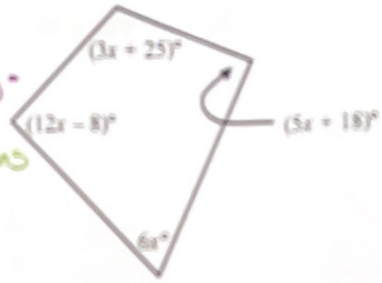
1. Find the value of $x$. ~~opposite~~ all the angles of quad at up to 360°

A. $x = 3.7$

B. $x = 5.6$

C. $x = 8.3$

D. $x = 12.5$




$(3x+25)+(12x-8)+6x+(5x+18)=360°$

Combine like terms

$26x+35=360$

Solve for "x"

$-35 \quad -35$

$\frac{26x}{26}=\frac{325}{26}$

$x=12.5$

2. Given parallelogram $ABCD$, determine which statements below must always be true. **Select all that apply.**

F. $\overline{AB} \cong \overline{BC}, \overline{DC} \cong \overline{BC}$

G. $\overline{AB} \cong \overline{DC}, \overline{BC} \cong \overline{AD}$

H. $m\angle A + m\angle B = 180°$

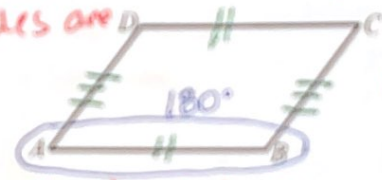
I. $AB + BC = AD + DC$

J. $m\angle B + m\angle D = 180°$

K. $\overline{AC} \cong \overline{DB}$

- opposite angles are ≅
- opposite sides are ≅
- opposite sides are parallel
- consecutive (neighbor) angles are supplementary
- diagonals bisect each other

- neighboring sides & angles are almost never ≅




Since $AB=DC$ & $BC=AD$

then $AB+BC=DC+AD$

3. In the rectangle below $JN = x + 3$ and $JL = 3x + 1$. Which of the following lengths below is correct?

For Rectangles, diagonals are ≅

A. $NL = 4$

B. $JN = 5$

C. $NM = 8$

D. $KM = 10$


$JL=JN+NL$

$3x+1=(x+3)+(x+3)$

$3x+1=2x+6$

$-2x \quad -2x$

$x+1=6$

$-1 \quad -1$

$x=5$

$JN=NM$

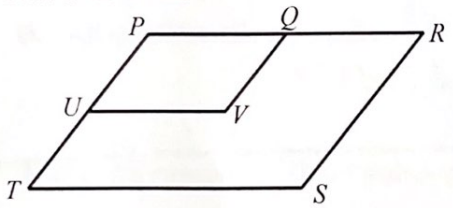
$x+3=NM$

$5+3=8$

$NM=8$

**4.** A student is given the following information and then asked to write a paragraph proof. Determine which statement would correctly complete the student's proof.

**Given:** Parallelogram $PRST$ and Parallelogram $PQVU$
**Prove:** $\angle V \cong \angle S$




**Proof:**
We are given Parallelogram $PRST$ and Parallelogram $PQVU$. Since opposite angles of a parallelogram are congruent, $\angle P \cong \angle V$ and $\angle P \cong \angle S$. _____.

Since these are the same angles, then the transitive property connects the other angles

$\angle V \cong \angle P \cong \angle S$

$\angle V \cong \angle S$

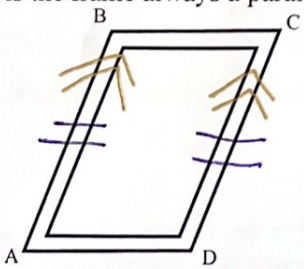
**A.** Therefore, $\angle V \cong \angle S$ by the Transitive Property of Congruence.

**B.** Therefore, $\angle V \cong \angle S$ by the Transformative Property of Congruence.

**C.** Therefore, $\angle V \cong \angle S$ by the Reflective Property of Congruence.

**D.** Therefore, $\angle V \cong \angle S$ by the Reflexive Property of Congruence.

**5.** A wooden frame has screws at $A$, $B$, $C$, and $D$ so that the sides of it can be pressed to change the angles occurring at each vertex. $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$, even when the angles change. Why is the frame always a parallelogram?




If one set of sides of a parallelogram are both $\cong$ & $\parallel$, then that quad is indeed a parallelogram.

**A.** The angles always stay the same, so $ABCD$ is a parallelogram.

**B.** All sides are congruent, so $ABCD$ is a parallelogram.

**C.** One pair of opposite sides is congruent and parallel, so $ABCD$ is a parallelogram.

**D.** One pair of opposite sides is congruent, so $ABCD$ is a parallelogram.

**6.** Which statement is true?

**A.** All quadrilaterals are rectangles. False, b/c quads can be trapezoids

**B.** All rectangles are parallelograms. TRUE

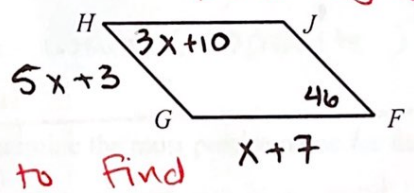
**C.** All parallelograms are rectangles. False, b/c not all parallelograms have 90° corner angles like rectangles

**D.** All quadrilaterals are squares. False, b/c quads can be trapezoids

---

**7.** What is the measure of $HJ$ in Parallelogram $FGHJ$, given the following: Opposite sides of a parallelogram are ≅

- $FG = x + 7$
- $GH = 5x + 3$
- $m\angle F = 46°$
- $m\angle H = (3x + 10)°$




Since $HJ = GF$

$HJ = x + 7$

$= 12 + 7$

$= 19$

**A.** $HJ = 63$

**B.** $HJ = 19$

**C.** $HJ = 12$

**D.** $HJ = 8$

- We need to find x before we can find HJ
- Opposite angles of a parallelogram are ≅

$3x + 10 = 46$
$-10 \quad -10$
$3x = 36$

$x = 12$

---

**8.** $JKLM$ is a rhombus. If $m\angle JML = 70°$ and $m\angle JKM = (5x + 16)°$, find the value of $x$.

↳ Diagonals are ⊥

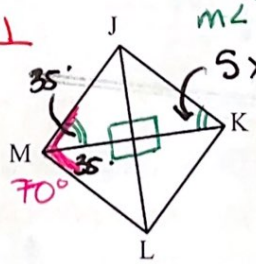
**A.** $x = 18.8$

**B.** $x = 10.8$

**C.** $x = 7.8$

**D.** $x = 3.8$

- Diagonals bisect the corner angles
- Bisect means cut in half




$m\angle JMK = m\angle JKM$

$5x + 16 = 35°$
$-16 \quad -16$

$\frac{5x}{5} = \frac{19}{5}$

$x = 3.8$

---

**9.** What is the value of $x$ in the rectangle?

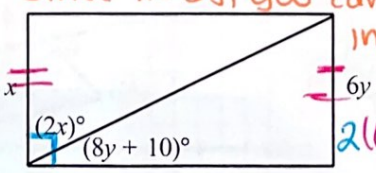
**A.** $x = 42$

**B.** $x = 24$

**C.** $x = 8$

**D.** $x = 4$

- Corner angles are 90°
- Opposite sides are ≅




$x = 6y$ $\quad 2x + 8y + 10 = 90$

Since $x = 6y$, you can put a 6y in for x (substitution)

$2(6y) + 8y + 10 = 90$

$12y + 8y + 10 = 90$

$20y + 10 = 90$
$-10 \quad -10$

$20y = 80 \quad y = 4$

Since $y = 4$

$x = 6(y)$
$6(4)$
$x = 24$

**10.** Given points $B\ (-3, 3), C(3, 4)$, and $D(4, -2)$. Which of the following points must be point $A$ in order for the quadrilateral $ABCD$ to be a parallelogram?

- parallelograms have parallel sides
- parallel means same slope

**A.** $A(-2, -1)$

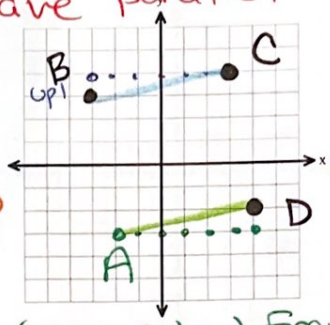
**B.** $A(-3, -2)$

**C.** $A(-2, -3)$

**D.** $A(-1, -2)$

Slope BC = Slope AD

$m = \frac{\text{rise}}{\text{run}} = \frac{\text{up } 1}{\text{right } 6} = \frac{1}{6}$




- so go backward (opposite) from D go down 1, left 6

**11.** Use slope or the distance formula to determine the most precise name for the figure: $A(-1, -4), B(1, -1), C(4, 1), D(2, -2)$.

- looking at the diagram, it is not a trapezoid or square.
- Diff btween Kites & Rhombi is a Rhombus has ≅ sides

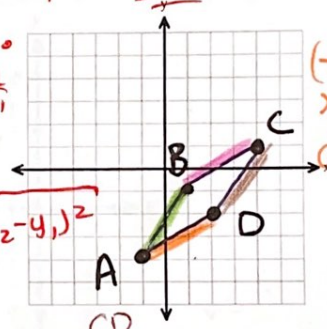
**A.** Kite

**B.** Rhombus

**C.** Trapezoid

**D.** Square

dist. Formula $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$




AD
$(-1,-4), (2,-2)$
$x_1\ y_1\ \ x_2\ y_2$
$d=\sqrt{(2-(-1))^2+(-2-(-4))^2}$
$\sqrt{3^2+2^2}$
$\sqrt{9+4}$
$\sqrt{13}$

AB
$(-1,-4), (1,-1)$
$x_1\ y_1\ \ x_2\ y_2$
$d=\sqrt{(1-(-1))^2+(-1-(-4))^2}$
$=\sqrt{2^2+3^2}=\sqrt{4+9}=\sqrt{13}$

BC
$(1,-1), (4,1)$
$x_1\ y_1\ \ x_2\ y_2$
$d=\sqrt{(4-1)^2+(-1-1)^2}$
$=\sqrt{3^2+(-2)^2}=\sqrt{9+4}=\sqrt{13}$

CD
$(4,1), (2,-2)$
$d=\sqrt{(2-4)^2+(-2-1)^2}=\sqrt{(-2)^2+(-3)^2}$
$=\sqrt{4+9}$
$=\sqrt{13}$

**12.** What is the scale factor of the dilation centered at the origin of $\Delta ABC$ to image $\Delta A'B'C'$?

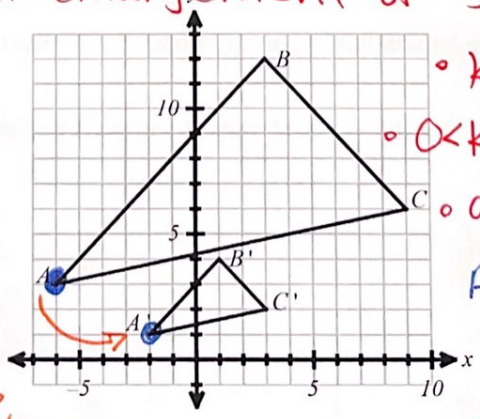
- Dialation is an enlargement or shrink

**A.** $k = \frac{1}{3}$

**B.** $k = \frac{1}{2}$

**C.** $k = 2$

**D.** $k = 3$




- $K > 1 \rightarrow$ grows
- $0 < K < 1 \rightarrow$ shrink
- always go $A \rightarrow A'$

$A(-6, 3) \rightarrow A'(-2, 1)$

$-6 \cdot K = -2$

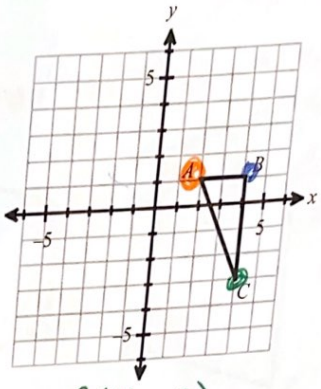
Solve for K

$K = \frac{-2}{-6} = \frac{1}{3}$

Getting smaller so it is a shrink

enlargement so multiply by 4

**13.** $\Delta ABC$ is dilated with a scale factor of 4 centered at the origin. What are the coordinates of the image points?




**A.** $A'(8,4), B'(16,4), C'(16,-12)$

**B.** $A'(8,4), B'(16,4), C'(16,12)$

**C.** $A'(0.5,0.25), B'(1,0.25), C'(1,-0.75)$

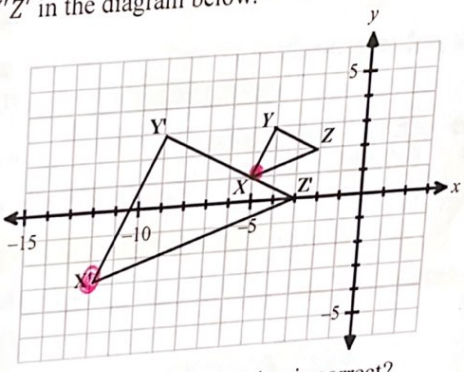
**D.** $A'(0.5,0.25), B'(1,0.25), C'(1,0.75)$

A(2,1)
4•(2,1)
A'(8,4)

B(4,1)
4•(4,1)
B'(16,4)

C(4,-3)
4•(4,-3)
C'(16,-12)

**14.** Three students were asked to explain which transformations map the pre-image of $\Delta XYZ$ onto the image $\Delta X'Y'Z'$ in the diagram below.




vector notation
$\langle 1,-2\rangle \rightarrow$
$(x+1, y-2)$

Based on the following responses, whose reasoning is correct?

- Jason says the image is result of translating the pre-image along the vector $\langle 1,-2\rangle$ and performing a dilation centered at the origin with a scale factor of 3.
- Sanjay says the pre-image is rotated 180° about the origin and dilated about the origin by a scale factor of 3.
- Teresa says the image is a result of applying the rule $(x,y) \rightarrow (3(x+1), 3(y-2))$.

Scale factor dialation is multiplying by 3

so Jason & Teresa have the same transformation

**A.** Only Jason is correct.

**B.** Sanjay and Jason are correct.

**C.** Jason and Teresa are correct.

**D.** Jason, Sanjay, and Teresa are all correct.

$X \rightarrow X'$
$(-5,1) \rightarrow (-12,-3)$
-5 & 1 are plugged into $3(-5+1), 3(1-2)$
$3(-4)$ $3(-1)$
$(-12, -3)$

Use as a key

means similar so angles are $\cong$ and sides are proportional

**15.** In the diagram below $PQRS \sim P'Q'R'S'$. Which statements must be true? **Select all that apply.**

- Proportional means they have the same Scale Factor (k)

**F.** $\angle P \cong \angle Q$ False

**G.** $\angle P \cong \angle P'$

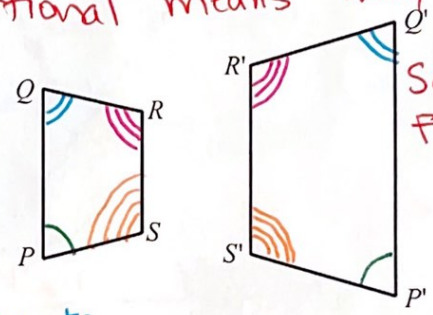
**H.** $\angle P \cong \angle Q'$ False

**I.** $\frac{PQ}{P'Q'} = \frac{QR}{Q'R'}$ Both of these reduce to the Scale factor

**J.** $\frac{PQ}{RS} = \frac{P'Q'}{R'S'}$

**K.** $\frac{PQ}{QR} = \frac{P'Q'}{P'S'}$ False

another way to write choice I.




---

**16.** Two triangles are similar and the ratio of each pair of corresponding sides is 2: 1 . Which statement regarding the two triangles is **not** true?

**A.** Their perimeters have a ratio of 2: 1 TRUE, the ratio of the perimeters is the same as the scale factor

**B.** The scale factor is a ratio of 2: 1 True, the ratio of sides is the scale factor

**C.** Their corresponding angles have a ratio of 2: 1 False b/c similar shapes have congruent angles

**D.** Their areas have a ratio of 4: 1

TRUE, the ratio of areas is the scale factor squared

Area Ratio $= \left(\text{Scale factor}\right)^2 = \left(\frac{2}{1}\right)^2 = \frac{4}{1}$

---

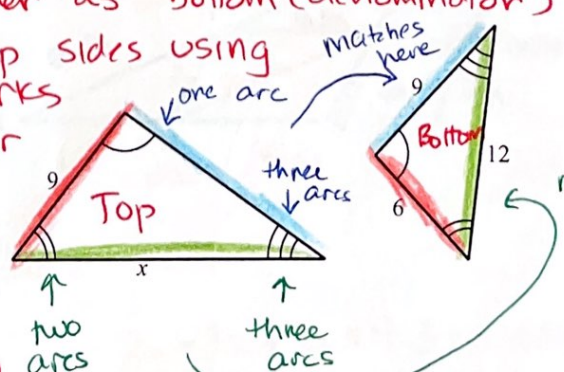
**17.** What is the value of $x$ ?

① label one as top (numerator) & the other as bottom (denominator)

② Match up sides using arc marks

③ Find Scale Factor (sides w/ 2 #s)

$SF = \frac{9}{6} = \frac{3}{2}$




**A.** $x = 18$

**B.** $x = 16$

**C.** $x = 12$

**D.** $x = 3$

④ Make a Proportion

$\frac{3}{2} = \frac{x}{12}$

⑤ Cross multiply

$\frac{3}{2} = \frac{x}{12}$

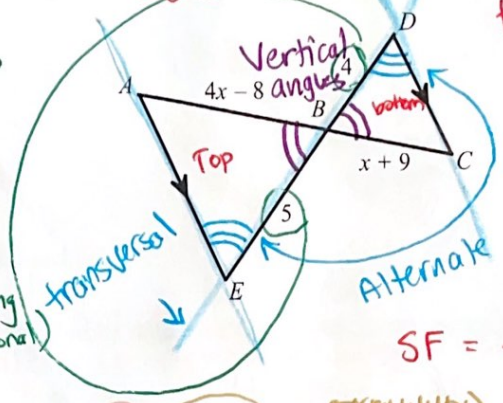
$2(x) = 3(12)$

$2x = 36$

$x = 18$

**18.** In the figure below, what is the length of $\overline{AB}$ ?

- Similar Figures are ≅ angles
- We need to match angles to match up sides




A. $AB = 7$

B. $AB = 11$

C. $AB = 16$

D. $AB = 20$

These two angles are inbetween 2 arcs & 3 ars so they are corresponding sides (proportional)

$AB = 4x - 8$
$= 4(7) - 8$
$= 28 - 8$
$= 20$

$SF = \frac{4}{5}$ or $\frac{5}{4}$

$\frac{5}{4} = \frac{4x-8}{x+9}$ → $4(4x-8) = 5(x+9)$
$16x - 32 = 5x + 45$
$-5x \quad -5x$
$11x - 32 = 45$
$+32 \quad +32$
$11x = 77$
$x = 7$

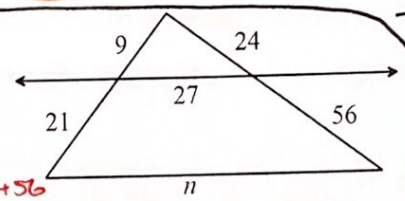
**19.** What is the value of $n$ ?

A. $n = 39$

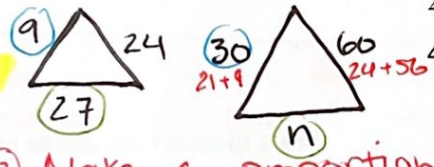
B. $n = 54$

C. $n = 63$

D. $n = 90$




① Break into 2 seperate Δs




② Make a proportion

$\frac{9}{30} = \frac{27}{n}$

③ cross multiply

$\frac{9}{30} = \frac{27}{n}$

Reduce

$\frac{3}{10} = \frac{27}{n}$

$3(n) = 10(27)$
$3n = 270$
$n = 90$

**20.** In $\Delta LMN$, $S$ is the midpoint of $\overline{LM}$, $T$ is the midpoint of $\overline{MN}$, and R is the midpoint of $\overline{LN}$. Given the following, what is the perimeter of $\Delta RST$ ?

- $LS = 8.2x$
- $ST = 4.3x$
- $MN = 6x$

add up all the sides

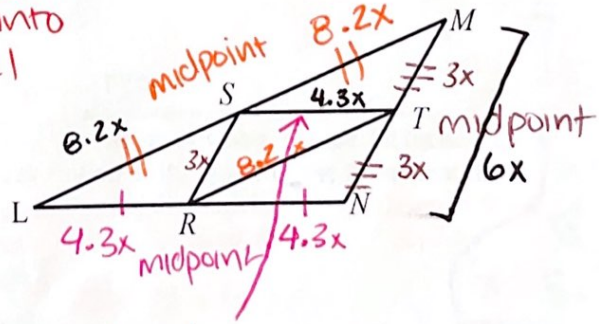
half way point or cuts into two equal pieces

A. $11.4x$

B. $15.5x$

C. $18.4x$

D. $18.5x$




- If you have all 3 midpoints of a triangle then, midsegment = $\frac{1}{2}$ parallel side

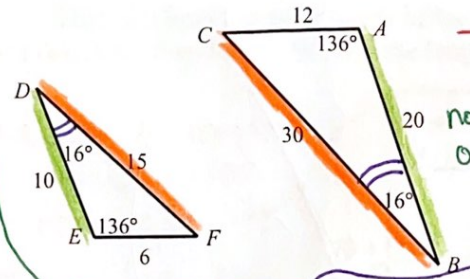
Big Δ = $8.2x + 8.2x + 3x + 3x + 4.3x + 4.3x$

Small Δ = $8.2x + 3x + 4.3x$
$= 15.5x$

**21.** Determine whether the triangles below are similar. Justify your answer.

• 3 options for proving similar

~~AA~~ ~ SAS ~ ~~SSS~~ ~




$\frac{DE}{AB} = \frac{10}{20} = \frac{1}{2}$

$\frac{DF}{CB} = \frac{15}{30} = \frac{1}{2}$

not an option

in between angles are ≅ 16° = 16°

sides are proportional (same scale factor)

**A.** $\Delta DEF \sim \Delta BAC$ because the corresponding angles of each triangle are congruent and the ratio of the corresponding sides is 2. Corresponding angles are ≅,

Scale factors can be flipped

**B.** $\Delta DEF \sim \Delta BAC$ because the corresponding angles of each triangle are congruent and the ratio of the corresponding sides is 3.

**C.** $\Delta DEF$ is not similar to $\Delta BAC$ because the ratios of corresponding sides are not the same.

**D.** $\Delta DEF$ is not similar to $\Delta BAC$ because the corresponding angles are not congruent.

---

* Don't have enough info to use $a^2+b^2=c^2$ yet... so use the Neighboring Leg Geometric Mean theorem/ Formula

**22.** Use the diagram to find the values of $x$ and $y$.

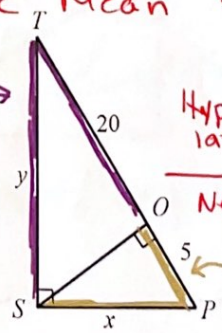
**A.** $x = 5\sqrt{15},\ y = 20\sqrt{5}$

**B.** $x = 5\sqrt{15},\ y = 10\sqrt{5}$

**C.** $x = 5\sqrt{5},\ y = 20\sqrt{5}$

**D.** $x = 5\sqrt{5},\ y = 10\sqrt{5}$

N.L for y




$\frac{\text{Hypo of large } \Delta}{\text{Neighboring Leg}} = \frac{\text{Neighboring Leg}}{\text{part of hypo leg touches}}$

$\frac{25}{y} = \frac{y}{20}$

$y^2 = 25 \cdot 20$

$\sqrt{y^2} = \sqrt{500}$

50 10

25 2 5 2

5 5

$y = 5 \cdot 2\sqrt{5} = 10\sqrt{5}$

N.L for x

$\frac{25}{x} = \frac{x}{5}$

$x^2 = 25 \cdot 5$

$\sqrt{x^2} = \sqrt{125}$

25 5

5 5

$x = 5\sqrt{5}$

---

**23.** A carpenter wants to make a triangular frame and has pieces of wood that are 19 inches, 28 inches, and 45 inches long. What is the best description of the shape of the frame that the carpenter can create?

① a = smallest side b = middle side c = longest side

**A.** These side lengths will not create a triangle.

**B.** These side lengths will create a right triangle.

**C.** These side lengths will create an obtuse triangle.

D. These make an acute Δ.

$a+b>c$

$19+28>45$

$47>45$

This means it is a Δ

$c^2$ smaller

② $a^2+b^2>c^2$ acute Δ

$a^2+b^2=c^2$ Right Δ

$a^2+b^2<c^2$ obtuse Δ

$19^2+28^2 \mid 45^2$

$361+784 \mid 2025$ → $1145 < 2025$ $c^2$ is bigger

**D.** These side lengths will create an acute triangle.

**24.** A construction company is building the foundation for a new office building. The diagram shows the lengths of some sides of the foundation. What is the length of the side between point $A$ and point $B$?

**A.** 30 ft

**B.** 40 ft

**C.** 50 ft

**D.** 70 ft

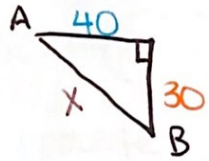
• All the Right angles means this quad is a rectangle

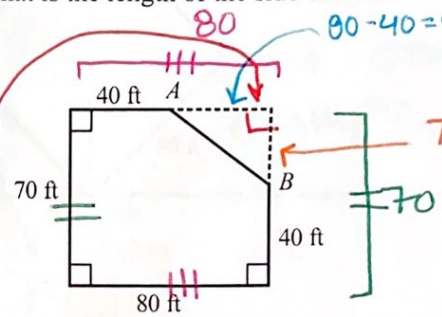
• opposite sides are ≅

• B/c we have a right Δ,

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

$30^2+40^2=x^2$




$900+1600=x^2$

$\sqrt{2500}=\sqrt{x^2}$

$x=50$

**25.** In the right triangle, $x$ and $y$ represent unknown side lengths. What is the length of side $x$?

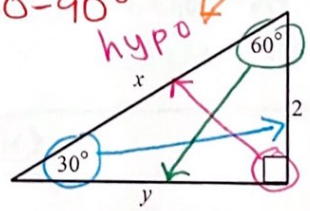
**A.** 2

**B.** 4

**C.** $2\sqrt{3}$

**D.** $3\sqrt{2}$

• This is a 30°-60°-90° Right Δ




short to hypo, multiply by 2

Short leg

$2 \cdot 2 = 4$

middle/long leg

**26.** In the figure, what is the distance a ball travels when thrown from second base to home plate?

**A.** 90 feet

**B.** 180 feet

**C.** $90\sqrt{2}$ feet

**D.** $2\sqrt{90}$ feet

Because of the Right Δ, you can use

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

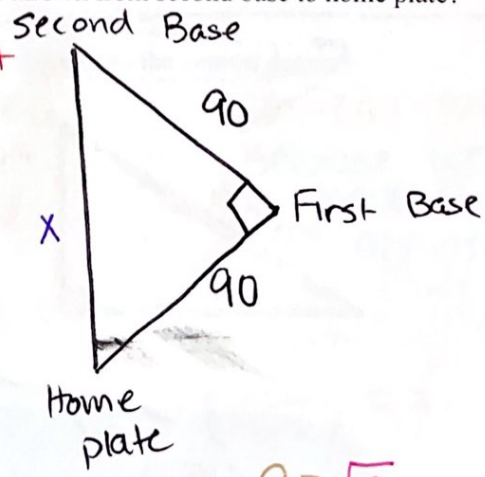
$90^2+90^2=x^2$

$8100+8100=x^2$

$\sqrt{16200}=\sqrt{x^2}$

$\boxed{2}$ 8100

single 90 90 pair → $90\sqrt{2}$



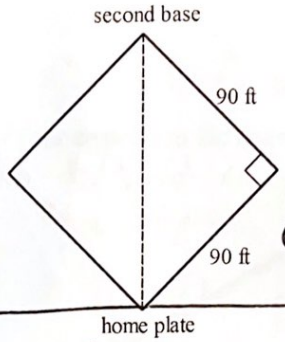



Diagram for the other example

This is a right Δ, so we can use SOH-CAH-TOA

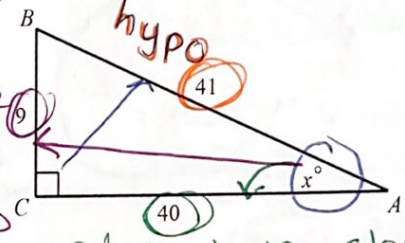
**27.** What is cos $x°$ in the triangle?

A. $\frac{40}{41}$

B. $\frac{9}{41}$

C. $\frac{41}{9}$

D. $\frac{9}{40}$




opposite side is the farthest side not the hypo

adjacent is closest side not the hypo

Cosine = $\frac{\text{adjacent}}{\text{hypo}}$ → $\frac{40}{41}$

**28.** Which of the following has the same value as sin $M$?

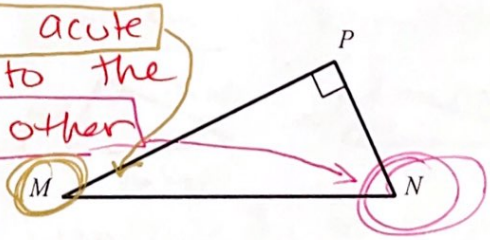
A. sin $N$

B. tan $M$

C. cos $N$

D. cos $M$

the sine of one acute angle is equal to the cosine of the other acute angle in a right Δ.




**29.** In the triangle below, what is the measure of angle A rounded to the nearest degree?

A. 35°

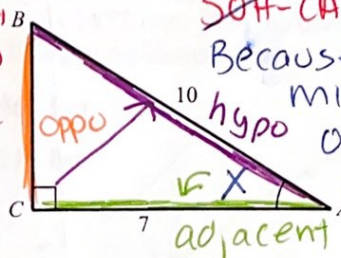
B. 44°

C. 46°

D. 72°

• B/C it is a right Δ lets use SOH-CAH-TOA

• However, because we are looking of an angle we need to use the Inverse Trig




~~SOH~~-CAH-~~TOA~~

Because we are missing the opposite, we can't use a "O"

$\cos^{-1}\left(\frac{\text{adj}}{\text{hypo}}\right) = x$

• Must put into a calculator → $\cos^{-1}\left(\frac{7}{10}\right) = x$ $x = 45.57$

① We need to find "y" before we can find "x"

**30.** Find the value of $x$ in the diagram below. Round your answers to the nearest tenth if necessary.

② Use SOH-~~CAH~~-~~TOA~~ to find x b/c we don't have the adjacent, we can't use "A"

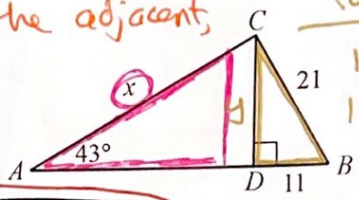
Use $a^2+b^2=c^2$ for "y"

$11^2+b^2=21^2$

$121+b^2=441$

$\sqrt{b^2}=\sqrt{320}$

$b=17.89$




A. $x = 12.2$

B. $x = 13.1$

C. $x = 24.5$

D. $x = 26.2$

Calculator → $\frac{\sin 43}{1} = \frac{y}{x}$

$\frac{0.682}{1} = \frac{17.89}{x}$

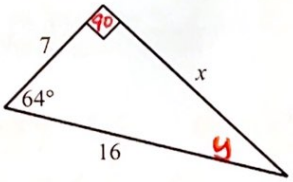
③ cross multiply

$1(17.89) = 0.682(x)$

$17.89 = 0.682x$

$x = 26.229$

**31.** Three students were asked to find the value of $x$ in the diagram below.




180° in a △

$90+y+64=180$

$y+144=180$

$y=26°$

The first step of each student's work is shown below. Determine which student(s) set up the problem correctly.

| Lewis | Alexa | Miranda |
|---|---|---|
| $\cos 26 = \frac{x}{16}$ | $\tan 26 = \frac{7}{x}$ | $\sin 64 = \frac{16}{x}$ |

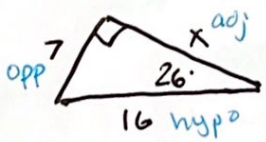
A. Lewis, Alexa, and Miranda

B. Miranda and Alexa

C. Lewis and Miranda

D. Lewis and Alexa

Lewis




$\cos 26 = \frac{x}{16}$

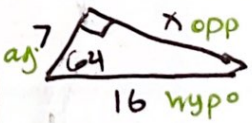
Correct

Alexa


$\tan(26) = \frac{7}{x}$

correct

Miranda




$\sin(64) = \frac{x}{16}$

incorrect

**32.** A person is standing at ground level with the base of the Empire State Building in New York City. The angle formed of elevation formed by his position and the top of the building is 48.4°. The height of the Empire State Building is 1472 feet. Find the distance that he is standing from the base of the Empire State Building to the nearest foot.

A. 8 feet

B. 1307 feet

C. 1968 feet

D. 2217 feet

① SOH-CAH-TOA

Calculator → $\frac{\tan(48.4)}{1} = \frac{1472}{x}$

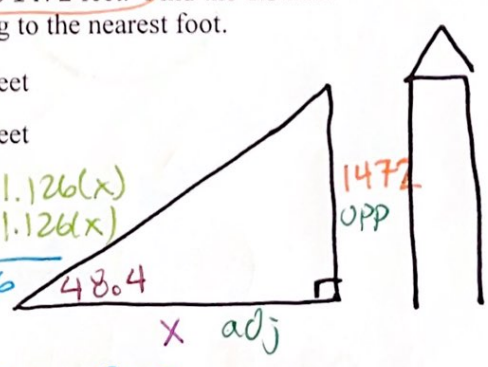
$\frac{1.126}{1} = \frac{1472}{x}$

② Cross multiply

$1(1472) = 1.126(x)$

$\frac{1472}{1.126} = 1.126(x)$

$x = 1306.902$



Corner angles are 90°

**33.** A rectangle is inscribed in the circle below. What is the exact circumference of the circle?

**A.** $26\pi\ cm$

**B.** $34\pi\ cm$

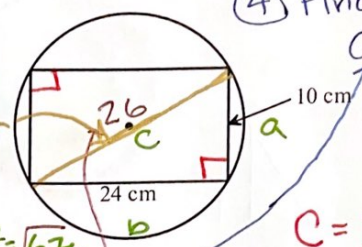
**C.** $169\pi\ cm$

**D.** $676\pi\ cm$

① Circumference ⇒ $2\pi r$
Need the radius

② Draw in a diameter

③ Use Pythags for d
$a^2+b^2=c^2$
$10^2+24^2=c^2$
$100+576=c^2$
$\sqrt{c^2}=\sqrt{676}$
$c=26$




④ Find radius
$d=2r$
$26=2r$
$r=13$

$C=2\pi r$
$=2(13)\pi$
$=26\pi$

**34.** Find the values of $x$ and $y$ in the diagram below.
**Select all that apply.**

**F.** $x = 54$

**G.** $x = 45$

**H.** $x = 36$

**I.** $y = 54$

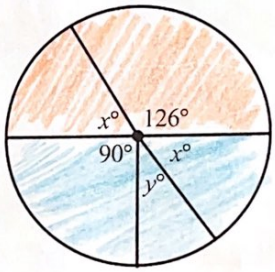
**J.** $y = 45$

**K.** $y = 36$

Diameters cut circles into 180° halfs

$x+126=180$
$x=54$

$90+y+x=180$
$90+y+54=180$
$y+144=180$
$-144\quad -144$
$y=36$




**35.** In the circle below, $PR = 8\ cm$ and $m\angle QSR = 46°$. What is the arc length of $\widehat{PQ}$ ?
Round you answer to the nearest hundredth.

**A.** 18.71 $cm$

**B.** 9.35 $cm$

**C.** 6.42 $cm$

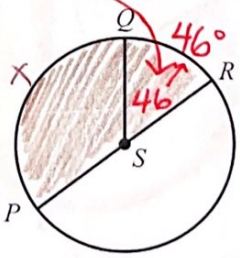
**D.** 2.51 $cm$

Central Angle = Arc

Radius
$d=2r$
$8=2r$
$r=4$

PR is a diameter which cuts into 180° halfs

$x+46=180$
$x=134$



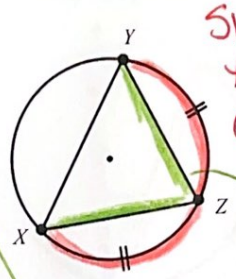

Central Angle

$\pi=3.14$

$$\text{Arc Lenghth} = \frac{N}{360}\cdot 2\pi r = \frac{134}{360}\cdot 2(4)\pi =$$

$(0.372)(8)(3.14) = 9.3502$

**36.** In the diagram below $\overline{XY} = 10x - 10$, $\overline{XZ} = 6x + 10$, and $\overline{YZ} = 8x - 5$. Find $XZ$ to the nearest whole number.




**A.** $XZ = 10$

**B.** $XZ = 25$

**C.** $XZ = 55$

**D.** $XZ = 101$

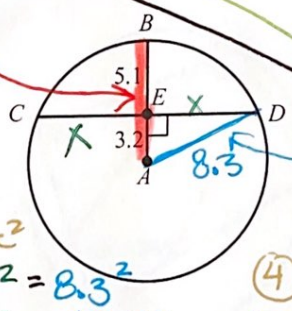
Since arcs are ≅, then corresponding chords are ≅

$\overset{\frown}{YZ} \cong \overset{\frown}{XZ}$, then $\overline{YZ} \cong \overline{XZ}$

$8x - 5 = 6x + 10$
$-6x \quad -6x$
$2x - 5 = 10$
$+5 \quad +5$
$2x = 15$
$x = 7.5$

$XZ = 6x + 10$
$6(7.5) + 10$
$45 + 10$
$55$

**37.** What is the length of $\overline{CD}$ to the nearest tenth?




**A.** $CD = 6.5$

**B.** $CD = 7.7$

**C.** $CD = 13.0$

**D.** $CD = 15.3$

radius

① $AB = AE + EB$
$= 3.2 + 5.1$
$= 8.3$

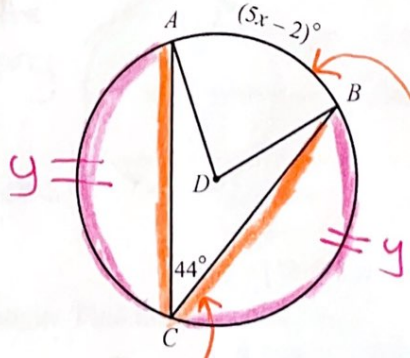
② Draw in a radius

③ Right △ → $a^2 + b^2 = c^2$
$3.2^2 + x^2 = 8.3^2$
$10.24 + x^2 = 68.89$
$\sqrt{x^2} = \sqrt{58.65}$
$x = 7.658$

④ If a radius is ⊥ to a chord, then it bisects that chord

$CD = x + x$
$CD = 2x$
$= 2(7.658)$
$= 15.316$

**38.** Given $m\overset{\frown}{AC} = m\overset{\frown}{BC}$ and $\angle ADB$ is a central angle, what is the value of $x$ and $m\overset{\frown}{BC}$?




**A.** $x = 18$, $m\overset{\frown}{BC} = 136°$

**B.** $x = 9.2$, $m\overset{\frown}{BC} = 88°$

**C.** $x = 18$, $m\overset{\frown}{BC} = 88°$

**D.** $x = 9.2$, $m\overset{\frown}{BC} = 136°$

360° in a Circle

$y + y + 88 = 360°$

$2y + 88 = 360°$
$-88 \quad -88$
$2y = 272°$
$\frac{2y}{2} = \frac{272°}{2}$
$y = 136°$

Inscribed angle

2 · Inscribed Angle = Intercepted Arc
$2(44) = 88$

$5x - 2 = 88$
$+2 \quad +2$
$5x = 90$
$x = 18$

**39.** What is the length of the minor arc $\overset{\frown}{AB}$ in the circle with a radius of 45 $cm$ ?

A. $20\pi\ cm$

B. $10\pi\ cm$

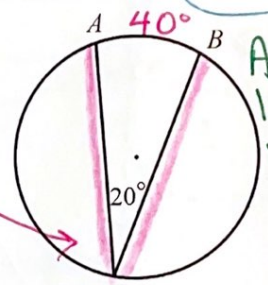
C. $5\pi\ cm$

D. $2\pi\ cm$

① Inscribed Angle

2·Inscribed∠ = Arc

2(20)=40°




② Arc length Formula $= \frac{N}{360} \cdot 2\pi r$

$= \frac{40}{360} \cdot 2(45)\pi$

Reduce

$= \frac{1}{9} \cdot 90 \cdot \pi$

$= \frac{90}{9}\pi$

$10\pi$

**40.** What is the value of $x$ ?

A. $x = 14$

B. $x = 15$

C. $x = 21$

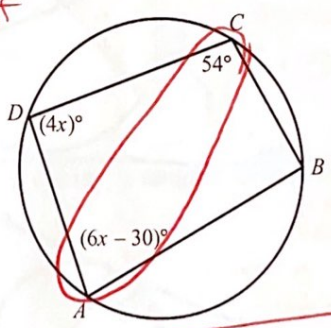
D. $x = 26$

① Opposite Angles of an Inscribed Quadrilateral are supplementary

$6x - 30 + 54 = 180$

$6x + 24 = 180$

$-24 \quad -24$




$\frac{6x}{6} = \frac{156}{6}$

$x = 26$

**41.** $AB$ is tangent to circle $M$ at point $A$. The circle has a radius of 9 and $BC = 14$. What is the length of $AB$?

A. $AB = 10.7$

B. $AB = 16.6$

C. $AB = 21.2$

D. $AB = 24.7$

① A tangent is ⊥ to a radius @ the point of tangency

② All radii of the same ⊙ are ≅

③ B/c it is ⊥

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

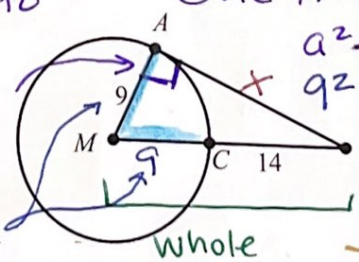
$9^2 + x^2 = 23^2$

$81 + x^2 = 529$

$-81 \quad -81$

$\sqrt{x^2} = \sqrt{448}$

$x = 21.166$




Whole hypo

$9 + 14 = 23$

**42.** In the figure below, $\angle QPR$ is a circumscribed angle. Find the value of $x$.

A. $x = 3.5$

B. $x = 5$

C. $x = 8.5$

D. $x = 12$

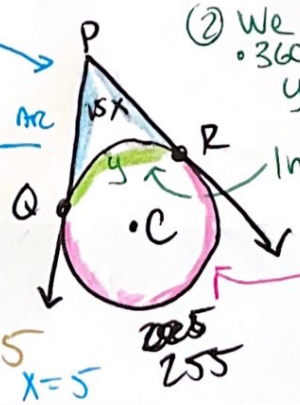
① External Angle

③ External Angle $= \frac{\text{Outside Arc} - \text{Inside Arc}}{2}$

$15x = \frac{225 - 105}{2}$

$15x = \frac{150}{2} \rightarrow 15x = 75$

$x = 5$



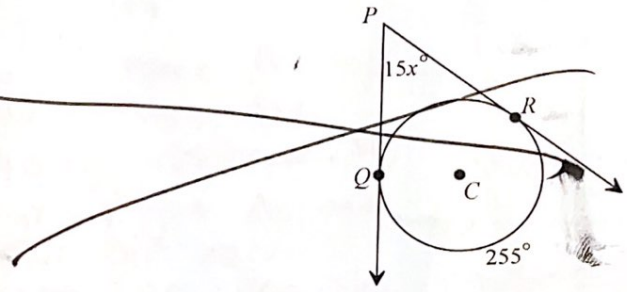

② We need inside arc

360° in a circle

$y + 255 = 360°$

$y = 105$

**D.** $x = 12$




**43.** What is the measure of $\widehat{RS}$ ?

**A.** 54°

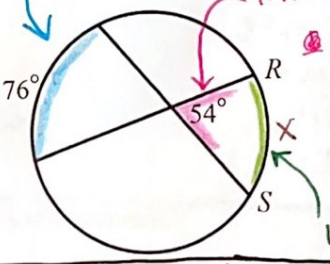
**B.** 38°

**C.** 32°

**D.** 27°

Vertical Angle arc

Internal Angle




Internal Angle Formula = $\frac{\text{its Arc} + \text{Vertical Angle Arc}}{2}$

$2 \cdot 54 = \frac{x + 76}{2} \cdot 2$

$108 = x + 76$

$-76 \quad -76$

$32 = x$

It's arc

**44.** What is the measure of the inscribed angle ($x$), if the ray is tangent to the circle?

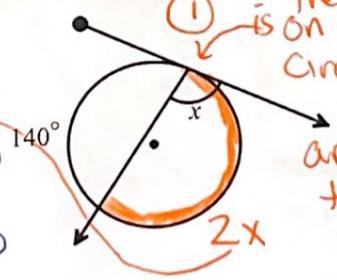
**A.** 140°

**B.** 110°

**C.** 70°

**D.** 55°

② 360° in a Circle




① the angle is on the Circle so the arc is twice the angle

$x(2) = 2x$

$140 + 2x = 360$

$\frac{2x}{2} = \frac{220}{2}$

$x = 110$

**45.** What is the perimeter of $\Delta LMN$ to the nearest tenth?

**A.** 29.9

**B.** 27.2

**C.** 26.0

**D.** 24.8

On next page

Find the Perimeter

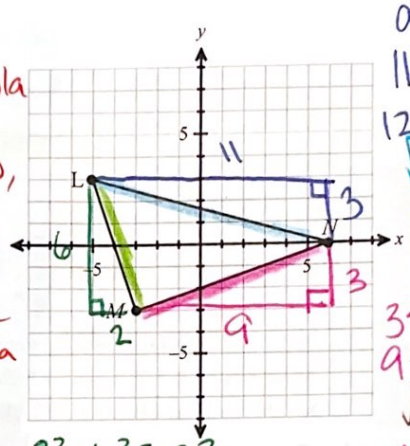
A 29.9

B 27.2

C 26.0

D 24.8

The distance formula comes from the Pythag theorem. So, make Right Δs, and solve for each hypo (you can use the distance formula if you want




$a^2+b^2=c^2$
$11^2+3^2=c^2$
$121+9=c^2$
$\sqrt{130}=\sqrt{c^2}$
$LN=11.4$

$3^2+9^2=c^2$
$9+81=c^2$
$\sqrt{90}=\sqrt{c^2}$
$MN=9.49$

$2^2+6^2=c^2$
$4+36=c^2$
$\sqrt{40}=\sqrt{c^2}$
$LM=6.32$

Perimeter = LN + MN + LM
= 11.4 + 9.49 + 6.32

---

**46.** What is the approximate area of the parallelogram ?

A. 69.9 $ft^2$

B. 105.3 $ft^2$

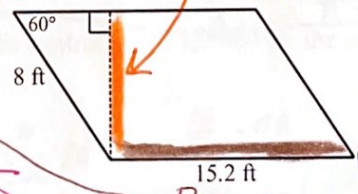
C. 121.6 $ft^2$

D. 210.6 $ft^2$

Area of Parallelogram = base · height

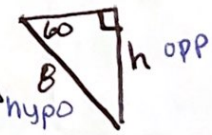
= (15.2)(6.93)

= 105.308




Base

height We need to use SOH-CAH-TOA to find the height




$\frac{\sin 60}{1}=\frac{h}{8}$

cross multiply → $\frac{0.866}{1}=\frac{h}{8}$

$1(h)=8(.866)$

$h=6.93$

---

**47.** Rhombus TUVW has an area of 45 $in^2$ and $TX = 6\ in$. What is the length of $\overline{XU}$?

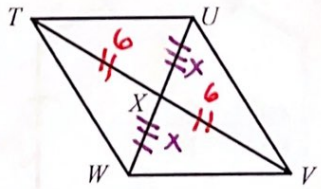
A. $XU = 15.0\ in$

B. $XU = 7.5\ in$

C. $XU = 3.75\ in$

D. $XU = 3.0\ in$

① Diagonals of a Rhombus bisect eachother (cut into 2 equal pieces)




② Area of a Rhombus $= \frac{1}{2}$(diagonal #1)(diagonal #2)

$45=\frac{1}{2}(6+6)(x+x)$

$45=\frac{1}{2}(12)(2x)$ Multiply left to Right

$45=6(2x)$

$45=12x$

$x=3.75$

**48.** What is the area of a circular pool that has a circumference of $100\pi$ feet ?

**A.** $10\pi\ ft^2$

**B.** $50\pi\ ft^2$

**C.** $100\pi\ ft^2$

**D.** $2500\pi\ ft^2$

Area of a Circle is

① $A = \pi \cdot radius^2$

We need the radius

② $C = 2(radius)\pi$

$\frac{100\pi}{2} = \frac{2r\pi}{2}$

$\frac{50\pi}{\pi} = \frac{r \cdot \pi}{\pi}$ $r = 50$

$A = (50)^2\pi$

$= 2500\pi$

---

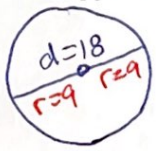
**49.** The diameter of a circular pizza pan is 18 inches. Two-thirds of the pizza is eaten by your friends. What is the approximate area of the pizza pan that is covered by the remaining pizza?

**A.** $170\ in^2$

**B.** $85\ in^2$

**C.** $54\ in^2$

**D.** $27\ in^2$




① Find radius

diameter = 2 · radius

$18 = 2r$

$r = 9$

② If 2/3 of the Pizza is eaten, then only 1/3 remains. So we will take 1/3 of the area of the circle

$\pi = 3.14$

$A = \frac{1}{3}\pi r^2$

$= \frac{1}{3}(9)^2\pi = \frac{1}{3}(81)\pi =$

$27\pi$

$= 27(3.14)$

$= 84.78$

---

**50.** A sector of a circle has an arc length of 10 feet. The central angle formed by the arc is 60°. What is the area of the sector?

**A.** $\frac{150}{\pi}\ ft^2$

**B.** $\frac{\pi}{150}\ ft^2$

**C.** $\frac{\pi}{360}\ ft^2$

**D.** $\frac{900}{\pi}\ ft^2$

② Arc length = $\frac{N}{360} \cdot 2\pi r$

$10 = \frac{60}{360} \cdot 2(\pi)r$

Reduce

$10 = \frac{1}{6}(2\pi)r$

$\frac{1}{6} \cdot \frac{2\pi}{1}$

$\frac{2\pi}{6}$

$\frac{10}{1} = \frac{\pi}{3}r\left(\frac{3}{\pi}\right)$

$\frac{30}{\pi} = r$

① Area Sector $= \frac{N}{360} \cdot \pi r^2$

We need the radius

③ $A = \frac{N}{360} \cdot \pi r^2$

$= \frac{60}{360} \cdot \pi\left(\frac{30}{\pi}\right)^2$

$= \frac{1}{6} \cdot \pi \cdot \frac{900}{\pi^2}$

$A = \frac{1}{6} \cdot \frac{900}{\pi}$

$= \frac{900}{6\pi}$ Reduce

$\frac{150}{\pi}$

---

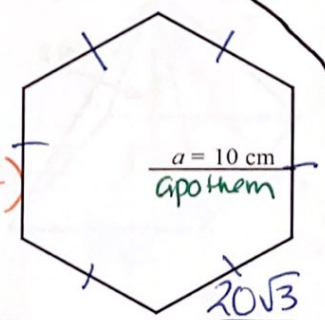
**51.** What is the area of a regular hexagon with an apothem of 10 $cm$ and a side length of $\frac{20\sqrt{3}}{3}\ cm$ ?

**A.** $200\sqrt{3}\ cm^2$

**B.** $300\sqrt{3}\ cm^2$

**C.** $600\sqrt{3}\ cm^2$

**D.** $600\ cm^2$




$\frac{20\sqrt{3}}{3}$

Area of a Regular Polygon $= \frac{1}{2}(\text{apothem}) \cdot (\text{Perimeter})$

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

$= \frac{1}{2}(10)(40\sqrt{3})$

$\frac{1}{2}(10)$

$5(40\sqrt{3})$

$200\sqrt{3}$

① Perimeter

Regular means all sides ≅

$P = 6$ sides $\left(\frac{20\sqrt{3}}{3}\right)$

$\frac{6}{1} \cdot \frac{20\sqrt{3}}{3} = \frac{120\sqrt{3}}{3} = 40\sqrt{3}$

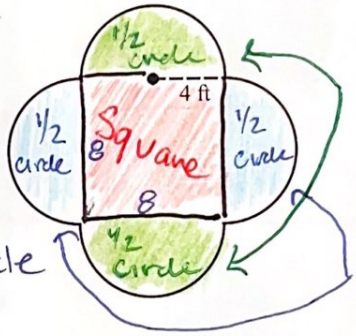
**52.** The shape below is made of semicircles. What is the approximate area of the shape?

round

A. $101\ ft^2$
B. $117\ ft^2$
C. $165\ ft^2$
D. $201\ ft^2$

① there is no formula for this shape so break it into shapes we know

②




Two halves make a full circle

Two halves make a full circle

Total Area = Square + Circle + Circle

$s^2 + \pi r^2 + \pi r^2$

$8^2 \quad 4^2\pi \quad 4^2\pi$

$64 + 16\pi + 16\pi$

$64 + 16(3.14) + 16(3.14) = 164.48$

$64 + 50.24 + 50.24$

**53.** The ratios of the areas of square A to square B is $\frac{16}{25}$. If the area of square B is $100\ cm^2$, what is the length of a side of square A?

A. $4\ cm$
B. $8\ cm$
C. $10\ cm$
D. $64\ cm$

① Make a Proportion

Square A → $\frac{16}{25} = \frac{x}{100}$ ← Square B

$16(100) \quad 25(x)$

$1600 = 25x$

Area of Square A is $x = 64$

② Area of a Square is

$A = side^2$

$\sqrt{64} = \sqrt{y^2}$

$y = 8$

**54.** What is the surface area of the pyramid below?

A. $240\ in^2$
B. $288\ in^2$
C. $336\ in^2$
D. $384\ in^2$

SA of a Pyramid = Area of Base + $\frac{1}{2}P\ell$

Perimeter of the base

slant height

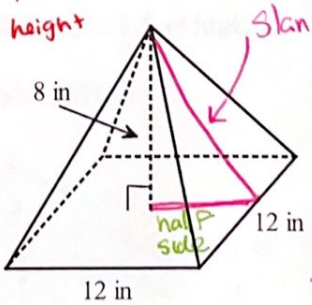
Square $s^2$

$(12)^2 + \frac{1}{2}(48)(10)$

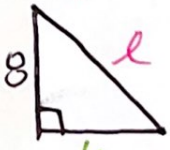
$144 + 24(10)$

$144 + 240$

$384$




Need to Find the Slant height




$6^2 + 8^2 = \ell^2$

$36 + 64 =$

$\sqrt{100} = \sqrt{\ell^2}$

$\ell = 10$

Perimeter of Square $= 12 + 12 + 12 + 12$
$= 48$

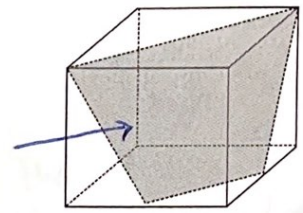
**55.** What best describes the cross section shown on the cube?

**A.** square

**B.** triangle

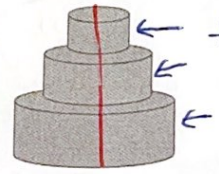
**C.** trapezoid

**D.** rectangle



This shaded shape is a trapezoid

**56.** A layered cake is a solid of revolution. Which of the following is the drawing of a two-dimensional shape and an axis of rotation that could form the cake?

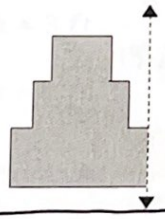


these are Flat sides not curved

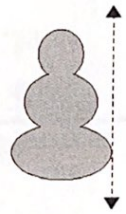
axis of Rotation is through the center

**A.**

**B.**



**C.**



**D.**

**57.** A tanker truck carrying 3,000 gallons of fuel and fills an empty cylindrical gas tank.

- The tank has a height of 4 feet.
- It takes approximately 846 gallons of fuel to fill the tank 1 foot high.

Will the tank hold all 3,000 gallons of fuel from the truck? Explain.


4 feet

4(846)
3384 gallons of fuel in that tank

**A.** Yes, the tank can hold a total of 3,384 gallons of fuel.

**B.** Yes, the tank can hold a total of 4,280 gallons of fuel.

C. No, the tank can only hold 2,154.

D. No, the tank can only hold 2538.

**C.** No, the tank can only hold a total of 2,154 gallons of fuel.

**D.** No, the tank can only hold a total of 2,538 gallons of fuel.

**58.** What is the volume of the figure below?

Area of the Base

Distance between the bases

Volume of a Triangular Prism $= B \cdot h$

Base is a triangle

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

$\frac{1}{2}(4.5)(3.1)$

$= 2.25(3.1)$

$= 6.975(6.7)$

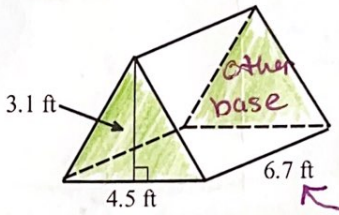
$= 46.7325$

**A.** $93.47\ ft^3$

**B.** $46.73\ ft^3$

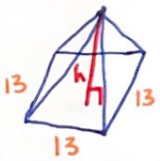
**C.** $31.16\ ft^3$

**D.** $15.58\ ft^3$




**59.** What is the height of a square pyramid that has a side length of 13 feet and a volume of 1521 cubic feet?

Draw a Picture




Base is Square so $B = s^2$
$= 13^2$
$= 169$

$V = \frac{\text{Base} \cdot \text{height}}{3}$

$3 \cdot 1521 = \frac{169 \cdot h}{3} \cdot 3$

$\frac{4563}{169} = \frac{169h}{169}$

$h = 27$

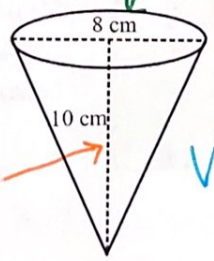
**A.** $h = 3\ ft$

**B.** $h = 9\ ft$

**C.** $h = 27\ ft$

**D.** $h = 39\ ft$

**60** A food manufacturer sells yogurt in cone shaped cups with the dimensions shown. To the nearest tenth, how many fluid ounces of yogurt does the cup hold if $1\ cm^3 \approx 0.034\ fl\ oz$ ?




diameter = 8

① We need the radius

$d = 2r$

$8 = 2r$

$r = 4$

height

② $V_{cone} = \frac{\pi r^2 h}{3}$

$= \frac{\pi(4)^2(10)}{3}$

$= \frac{16(10)\pi}{3}$

$= \frac{160(3.14)}{3}$

$= 502.4/3$

$V = 167.47\ cm^3$

③ Convert

$1cm^3 = 0.034$ fl oz.

$167.47(0.034)$

$5.694$

**A.** $0.6\ fl\ oz$

**B.** $5.7\ fl\ oz$

**C.** $17.1\ fl\ oz$

**D.** $22.8\ fl\ oz$

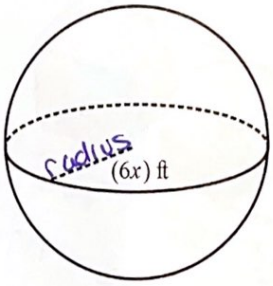
**61.** What is the volume of the sphere in terms of $x$ ?

A. $36\pi x^3\ ft^3$

B. $48\pi x^3\ ft^3$

C. $288\pi x^3\ ft^3$

D. $864\pi x^3\ ft^3$




Volume of a sphere $= \frac{4 \cdot \text{radius}^3 \cdot \pi}{3}$

$\frac{4(6x)^3\pi}{3}$

$(6x)(6x)(6x)$

$\frac{4(216x^3)\pi}{3}$

$\frac{864x^3\pi}{3}$

$288x^3\pi$

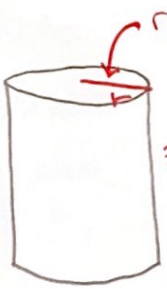
**62.** You want to design a cylindrical container for oatmeal that has a volume of 90 $in^3$. You also want the height of the container to be 3.5 times the radius. To the nearest tenth, what should the approximate radius of the container be?

A. 2.0 $in$

B. 2.9 $in$

C. 3.0 $in$

D. 3.1 $in$




3.5 radius or 3.5r

$V_{cylinder} = \pi r^2 h$

$90 = \pi (r)^2 (3.5r)$

$90 = \pi (r^2)(3.5r)$

$\frac{90}{\pi} = \frac{\pi(3.5r^3)}{\pi}$

$\frac{28.66}{3.5} = \frac{3.5r^3}{3.5}$

$r^3 = 8.189$

$\sqrt[3]{r^3} = \sqrt[3]{8.198}$

Cube root b/c it is an r cube

$r = 2.01$

**63.** What is the closest approximation of the volume of the figure below?

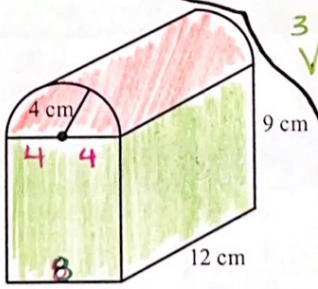
A. 734 $cm^3$

B. 998 $cm^3$

C. 1090 $cm^3$

D. 1166 $cm^3$

We don't have a formula for this shape so we will break it up into shapes we know




$V_{TOTAL}$ = Rectangular Prism + Half Cylinder

$= B \cdot h$

$b \cdot h \cdot h$

$8(12)(9)$

$96(9)$

$864$

$+$

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

$\frac{1}{2}(4)^2(12)\pi$

$\frac{1}{2}(16)(12)\pi$

$8(12)\pi = 96\pi$

$= 864 + 96(3.14)$

$1165.44$

**64.** A box in the shape of a square prism has three golf balls inside. Each golf ball has a radius of 0.84 inches. What is the minimum volume of the box needed to hold the golf balls?

r
.84

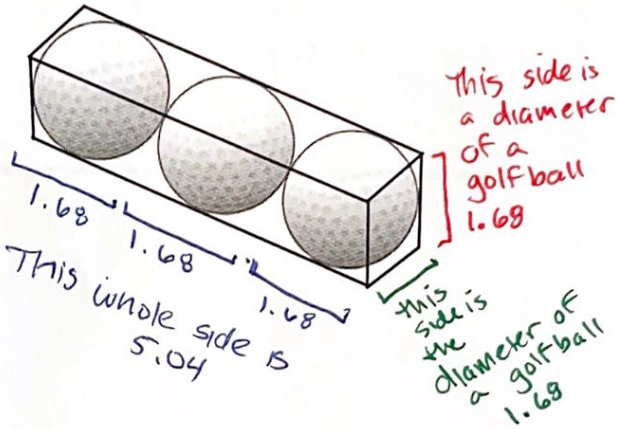
**A.** 4.74 $in^2$

**B.** 7.44 $in^2$

**C.** 14.22 $in^2$

**D.** 19.86 $in^2$

Need the diameter
$d = 2r$
$= 2(.84)$
$= 1.68$




Volume Prism (Rectangular) $= B \cdot h$
$(5.04)(1.68)(1.68)$
$= (8.4672)(1.68) \rightarrow 14.224$

**65.** The two figures below are similar. What is the ratio of the volume of Figure A to the volume of Figure B?

**A.** 27:512

**B.** 36:256

**C.** 8:125

**D.** 4:25

Ratio of Volumes $= \left(\text{Scale Factor}\right)^3$

Reduce first

$\left(\frac{6}{16}\right)^3$

$\left(\frac{3}{8}\right)^3 = \frac{3^3}{8^3} = \frac{27}{512}$

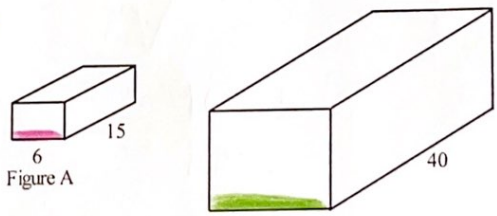


Figure A
Figure B

**Geometry Semester 2**
**Instructional Materials 2021-22 Answers**

| Unit 6 Quadrilaterals | | | Unit 7 Similarity | | | Unit 8 Right Triangles & Trigonometry | | | Unit 9 Circles | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Ans | Standard | # | Ans | Standard | # | Ans | Standard | # | Ans | Standard |
| 1. | D | HSG.MG.A.1 | 12. | A | HSG.SRT.A.1 | 22. | D | HSG.SRT.B.5 | 33. | A | HSG.CO.A.1 |
| 2. | G, H, I | HSG.CO.C.11 | 13. | A | HSG.SRT.A.1 | 23. | C | HSG.SRT.C.8 | 34. | F, K | HSG.C.A.2 |
| 3. | C | HSG.CO.C.11 | 14. | C | HSG.CO.A.2 | 24. | C | HSG.SRT.C.8 | 35. | B | HSG.C.B.5 |
| 4. | A | HSG.CO.C.11 | 15. | G, I, J | HSG.SRT.A.2 | 25. | B | HSG.SRT.C.6 | 36. | C | HSG.C.A.2 |
| 5. | C | HSG.CO.C.11 | 16. | C | HSG.SRT.A.2 | 26. | C | HSG.SRT.C.6 | 37. | D | HSG.C.A.2 |
| 6. | B | HSG.CO.C.11 | 17. | A | HSG.SRT.B.5 | 27. | A | HSG.SRT.C.8 | 38. | A | HSG.C.A.2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7. | B | HSG.CO.C.11 | 18. | D | HSG.SRT.B.5 | 28. | C | HSG.SRT.C.7 | 39. | B | HSG.C.A.2 |
| 8. | D | HSG.CO.C.11 | 19. | D | HSG.SRT.B.4 | 29. | C | HSG.SRT.C.8 | 40. | D | HSG.C.A.3 |
| 9. | B | HSG.CO.C.11 | 20. | B | HSG.SRT.B.5 | 30. | D | HSG.SRT.C.8 | 41. | C | HSG.C.A.2 |
| 10. | C | HSG.CO.C.11<br>HSG.GPE.B.4 | 21. | A | HSG.SRT.A.3 | 31. | D | HSG.SRT.C.7 | 42. | B | HSG.C.A.2 |
| 11. | B | HSG.CO.C.11<br>HSG.GPE.B.5 | | | | 32. | B | HSG.SRT.C.8 | 43. | C | HSG.C.A.2 |
| | | | | | | | | | 44. | B | HSG.C.A.2 |

## Geometry Semester 2 Instructional Materials 2021-22 Answers

| Unit 10 Extending Area | | | Unit 11 Extending Volume | | |
|---|---|---|---|---|---|
| # | Ans | Standard | # | Ans | Standard |
| 45. | B | HSG.GPE.B.7 | 55. | C | HSG.GMD.B.4 |
| 46. | B | HSG.MG.A.3 | 56. | D | HSG.GMD.B.4 |
| 47. | C | HSG.MG.A.3 | 57. | A | HSG.GMD.A.1 |
| 48. | D | HSG.C.B.5<br>HSG.MG.A.1 | 58. | B | HSG.GMD.A.3 |
| 49. | B | HSG.C.B.5<br>HSG.MG.A.1 | 59. | C | HSG.GMD.A.3 |
| 50. | A | HSG.C.B.5 | 60. | B | HSG.GMD.A.3 |
| 51. | A | HSG.MG.A.3 | 61. | C | HSG.GMD.A.3 |
| 52. | C | HSG.MG.A.3 | 62. | A | HSG.MG.A.3 |
| 53. | B | HSG.GMD.A.1 | 63. | D | HSG.GMD.A.3 |
| 54. | D | HSG.MG.A.3 | 64. | C | HSG.MG.A.3 |
| | | | 65. | A | HSG.GMD.A.1 |