Name Schlansky
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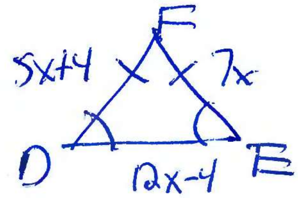
Date ____________
Geometry

CCG Regents Review Homework 2026

1. In ΔDEF, $\angle F$ is the vertex angle. If $\overline{DF} = 5x+4$, $\overline{DE} = 12x-4$, and $\overline{EF} = 7x$, find $\overline{DE}$.

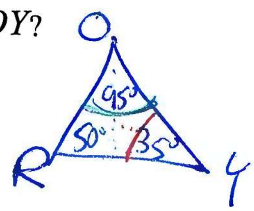
non ≅ angle



$DE = 12(2)-4$
$DE = 20$

$5x+4 = 7x$
$-5x \quad -5x$
$\frac{4}{2} = \frac{2x}{2}$
$2 = x$

2. In ΔROY, $m\angle R = 50^\circ$ and $m\angle O = 95^\circ$. What is the largest side of ΔROY? What is the smallest side of ΔROY?

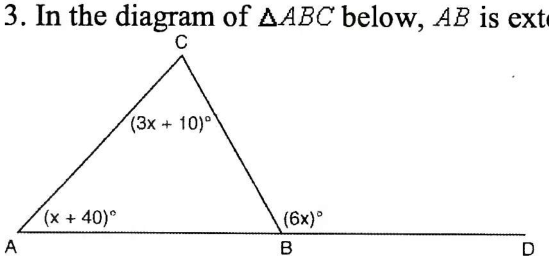


$50 + 95 = 145$

$180 - 145 = 35$

Largest: $\overline{RY}$
Smallest: $\overline{RO}$

3. In the diagram of ΔABC below, $\overline{AB}$ is extended to point D.



$x+40+3x+10 = 6x$
$4x+50 = 6x$
$-4x \quad -4x$
$\frac{50}{2} = \frac{2x}{2}$
$25 = x$

$\angle CAB = 25+40$
$= 65$

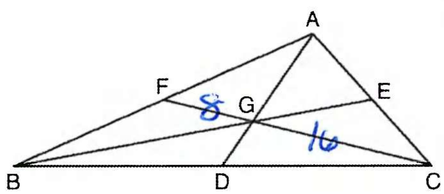
If m$\angle CAB = x + 40$, m$\angle ACB = 3x + 10$, m$\angle CBD = 6x$, what is m$\angle CAB$?
1) 13
2) 25
3) 53
4) 65

4. Which set of numbers represents the lengths of the sides of a triangle?
1) $\{5, 18, 13\}$
2) $\{6, 17, 22\}$ $6+17>22$
3) $\{16, 24, 7\}$
4) $\{26, 8, 15\}$

5. In $\triangle ABC$, $AB = 5$ feet and $BC = 3$ feet. Which *cannot* represent the value for the length of $\overline{AC}$, in feet?

1) 3, 5, 3
2) 5, 5, 3
3) 7, 5, 3
4) 9, 5, 3 $3+5>9$ x

6. In the diagram below of $\triangle ABC$, medians $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ intersect at G. If $CF = 24$, what is the length of $\overline{FG}$?



$2x + 1x = 24$

$\frac{3x}{3} = \frac{24}{3}$

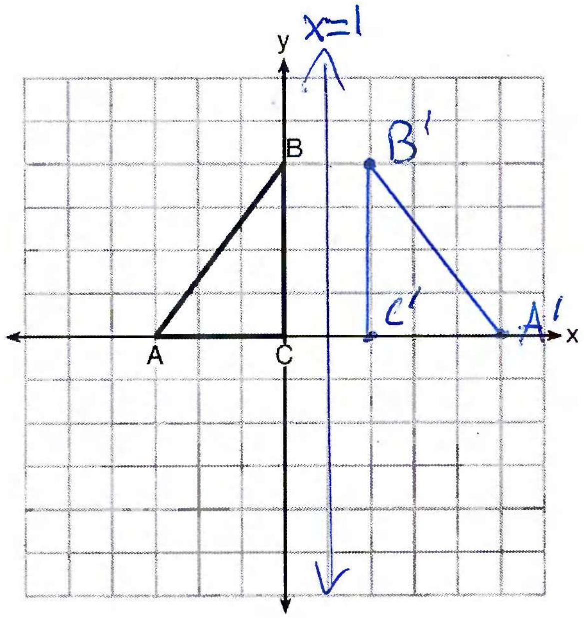
$x = 8$

$2(8) = 16$

$1(8) = 8$

$FG = 8$

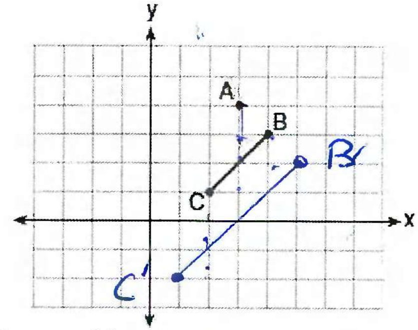
7. Triangle *ABC* is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.



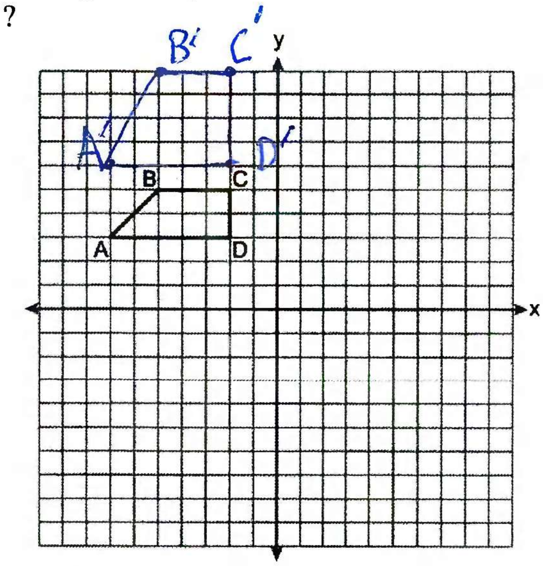
8. On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.

What are the coordinates of B' and C' after $\overline{BC}$ undergoes a dilation centered at point A with a scale factor of 2?

1) $B'(5,2)$ and $C'(1,-2)$
2) $B'(6,1)$ and $C'(0,-1)$
3) $B'(5,0)$ and $C'(1,-2)$
4) $B'(5,2)$ and $C'(3,0)$

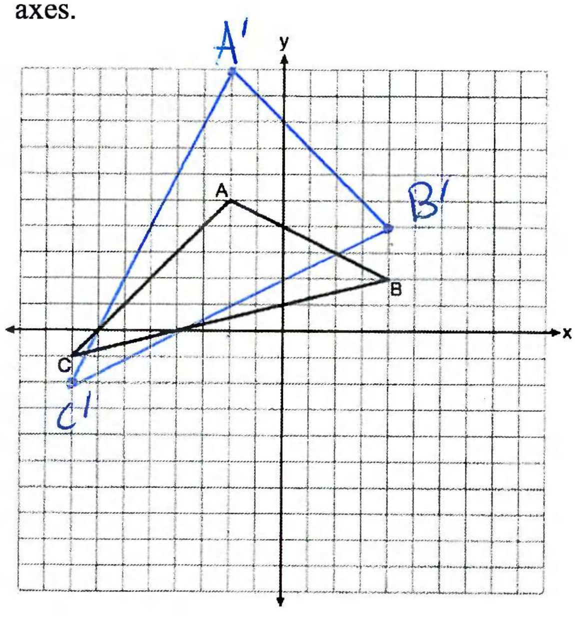


9. Trapezoid $ABCD$ is graphed on the set of axes below. Trapezoid $A'B'C'D'$, whose vertices are $A'(-7,6)$, $B'(-5,10)$, $C'(-2,10)$, and $D'(-2,6)$ is the image of trapezoid $ABCD$. What transformation maps trapezoid $ABCD$ on trapezoid $A'B'C'D'$?



1) dilation
2) translation
3) vertical stretch
4) horizontal stretch

10. The triangle graphed below with vertices at A(-2,5), B(4,2), and C(-8,-1), is graphed on the set of axes below. A vertical stretch of scale factor 2 with respect to y = 0 is represented by $(x, y) \rightarrow (x, 2y)$. Graph the image of this triangle, after the vertical stretch on the same set of axes.

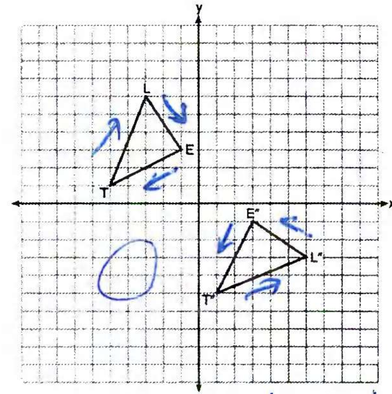


$A(-2,5) \xrightarrow{x,2y} (-2,10)$
$B(4,2) \rightarrow (4,4)$
$C(-8,-1) \rightarrow (-8,-2)$

11. On the set of axes below, $\triangle LET$ and $\triangle L''E''T''$ are graphed in the coordinate plane where $\triangle LET \cong \triangle L''E''T''$.
Which sequence of rigid motions maps $\triangle LET$ onto $\triangle L''E''T''$?

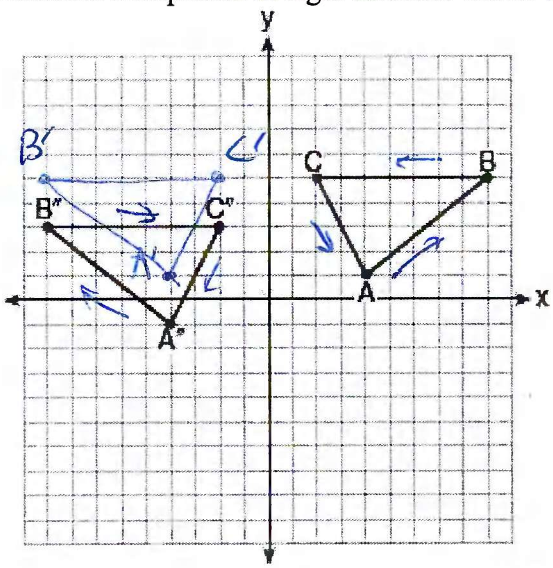
1) a reflection over the y-axis followed by a reflection over the x-axis
2) a rotation of 180° about the origin
3) a rotation of 90° counterclockwise about the origin followed by a reflection over the y-axis
4) a reflection over the x-axis followed by a rotation of 90° clockwise about the origin

doesn't work



opposite orientation
single line reflection

12. The graph below shows $\triangle ABC$ and its image, $\triangle A''B''C''$.
Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

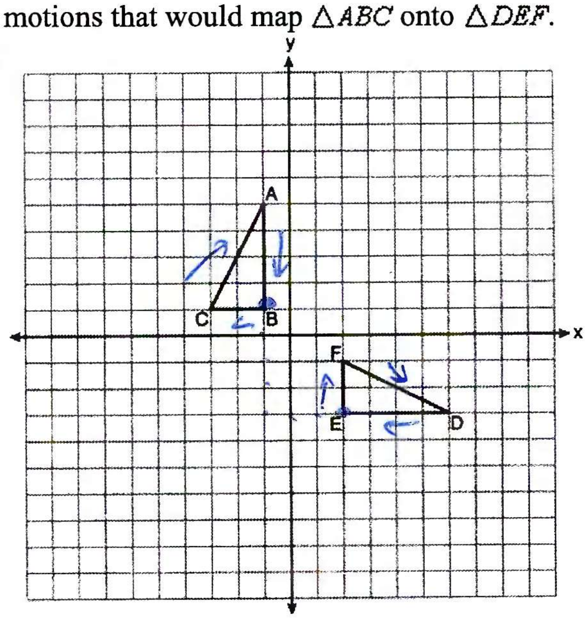


opposite orientation
reflection/translation

Reflection over the y-axis followed by a translation 2 units down.

13. On the set of axes below, $\triangle ABC$ and $\triangle DEF$ are graphed. Describe a sequence of rigid motions that would map $\triangle ABC$ onto $\triangle DEF$.

Same orientation
rotation/translation

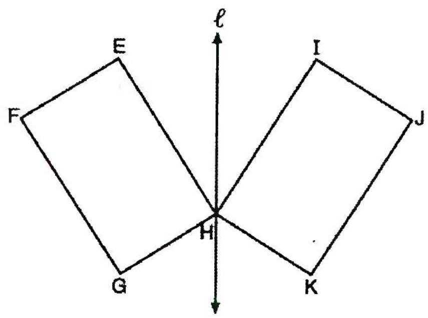


Rotation of 90° clockwise centered at B followed by a translation 4 down and 3 right.

14. If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1) reflection over the x-axis
2) translation to the left 5 and down 4
3) dilation centered at the origin with scale factor 2
4) rotation of 270° counterclockwise about the origin

15. In the diagram below, parallelogram $EFGH$ is mapped onto parallelogram $IJKH$ after a reflection over line ℓ. Use the properties of rigid motions to explain why parallelogram $EFGH$ is congruent to parallelogram $IJKH$.

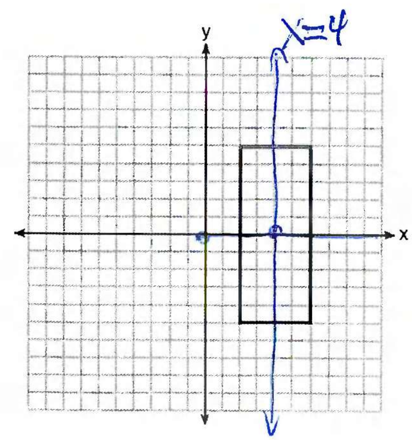
A reflection is a rigid motion. A rigid motion preserves size and angle measure producing a congruent figure.



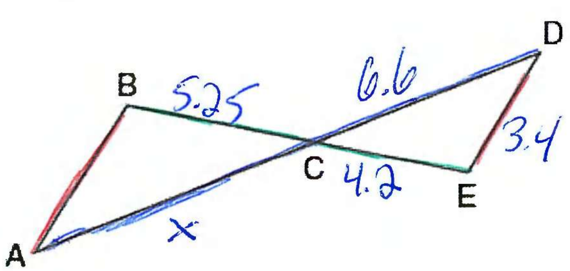
16. Which rotation would map a regular hexagon onto itself?
1) 45°
2) 150°
3) 240° 60(4)
4) 315°

$\frac{360}{6} = 60$

17. As shown in the graph below, the quadrilateral is a rectangle. Which transformation would *not* map the rectangle onto itself?
1) a reflection over the x-axis
2) a reflection over the line $x = 4$
3) a rotation of 180° about the origin not center of shape
4) a rotation of 180° about the point $(4, 0)$



18. In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$. If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?

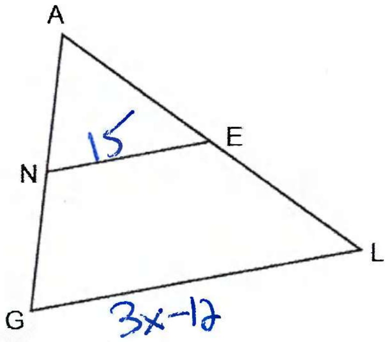


$\frac{x}{6.6} = \frac{5.25}{4.2}$

$\frac{4.2x}{4.2} = \frac{34.65}{4.2}$

$x = 8.25$

19. In $\triangle AGL$ below, N and E are the midpoints of $\overline{AG}$ and $\overline{AL}$, respectively, $\overline{NE}$ is drawn. If $NE = 15$ and $GL = 3x - 12$, determine and state the value of x.



2(midsegment) = opposite side

$2(15) = 3x - 12$

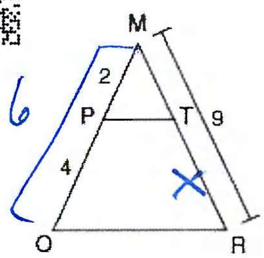
$30 = 3x - 12$

$+12 \quad +12$

$\frac{42}{3} = \frac{3x}{3}$

$14 = x$

20. Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$. What is the length of $\overline{TR}$?



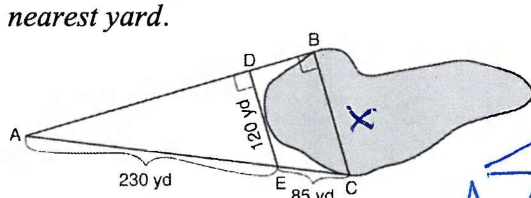
$\frac{\text{bottom}}{\text{bottom}} = \frac{\text{side}}{\text{side}}$

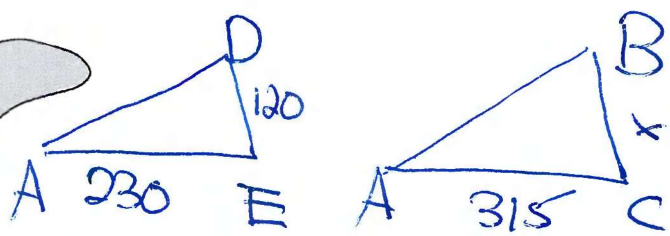
$\frac{4}{x} = \frac{6}{9}$

$\frac{6x}{6} = \frac{36}{6}$

$x = 6$

21. To find the distance across a pond from point B to point C, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.
Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.



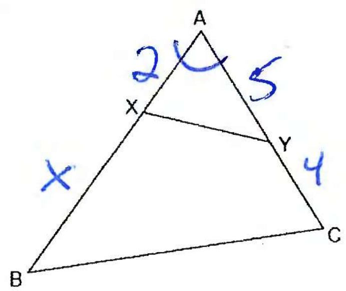


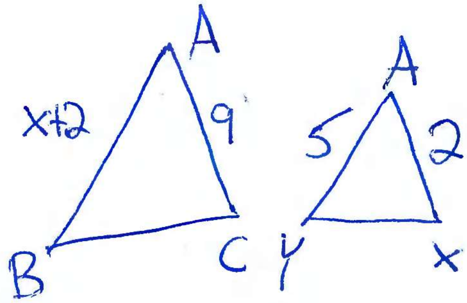
$\frac{230}{315} = \frac{120}{x}$

$\frac{230x}{230} = \frac{37800}{230}$

$x = 164$

22. In the diagram below of $\triangle ABC$, X and Y are points on $\overline{AB}$ and $\overline{AC}$, respectively, such that $m\angle AYX = m\angle B$. If $\overline{AX} = 2$, $\overline{AY} = 5$, and $\overline{YC} = 4$, find $\overline{BX}$.





$\frac{x+2}{5} = \frac{9}{2}$

$2(x+2) = 45$

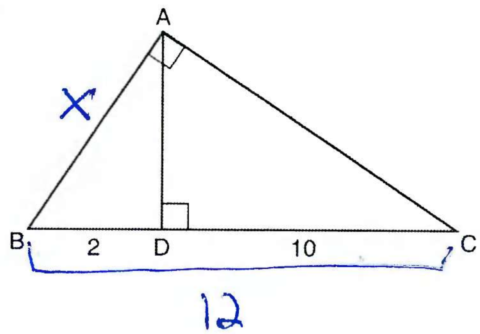
$2x+4 = 45$

$-4 \quad -4$

$\frac{2x}{2} = \frac{41}{2}$

$x = 20.5$

23. Triangle ABC shown below is a right triangle with altitude $\overline{AD}$ drawn to the hypotenuse $\overline{BC}$. If $BD = 2$ and $DC = 10$, what is the length of $\overline{AB}$ to the *nearest tenth*?



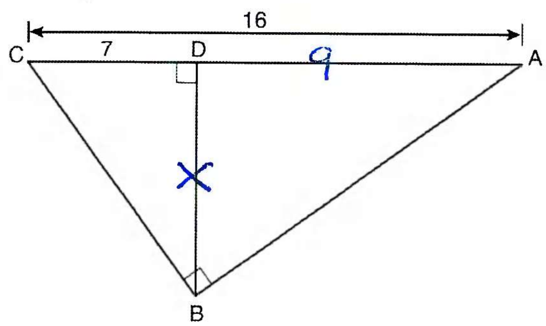
$\frac{H}{L} = \frac{L}{S}$

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

$\sqrt{x^2} = \sqrt{24}$

$x = 4.9$

24. In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $AC = 16$, and $CD = 7$. What is the length of $\overline{BD}$ to the *nearest tenth*?



$\frac{S}{A} = \frac{A}{S}$

$\frac{7}{x} = \frac{x}{9}$

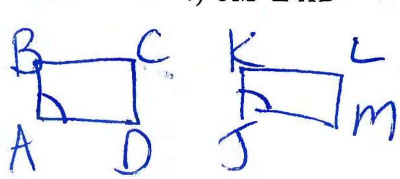
$\sqrt{x^2} = \sqrt{63}$

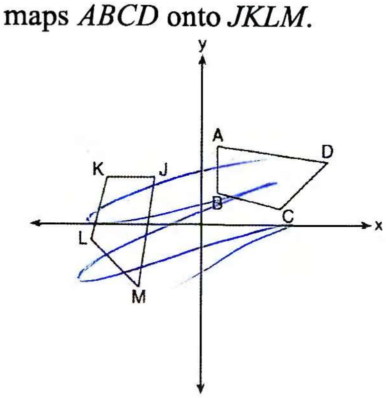
$x = 7.9$

25. In the diagram below, a sequence of rigid motions maps $ABCD$ onto $JKLM$.

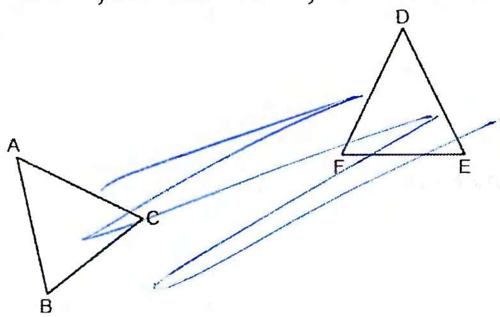
Which of the following statements must be true?

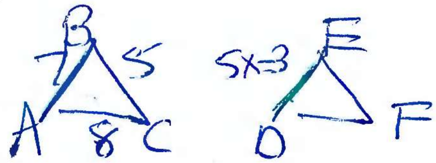
1) $\angle L \cong \angle B$
2) $\angle A \cong \angle J$
3) $\overline{JK} \cong \overline{AC}$
4) $\overline{JM} \cong \overline{AB}$





26. In the diagram below, ΔDEF is the image of ΔABC after a reflection. If $\overline{AB}=7$, $\overline{CB}=5$, $\overline{AC}=8$, and $\overline{DE}=5x-3$, find the value of x.

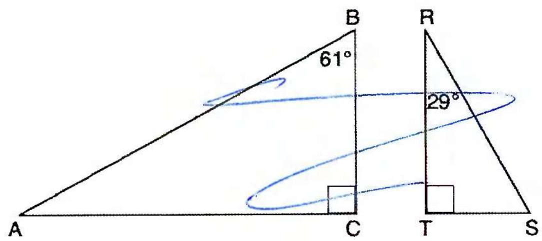


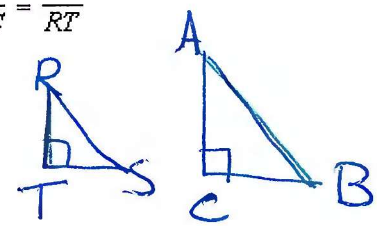


$5x-3=7$
$+3 \quad +3$
$\frac{5x}{5}=\frac{10}{5}$
$x=2$

27. Given right triangle ABC with a right angle at C, $m\angle B = 61°$. Given right triangle RST with a right angle at T, $m\angle R = 29°$.
Which proportion in relation to $\triangle ABC$ and $\triangle RST$ is *not* correct?

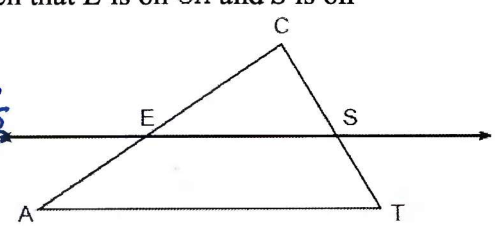
1) $\frac{AB}{RS} = \frac{RT}{AC}$ X
2) $\frac{BC}{ST} = \frac{AB}{RS}$
3) $\frac{BC}{ST} = \frac{AC}{RT}$
4) $\frac{AB}{AC} = \frac{RS}{RT}$





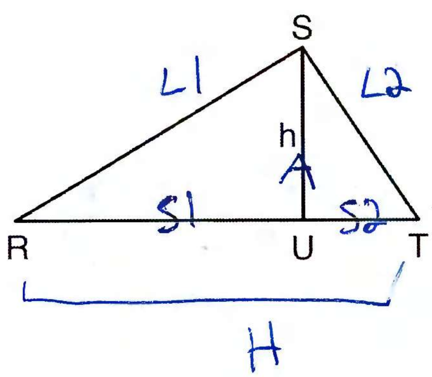
28. In the diagram below of $\triangle ACT$, $\overleftrightarrow{ES}$ is drawn parallel to $\overline{AT}$ such that E is on $\overline{CA}$ and S is on $\overline{CT}$.
Which statement is always true?

1) $\frac{CE}{CA} = \frac{CS}{ST}$ $\frac{T}{S} = \frac{T}{B}$ X
2) $\frac{CE}{ES} = \frac{EA}{AT}$ $\frac{T}{Base}$
3) $\frac{CE}{EA} = \frac{CS}{ST}$ $\frac{T}{B} = \frac{T}{B}$
4) $\frac{CE}{ST} = \frac{EA}{CS}$

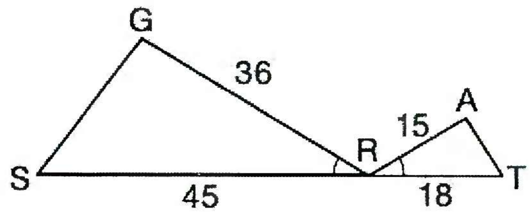


29. In right triangle RST below, altitude $\overline{SU}$ is drawn to hypotenuse $\overline{RT}$. Which of the following proportions is *not* true?

1) $\frac{RU}{SU} = \frac{SU}{UT}$ $\frac{S1}{A} = \frac{A}{S2}$ ✓
2) $\frac{SU}{RU} = \frac{RU}{UT}$ $\frac{A}{S1} = \frac{S1}{S2}$
3) $\frac{RT}{RS} = \frac{RS}{RU}$ $\frac{H}{L1} = \frac{L1}{S1}$ ✓
4) $\frac{TR}{ST} = \frac{ST}{UT}$ $\frac{H}{L2} = \frac{L2}{S2}$ ✓



30. In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



$\frac{36}{15} = \frac{45}{18}$

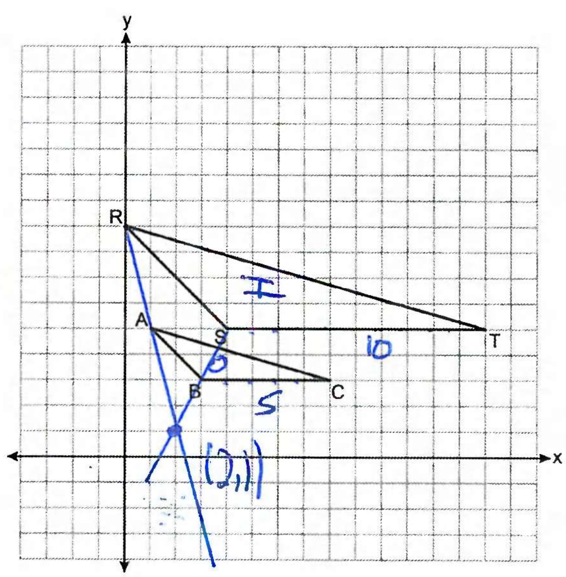
$\frac{12}{5} = \frac{5}{2}$

X

Which triangle similarity statement is correct?

1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

31. Find the center of dilation AND the scale factor if $\triangle RST$ is the image of $\triangle ABC$



Scale factor = $\frac{\text{image}}{\text{original}}$

scale factor $= \frac{10}{5}$

scale factor $= 2$

32. Triangle JOY has a perimeter of 10 and an area of 12. What is the perimeter and area of triangle JOY after a dilation by a scale factor of 2?

Perimeter(scale factor) $10(2) = 20$

area(scale factor)^2 $12(2)^2 = 48$

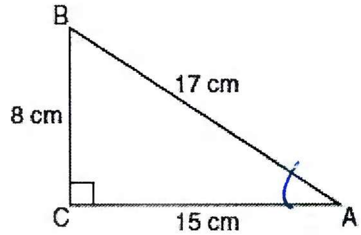
33. Which equation shows a correct trigonometric ratio for angle *A* in the right triangle below?

1) $\sin A = \frac{15}{17}$ $\frac{O}{H}$ X

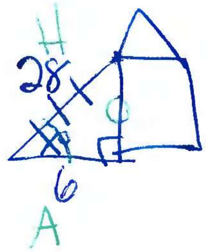
2) $\tan A = \frac{8}{17}$ $\frac{O}{A}$ X

3) $\cos A = \frac{15}{17} = \frac{A}{H}$

4) $\tan A = \frac{5}{8}$ $\frac{O}{A}$ X



34. A 28-foot ladder is leaning against a house. The bottom of the ladder is 6 feet from the base of the house. Find the measure of the angle formed by the ladder and the ground, to the *nearest degree*.



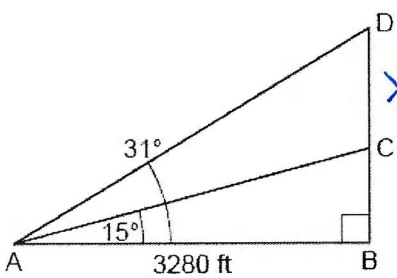
$\cos\theta = \frac{A}{H}$

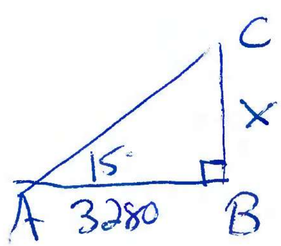
$\cos^{-1}\cos x = \cos^{-1}\frac{6}{28}$

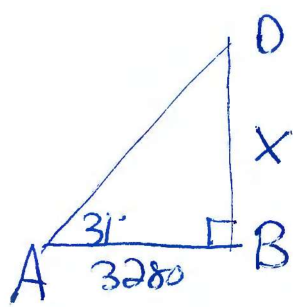
$x = \cos^{-1}\frac{6}{28}$

$x = 78°$

35. Cape Canaveral, Florida is where NASA launches rockets into space. As modeled in the diagram below, a person views the launch of a rocket from observation area *A*, 3280 feet away from launch pad *B*. After launch, the rocket was sighted at *C* with an angle of elevation of 15°. The rocket was later sighted at *D* with an angle of elevation of 31°. Determine and state, to the *nearest foot*, the distance the rocket traveled between the two sightings, *C* and *D*.







$$\begin{array}{r} 1970 \\ -\ 878 \\ \hline 1092 \end{array}$$

$\tan 15 = \frac{x}{3280}$

$x = 3280 \tan 15$

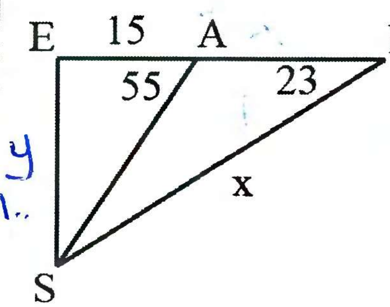
$x = 878$

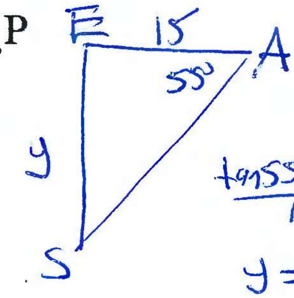
$\tan 31 = \frac{x}{3280}$

$x = 3280 \tan 31$

$x = 1970$

36. Find the measure of $\overline{SP}$ in the diagram of right triangle SEP below to the nearest unit.

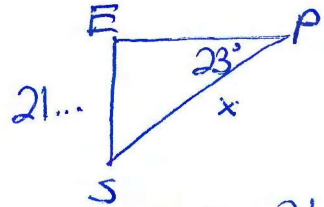




$\frac{\tan 55}{1} = \frac{y}{15}$

$y = 15\tan 55$

$y = 21..$



$\frac{\sin 23}{1} = \frac{21..}{x}$

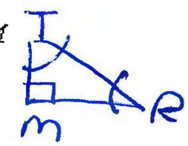
$\frac{x \sin 23}{\sin 23} = \frac{21..}{\sin 23}$

$x = 55$

37. Right triangle *TMR* is a scalene triangle with the right angle at *M*. Which equation is true?

1) $\sin M = \cos T$
2) $\sin R = \cos R$
3) $\sin T = \cos R$
4) $\sin T = \cos M$

$\sin A = \cos B$



38. If $\sin(2x + 7)° = \cos(4x - 7)°$, what is the value of x?

$\sin A = \cos B$

1) 7
2) 15
3) 21
4) 30

$A + B = 90$

$2x + 7 + 4x - 7 = 90$

$\frac{6x}{6} = \frac{90}{6}$

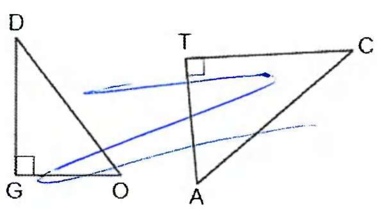
$x = 15$

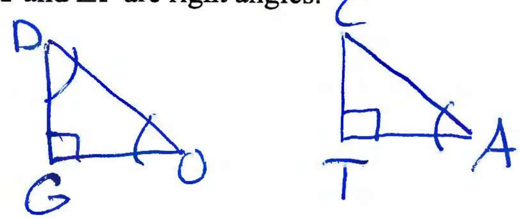
$40 + \_\_ = 90$

39. Which of the following is equivalent to $\sin 40$? $= \cos \underline{50}$

1) $\sin 50$ 2) $\cos 50$ 3) $\cos 40$ 4) $\tan 50$

40. In the diagram below, $\triangle DOG \sim \triangle CAT$, where $\angle G$ and $\angle T$ are right angles.

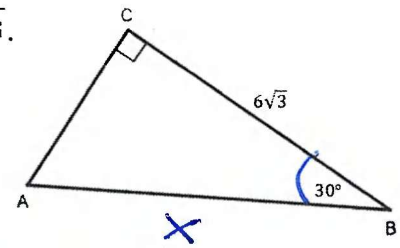




Which expression is always equivalent to $\sin D$? $= \cos O = \cos A$

1) $\cos A$
2) $\sin A$
3) $\tan A$
4) $\cos C$

41. In right triangle ABC below, $m\angle C = 90°$, $m\angle B = 30°$, and $CB = 6\sqrt{3}$.



The length of $\overline{AB}$ is

1) $3\sqrt{3}$
2) 9
3) 12
4) $12\sqrt{3}$

$6 \quad x \quad 60° \quad 2x \quad 12 \quad 30° \quad x\sqrt{3} \quad 6\sqrt{3}$

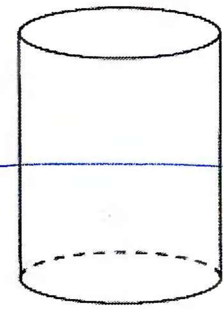
x

or $\quad \dfrac{\cos 30}{1} = \dfrac{6\sqrt{3}}{x} \quad \dfrac{x\cos 30}{\cos 30} = \dfrac{6\sqrt{3}}{\cos 30}$

$x = 12$

42. A plane intersects a cylinder parallel to its bases.

base

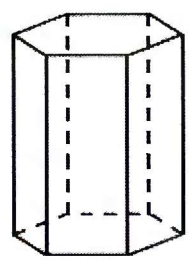


This cross section can be described as a

1) rectangle
2) parabola
3) triangle
4) circle

43. A right hexagonal prism is shown below. A two-dimensional cross section that is perpendicular to the base is taken from the prism.

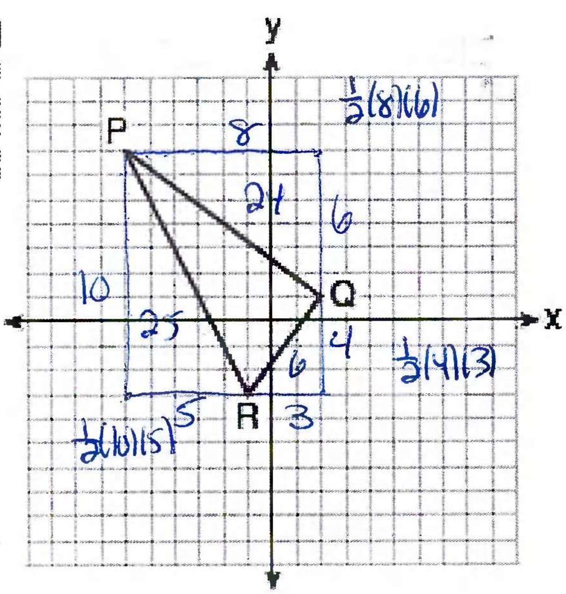
rectangle or triangle



Which figure describes the two-dimensional cross section?

1) triangle
2) rectangle
3) pentagon
4) hexagon

44. Find the area of PQR.

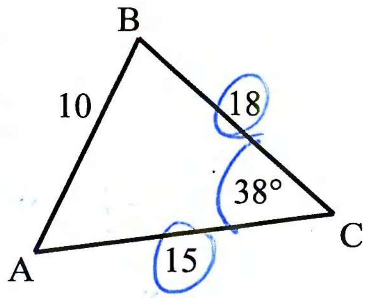


$A = lw$
$A = 10(8)$
$A = 80$

$25 + 24 + 6 = 55$

$80 - 55 = 25$

45. Find the area of *ABC* to the *nearest tenth of a unit*.



$A = \frac{1}{2}ab\sin C$

$A = \frac{1}{2}(15)(18)\sin 38°$

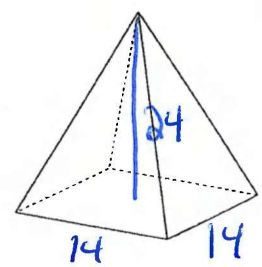
$A = 83.1$

46. A regular pyramid has a square base with an edge length of 14 cm and an altitude of 24 cm. Find its volume.

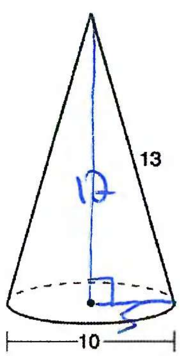
$V = \frac{1}{3}lwh$

$V = \frac{1}{3}(14)(14)(24)$

$V = 1568$



47. Determine and state the volume of the cone, in terms of π.



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

$5^2+b^2=13^2$

$25+b^2=169$

$-25 \quad -25$

$\sqrt{b^2}=\sqrt{144}$

$b=12$

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

$V = \frac{1}{3}\pi(5)^2(12)$

$V = 100\pi$

48. In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087. Which village had the larger population density in 2020? Justify your answer.

$pd = \frac{\text{Population}}{\text{area}}$

Depew

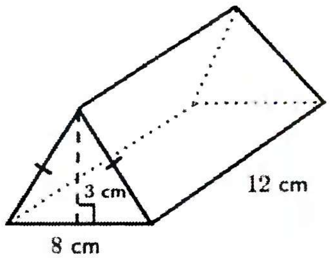
$\frac{15069}{5.1} = 2954...$

Lancaster

$\frac{10087}{2.7} = 3735...$

Lancaster

49. Clay in the shape of a triangular prism shown below has a mass of 1260 grams. What is its density?



$V=\frac{1}{2}lwh$

$V=\frac{1}{2}(12)(8)(3)$

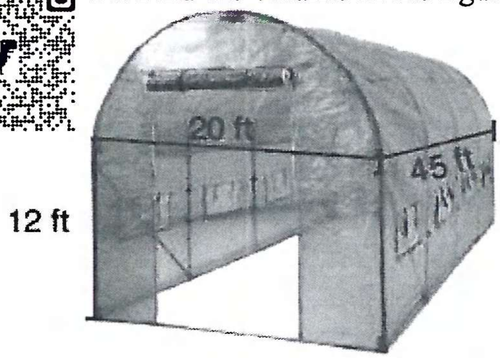
$V=144\ cm^3$

$d=\frac{mass}{volume}$

$d=\frac{1260g}{144cm^3}$

$d=8.75\ g/cm^3$

50. Find the volume of the figure below to the *nearest tenth of a foot*.



half cylinder

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

$V=\frac{1}{2}\pi(10)^2(45)$

$V=7068...$

rectangular prism

$V=lwh$

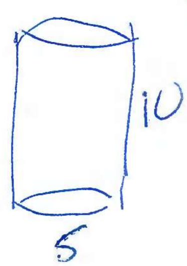
$V=12(20)(45)$

$V=10800$

10800
+ 7068...

178686 ft³

51. A hollow cylinder has a height of 10 inches, an outer diameter of 5 inches, and a thickness of 1 inch. Find the volume to the hollow cylinder to the nearest cubic inch.



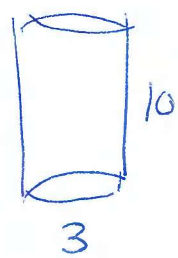
$V=\pi r^2h$

$V=\pi(2.5)^2(10)$

$V=196...$

196..
− 70.

126

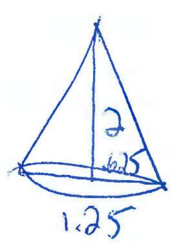


$V=\pi r^2h$

$V=\pi(1.5)^2(10)$

$V=70...$

52. Find the volume of a cone whose diameter is 15 inches and height of 2 feet rounded to the *nearest cubic foot*.



$\frac{15}{12}=1.25$

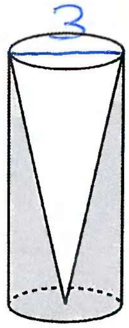
$V=\frac{1}{3}\pi r^2h$

$V=\frac{1}{3}\pi(.625)^2(2)$

$V=1\ ft^3$

53. Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches.

Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?



8

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

$V=\frac{1}{3}\pi(1.5)^2(8)$

$V=18\ldots in^3$

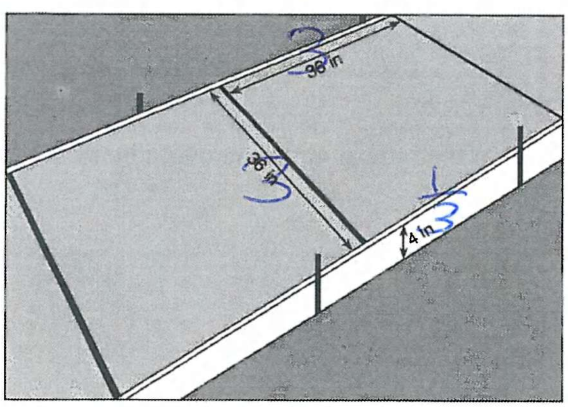
$18\ldots \cancel{in^3} \cdot \frac{.52\ \cancel{oz}}{1\ \cancel{in^3}} \cdot \frac{.10\ \$}{1\ \cancel{oz}} \cdot 100$

\$98.02

54. Ian needs to replace two concrete sections in his sidewalk, as modeled below. Each section is 36 inches by 36 inches and 4 inches deep. He can mix his own concrete for $3.25 per cubic foot. How much money will it cost Ian to replace the two concrete sections?

$\frac{36}{12}=3$

$\frac{4}{12}=\frac{1}{3}$



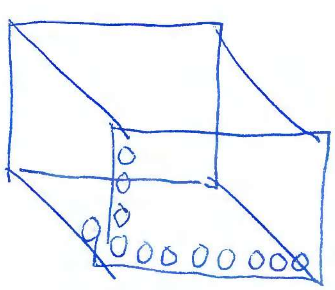
$V=lwh$

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

$V=3 ft^3$

$3 ft^3 \cdot \frac{3.25\ \$}{1\ ft^3} \cdot 2 = \$19.50$

*55. Baseballs that have a diameter of 2.8 inches are to be packed into a rectangular shipping box that has dimensions 24 inches by 12 inches by 6 inches. What is the maximum number of baseballs that can fit into the shipping box?



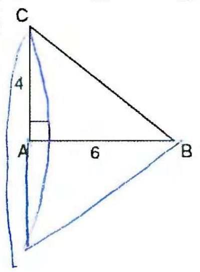
$\frac{24}{2.8}=8\ldots$

$\frac{12}{2.8}=4\ldots$

$\frac{6}{2.8}=2\ldots$

$8(4)(2)=64$

56. In the diagram below, right triangle ABC has legs whose lengths are 4 and 6. What is the volume, in terms of π, of the three-dimensional object formed by continuously rotating the right triangle around $\overline{AB}$?



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

$V = \frac{1}{3}\pi(4)^2(6)$

$V = 32\pi$

multiply scale factor and b

57. The line $y = 3x - 2$ is dilated by a scale factor of 2 and centered at the origin. Write an equation that represents the image of the line after the dilation.

1) $y = 3x - 2$
3) $y = 6x - 2$
2) $y = 3x - 4$
4) $y = 6x - 4$

$2(-2) = -4$

Same line

58. The line $y = 3x - 2$ is dilated by a scale factor of 2 and centered at (-1,-5). Write an equation that represents the image of the line after the dilation.

1) $y = 3x - 2$
2) $y = 3x - 4$
3) $y = 6x - 2$
4) $y = 6x - 4$

Same slope

59. The line $y = \frac{2}{3}x + 3$ is dilated centered at the origin. Which linear equation could be its image?

1) $2x + 3y = 7$
3) $3x - 2y = 7$
2) $2x - 3y = 7$
4) $3x + 2y = 7$

$-2x \quad -2x$

$\frac{-3y}{-3} = \frac{-2x + 7}{-3}$ $y = \frac{2}{3}x - \frac{7}{3}$

x_1 y_1 Same slope

60. What is the equation of a line that passes through the point $(-3, -11)$ and is parallel to the line whose equation is $y = 2x - 4$?

1) $y = 2x + 5$
3) $y = \frac{1}{2}x + \frac{25}{2}$
2) $y = 2x - 5$
4) $y = -\frac{1}{2}x - \frac{25}{2}$

$m \parallel = 2$

$x_1 = -3$

$y_1 = -11$

$y - y_1 = m(x - x_1)$

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

$y + 11 = 2x + 6$

$-11 \quad -11$

$y = 2x - 5$

$x_1\ y_1$ negative reciprocal slopes

61. What is an equation of the line that passes through the point $(6, 8)$ and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

1) $y - 8 = \frac{3}{2}(x - 6)$

2) $y - 8 = -\frac{2}{3}(x - 6)$

3) $y + 8 = \frac{3}{2}(x + 6)$

4) $y + 8 = -\frac{2}{3}(x + 6)$

$m\perp = -\frac{2}{3}$
$x_1 = 6$
$y_1 = 8$

$y - y_1 = m(x - x_1)$
$y - 8 = -\frac{2}{3}(x - 6)$

62. Line segment NY has endpoints $N(-11, 5)$ and $Y(5, -7)$. What is the equation of the perpendicular bisector of $\overline{NY}$?

1) $y + 1 = \frac{4}{3}(x + 3)$

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

3) $y - 6 = \frac{4}{3}(x - 8)$

4) $y - 6 = -\frac{3}{4}(x - 8)$

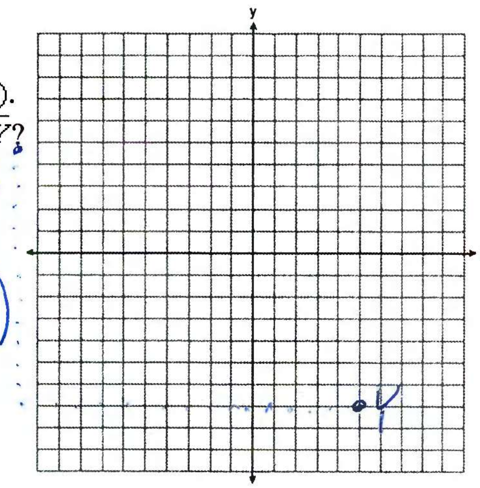
negative reciprocal slope   midpoint N

$m = \frac{\Delta y}{\Delta x}$ $mp = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$\frac{-12}{16} = \frac{-3}{4}$ $\frac{-11+5}{2}, \frac{5+-7}{2}$ $(-3, -1)$

$m\perp = \frac{4}{3}$
$x_1 = -3$
$y_1 = -1$

$y - y_1 = m(x - x_1)$
$y + 1 = \frac{4}{3}(x + 3)$



63. Which of the following is the equation of the given circle?

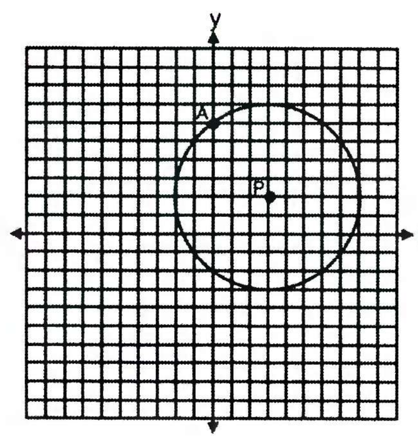
1) $(x - 3)^2 + (y - 2)^2 = 25$

2) $(x + 3)^2 + (y + 2)^2 = 25$

3) $(x - 3)^2 + (y - 2)^2 = 5$

4) $(x + 3)^2 + (y + 2)^2 = 5$

Center: (3,2)
radius: 5



64. State the center and the exact value of the radius of $x^2 + y^2 - 4x + 8y + \frac{31}{4} = 0$

conics

$A = 1$
$B = -4$
$C = 8$
$D = \frac{31}{4}$

center: (2,-4)
radius: 3.5

or

$x^2 - 4x + y^2 + 8y = -\frac{31}{4}$

$x^2 - 4x + 4 + y^2 + 8y + 16 = -\frac{31}{4} + 4 + 16$

$(x-2)^2 + (y+4)^2 = \frac{49}{4}$

Center: (2,-4)
$r = \frac{7}{2}$

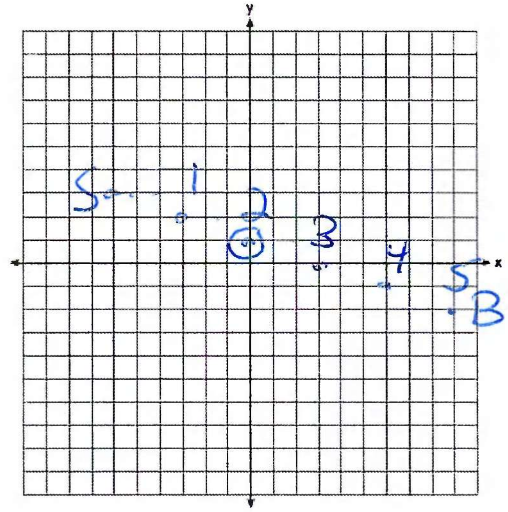
65. Directed line segment SB has endpoints whose coordinates are $S(-6,3)$ and $B(9,-2)$. Determine the coordinates of point J that divides the segment in the ratio 2 to 3. $= 5$

$\frac{\Delta x}{p}$ $\frac{\Delta y}{p}$

$\frac{15}{5}$ $\frac{5}{5}$

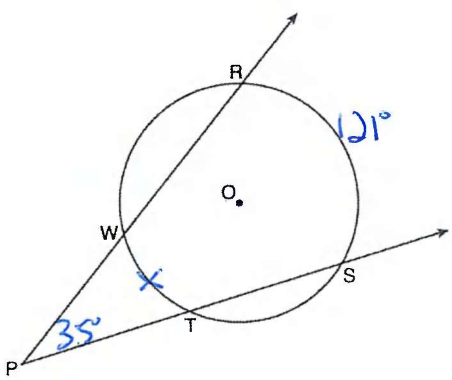
3 1

(0,1)



66. As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle O from external point P.

If $m\angle RPS = 35°$ and $m\overparen{RS} = 121°$, determine and state $m\overparen{WT}$.



2(EA) = major − minor

2(35) = 121 − x ⊙ Math up!

70 = 121 − x

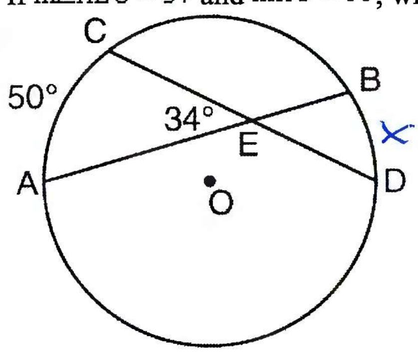
−121 −121

−51 = −x

x = 51

67. In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E.

If $m\angle AEC = 34$ and $m\overparen{AC} = 50$, what is $m\overparen{DB}$?



2(VA) = arc + arc

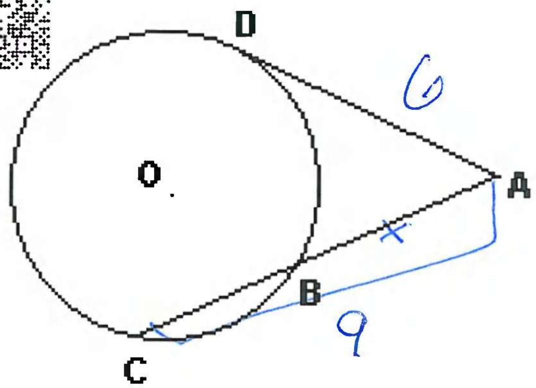
2(34) = 50 + x ⊙ Math up!

68 = 50 + x

−50 −50

18 = x

68. In the diagram, $\overline{AD}$ is tangent to circle O at D, and $\overline{CBA}$ is a secant. If $AD = 6$ and $AC = 9$, what is AB?



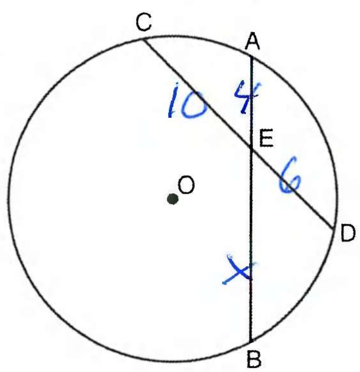
whole·exterior = whole·exterior

$6 \cdot 6 = 9 \cdot x$

$\frac{36}{9} = \frac{9x}{9}$

$4 = x$

69. In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If $CE = 10$, $ED = 6$, and $AE = 4$, what is the length of $\overline{EB}$?



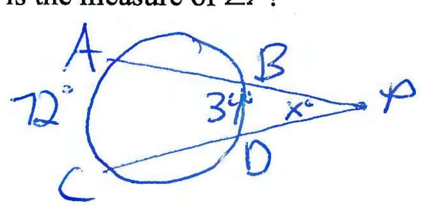
$P \cdot P = P \cdot P$

$10 \cdot 6 = 4 \cdot x$

$\frac{60}{4} = \frac{4x}{4}$

$15 = x$

70. In circle O two secants, $\overline{ABP}$ and $\overline{CDP}$, are drawn to external point P. If $m\overset{\frown}{AC} = 72°$, and $m\overset{\frown}{BD} = 34°$, what is the measure of $\angle P$?



2(EA) = major − minor

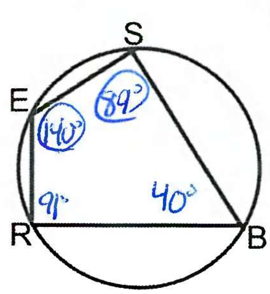
$2x = 72 - 34$

$\frac{2x}{2} = \frac{38}{2}$

$x = 19$

71. In the diagram below, quadrilateral $SBRE$ is inscribed in the circle. If $m\angle BRE = 91°$ and $m\angle SBR = 40°$, find $m\angle BSE$ 89° and $m\angle SER$ 140°

opposite angles add to 180°



$180 - 91 = 89$

$180 - 40 = 140$

72. In the diagram below of circle O, $GO = 8$ and $m\angle GOJ = 60°$. What is the area, in terms of π, of the shaded region?

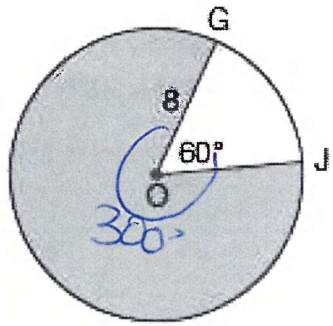
don't type π in

1) $\frac{4\pi}{3}$
2) $\frac{20\pi}{3}$
3) $\frac{32\pi}{3}$
4) $\frac{160\pi}{3}$

$A = \frac{\theta \pi r^2}{360}$

$A = \frac{300\pi(8)^2}{360}$

$A = \frac{160}{3}\pi$

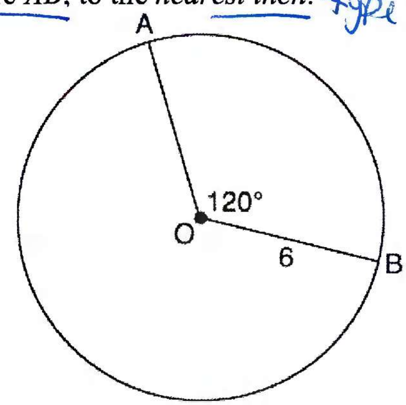


73. The diagram below shows circle O with radii $\overline{OA}$ and $\overline{OB}$. The measure of angle AOB is 120°, and the length of a radius is 6 inches. Find the length of arc AB, to the *nearest inch*. type π in

$L = \frac{\theta \pi d}{360}$

$L = \frac{120\pi(12)}{360}$

$L = 13$



74. The volume of a cylinder is 12,566.4 cm^3. The height of the cylinder is 8 cm. Find the radius of the cylinder to the *nearest tenth of a centimeter*.

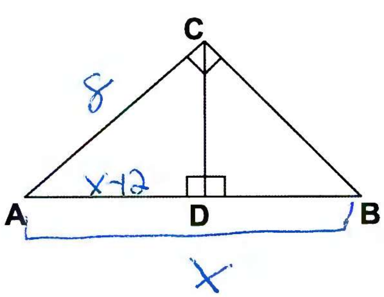
1) 12.3
2) 22.4
3) 7.9
4) 501.8

$V = \pi r^2 h$

$12566.4 = \pi x^2 (8)$ math, up!

$x = 22.4$

*75. Altitude $\overline{CD}$ is drawn to right triangle ABC. If $\overline{AC} = 8$, $\overline{AB} = x$, and $\overline{AD} = x - 12$. Find the measure of $\overline{AD}$.



$\frac{H}{L} = \frac{L}{S}$

$\frac{x}{8} = \frac{8}{x-12}$

$x(x-12) = 64$

$x^2 - 12x = 64$

$-64 \quad -64$

$x^2 - 12x - 64 = 0$

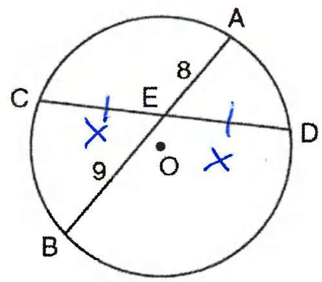
$(x-16)(x+4) = 0$

$x = 16 \quad \cancel{x = -4}$

$\overline{AD} = 16 - 12$

$\overline{AD} = 4$

*76 In the diagram below of circle O, chord $\overline{AB}$ bisects chord $\overline{CD}$ at E. If $AE = 8$ and $BE = 9$, find the length of $\overline{CE}$ in simplest radical form.



$P \cdot P = P \cdot P$

$x \cdot x = 9 \cdot 8$

$\sqrt{x^2} = \sqrt{72}$

$\sqrt{36}\ \sqrt{2}$

$6\sqrt{2}$

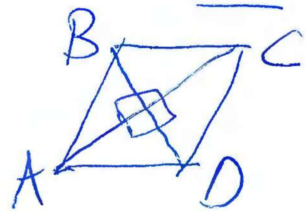
77. A parallelogram must be a rectangle when its
1) diagonals are perpendicular
2) diagonals are congruent
3) opposite sides are parallel
4) opposite sides are congruent

Rectangle
CD RA
congruent diagonals
right angles

Rhombus
PD CSC DB4
perpendicular diagonals
consecutive sides congruent
diagonals bisect angles

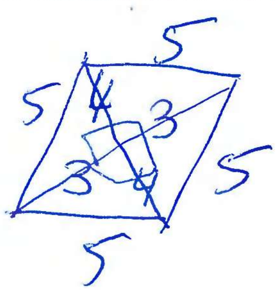
78. If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rhombus?
1) $\angle ABC \cong \angle CDA$
2) $\overline{AC} \cong \overline{BD}$
3) $\overline{AC} \perp \overline{BD}$
4) $\overline{AB} \perp \overline{CD}$

Perpendicular diagonals



79. A rhombus has diagonals that measure 6 and 8. Find the perimeter of the rhombus.

$5(4) = 20$



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

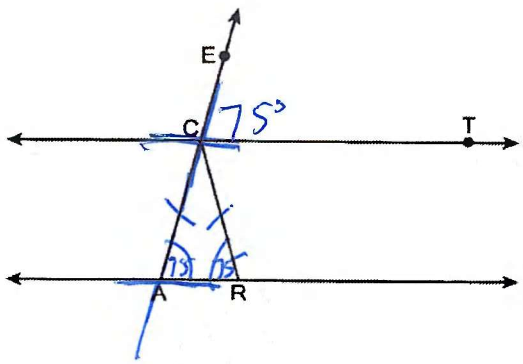
$3^2 + 4^2 = c^2$

$9 + 16 = c^2$

$\sqrt{25} = \sqrt{c^2}$

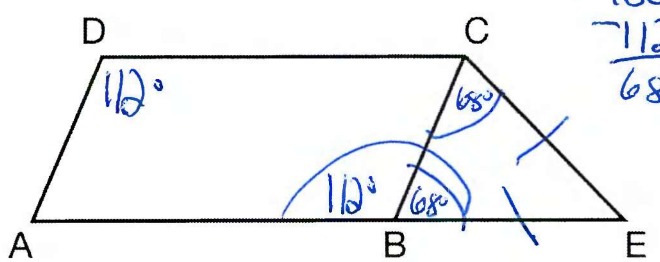
$5 = c$

80. In the diagram below, $\overleftrightarrow{CT} \parallel \overleftrightarrow{AR}$, and $\overrightarrow{ACE}$ and $\overline{RC}$ are drawn such that $\overline{AC} \cong \overline{RC}$.. If m$\angle ECT$ = 75°, what is m$\angle ACR$?



$$\begin{array}{r} 75 \\ +75 \\ \hline 150 \end{array} \qquad \begin{array}{r} 180 \\ -150 \\ \hline 30° \end{array}$$

81. In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through B to E, and $\overline{CE}$ is drawn.



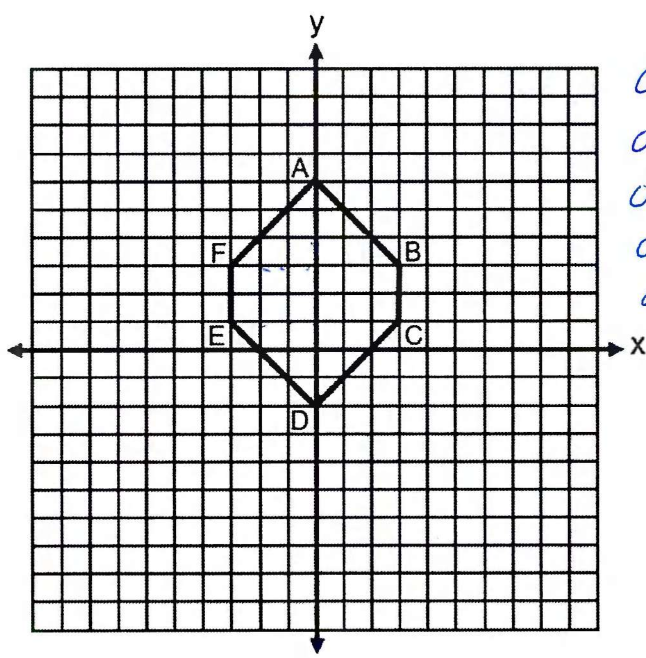
$$\begin{array}{r} 180 \\ -112 \\ \hline 68 \end{array}$$

If $\overline{CE} \cong \overline{BE}$ and m$\angle D$ = 112°, what is m$\angle E$?

1) 44°
2) 56°
3) 68°
4) 112°

$$\begin{array}{r} 68 \\ +68 \\ \hline 136 \end{array} \qquad \begin{array}{r} 180 \\ -136 \\ \hline 44° \end{array}$$

82. Find the perimeter of $ABCDEF$ in simplest radical form.



$d\overline{AF} = \sqrt{3^2+3^2} = \sqrt{9+9} = \sqrt{18}$

$d\overline{FE} = 2$

$d\overline{ED} = \sqrt{3^2+3^2} = \sqrt{9+9} = \sqrt{18}$

$d\overline{DC} = \sqrt{3^2+3^2} = \sqrt{9+9} = \sqrt{18}$

$d\overline{CB} = 2$

$d\overline{BA} = \sqrt{3^2+3^2} = \sqrt{9+9} = \sqrt{18}$

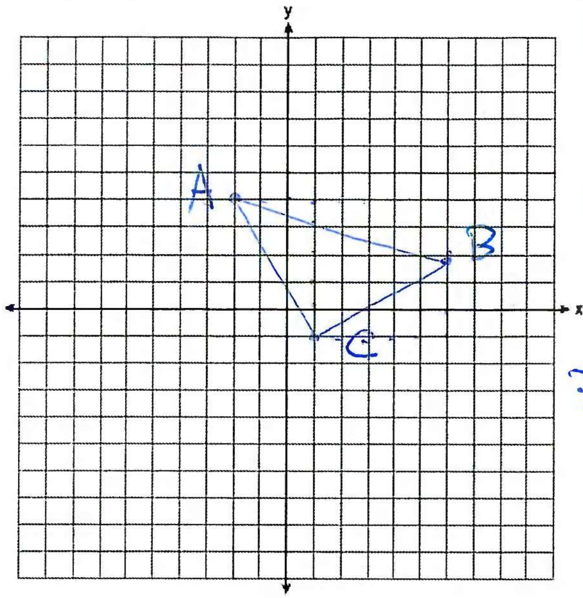
$4 + 4\sqrt{18}$

$4 + 4\sqrt{9}\,\sqrt{2}$

$4 + 4(3)\sqrt{2}$

$4 + 12\sqrt{2}$

83. A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$. Prove that $\triangle ABC$ is an isosceles right triangle. [The use of the set of axes below is optional.]



1) $\triangle ABC$ is an isosceles right triangle because its sides fit into Pythagorean Theorem and it has two congruent sides.

2) $d\overline{AB} = \sqrt{8^2+2^2} = \sqrt{64+4} = \sqrt{68}$

$d\overline{BC} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$

$d\overline{CA} = \sqrt{3^2+5^2} = \sqrt{9+25} = \sqrt{34}$

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

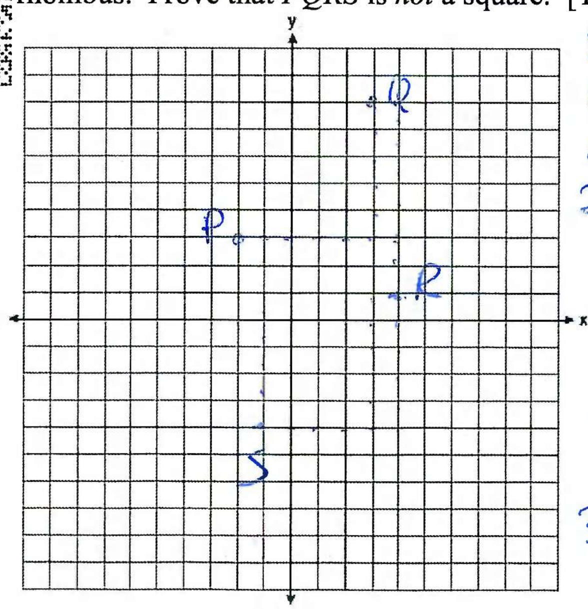
$\sqrt{34}^2+\sqrt{34}^2=\sqrt{68}^2$

$34+34=68$

$68=68$ ✓

$\overline{BC} \cong \overline{CA}$ because they have the same distance.

84. Quadrilateral $PQRS$ has vertices $P(-2,3)$, $Q(3,8)$, $R(4,1)$, and $S(-1,-4)$. Prove that $PQRS$ is a rhombus. Prove that $PQRS$ is *not* a square. [The use of the set of axes below is optional.]



1) PQRS is a rhombus because all sides are congruent. It is not a square because diagonals are not congruent.

2) $d\overline{PQ} = \sqrt{5^2+5^2} = \sqrt{25+25} = \sqrt{50}$

$d\overline{QR} = \sqrt{1^2+7^2} = \sqrt{1+49} = \sqrt{50}$

$d\overline{RS} = \sqrt{5^2+5^2} = \sqrt{25+25} = \sqrt{50}$

$d\overline{SP} = \sqrt{1^2+7^2} = \sqrt{1+49} = \sqrt{50}$

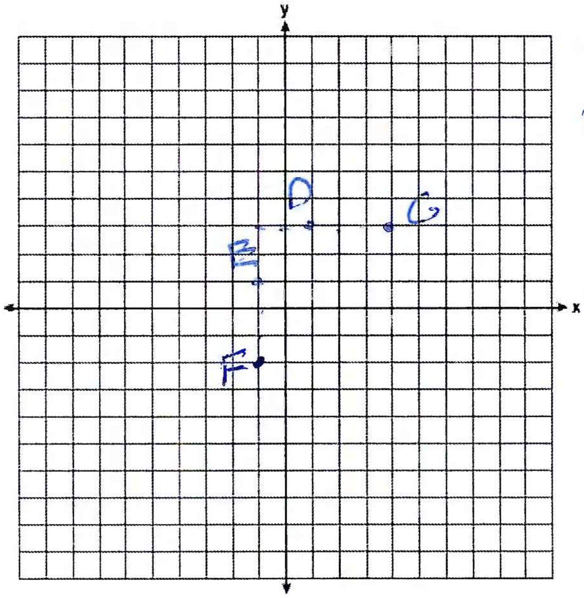
$d\overline{PR} = \sqrt{6^2+2^2} = \sqrt{36+4} = \sqrt{40}$

$d\overline{QS} = \sqrt{4^2+12^2} = \sqrt{16+144} = \sqrt{160}$

3) $\overline{PQ} \cong \overline{QR} \cong \overline{RS} \cong \overline{SP}$ because they have the same distance.

$\overline{PR} \not\cong \overline{QS}$ because they don't have the same distance.

85. Quadrilateral DEFG has vertices D(1,3) E(-1,1) F(-1,-2) G(4,3). Prove that DEFG is an isosceles trapezoid.



1) DEFG is an isosceles trapezoid because it has one pair of opposite sides parallel and congruent legs.

2) $m\overline{ED} = \frac{2}{2} = 1$

$m\overline{FG} = \frac{5}{5} = 1$

$d\overline{FE} = 3$

$d\overline{DG} = 3$

3) $\overline{ED} \parallel \overline{FG}$ because they have the same slope

$\overline{FE} \cong \overline{DG}$ because they have the same distance

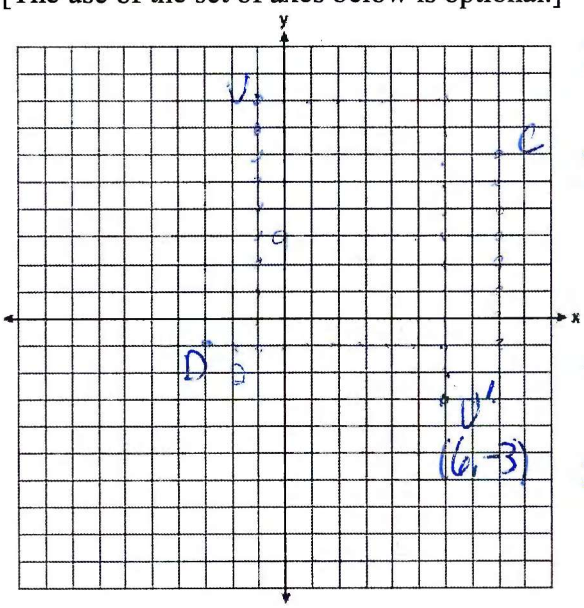
86. Given: Triangle DUC with coordinates $D(-3,-1)$, $U(-1,8)$, and $C(8,6)$

Prove: $\triangle DUC$ is a right triangle

Point U is reflected over $\overline{DC}$ to locate its image point, U', forming quadrilateral $DUCU'$.

Prove quadrilateral $DUCU'$ is a square.

[The use of the set of axes below is optional.]



1) $\triangle DUC$ is a right triangle because its sides fit into Pythagorean Theorem.

2) $d\overline{DU} = \sqrt{2^2+9^2} = \sqrt{4+81} = \sqrt{85}$

$d\overline{UC} = \sqrt{9^2+2^2} = \sqrt{81+4} = \sqrt{85}$

$d\overline{CD} = \sqrt{11^2+7^2} = \sqrt{121+49} = \sqrt{170}$

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

$\sqrt{85}^2 + \sqrt{85}^2 = \sqrt{170}^2$

$85+85 = 170$

$170 = 170$ ✓

1) $DUCU'$ is a square because all sides are congruent and diagonals are congruent.

2) $d\overline{DU'} = \sqrt{9^2+2^2} = \sqrt{81+4} = \sqrt{85}$

$d\overline{CU'} = \sqrt{2^2+9^2} = \sqrt{4+81} = \sqrt{85}$

$d\overline{UU'} = \sqrt{7^2+11^2} = \sqrt{49+121} = \sqrt{170}$

3) $\overline{DU} \cong \overline{UC} \cong \overline{CU'} \cong \overline{U'D}$ because they have the same distance.

$\overline{DC} \cong \overline{UU'}$ because they have the same distance.

$\sin A = \cos B$
$A + B = 90$

Enhanced by Schlansky!
2026

Conics App!
Alpha Enter!

Ratio Partitions
$\frac{\Delta x}{p}$ $\frac{\Delta y}{p}$

Reference Sheet for Geometry (NGLS)

Scale factor = $\frac{\text{image}}{\text{original}}$

perimeter(scale factor)
area(scale factor)^2

line of reflection = line of symmetry
center of rotation = center of shape

min rotation = $\frac{360}{n}$
and any multiple of that

density = $\frac{\text{mass}}{\text{volume}}$

Population density = $\frac{\text{Population}}{\text{area}}$

Volume	~~Cylinder~~	~~$V = Bh$ where B is the area of the base~~
	~~General Prism~~	~~$V = Bh$ where B is the area of the base~~
	Sphere	$V = \frac{4}{3}\pi r^3$
	~~Cone~~	~~$V = \frac{1}{3}Bh$ where B is the area of the base~~
	~~Pyramid~~	~~$V = \frac{1}{3}Bh$ where B is the area of the base~~

$d = \sqrt{\Delta x^2 + \Delta y^2}$
$m = \frac{\Delta y}{\Delta x}$

$y - y_1 = m(x - x_1)$
Might have to distribute and isolate y

Rectangle
CD RA
congruent diagonals
right angle

Rhombus
PD CSC DBA
perpendicular diagonals
consecutive sides congruent
diagonals bisect angles

Rectangular Prism $V = lwh$
Triangular Prism $V = \frac{1}{2}lwh$
Pyramid $V = \frac{1}{3}lwh$

Cylinder $V = \pi r^2 h$
Cone $V = \frac{1}{3}\pi r^2 h$

Triangle Area
$A = \frac{1}{2}ab\sin C$

"I Can't Remember Doing this!"
ICRDT
Look for
Inscribed
Central
Radii
Diameters
Tangents

Look for Linear Pairs and angles of a triangle

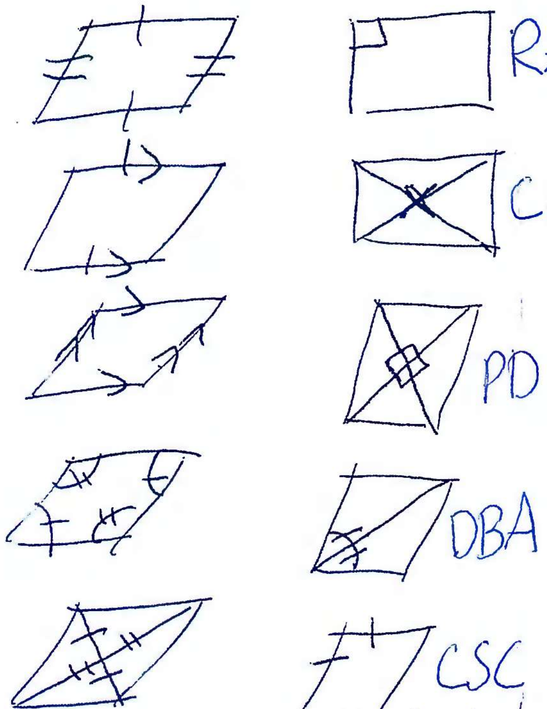
$A = \frac{\theta \pi r^2}{360}$
Area of a Sector

$L = \frac{\theta \pi d}{360}$
Arc Length

$2(EA) = \text{major} - \text{minor}$
$2(VA) = \text{arc} + \text{arc}$
arcs and angles

$p \cdot p = p \cdot p$
$w \cdot e = w \cdot e$
segments

P-Gram Properties



A rigid motion preserves size and angle measure producing a congruent figure.

Identifying Transformations

CHECK ORIENTATION!

Same	different
Not a single line reflection	Must be a single line reflection
OR	OR
Rotation ⇒ state center	Reflection
Translation	Translation

Parallel lines have the same slope
Perpendicular lines have negative reciprocal slopes

$y - y_1 = m(x - x_1)$

* might have to distribute and isolate y

Line Dilations

Parallel! Keep the slope!
Cheat!

Dilate Not origin:	Dilate origin
Same line	multiply scale factor and b

If the center of dilation is on the line, the image is the same line.

Coordinate Geometry Proofs

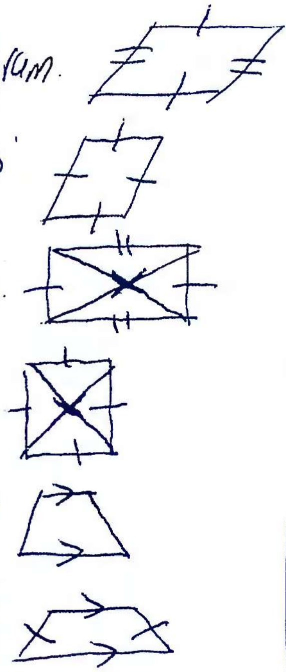
$d = \sqrt{\Delta x^2 + \Delta y^2}$

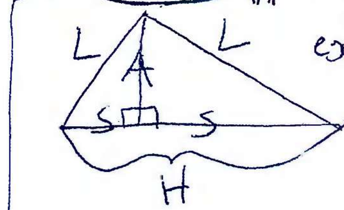
$m = \frac{\Delta y}{\Delta x}$

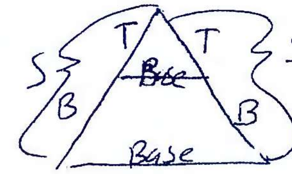
$mp = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ or eyeball it

Isosceles Triangle
Equilateral Triangle
Right Triangle: $a^2 + b^2 = c^2$

Parallelogram
Rhombus
Rectangle
Square
Trapezoid
Isosceles Trapezoid

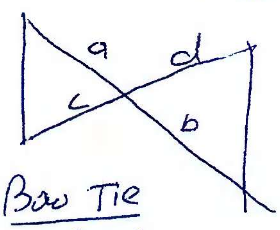






Candy corn

Bases	No Bases
separate	$\frac{T}{T} = \frac{B}{B} = \frac{S}{S}$



Bow Tie

$\frac{a}{b} = \frac{c}{d}$

2(midsegment) = opposite side

Prove Triangles

Prove 3 things
CPCTC for segments or angles

1) Min Proofs

2) Additional tools (VRIAS)
Vertical angles are congruent
Reflexive Property
Isosceles Triangle theorem
Addition Property
Subtraction Property

*If you get stuck, make something up.

6 Pointer

1) Prove P-gram
2) Use P-gram for alternate interior angles
3) Prove triangles ≅ or ~

*expect to have to do addition/subtraction property

Prove multiply, work backwards

$\Delta \sim \Delta$ — AA≅AA

$\frac{A}{D} = \frac{C}{B}$ — CSSTIP

$A \cdot B = C \cdot D$ — Cross products are equal

The 2 smallest sides of a triangle add to be larger than the third side

Medians are cut in a ratio of 2:1

Cross Sections

Perpendicular to base		Parallel to base
Prism/cylinder	Pyramid/cone	always base!
rectangle	triangle	

centroid → medians
circumcenter → perpendicular bisectors
incenter → angle bisectors
orthocenter → altitudes