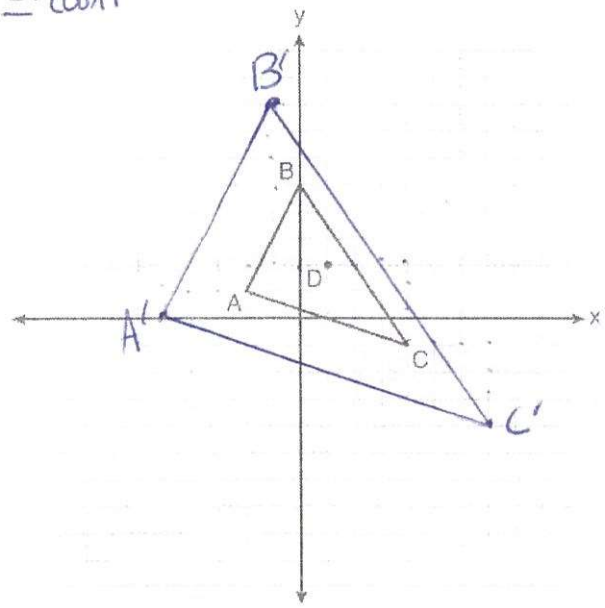
Name Schlansky
Mr. Schlansky

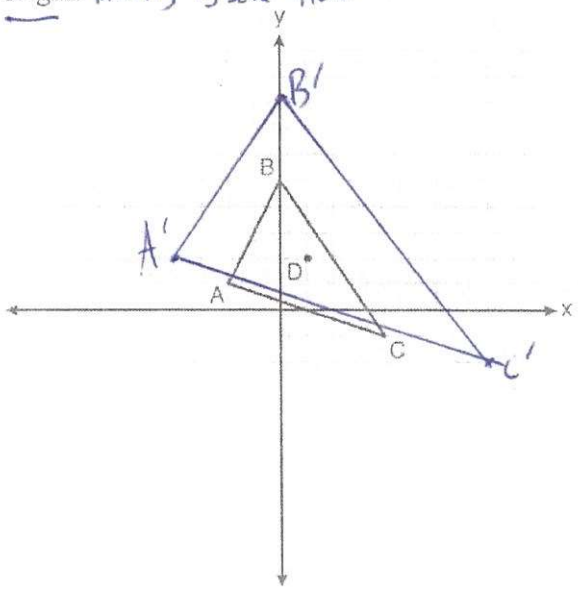
Date _____
Geometry

CCG Common Regents Test

1. Triangle ABC and point $D(1, 2)$ are graphed on the set of axes below.
Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$, after a dilation of scale factor 2 centered at point D. count

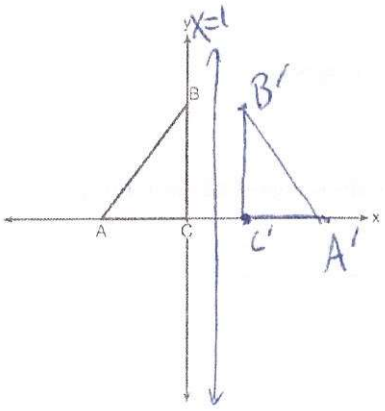


2. Triangle ABC and point $D(1, 2)$ are graphed on the set of axes below.
Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$, after a dilation of scale factor 2 centered at the origin. multiply by scale factor



A(-2,1) $\xrightarrow{\times 2}$ (-4,2)
B(0,4) → (0,8)
C(4,-1) → (8,-2)

3. 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 $x = 1$.

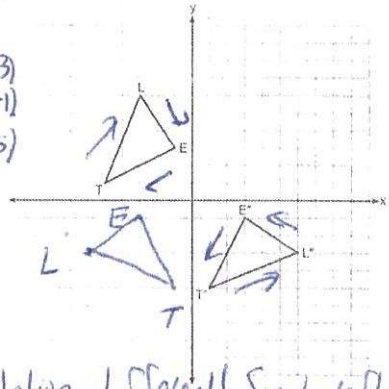


4. On the set of axes below, $\triangle LET$ and $\triangle L"E"T"$ are graphed in the coordinate plane where $\triangle LET \cong \triangle L"E"T"$.

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

L (-3,6) → (-6,-3)
E (-1,3) → (-3,-1)
T (-5,1) → (-1,-5)



Orientation different! Single reflection

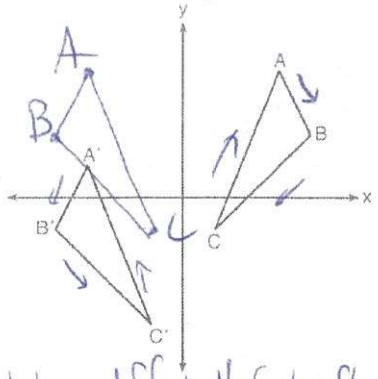
5. If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?

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

6. After a reflection over a line, $\Delta A'B'C'$ is the image of ΔABC. Explain why triangle ABC is congruent to triangle $\Delta A'B'C'$.

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

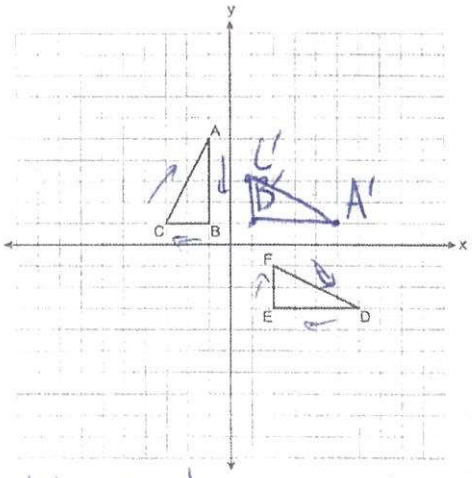
7. As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations. Identify the sequences of transformations.
Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.



1) Reflect $\triangle ABC$ over the y-axis followed by a translation down 3 units.
2) Yes, a reflection and translation are rigid motions.
3) A rigid motion preserves size and angle measure producing a congruent figure.

orientation different. Single reflection

8. 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 $\triangle DEF$.



1) rotate $\triangle ABC$ 270° counter-clockwise centered at the origin followed by a translation 1 unit right and 4 units down.

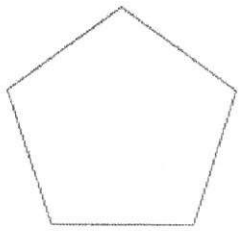
$A(-1,5) \xrightarrow{y,-x} (5,1)$
$B(-1,1) \rightarrow (1,1)$
$C(-3,1) \rightarrow (1,3)$

orientation same!
No reflection!

9. The regular polygon below is rotated about its center.
Which angle of rotation will carry the figure onto itself?

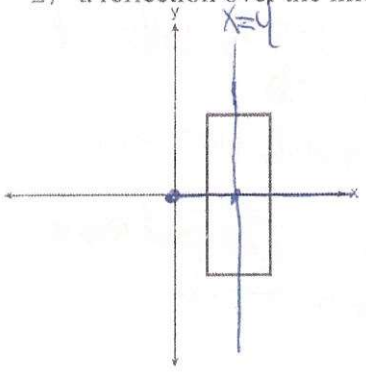
1) 60°
2) 108°
3) 216°
4) 540°

$\frac{360}{n}$ $\frac{360}{5} = 72$



10. As shown in the graph below, the quadrilateral is a rectangle.
Which transformation would *not* map the rectangle onto itself? not center of shape

1) a reflection over the x-axis ✓
2) a reflection over the line $x = 4$ ✓
3) a rotation of 180° about the origin ✗
4) a rotation of 180° about the point $(4, 0)$ ✓



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

11. After a dilation with center $(0, 0)$, the image of $\overline{DB}$ is $\overline{D'B'}$. If $DB = 4.5$ and $D'B' = 18$, the scale factor of this dilation is

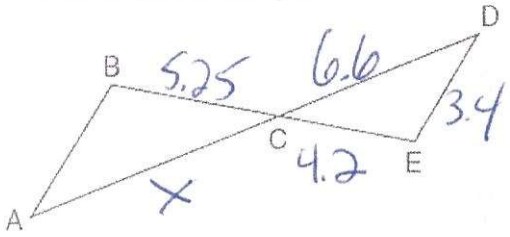
1) $\frac{1}{5}$
2) 5
3) $\frac{1}{4}$
4) 4

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

scale factor = $\frac{18}{4.5} = 4$

12. 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*?



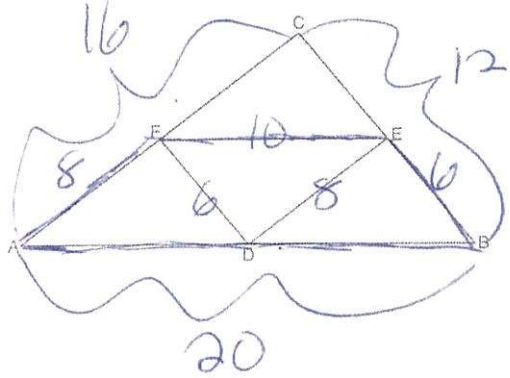
$\frac{X}{6.6} = \frac{5.25}{4.2}$

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

$X = 8.25$

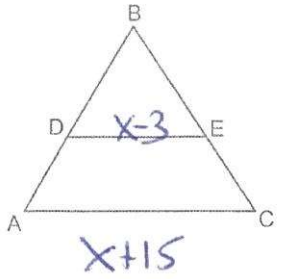
13. In the diagram of $\triangle ABC$ shown below, D is the midpoint of $\overline{AB}$, E is the midpoint of $\overline{BC}$, and F is the midpoint of $\overline{AC}$. If $AB = 20$, $BC = 12$, and $AC = 16$, what is the perimeter of trapezoid $ABEF$?

2(midsegment) = opposite side



$20 + 6 + 8 + 6 = \boxed{44}$

14. D and E are midpoints of $\overline{AB}$ and $\overline{BC}$ respectively. If $\overline{AC} = x+15$ and $\overline{DE} = x-3$, find the measure of $\overline{DE}$.



2(midsegment) = opposite side

$2(x-3) = x+15$

$2x-6 = x+15$

$-x \quad -x$

$x-6 = 15$

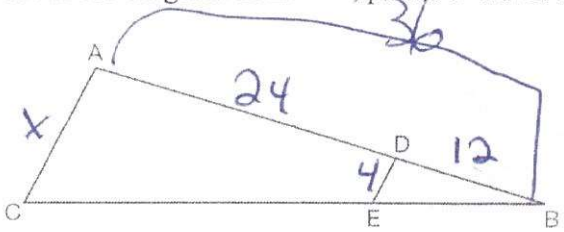
$+6 \quad +6$

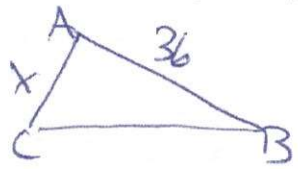
$x = 21$

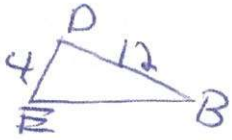
$\overline{DE} = 21-3$

$DE = 18$

15. In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.







If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?

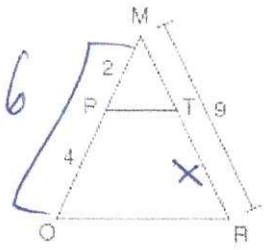
1) 8
2) 12
3) 16
4) 72

$\frac{x}{4} = \frac{36}{12}$

$\frac{12x}{12} = \frac{144}{12}$

$x = 12$

16. Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.



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

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

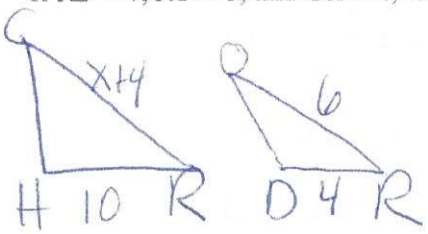
$\frac{6x}{6} = \frac{36}{6}$

$x = 6$

What is the length of $\overline{TR}$?

1) 4.5
2) 5
3) 3
4) 6

17. In triangle CHR, O is on $\overline{HR}$, and D is on $\overline{CR}$ so that $\angle H \cong RDO$. If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?



$\frac{x+4}{6} = \frac{10}{4}$

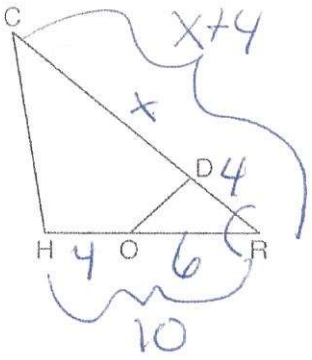
$4(x+4) = 60$

$4x + 16 = 60$

$-16 \quad -16$

$\frac{4x}{4} = \frac{44}{4}$

$x = 11$



18. In right triangle ABC shown in the diagram below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $CD = 12$, and $AD = 3$.

What is the length of $\overline{AB}$?

1) $5\sqrt{3}$
2) 6
3) $3\sqrt{5}$
4) 9

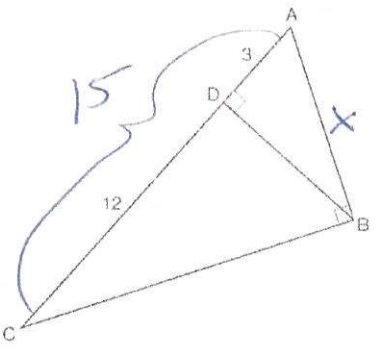
$\frac{\#}{L} = \frac{L}{S}$

$\frac{15}{x} = \frac{x}{3}$

$x^2 = \sqrt{45}$

$\sqrt{9}\sqrt{5}$

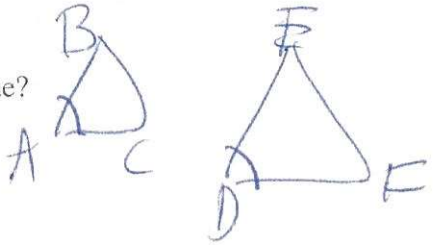
$x = 3\sqrt{5}$

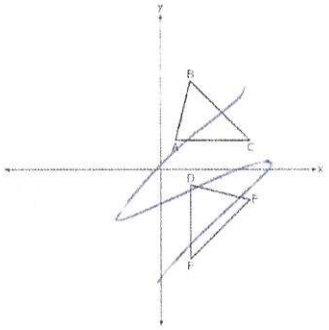


19. The image of ΔABC after a rotation of 90° clockwise about the origin is ΔDEF, as shown below.

Which statement is true?

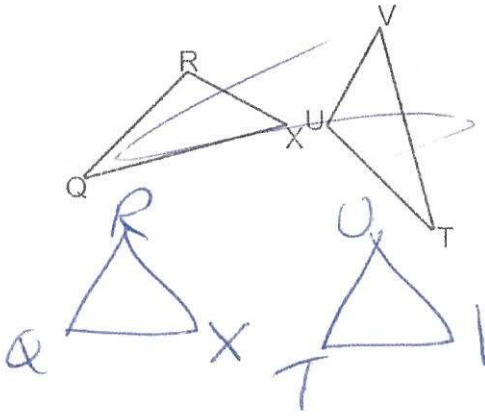
1) $\overline{BC} \cong \overline{DE}$
2) $\overline{AB} \cong \overline{DF}$
3) $\angle C \cong \angle E$
4) $\angle A \cong \angle D$





20. In the diagram below, $\Delta QRX \sim \Delta TUV$. Which of the following statements is *not* true?

1) $\frac{QR}{TU} = \frac{QX}{TV}$
2) $\frac{\angle X}{\angle V} = \frac{\angle Q}{\angle T}$
3) $\frac{RX}{UV} = \frac{VT}{XQ}$
4) $\frac{QX}{QR} = \frac{TV}{TU}$



21. In $\triangle ABC$ below, $\overline{DE}$ is drawn such that D and E are on $\overline{AB}$ and $\overline{AC}$, respectively.

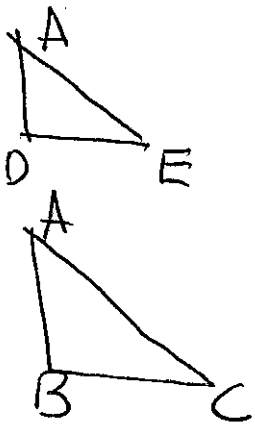
If $\overline{DE} \parallel \overline{BC}$, which equation will always be true?

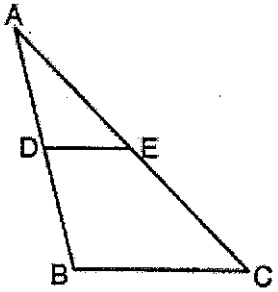
1) $\frac{AD}{DE} = \frac{DB}{BC}$ $\frac{I}{Base} = \frac{B}{Base}$

2) $\frac{AD}{DE} = \frac{AB}{BC}$

3) $\frac{AD}{BC} = \frac{DE}{DB}$

4) $\frac{AD}{BC} = \frac{DE}{AB}$





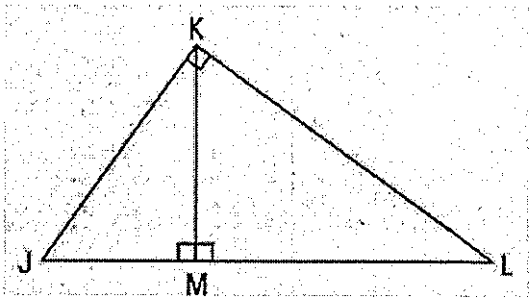
22. In right triangle JKL below, altitude $\overline{KM}$ is drawn to hypotenuse $\overline{JL}$. Which of the following proportions is *not* true?

1) $\frac{JL}{JK} = \frac{JK}{KM}$ $\frac{H}{L1} = \frac{L1}{A}$ ✗

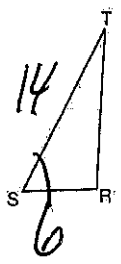
2) $\frac{JM}{KM} = \frac{KM}{ML}$ $\frac{S}{A} = \frac{A}{S}$ ✓ OOPS

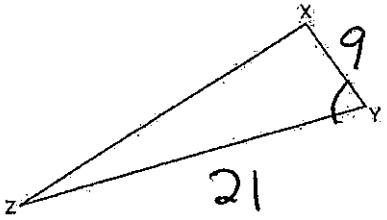
3) $\frac{JL}{KL} = \frac{KL}{JM}$ $\frac{H}{L2} = \frac{L2}{S1}$ ✗

4) $\frac{ML}{MK} = \frac{MK}{MJ}$ $\frac{S}{A} = \frac{A}{S}$ ✓



23. Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.





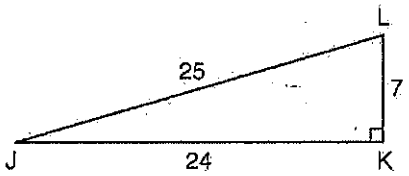
$\frac{6}{9} = \frac{14}{21}$

$\frac{2}{3} = \frac{2}{3}$ ✓

Yes, because SAS

S O/H C A/H T O/A

24. In right triangle JKL in the diagram below, $KL = 7$, $JK = 24$, $JL = 25$, and $\angle K = 90°$.



Which statement is *not* true?

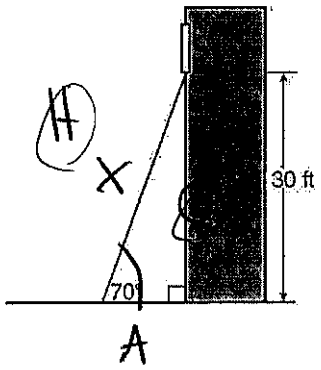
1) $\tan L = \frac{24}{7}$ ✓

2) $\cos L = \frac{24}{25}$ $\cos L = \frac{7}{25}$

3) $\tan J = \frac{7}{24}$ ✓

4) $\sin J = \frac{7}{25}$ ✓

25. A carpenter leans an extension ladder against a house to reach the bottom of a window 30 feet above the ground. As shown in the diagram below, the ladder makes a 70° angle with the ground. To the *nearest foot*, determine and state the length of the ladder.



$\sin\theta = \frac{O}{H}$

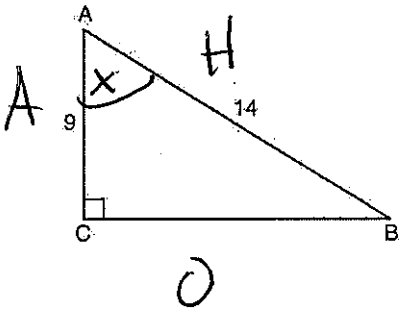
$\sin 70 = \frac{30}{X}$

$X \sin 70 = 30$

$\frac{X \sin 70}{\sin 70} = \frac{30}{\sin 70}$

$X = 30$

26. In the diagram of right triangle ABC shown below, $AB = 14$ and $AC = 9$.
What is the measure of $\angle A$, to the *nearest degree*?



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

$\cos^{-1}$

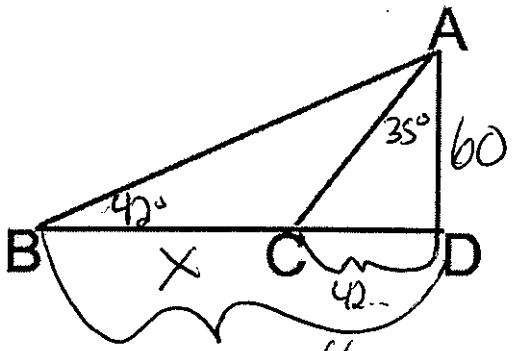
$\cos^{-1}\cos X = \frac{9}{14}$

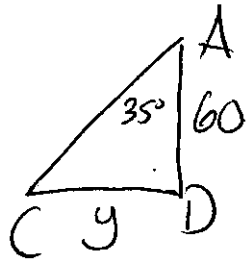
$X = \cos^{-1}\left(\frac{9}{14}\right)$

$X = 50°$

27. In the diagram below, $m\angle CAD = 35$, $m\angle ABD = 42$, and $m\overline{AD} = 60$. Find to the nearest tenth, $m\overline{BC}$.

Subtraction

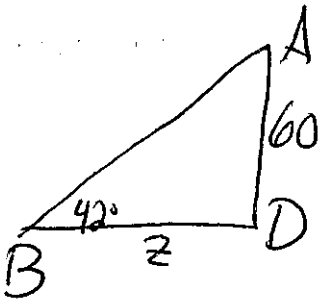




$\tan 35 = \frac{y}{60}$

$y = 60\tan 35$

$y = 42...$



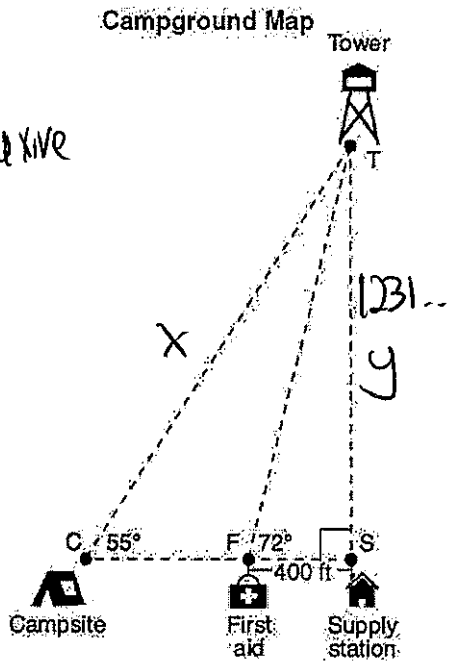
$\tan 42 = \frac{60}{z}$

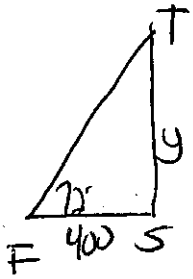
$\frac{60}{\tan 42} = \frac{z\tan 42}{\tan 42}$

$66.. = z$

28. The map of a campground is shown below. Campsite C, first aid station F, and supply station S lie along a straight path. The path from the supply station to the tower, T, is perpendicular to the path from the supply station to the campsite. The length of path $\overline{FS}$ is 400 feet. The angle formed by path $\overline{TF}$ and path $\overline{FS}$ is 72°. The angle formed by path $\overline{TC}$ and path $\overline{CS}$ is 55°. Determine and state, to the *nearest foot*, the distance from the campsite to the tower.

Reflexive

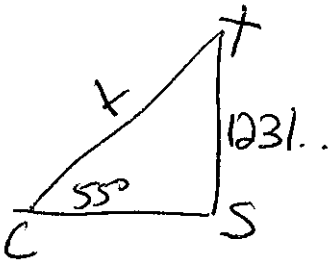




$\tan 72 = \frac{y}{400}$

$y = 400\tan 72$

$y = 1231.$



$\sin 55 = \frac{1231.}{x}$

$x\sin 55 = 1231.$

$\frac{x\sin 55}{\sin 55} = \frac{1231.}{\sin 55}$

$x = 1503$

29. In right triangle ABC, $m\angle C = 90°$. If $\cos B = \frac{5}{13}$, which function also equals $\frac{5}{13}$?

$\sin A = \cos B$

1) $\tan A$
2) $\tan B$
3) $\sin A$
4) $\sin B$

Sin A = Cos B

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

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

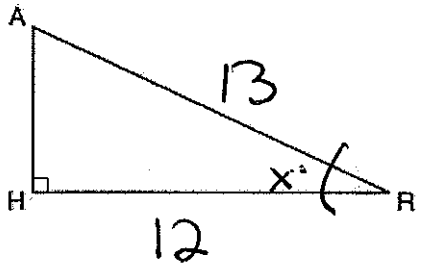
$A+B=90$

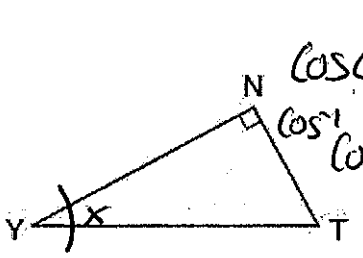
$2x+7+4x-7=90$

$\frac{6x}{6}=\frac{90}{6}$ → $x=15$

31. In the diagram below of $\triangle HAR$ and $\triangle NTY$, angles H and N are right angles, and $\triangle HAR \sim \triangle NTY$. If $AR = 13$ and $HR = 12$, what is the measure of angle Y, to the *nearest degree*?

1) 23°
2) 25°
3) 65°
4) 67°





$\cos\theta = \frac{A}{H}$ $\cos^{-1}$ $\cos^{-1}$

$\cos x = \frac{12}{13}$

$x = \cos^{-1}\left(\frac{12}{13}\right)$

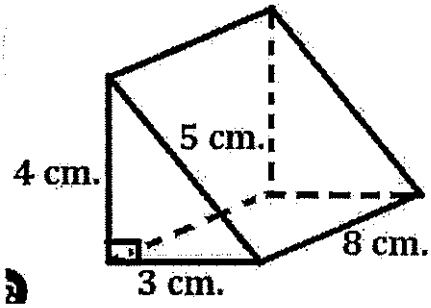
$x = 23°$

32. A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?

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

Vertical

33. Find the volume of the triangular prism below:



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

$V = \frac{1}{2}(3)(8)(4)$

$V = 48\ cm^3$

34. Find the volume of a square pyramid with a base with edge length 4 inches and a height of 18 inches.

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

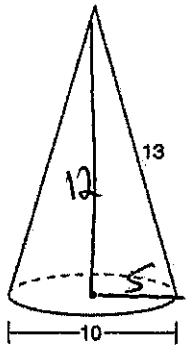
don't use this

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

$V = \frac{1}{3}(4)(4)(18)$

$V = 96\ in^3$

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



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

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

$V = 100\pi$

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

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

$25 + b^2 = 169$

$-25 \quad -25$

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

$b = 12$

36. 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*.

Use the equation solver! Math,up!

$V = \pi r^2 h$

$\frac{12,566.4}{8\pi} = \frac{\pi(r)^2(8)}{8\pi}$

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

$22.4 = r$

37. Town A has an area of 12 square miles. Town B has an area of 10 square miles. If town A has a population of 8,198 people and town B has a population of 7,384 people, which town has a greater population density? Justify your answer.

$Pd = \frac{P}{a}$

Town A: $\frac{8198}{12} = 683.\overline{3}$ ppl/mi^2

Town B: $\frac{7384}{10} = 738.4$ ppl/mi^2

Town B

38. A brick that weighs 1824 grams has dimensions that measure 4 cm by 3 cm by 8 cm. To the nearest tenth, what is the density of the brick?

$d = \frac{m}{V}$

$d = \frac{1824\ g}{96\ cm^3}$

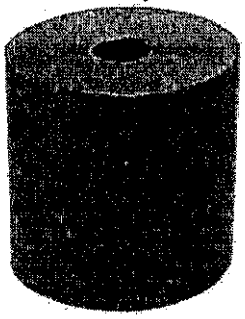
$d = 19\ g/cm^3$

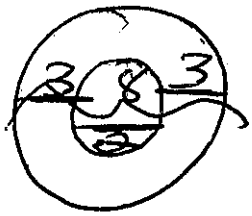
$V = lwh$

$V = 4(3)(8)$

$V = 96\ cm^3$

39. The paper towel roll shown below has a diameter of 8 inches and the paper has a thickness of 3 inches. If the height of the paper towel roll is 12 inches, what is the volume of the paper towels? Round your answer to the nearest tenth of a cubic inch.





$V = \pi r^2 h$

$V = \pi(4)^2(12)$

$V = 603..$

$V = \pi r^2 h$

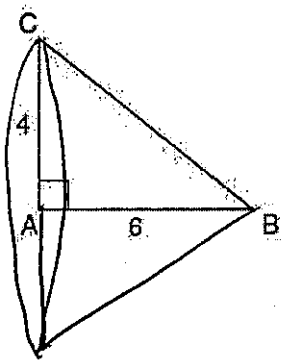
$V = \pi(1)^2(12)$

$V = 37..$

$603.. - 37.. = 565.5\ in^3$

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

1) 32π
2) 48π
3) 96π
4) 144π



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

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

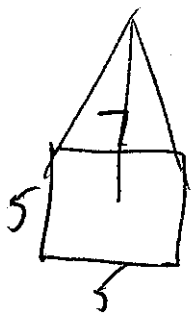
$V = 32\pi$

41. A child's tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the *nearest cubic foot*?

Convert first!

$60\ in \cdot \frac{1\ ft}{12\ in} = 5\ ft$

$84\ in \cdot \frac{1\ ft}{12\ in} = 7\ ft$

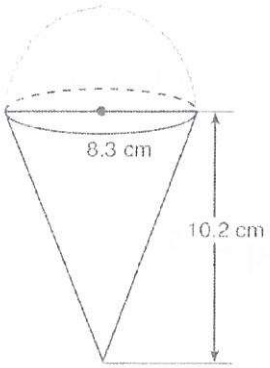


$V = \frac{1}{3}lwh$

$V = \frac{1}{3}(5)(5)(7)$

$V = \frac{175}{3} = 58\ ft^3$

42. A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters. The desired density of the shaved ice is 0.697 g/cm^3, and the cost, per kilogram, of ice is \$3.83. Determine and state the cost of the ice needed to make 50 snow cones.



Cone

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

$V = \frac{1}{3}\pi(4.15)^2(10.2)$

$V = 183.$

Hemisphere

$V = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$

$V = \frac{1}{2}\left(\frac{4}{3}\pi(4.15)^3\right)$

$V = 149..$

183

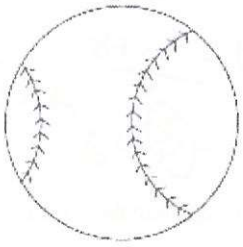
+149..

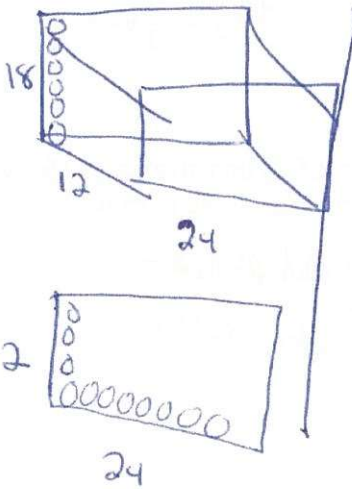
333.. cm^3 $\cdot \frac{.697\ g}{1\ cm^3} \cdot \frac{1\ kg}{1000\ g} \cdot \frac{3.83}{1\ kg} \times 50$

\$44.53

43. A packing box for baseballs is the shape of a rectangular prism with dimensions of 2 ft × 1 ft × 18 in. Each baseball has a diameter of 2.94 inches.
Determine and state the maximum number of baseballs that can be packed in the box if they are stacked in layers and each layer contains an equal number of baseballs. The weight of a baseball is approximately 0.025 pound per cubic inch. Determine and state, to the *nearest pound*, the total weight of all the baseballs in the fully packed box.

# of balls = 8(4)(6) = 192





$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(1.47)^3$

$V = 13.3\ in^3$

$13.3\ in^3 \cdot \frac{.025\ lb}{1\ in^3} \times 192$

64 pounds

2 ft · $\frac{12\ in}{1\ ft} = 24\ in$

1 ft · $\frac{12\ in}{1\ ft} = 12\ in$

$\frac{24}{2.94} = 8.16$ → 8

$\frac{12}{2.94} = 4.08$ → 4

$\frac{18}{2.94} = 6.12$ → 6

$(-\frac{4}{2})^2 = 4 \quad (\frac{9}{2})^2 = 9$

44. What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?

1) (3, −2) and 36
2) (3, −2) and 6
3) (−3, 2) and 36
4) (−3, 2) and 6

$x^2+6x+y^2-4y=23$
$x^2+6x+\boxed{9}+y^2-4y+\boxed{4}=23+\boxed{9}+\boxed{4}$
$(x+3)(x+3)+(y-2)(y-2)=36$
$(x+3)^2=(y-2)^2=36$
center $=(-3,2)$ $r=6$

45. What is an equation of the image of the line $y = \frac{3}{2}x - 4$ after a dilation of a scale factor of $\frac{3}{4}$ centered at the origin?

1) $y = \frac{9}{8}x - 4$
2) $y = \frac{9}{8}x - 3$
3) $y = \frac{3}{2}x - 4$
4) $y = \frac{3}{2}x - 3$

multiply scale factor and b

same slope

$m = \frac{3}{2}$

$b = \frac{3}{4}(-4) = -3$

same slope

46. Line MN is dilated by a scale factor of 2 centered at the point (0, 6). If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?

same equation

1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

same slope

47. The line $-3x + 4y = 8$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

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

$m = \frac{3}{4}$

$-3x+4y=8$
$+3x \quad +3x$
$\frac{4y}{4} = \frac{3x+8}{4}$
$y = \frac{3}{4}x + 2$ $\quad m = \frac{3}{4}$

48. Quadrilateral CAMI has a perimeter of 20 and an area of 15. What is the perimeter and area of quadrilateral CAMI after a dilation by a scale factor of 4?

new perimeter = scale factor · old perimeter
new area = (scale factor)^2 · old area

$P = 20(4) = 80$
$A = 15(4)^2 = 240$

negative reciprocal slopes

49. What is an equation of the line that contains the point $(3,-1)$ and is perpendicular to the line whose equation is $y=-3x+2$?

1) $y=-3x+8$

2) $y=-3x$

3) $y=\frac{1}{3}x$

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

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

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

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

$y+1=\frac{1}{3}x-1$

$-1 \quad -1$

$y=\frac{1}{3}x-2$

Same slope

50. An equation of the line that passes through $(2,-1)$ and is parallel to the line $2y+3x=8$ is

$m\parallel=\frac{-3}{2}$ $x_1=2$ $y_1=-1$

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

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

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

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

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

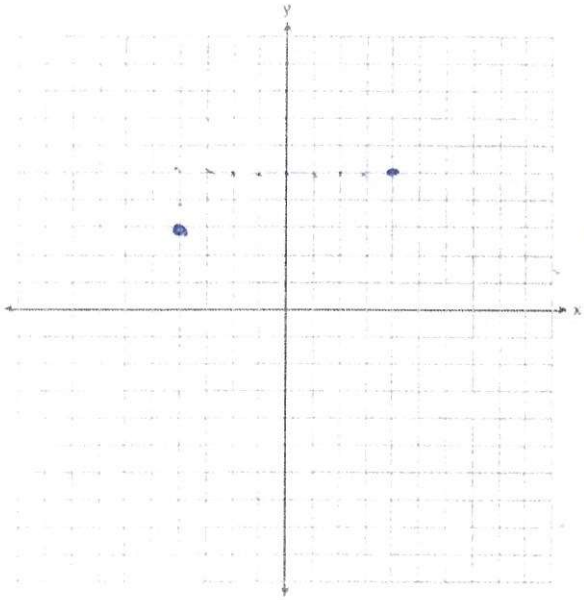
$y+1=-\frac{3}{2}(x-2)$

$-3x \quad -3x$

$\frac{2y}{2}=\frac{-3x+8}{2}$

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

51. Write an equation of the perpendicular bisector of the line segment whose endpoints are (-4,3) and (4,5) in both point slope and slope intercept form.



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

$m=\frac{2}{8}=\frac{1}{4}$

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

$mp=\left(\frac{-4+4}{2}, \frac{3+5}{2}\right)$

$mp=(0,4)$

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

$y-4=-4(x-0)$

$m\perp=-4$ $x_1=0$ $y_1=4$

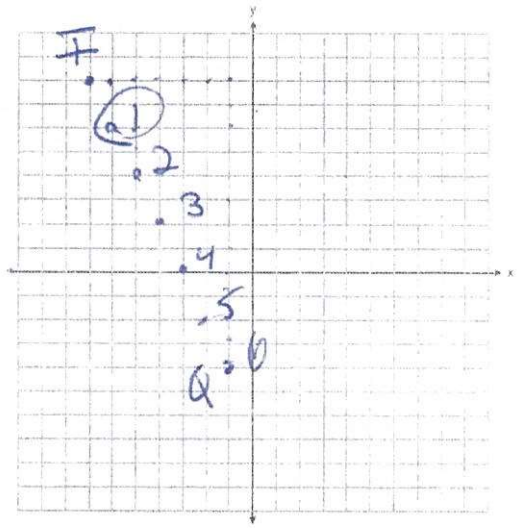
52. Directed line segment IQ has endpoints whose coordinates are $I(-7,8)$ and $Q(-1,-4)$. Determine the coordinates of point J that divides the segment in the ratio 1 to 5. $P=6$

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

$\frac{6}{6}$ $\frac{12}{6}$

1 2

$(-6,6)$



53 On the set of axes below, the vertices of $\triangle PQR$ have coordinates $P(-6, 7)$, $Q(2, 1)$, and $R(-1, -3)$.

What is the area of $\triangle PQR$?

1) 10 3) 25
2) 20 4) 50

$A_{\square} = 10(8) = 80$

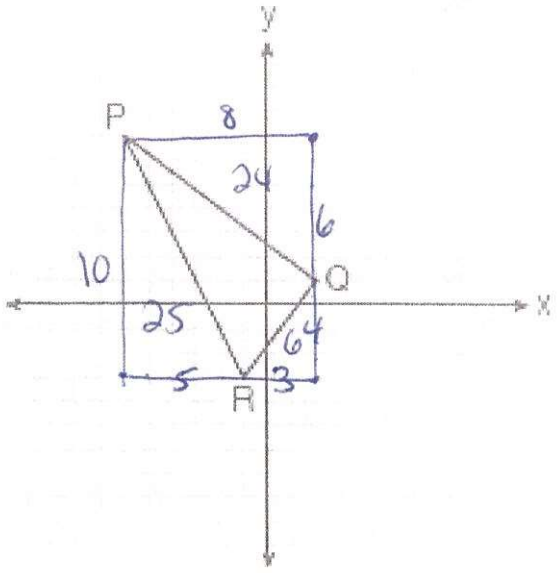
$A_{T1} = \frac{1}{2}(10)(5) = 25$

$A_{T2} = \frac{1}{2}(3)(4) = 6$

$A_{T3} = \frac{1}{2}(8)(6) = 24$

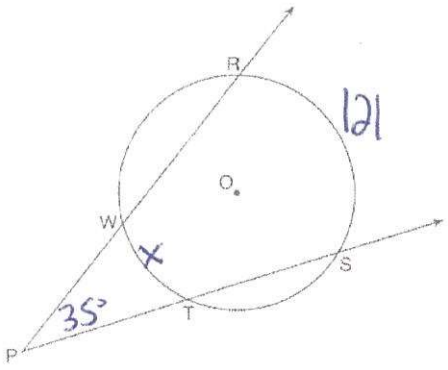
80
−55
25

25
+ 6
+24
55



54. 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 $m\overset{\frown}{RS} = 121°$, determine and state $m\overset{\frown}{WT}$.



$2(EA) = \text{major} - \text{minor}$

$2(35) = 121 - x$

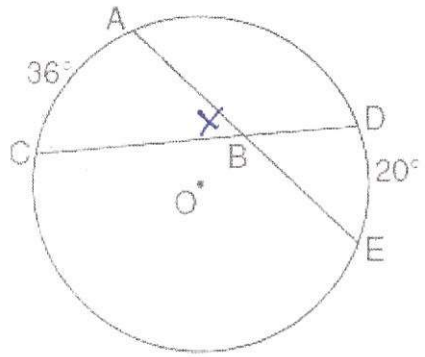
$70 = 121 - x$

$-121 \quad -121$

$\frac{-51}{-1} = \frac{-x}{-1}$

$51 = x$

55. In the diagram below of circle O, chords $\overline{AE}$ and $\overline{DC}$ intersect at point B, such that $m\overset{\frown}{AC} = 36$ and $m\overset{\frown}{DE} = 20$. What is $m\angle ABC$?



$2(VA) = \text{arc} + \text{arc}$

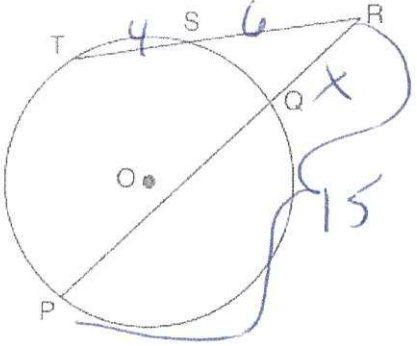
$2x = 36 + 20$

$\frac{2x}{2} = \frac{56}{2}$

$x = 28$

56. In the diagram below, secants $\overline{RST}$ and $\overline{RQP}$, drawn from point R, intersect circle O at S, T, Q, and P.

If $RS = 6$, $ST = 4$, and $RP = 15$, what is the length of $\overline{RQ}$?



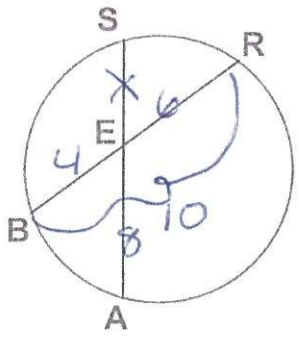
whole · exterior = whole · exterior

$10 \cdot 6 = 15 \cdot x$

$\frac{60}{15} = \frac{15x}{15}$

$4 = x$

57. If $\overline{BR} = 10$, $\overline{BE} = 4$, $\overline{AE} = 8$, find $\overline{ES}$



part · part = part · part

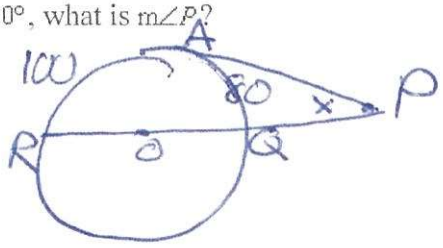
$4 \cdot 6 = 8 \cdot x$

$\frac{24}{8} = \frac{8x}{8}$

$3 = x$

58. Diameter $\overline{ROQ}$ of circle O is extended through Q to point P, and tangent $\overline{PA}$ is drawn. If $m\widehat{RA} = 100°$, what is $m\angle P$?

180
−100
80



2(EA) = major − minor

$2x = 100 - 80$

$\frac{2x}{2} = \frac{20}{2}$

$x = 10$

51. Quadrilateral $ABCD$ is inscribed in circle O, as shown below.

If $m\angle A = 80°$, $m\angle B = 75°$, $m\angle C = (y + 30)°$, and $m\angle D = (x - 10)°$, which statement is true?

1) $x = 85$ and $y = 50$
2) $x = 90$ and $y = 45$
3) $x = 110$ and $y = 75$
4) $x = 115$ and $y = 70$

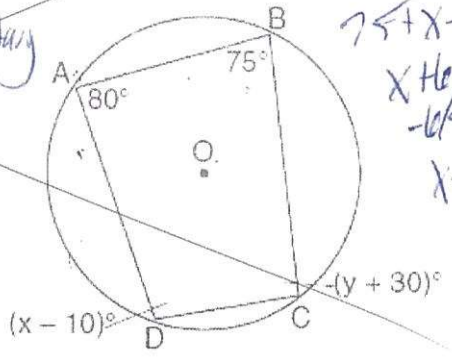
opposite angles are supplementary

$80 + y + 30 = 180$

$y + 110 = 180$

$-110 \quad -110$

$y = 70$



$75 + x - 10 = 180$

$x + 65 = 180$

$-65 \quad -65$

$x = 115$

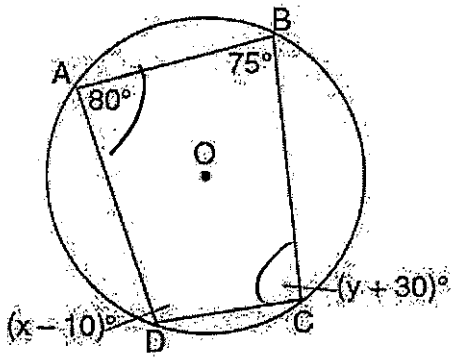
59. Quadrilateral $ABCD$ is inscribed in circle O, as shown below.
If $m\angle A = 80°$, $m\angle B = 75°$, $m\angle C = (y + 30)°$, and $m\angle D = (x - 10)°$, which statement is true?

1) $x = 85$ and $y = 50$
2) $x = 90$ and $y = 45$
3) $x = 110$ and $y = 75$
4) $x = 115$ and $y = 70$

opposite angles add to 180°

$80+y+30=180$
$y+110=180$
$-110 \quad -110$
$y=70$

$75+x+10=180$
$x+85=180$
$-85 \quad -85$
$x=95$



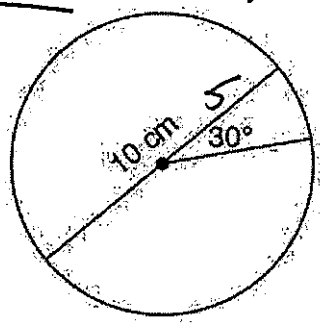
60. A circle with a diameter of 10 cm and a central angle of 30° is drawn below.
What is the area, to the *nearest tenth of a square centimeter*, of the sector formed by the 30° angle?

1) 5.2
2) 6.5
3) 13.1
4) 26.2

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

$A=\frac{30\pi(5)^2}{360}$

$A=6.5$



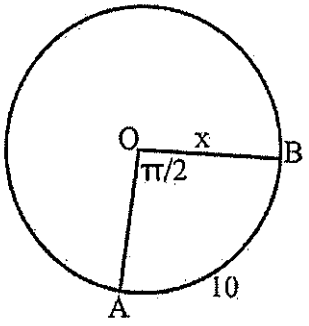
61. In circle O, the measure of central angle AOB is $\frac{\pi}{2}$ radians and the length of arc AB is 10 cm. What is the measure of radius OB to the *nearest tenth of a cm*?

$s=\theta r$

$2(10)=\left(\frac{\pi}{2}x\right)2$

$\frac{20}{\pi}=\frac{\pi x}{\pi}$

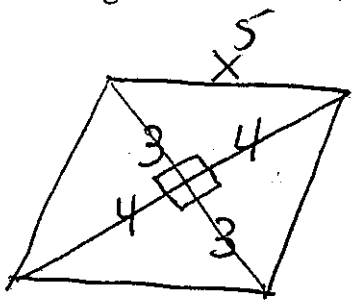
$6.4=x$



62. Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals? rhombus

1) the rhombus, only
2) the rectangle and the square
3) the rhombus and the square
4) the rectangle, the rhombus, and the square

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



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

$3^2+4^2=x^2$

$9+16=x^2$

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

$5=x$

$5(4)=20$

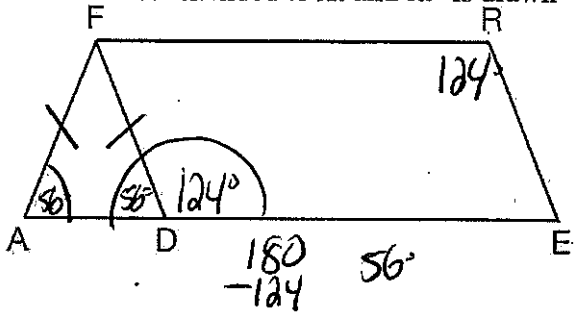
64. In the diagram of parallelogram *FRED* shown below. $\overline{ED}$ is extended to *A*. and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.

If $m\angle R = 124°$, what is $m\angle AFD$?

1) 124°
2) 112°
3) 68°
4) 56°

56 + 56 = 112

180 − 112 = 68°

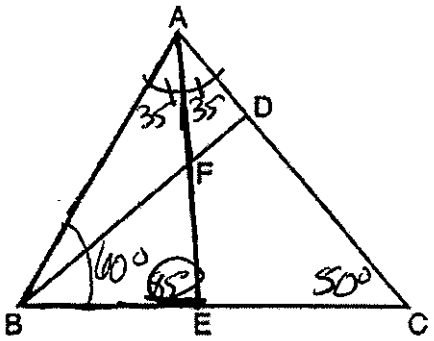


180 − 124 = 56°

65. In the diagram of $\triangle ABC$ below, $\overline{AE}$ bisects angle *BAC*, and altitude $\overline{BD}$ is drawn. If $m\angle C = 50°$ and $m\angle ABC = 60°$, what is $m\angle FEB$?

60 + 50 = 110

180 − 110 = 70

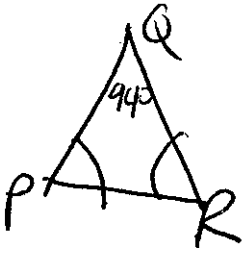


$\triangle AEB$

$60+35=95$

180 − 95 = 85

66. In $\triangle PQR$, $\angle Q$ is the vertex angle. If $\angle Q = 94°$, find the measure of $\angle P$.



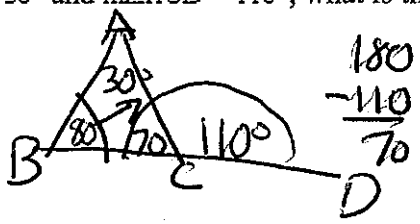
180 − 94 = 86

$\frac{86}{2} = 43°$

67. In $\triangle ABC$, side $\overline{BC}$ is extended through C to D. If $m\angle A = 30°$ and $m\angle ACD = 110°$, what is the longest side of $\triangle ABC$?

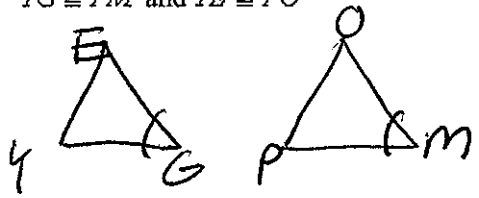
1) $\overline{AC}$
2) $\overline{BC}$
3) $\overline{AB}$
4) $\overline{CD}$

30 + 70 = 100 ; 180 − 100 = 80

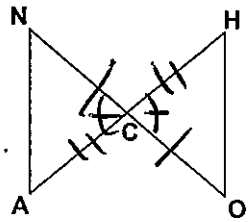


68. Triangles YEG and POM are two distinct non-right triangles such that $\angle G \cong \angle M$. Which statement is sufficient to prove $\triangle YEG$ is always congruent to $\triangle POM$?

1) $\angle E \cong \angle O$ and $\angle Y \cong \angle P$ AAA ✗
2) $\overline{YG} \cong \overline{PM}$ and $\overline{YE} \cong \overline{PO}$ ASS ✗
3) There is a sequence of rigid motions that maps $\angle E$ onto $\angle O$ and $\overline{YE}$ onto $\overline{PO}$. AAS ✓
4) There is a sequence of rigid motions that maps point ~~Y~~ onto point ~~P~~ and $\overline{YG}$ onto $\overline{PM}$. ✗

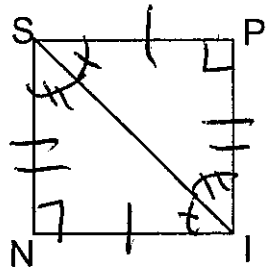


69. Given: $\overline{NO}$ and $\overline{HA}$ bisect each other
Prove: $\overline{NA} \cong \overline{HO}$



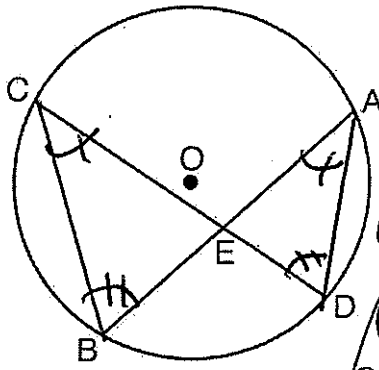
Statements	Reasons
1) $\overline{NO}$ and $\overline{HA}$ bisect each other	1) given
2) $\overline{NC} \cong \overline{CO}$, $\overline{AC} \cong \overline{CH}$	2) A line bisector creates two congruent segments
3) $\angle NCA \cong \angle HCO$	3) Vertical angles are congruent
4) $\triangle NCA \cong \triangle OCH$	4) SAS ≅ SAS
5) $\overline{NA} \cong \overline{HO}$	5) CPCTC

70. Given: SPIN is a square
Prove: $\triangle SNI \cong \triangle SPI$



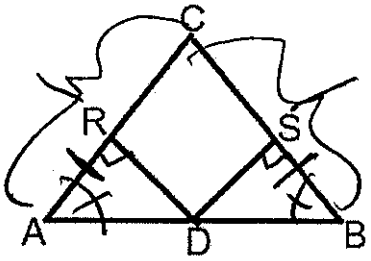
Statements	Reasons
1) SPIN is a square	1) given
2) $\overline{SP} \cong \overline{NI}$, $\overline{SN} \cong \overline{PI}$	2) A square has opposite sides congruent
3) $\angle SNI \cong \angle SPI$	3) A square has congruent right angles.
4) $\overline{SP} \parallel \overline{NI}$, $\overline{SN} \parallel \overline{PI}$	4) A square has opposite sides parallel
5) $\angle PSI \cong \angle NIS$, $\angle NSI \cong \angle PIS$	5) Parallel lines cut by a transversal creates congruent alternate interior $\angle$s.
6) $\overline{SI} \cong \overline{SI}$	6) Reflexive Property
7) $\triangle SNI \cong \triangle SPI$	7) _____

71. Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E
Theorem: If two chords intersect in a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord. Prove this theorem by proving $AE \cdot EB = CE \cdot ED$.



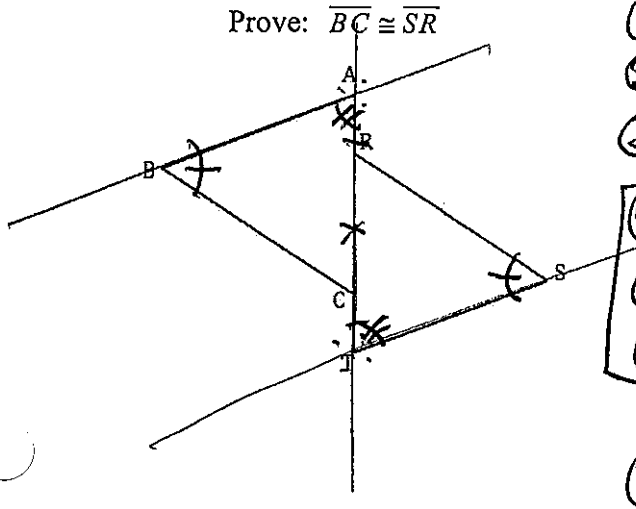
Statements	Reasons
① $\angle C \cong \angle A$, $\angle B \cong \angle D$	① Angles inscribed to the same arc are congruent
② $\triangle BCE \sim \triangle DAE$	② $AA \cong AA$
③ $\frac{AE}{ED} = \frac{CE}{EB}$	③ CJSTIP
④ $AE \cdot EB = CE \cdot ED$	④ cross products are equal

72. Given: In ΔABC, $\overline{CA} \cong \overline{CB}$, $\overline{AR} \cong \overline{BS}$, $\overline{DR} \perp \overline{AC}$, and $\overline{DS} \perp \overline{BC}$
Prove: $\overline{DR} \cong \overline{DS}$



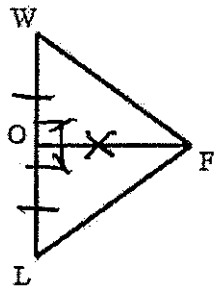
Statements	Reasons
① $\overline{CA} \cong \overline{CB}$	① given
② $\angle A \cong \angle B$	② Isosceles Triangle theorem
③ $\overline{AR} \cong \overline{BS}$	③ given
④ $\overline{DR} \perp \overline{AC}$, $\overline{DS} \perp \overline{BC}$	④ given
⑤ $\angle ARD \cong \angle BSD$	⑤ perpendicular lines form $\cong$ right angles
⑥ $\Delta ARD \cong \Delta BSD$	⑥ ASA = ASA
⑦ $\overline{DR} \cong \overline{DS}$	⑦ CPCTC

73. Given: $\angle B \cong \angle S$, $\overline{AB} \parallel \overline{ST}$, $\overline{AR} \cong \overline{TC}$
Prove: $\overline{BC} \cong \overline{SR}$



Statements	Reasons
① $\angle B \cong \angle S$	① given
② $\overline{AB} \parallel \overline{ST}$	② given
③ $\angle BAC \cong \angle RST$	③ Parallel lines cut by a transversal creates congruent alternate interior $\angle$s.
④ $\overline{AR} \cong \overline{TC}$	④ given
⑤ $\overline{RC} \cong \overline{RC}$	⑤ reflexive property
⑥ $\overline{AC} \cong \overline{RT}$ or $AR + RC = TC + CR$	⑥ Addition Property
⑦ $\Delta ABC \cong \Delta TSR$	⑦ AAS $\cong$ AAS
⑧ $\overline{BC} \cong \overline{SR}$	⑧ CPCTC

74. Given: $\overline{OF}$ is the perpendicular bisector of $\overline{WL}$
Prove: ΔWFL is isosceles



Statements	Reasons
① $\overline{OF}$ is the perpendicular bisector of $\overline{WL}$	① given
② $\angle WOF \cong \angle LOF$	② Perpendicular lines form congruent right angles
③ $\overline{WO} \cong \overline{OL}$	③ A line bisector creates congruent segments
④ $\overline{OF} \cong \overline{OF}$	④ Reflexive Property
⑤ $\Delta WOF \cong \Delta LOF$	⑤ SAS ≅ SAS
⑥ $\overline{WF} \cong \overline{FL}$	⑥ CPCTC
⑦ ΔWFL is isosceles	⑦ Isosceles Triangle theorem

75.
a) Name the two ways to prove a parallelogram is a rectangle.

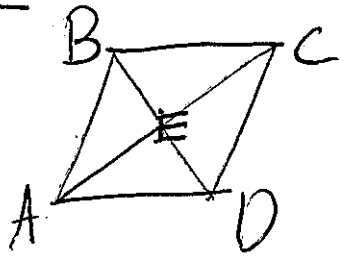
- a right angle
- Congruent diagonals

b) Name the three ways to prove a parallelogram is a rhombus.

- perpendicular diagonals
- diagonals bisect the angles
- Consecutive sides congruent

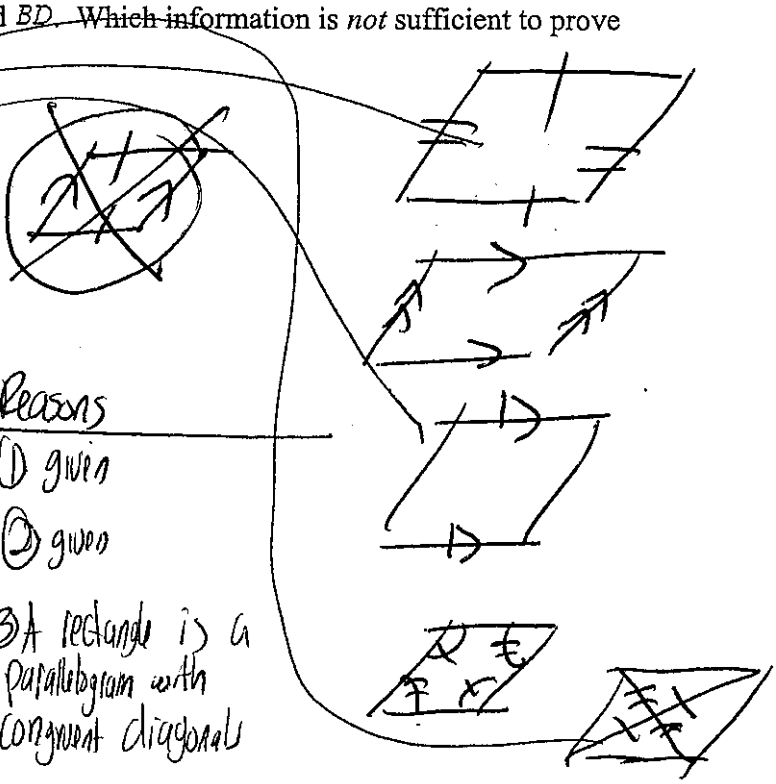
76. A parallelogram must be a rectangle when its
1) diagonals are perpendicular
2) diagonals are congruent
3) opposite sides are parallel
4) opposite sides are congruent

77. In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement does *not* prove parallelogram $ABCD$ is a rhombus?
1) $\overline{AC} \cong \overline{DB}$ Congruent diagonals
2) $\overline{AB} \cong \overline{BC}$ consecutive sides ≅
3) $\overline{AC} \perp \overline{DB}$ ⊥ diagonals
4) $\overline{AC}$ bisects $\angle DCB$ diagonals bisects angles

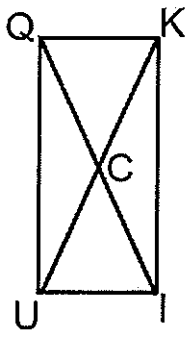


78. Quadrilateral $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. ~~Which information~~ is *not* sufficient to prove $ABCD$ is a parallelogram?

1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

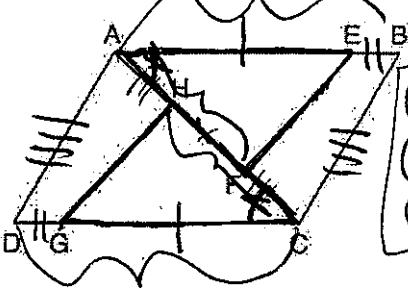


79. Given: QUIK is a parallelogram, $\overline{QI} \cong \overline{KU}$
Prove: QUIK is a rectangle



Statements	Reasons
(1) QUIK is a parallelogram	(1) given
(2) $\overline{QI} \cong \overline{KU}$	(2) given
(3) QUIK is a rectangle	(3) A rectangle is a parallelogram with congruent diagonals

80. In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$. Prove: $\overline{EF} \cong \overline{GH}$

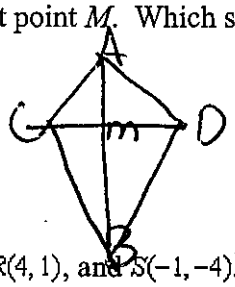


Prove Δgram and prove triangles ≅

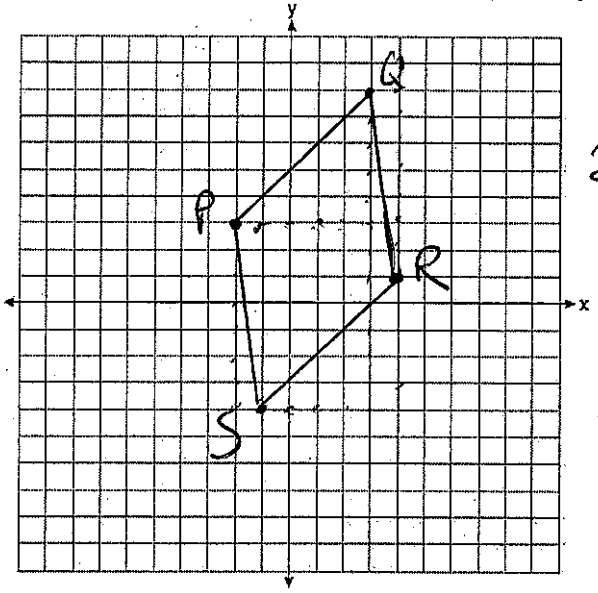
Statements	Reasons
(1) $\overline{AE} \cong \overline{CE}$	(1) given
(2) $\overline{BE} \cong \overline{DG}$	(2) given
(3) $\overline{AB} \cong \overline{DC}$ or $AE+EB = CG+DG$	(3) Addition Property
(4) $\overline{AH} \cong \overline{CF}$	(4) given
(5) $\overline{HF} \cong \overline{HF}$	(5) reflexive property
(6) $\overline{AF} \cong \overline{HC}$ or $AH+HF = CF+HF$	(6) Addition Property
(7) $\overline{AD} \cong \overline{CB}$	(7) given
(8) ABCD is a parallelogram	(8) A parallelogram has 2 pairs of opposite sides congruent.
(9) $\overline{AB} \parallel \overline{DC}$	(9) A parallelogram has opposite sides parallel
(10) $\angle BAC \cong \angle DCA$	(10) Parallel lines cut by a transversal create congruent alternate interior angles.
(11) $\triangle EAF \cong \triangle CGH$	(11) SAS ≅ SAS
(12) $\overline{EF} \cong \overline{GH}$	(12) CPCTC

81. Segment AB is the perpendicular bisector of $\overline{CD}$ at point M. Which statement is always true?

1) $\overline{CB} \cong \overline{DB}$ ✓
2) $\overline{CD} \cong \overline{AB}$ ✗
3) $\triangle ACD \sim \triangle BCD$ ✗
4) $\triangle ACM \sim \triangle BCM$ ✗



82. 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.]

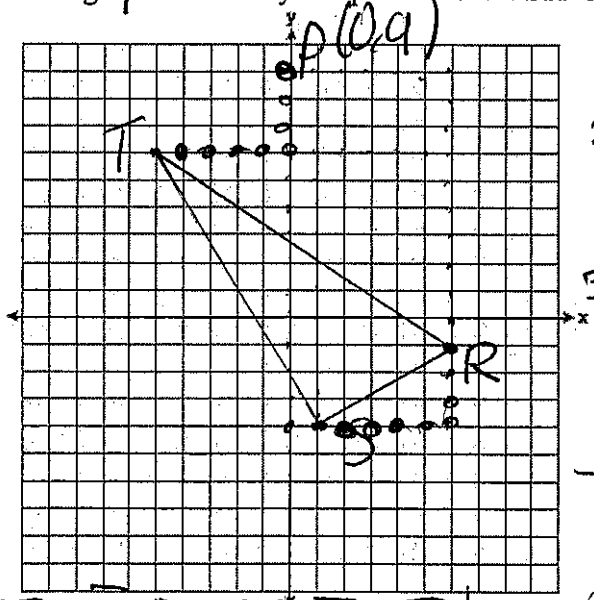


1) PQRS is a rhombus because all sides are congruent. It is not a square because the diagonals are not congruent.

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

83. In the coordinate plane, the vertices of $\triangle RST$ are $R(6, -1)$, $S(1, -4)$, and $T(-5, 6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point P such that quadrilateral $RSTP$ is a rectangle. Prove that your quadrilateral $RSTP$ is a rectangle.



1) $\triangle RST$ is a right triangle because the sides fit into Pythagorean Theorem.

2) $d\overline{RS} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$
$d\overline{ST} = \sqrt{6^2+10^2} = \sqrt{36+100} = \sqrt{136}$
$d\overline{TR} = \sqrt{11^2+7^2} = \sqrt{121+49} = \sqrt{170}$

3) $a^2+b^2=c^2$
$\sqrt{34}^2 + \sqrt{136}^2 = \sqrt{170}^2$
$34+136=170$
$170=170$ ✓

1) RSTP is a rectangle because it has 2 pairs of opposite sides congruent and diagonals congruent.

2) $d\overline{TP} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$
$d\overline{PR} = \sqrt{6^2+10^2} = \sqrt{36+100} = \sqrt{136}$
$d\overline{PS} = \sqrt{1^2+13^2} = \sqrt{1+169} = \sqrt{170}$

3) $\overline{RS} \cong \overline{TP}$, $\overline{ST} \cong \overline{PR}$, $\overline{TR} \cong \overline{PS}$ because they have the same distance.

84. Parallelogram QRST has coordinates Q(-3,2) and S(6,0). Which statement would prove that QRST is a rectangle?

1) The slope of $\overline{RT}$ is $\frac{9}{2}$

2) The length of $\overline{RT}$ is $\sqrt{85}$

3) The midpoint of $\overline{RT}$ is (1.5,1)

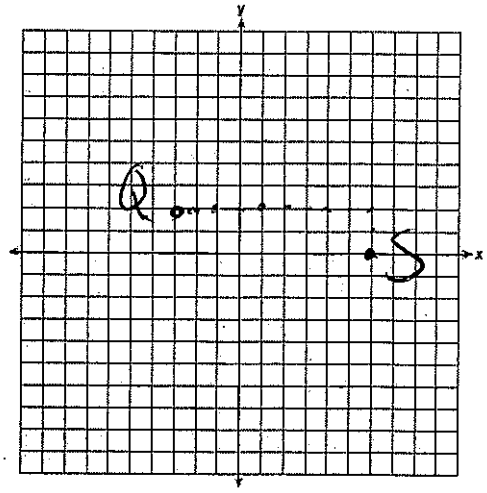
4) $\overline{QR} \cong \overline{ST}$

congruent diagonals

$d\overline{QS} = \sqrt{9^2+2^2}$

$d\overline{QS} = \sqrt{81+4}$

$d\overline{QS} = \sqrt{85}$



85. The ratio of the measures of the angles of a triangle is 2:3:5. Find the measure of the *smallest* angle of the triangle.

$2x+3x+5x=180$

$10x=180$

$\frac{10}{10} \quad \frac{180}{10}$

$x=18$

$2x$

$2(18)=36$