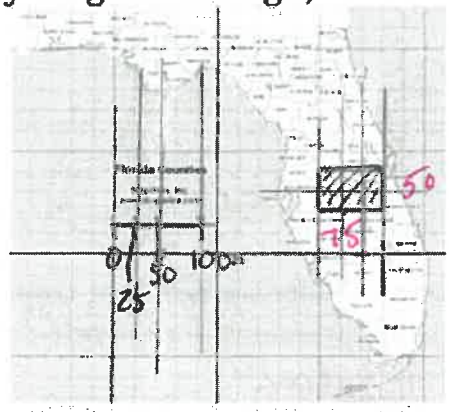
$\left(\frac{2(-4)+1(2)}{3}, \frac{2(2)+1(}{3}\right)$

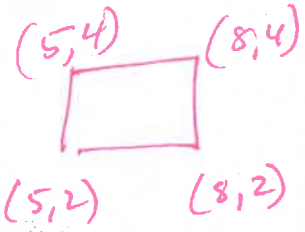
$\frac{-8+2}{3} = \frac{-6}{3}$ $\frac{4+1}{3}$

$M = \left(-2, \frac{5}{3}\right)$

*Instructional Item 1*

(23) The Move With Us Run Team is planning a run around the combined perimeter of Polk and Osceola counties (as shown by the green rectangle).




Part A. What are the coordinates of the four vertices that could be used to measure the run around the two counties? Use the scale provided on the map to determine the coordinates. 100 + 150 = 250 miles

Part B. Using the coordinates found in Part A, what would be the total distance of the run, in miles?

Part C. Assume that the group runs a total of 10 miles every day, how many days would it take them to complete the distance around the two counties? 25 days

*Instructional Item 1*

(24) Which of the following polygons are cross-sections that are parallel or perpendicular to the base of a regular pentagonal pyramid? Select all that apply.

a. Triangle •
b. Parallelogram
c. Trapezoid •
d. Pentagon •
e. Hexagon
f. Octagon

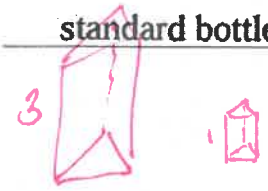
*Instructional Item 1*

(25) Which real-world object could be used describe the figure generated by rotating a rectangle about a line that is parallel to a side but not touching the rectangle?

a. A doughnut
b. A piece of plastic tubing •
c. An ice cream cone
d. A shoebox
e. An egg

*Instructional Item 1*

(26) The perfume Eau de Matimatica is packaged in a triangular prism bottle. The dimensions of the travel size are $\frac{1}{3}$ the dimensions of the standard bottle. How does the volume of the standard bottle compare to the travel size?




Standard is 27 times the size of sample

$d = \frac{p}{mi^2}$ SK $\frac{5,573}{3.475} \approx 1604$ D $\frac{13702}{8.46} \approx 1620$

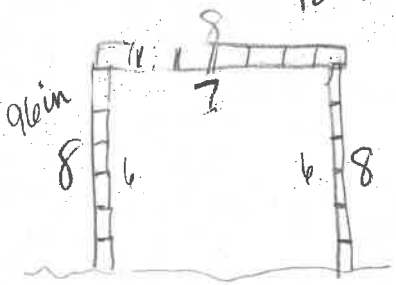
*Instructional Item 1*

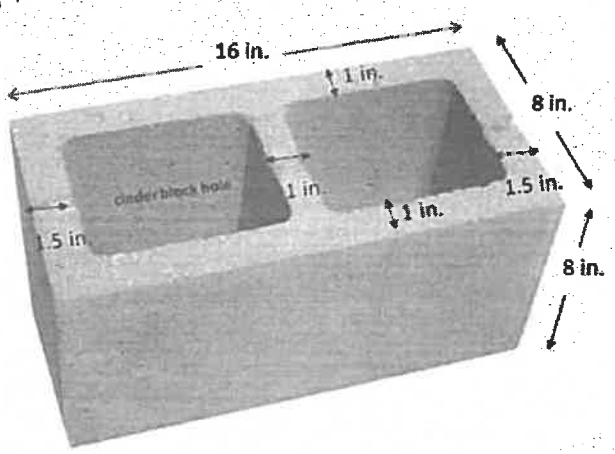
(27) In 2019 the population for Siesta Key, FL, was 5,573 while Destin, FL, had a population of 13,702. Siesta Key is 3.475 square miles and Destin is 8.46 square miles. Which location has a smaller population density? Siesta Key

*Instructional Item 1*

(28) Joshua is going to create a garden border around three sides of his backyard deck using cinder blocks. He is going to plant a flower in each hole of the cinder block. The dimensions of the cinder blocks are 8 inches by 16 inches by 8 inches. Each hole needs to be completely filled with potting soil before the flowers can be planted. Potting soil is sold in 1 cubic foot bags.


$1728 in^3 = 1 ft^3$



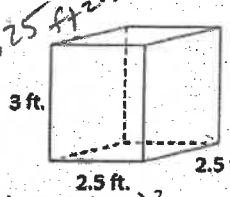

19 blocks
38 holes
$38 \cdot 6 \cdot 6 \cdot 8\ in^3$
$\frac{10944\ in^3}{1728} \approx 6\frac{1}{3}$ bags

Part A. What are the dimensions of a cinder block hole? l w d $6'' \times 6'' \times 8''$

Part B. The patio is a square with a side length of 8 feet. One of the sides of the square patio is adjacent to an exterior wall of the house. If Joshua puts blocks around the other three sides of the patio, how many bags will Joshua need to purchase to fill the blocks? 7 bags

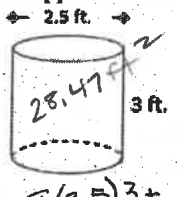
*Instructional Item 1*

(29) Kristin and Rachel are hosting an art show where they will showcase local artists' sculptures. They are painting pedestals upon which the sculptures will be placed. Pictures of the pedestals they will be using are below. One gallon of paint can cover 400 square feet/can



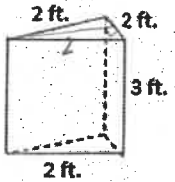

$36.25\ ft^2$

$4(2.5)3 + (2.5)^2 =$




$28.47\ ft^2$

$\pi(2.5)3 + \pi(1.25)^2$




$\frac{(\sqrt{3})2}{2} + 6(3)$

$19.73\ ft^2$

Part A. How many gallons of paint will they need to purchase to cover at least 4 of each type of pedestal? Assume that the base of each will not be painted. 1 gallon

Part B. If there is any paint left over, determine how many of which shape pedestals could be painted.

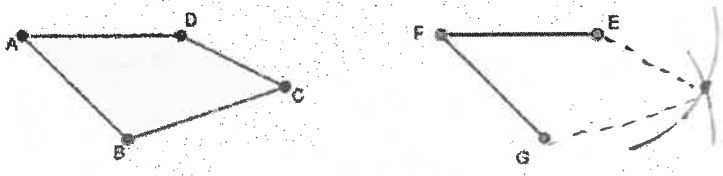
$62\ ft^2$

3 $\Delta$ prism
OR
2
OR
1 $\square$ & $\Delta$ prism

78.93
+ 113.88
145
337.81 $ft^2$

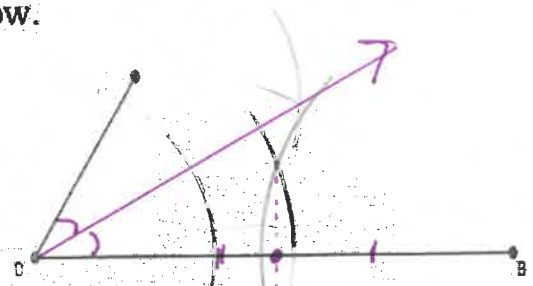
*Instructional Item 1*

(30) Construct the necessary segments and angles to construct quadrilateral $EFGH$ so that it is congruent to quadrilateral $DABC$. Assume $\angle DAB \cong \angle EFG$, $\overline{DA} \cong \overline{EF}$ and $\overline{AB} \cong \overline{FG}$.




*Instructional Item 1*

(31) An image is provided below.

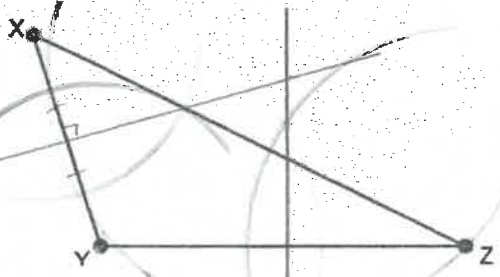



Part A. Construct the bisector of angle $D$.
Part B. Construct the midpoint of segment $DB$.

*Instructional Item 1*

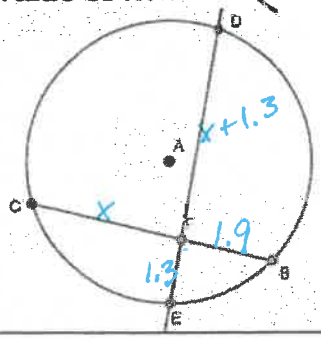
(32) Construct the circle that is circumscribed about $\Delta XYZ$.

⊥ bisectors of sides




*Instructional Item 1*

(33) In Circle $A$, $\overline{DE}$ and $\overline{BC}$ intersect at point $F$. $FE = 1.3$ units, $BF = 1.9$ units, $FD = x + 1.3$ units and $CF = x$ units. Find the value of $x$.

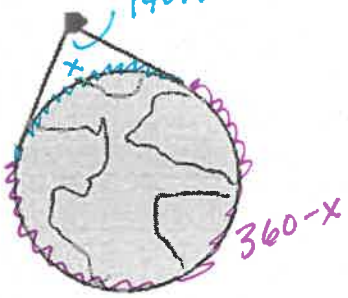



$1.9x = 1.3(x+1.3)$
$1.9x = 1.3x + 1.69$
$.6x = 1.69$
$x = \frac{1.69}{.6} = \frac{169}{60} =$

2.82

*Instructional Item 1*

(34) The International Space Station (ISS) passes over the earth 248 miles above the earth's surface. The angle formed between the two tangents formed from the ISS and the earth measures 140.4°. What is the measure of the arc of the earth that could have a view of the ISS passing overhead?




$\frac{(360-x)-(x)}{2} = 140.4$

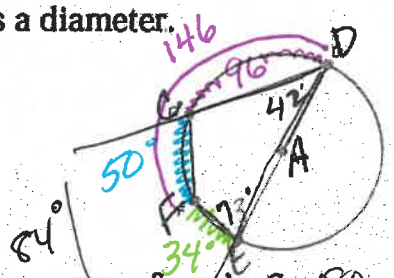
$360-2x = 280.8$

$-2x = -79.2$

$x = 39.6$ mi

*Instructional Item 1*

(35) In circle $A$, segment $DE$ is a diameter.




$m\angle E = 73°$

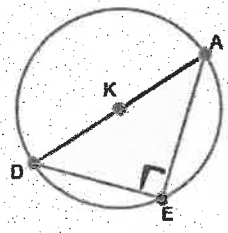
Part A. Determine the measure of angle $C$. $180 - 73 = 107°$

Part B. If the measure of arc $CF$ is 50°, determine the measures of angle $D$ and angle $F$.

$m\angle D = 42°$ $m\angle F = 138°$

*Instructional Item 2*

(36) Triangle $DAE$ is inscribed in Circle $K$.




$x = 30$

$2x = 60$

Part A. Determine the value of $x$ if the measure of angle $E$ is $(2x + 30)°$. $= 90$

Part B. Determine the measure of angle $D$ if the measure of angle $A$ is $(2x - 20)°$.

$60 - 20$

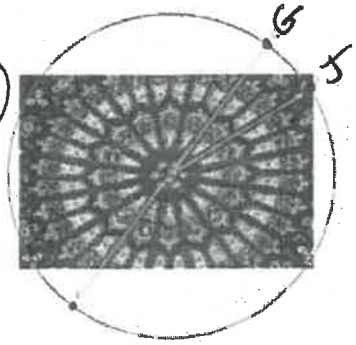
$m\angle A = 40°$

$m\angle D = 140°$ ~~140~~ 50

*Instructional Item 1*

$r = 11.5$ $d = 23$

(37) The North Rose Window in the Rouen Cathedral in France has a diameter of 23 feet. The stained glass design is equally spaced about the center of the circle. What is the area of the sector bounded by arc $GJ$?




$A = \frac{1}{16}(\pi 11.5^2)$

$A \approx 25.97$ ft²

---

*Instructional Item 1*

(38) Given the equation $x^2 + 2x + y^2 - 4y + E = 0$, determine possible values of $E$ such that the equation is an equation of a circle. $(x^2+2x+1) + (y^2-4y+4) = 1+4-E$

$(x+1)^2 + (y-2)^2 = 5+E > 0$

$E > -5$

*Instructional Item 2*

(39) What is the equation of a circle centered at $(-1, 2)$, with a diameter of 2 units? $r = 1$

$(x+1)^2 + (y-2)^2 = 1$

*Instructional Item 3*

(40) What is the equation of the circle centered at $(-2, -5)$ and passing through $(5, 0)$?

$(5+2)^2 + (0+5)^2 = 49+25 = 74$ $(x+2)^2 + (y+5)^2 = 74$

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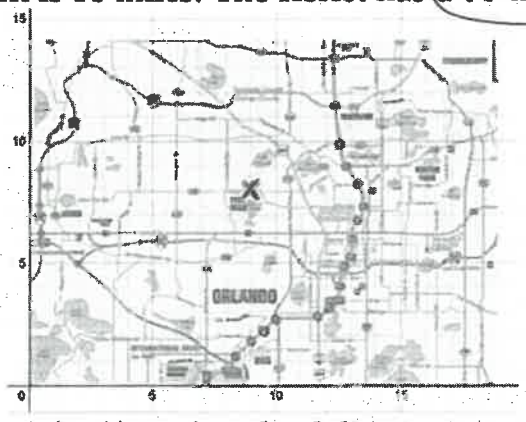
*Instructional Item 1*

(41) A florist serving the Orlando area located at (9,8), and marked with an X on the coordinate plane shown where each unit is 10 miles. The florist has a 50-mile delivery radius.




convert to map units

50 mi = 5 units on map

Part A. Write an equation that describes the delivery area. $(x-9)^2 + (y-8)^2 = 25$

Part B. Does any of the florist's delivery area include part of Seminole County?

? can't see boundary

*Instructional Item 2*

(42) The equation of a circle is given.

$$x^2 + y^2 - 6x + 8y + 5 = 0$$

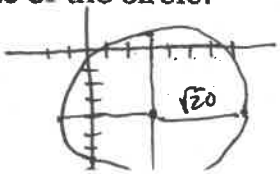
$(x^2-6x+9) + (y^2+8y+16) = -5 + 9 + 16$

$(x-3)^2 + (y+4)^2 = 20$

Part A. Determine the center and the radius of the circle. $(3, -4)$ $r = \sqrt{20}$

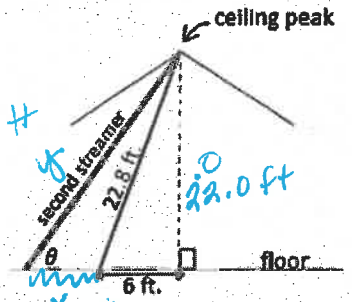
Part B. What is the ordered pair that contains the maximum y-value of the circle?

Part C. Sketch the graph of the circle on the coordinate plane.



*Instructional Item 1*

(43) Belle is hanging streamers for her brother's surprise birthday party. She secures two streamers of different lengths at the peak of the ceiling. The center of the floor is directly underneath the ceiling peak. The distance along the floor from the center of the room to where the first streamer is attached is 6 feet. The second streamer is attached to the floor further from the center of the floor than the first streamer.




The distance between the streamers is $x$ feet and the length of the second streamer is $y$ feet. The angle formed between the second streamer and the floor is $\theta$. Select all of the equations that are true to the nearest tenth based on the diagram.

a. $\sin\theta = \frac{22.0}{y}$

b. $\sin\theta = \frac{22.8}{y}$

c. $\tan\theta = \frac{22.0}{6}$

d. $\cos\theta = \frac{x}{y}$

e. $\cos\theta = \frac{x+6}{22.8}$

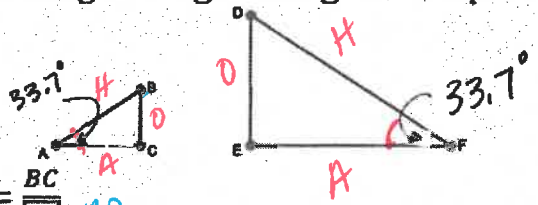
f. $\tan\theta = \frac{22.0}{x+6}$

g. $\sin\theta = \frac{22.0}{22.8}$

h. $\tan\theta = \frac{22.8}{x}$

*Instructional Item 2*

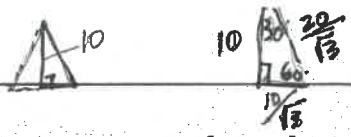
(44) Given the diagram below showing two right triangles, complete the following statements.




Statement A. $\sin 33.7° = \frac{BC}{\square}$ AB

Statement B. $\sin 33.7° = \frac{\square}{DF}$ ED

Statement C. $\frac{BC}{AC} = \frac{\square}{\square}$ DE / EF



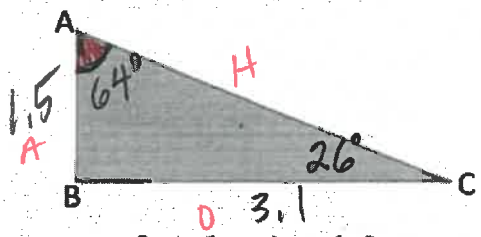

*Instructional Item 1*

(45) The logo of a local construction company contains an equilateral triangle. The height of the triangle is 10 units. What is the length of the measure of each side of the triangle?

$\frac{20}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{20\sqrt{3}}{\sqrt{9}} = \frac{20\sqrt{3}}{3}$ units

*Instructional Item 2*

(46) The right triangle $ABC$ is shown. Angle $B$ is the right angle and the length of $AB$ is 1.5 centimeters and the length of $BC$ is 3.1 centimeters.




$\tan A = \frac{3.1}{1.5}$

$A = \tan^{-1}\left(\frac{3.1}{1.5}\right) \approx 64°$

$m\angle A + m\angle C = 90$

$64 + m\angle C = 90$

$m\angle C = 26°$

Part A. Determine the measure of angles $A$ and $C$.

Part B. Determine the length of $AC$.

*Instructional Item 1*

(47) Use the following statement to answer the questions.

*A triangle is an equilateral triangle if and only if the triangle has three congruent sides.*

$p \to q$ If a triangle is equilateral, then it has 3 $\cong$ sides.

Part A. Write the two "if…then" statements that can be written from the given statement.

Part B. Write the converse of one of the conditional statements created in Part A.

$q \to p$ If a triangle has 3 $\cong$ sides, then it is equilateral.

They are converses of each other.

*Instructional Item 1*

(48) Puaglo said the following statements are true. Select all the statements that are false.

a. All quadrilaterals have four right angles. F 

b. A triangle is a polygon with three sides. T

c. All circles are similar. T

d. All equiangular quadrilaterals are congruent. F 

e. A trapezoid must have at least one obtuse angle. F

↳ new definition:
at least 1 pair of // sides ∴ 
falls into that category