

ACP GEOMETRY – MIDTERM REVIEW 17/18

Chapter 1 Tools of Geometry



The distance between the two points is 20.

2. Identify what each of the following means:

a) AB
distance
from A to B

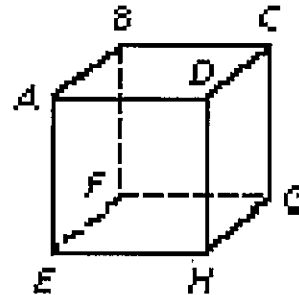
b) \overline{AB}
Segment
AB

c) \overleftrightarrow{AB}
Line
AB

d) \overrightarrow{AB}
Ray AB,
endpt @ A.

3. Use the figure to answer the questions:

* There may be more
than 1 right answer.



a) Name two collinear points.

A, E * Any 2 points are
collinear *

c) Name three planes that intersect at point F.

ABF, BCF, EFG

e) Name four points that are not coplanar.

E, F, D, B

g) Name a line that is skew to \overline{FE} .

\overleftrightarrow{DH}

b) Name two lines that intersect at point B.

\overleftrightarrow{AB} , \overleftrightarrow{BC}

d) Name two planes that do not intersect.

ABC & EFH

f) Plane EFGH and \overline{CH} intersect at H.

4. a) Name a line segment.

\overline{TU}

b) Name a pair of opposite rays.

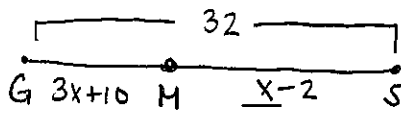
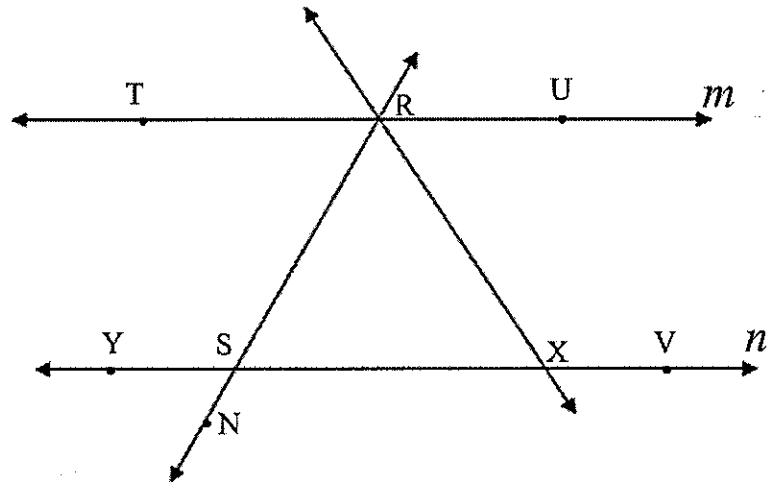
\overrightarrow{RT} & \overrightarrow{RU}

c) Name line m three different ways.

\overleftrightarrow{TR} , \overleftrightarrow{RU} & \overleftrightarrow{TU}

d) Name 2 lines which appear parallel.

m & n .



5. a) M is a point on \overline{GS} , between G and S.

$$GS = 32$$

$$GM = 3x + 10$$

$$MS = x - 2$$

Find: x , GM , MS

$$3x + 10 + x - 2 = 32 \quad x = 6$$

$$4x + 8 = 32 \quad GM = 28$$

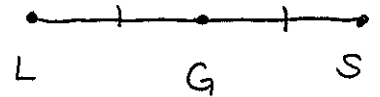
$$4x = 24 \quad MS = 4$$

b) G is the midpoint of \overline{LS} .

$$LG = 6x + 5$$

$$GS = 2x + 9$$

Find x , LS , GS , LG



$$6x + 5 = 2x + 9$$

$$LG = 11$$

$$4x = 4$$

$$GS = 11$$

$$x = 1$$

$$LS = 22$$

6. a. Name $\angle 1$ two other ways. $\angle FJT$ or $\angle TJF$

b. If $m\angle 1 = 142^\circ$, find $m\angle 2$. 38°

c. $\angle KJT$ and $\angle TJF$ are a linear pair.
(Supplementary)

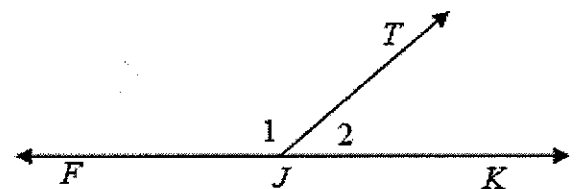
d. If $m\angle 2 = 5x + 2$ and $m\angle 1 = 24x + 2$, find x .

$$5x + 2 + 24x + 2 = 180$$

$$29x + 4 = 180$$

$$29x = 176$$

$$x = 6.07$$



7. Use the points below to answer the following questions

A(0, 3)

B(-1, -4)

C(-7, -9)

D(8, 10)

E(0, -2)

Find: a) $AE \sqrt{(0-0)^2 + (3-(-2))^2} \rightarrow \sqrt{25} = \boxed{5}$

b) $BC \sqrt{(-1+(-7))^2 + (-4+(-9))^2} \rightarrow \sqrt{(-8)^2 + (-13)^2} = \sqrt{64 + 169} = \boxed{\sqrt{233}}$

c) midpoint of $\overline{BE} \left(\frac{-1+0}{2}, \frac{-4+(-2)}{2} \right) = \boxed{\left(-\frac{1}{2}, -3 \right)}$

d) midpoint of $\overline{CD} \left(\frac{-7+8}{2}, \frac{-9+10}{2} \right) = \boxed{\left(\frac{1}{2}, \frac{1}{2} \right)}$

8. The midpoint of \overline{QT} is (-5, 1). The coordinates of point Q are (-7, 4). Find the coordinates of point T.

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

$$-10 = -7 + x$$

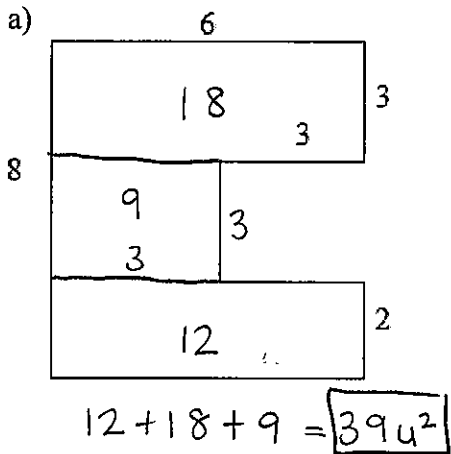
$$1 = \frac{4 + y}{2}$$

$$2 = 4 + y$$

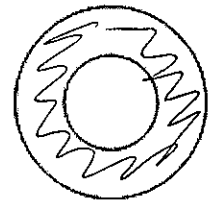
$$y = -2$$

$$\boxed{(-3, -2)}$$

9. Find the area of the region:



b) Radius of larger circle = 4
Radius of smaller circle = 2



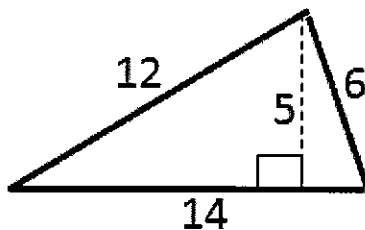
Find the area of the 'donut'

$$A_B = \pi r^2 \rightarrow \pi 4^2 = 16\pi$$

$$A_S = \pi(2^2) = 4\pi$$

$$A_D = 16\pi - 4\pi = \boxed{12\pi \text{ or } 37.68}$$

c)
Find the area of the triangle.



$$\frac{1}{2}(14)(5) = \boxed{35 u^2}$$

10. In the figure on the right, point R is the midpoint of \overline{MP} . Find each of the following (diagram is not drawn to scale).

A. $x = 9$

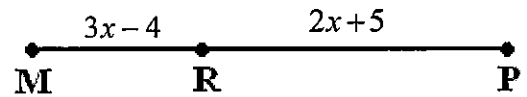
B. $MR = 23$

C. $PM = 46$

$$3x - 4 = 2x + 5$$

$$x = 9$$

$$3(9) - 4 =$$



11. In the figure on the right, $PQ = 27$. Find each of the following.

A. $x = 5$

B. $PL = 10$

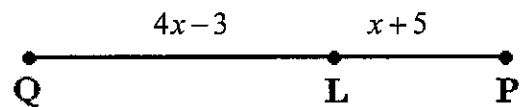
C. $LQ = 17$

$$4x - 3 + x + 5 = 27$$

$$5x + 2 = 27$$

$$5x = 25$$

$$x = 5$$



In the figure on the right, \overline{OB} bisects $\angle AOC$, and $\angle BOC$ and $\angle COD$ are complementary. Find each of the following. Remember to use three letters to identify angles. (Justify your answers)

12. $x = 6$

→ Compliment Theorem

13. $m\angle COD = 32^\circ$

→ Substitution

15. $m\angle AOB = 58^\circ$

→ Def of \angle Bisector ($\cong \angle BOC$)

16. $m\angle AOD = 148^\circ$

→ Angle Addition Postulate

17. Name two adjacent angles to $\angle AOB$.

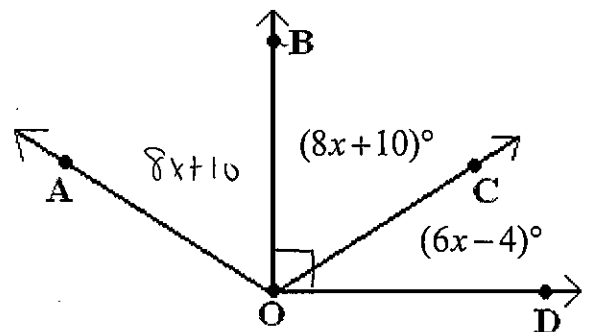
$\angle BOC$ & $\angle BOD$

18. Name an obtuse angle.

$\angle AOD$

19. Name two rays that are perpendicular to each other.

\overrightarrow{OB} & \overrightarrow{OD}



$$8x + 10 + 6x - 4 = 90$$

$$14x + 6 = 90$$

$$14x = 84$$

$$x = 6$$

In the figure on the right, find the measure of each of the following. (Justify your answers)

20. $x = 15$ (Supplement Theorem)

21. $m\angle BCE = 55^\circ$

→ substitution

22. $m\angle ACD = 25^\circ$

→ substitution

23. $m\angle DCF = 30^\circ$

→ substitution

24. $m\angle FCE = 125^\circ$

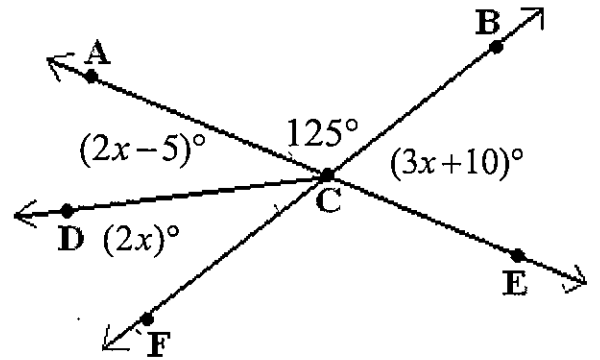
→ vertical ~~∠~~ are \cong

25. Name two angles that are linear pair to $\angle ACB$.

$\angle BCE$ & $\angle ACF$

26. Name the vertical angle to $\angle ACF$

$\angle BCE$



$$3x + 10 + 125 = 180$$

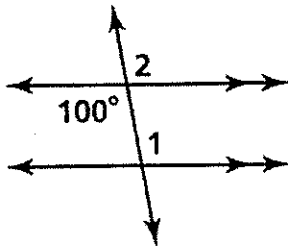
$$3x + 135 = 180$$

$$3x = 45$$

$$x = 15$$

Chapter 2: Logical Arguments and Line Relationships (Parallel Lines)

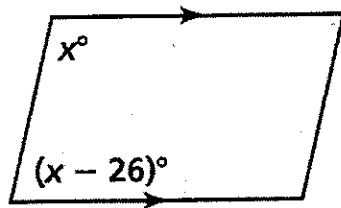
1) Find $m\angle 1$ and then $m\angle 2$. Justify each answer.



$$\angle 2 = 100^\circ \text{ (vertical } \sphericalangle \text{)}$$

$$\angle 1 = 100^\circ \text{ Alt int. Angles}$$

2) Find the value of x . Then find the measure of each angle. Justify each answer.



$$x + x - 26 = 180$$

$$2x - 26 = 180$$

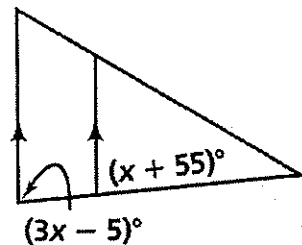
$$2x = 206$$

$$x = 103$$

$$103^\circ, 77^\circ$$

• Consecutive int
 \sphericalangle

3) Find the value of x . Then find the measure of each angle. Justify each answer.



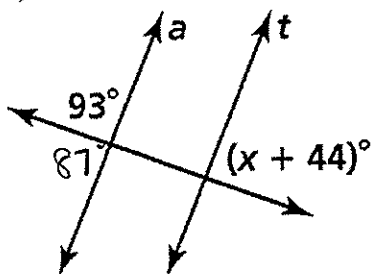
$$3x - 5 = x + 55$$

$$2x = 60$$

$$x = 30$$

$$\sphericalangle = 85^\circ \text{ corresponding } \sphericalangle$$

4) Find the value of x for which $a \parallel t$. Justify each answer.

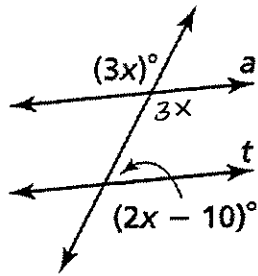


$$87^\circ \rightarrow \text{linear pair}$$

$$x + 44 = 87 \rightarrow \text{Alt ext } \sphericalangle \text{ converse}$$

$$x = 43$$

5) Find the value of x if $a \parallel t$. Justify each answer.



$$3x + 2x - 10 = 180$$

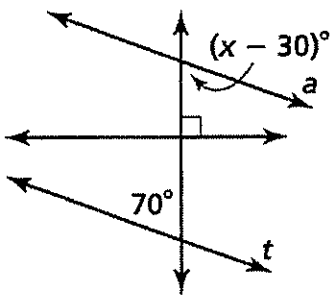
$$5x - 10 = 180$$

$$5x = 190$$

$$x = 38$$

Vertical \angle , then consecutive int
 \angle converse

6) Find the value of x for which $a \parallel t$. Justify each answer.

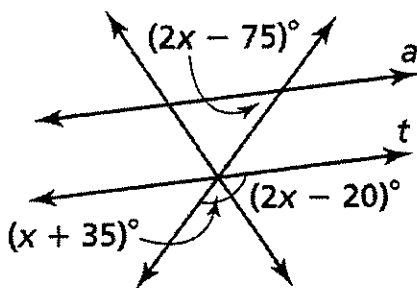


$$x - 30 = 70$$

$$x = 100$$

Alt int \angle converse

7) Find the value of x if $a \parallel t$. Justify each answer.



$$2x - 20 + x + 35 + 2x - 75 = 180$$

$$5x - 60 = 180$$

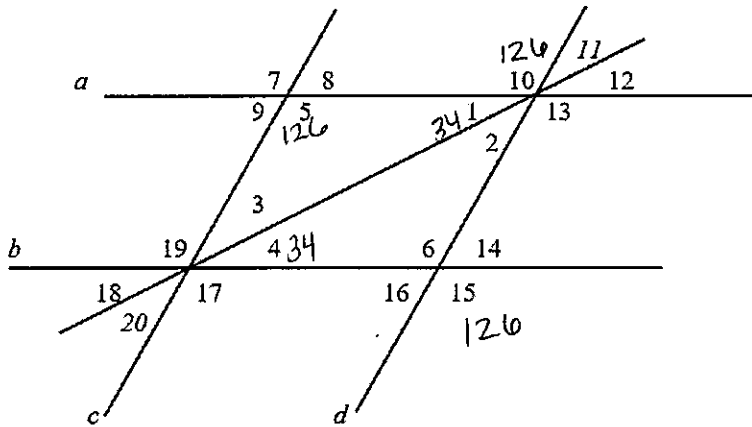
$$5x = 240$$

$$x = 48$$

- Alt Ext \angle

- linear pair

8) Use the diagram below. Given $m\angle 4 = 34$, $m\angle 5 = 126$. $a \parallel b$ and $c \parallel d$.

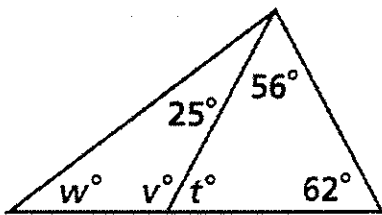


a) $m\angle 1 = 34^\circ$ Alt Int \sphericalangle

b) $m\angle 16 = 54^\circ$

c) $m\angle 11 = 20^\circ$

9) Find the value of each variable. Justify each answer.



$t = 62^\circ$ (triangle \sphericalangle sum)

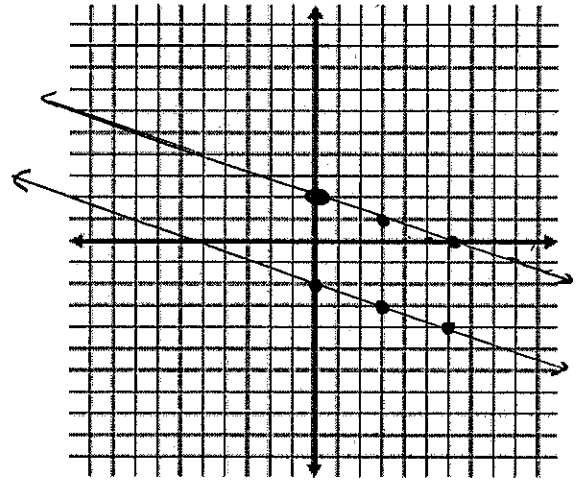
$v = 118^\circ$ Linear Pair

$w = 37^\circ$ triangle \sphericalangle sum

10) a) Graph $3x + 9y = 18$ on the coordinate plane.

$$9y = -3x + 18$$

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



b) Write the equation of a line parallel to the line from part a.

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

c) Graph the parallel line.

See graph

11) Are the lines parallel, perpendicular or neither? Explain.

$$y = 3x - 2$$

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

neither (opp, not recip)

$$2x - 3y = 17 \quad \frac{2}{3} = m$$

b) $-6x + 9y = -2 \quad m = \frac{2}{3}$

parallel (same slope)

$$x = -4$$

c) $y = 10$ Perpendicular

horizontal + vertical lines are \perp

12) Write the equation of the line perpendicular to $y = 2x + 5$ that contains the point $(-4, 5)$. Write always the equation in slope-intercept form.

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

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

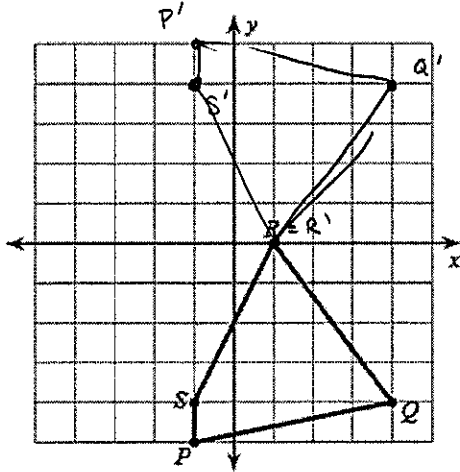
$$y - 5 = -\frac{1}{2}x - 2$$

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

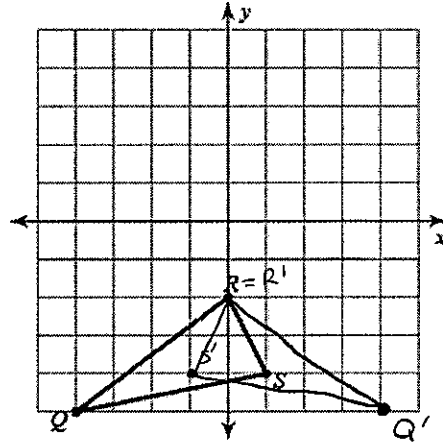
Chapter 3: Transformation and Symmetry

Graph the image of the figure using the transformation indicated.

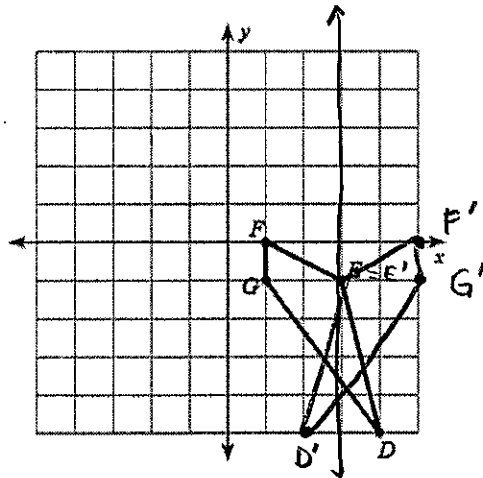
1. reflection across the x-axis



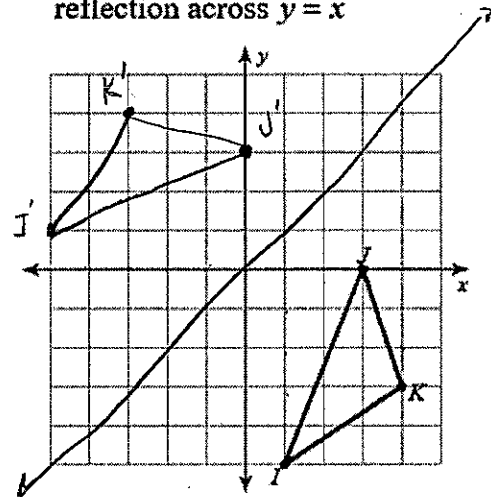
2. reflection across the y-axis



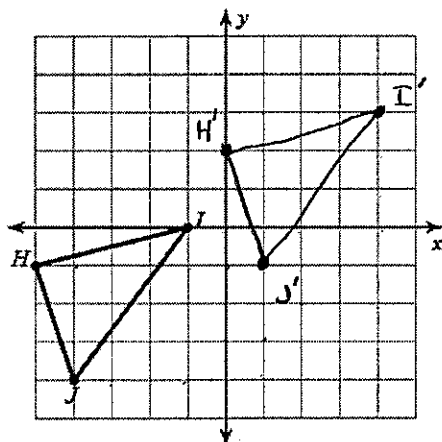
3. reflection across $x = 3$



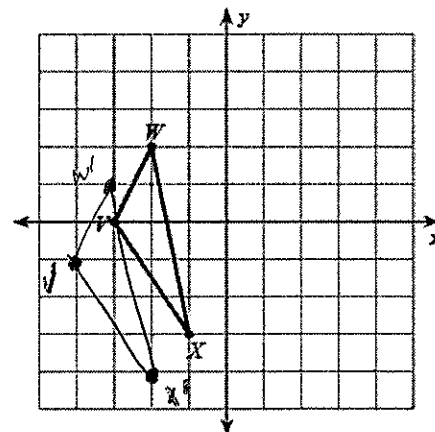
4. reflection across $y = x$



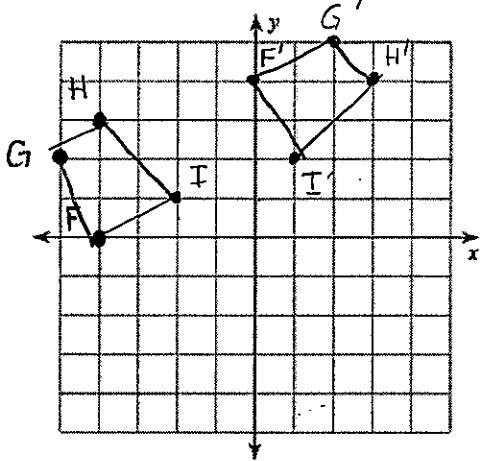
5. translation: $(5, 3)$



6. translation: $(-1, -1)$

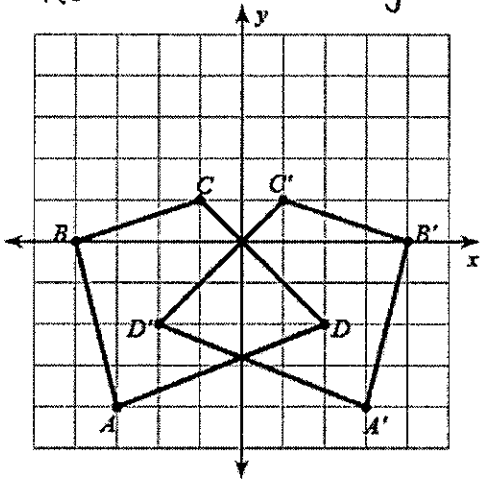


7. rotation 90° clockwise about the origin
 $F(-4, 0)$, $G(-5, 2)$, $H(-4, 3)$, $I(-2, 1)$

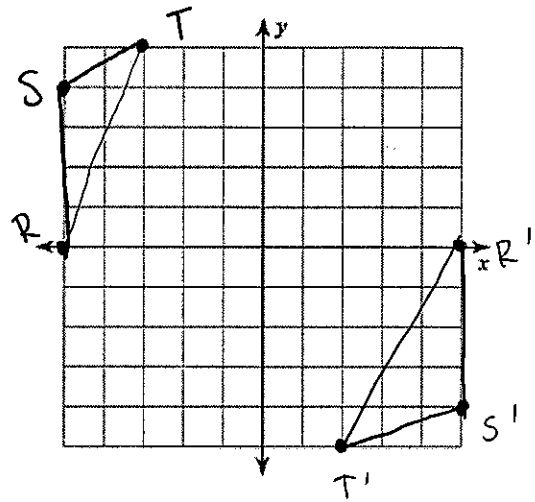


Write a rule to describe the transformation.

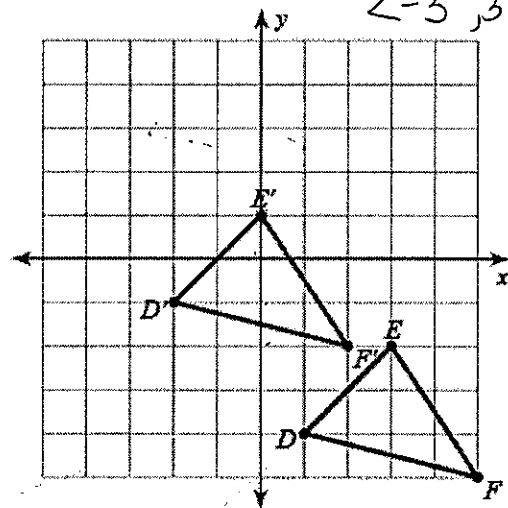
9. Reflection over y-axis



8. rotation 180° about the origin
 $R(-5, 0)$, $S(-5, 4)$, $T(-3, 5)$

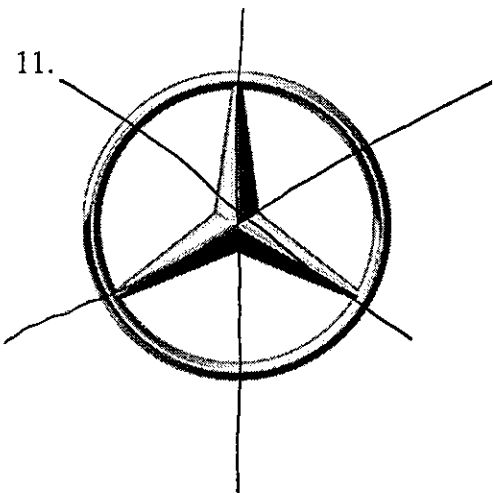


10. $\langle -3, 3 \rangle$



Determine if the following pictures have line symmetry, rotational symmetry or both. Draw in any lines of symmetry and state the order and magnitude of the rotational symmetry.

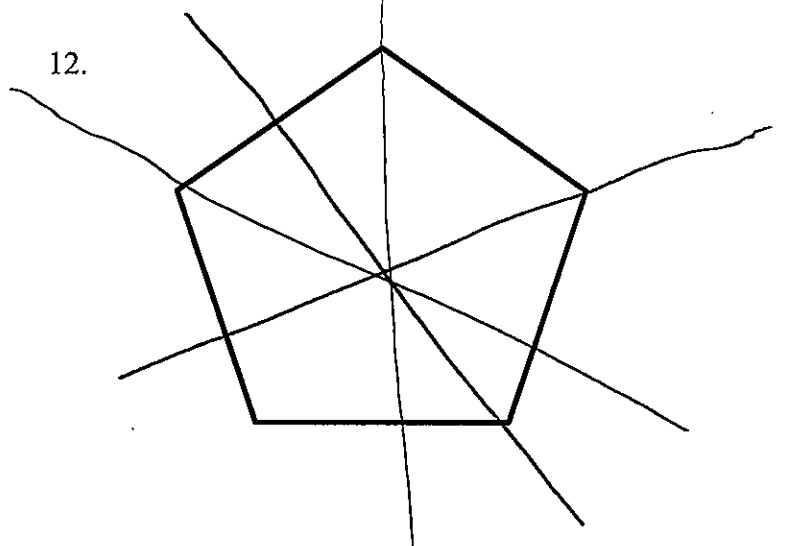
11.



Order $\rightarrow 3$

magnitude = 120°

12.



order $\rightarrow 5$

magnitude = 72°

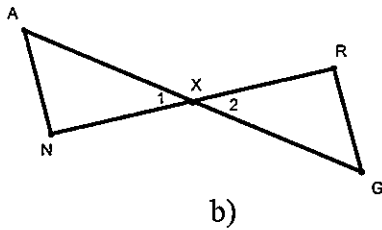
Chapter 4 Triangles and Congruence

1) If $\triangle HIL \cong \triangle SUV$ name the corresponding angles and sides. (Sections 4-1)

$$\begin{array}{l} \overline{HI} \cong \overline{SU} \\ \overline{IL} \cong \overline{UV} \end{array} \quad \overline{HL} \cong \overline{SV} \quad \left| \quad \begin{array}{l} \angle H \cong \angle S \\ \angle I \cong \angle U \end{array} \quad \angle L \cong \angle V$$

2) Supply the reasons in the two-column proof. (Sections 4-2)

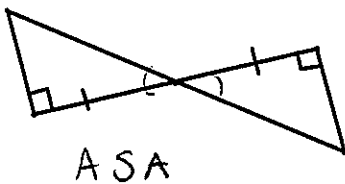
Given: X is the midpoint of \overline{AG} and of \overline{NR} .
 Prove: $\triangle ANX \cong \triangle GRX$



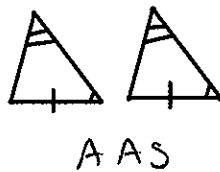
Statements	Reasons
a) X is the midpoint of \overline{AG}	Given
$\overline{AX} \cong \overline{GX}$	def of midpt
c) $\angle 1 \cong \angle 2$	vertical
d) X is the midpoint of \overline{NR}	Given
e) $\overline{NX} \cong \overline{RX}$	def of midpt
f) $\triangle ANX \cong \triangle GRX$	SAS

In #3 - 8 state which postulate/theorem, if any, could be used to prove the two triangles congruent? If not enough information is given, write not possible. (sections 4-2, 4-3, 4-6)

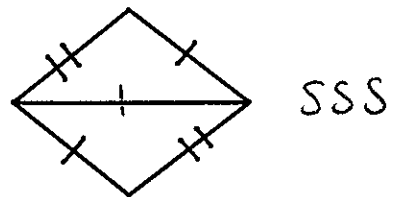
3)



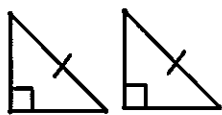
4)



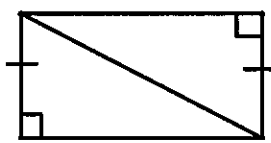
5)



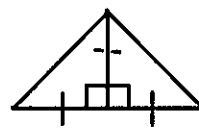
6)



7)

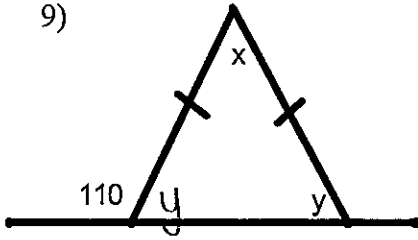


8)



In #9 – 10, find the values of the variables (section 4-5).

9)



$$110 + y = 180$$

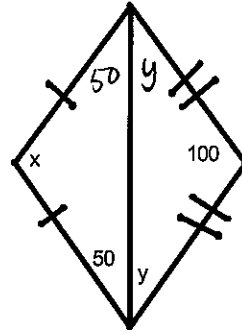
$$y = 70$$

$$70 + 70 + x = 180$$

$$140 + x = 180$$

$$x = 40^\circ$$

10)



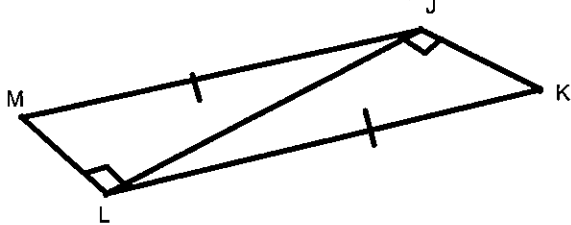
$$x = 80$$

$$y = 40$$

11- 12) Prove using a two- column proof. (Section 4-6 and 4-7)

11)

Given: $\overline{JL} \perp \overline{LM}$, $\overline{LJ} \perp \overline{JK}$, and $\overline{MJ} \cong \overline{KL}$
 Prove: $\triangle MJL \cong \triangle KLJ$



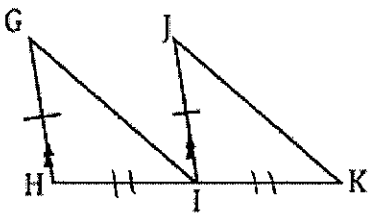
Statements	Reasons
$\overline{JL} \perp \overline{LM}$, $\overline{LJ} \perp \overline{JK}$ $\overline{MJ} \cong \overline{KL}$	Given
$\overline{JL} \cong \overline{JL}$	Reflexive
$\angle KJL$ & $\angle MLJ$ are Right	def of \perp
$\triangle MJL$ & $\triangle KLJ$ are Right	def of Right \triangle
$\triangle MJL \cong \triangle KLJ$	HL

12)

Given: $\overline{GH} \cong \overline{JI}$, $\overline{GH} \parallel \overline{JI}$

I is the midpoint of \overline{HK}

Prove: $\angle G \cong \angle J$



Statements	Reasons
$\overline{GH} \cong \overline{JI}$, $\overline{GH} \parallel \overline{JI}$	Given
I is the midpt of HK	
$\angle H \cong \angle JIK$	corresponding \angle
$\overline{HI} \cong \overline{IK}$	def of midpt
$\triangle GHI \cong \triangle JIK$	SAS
$\angle G \cong \angle J$	CPCTC

13)

a) Find $m\angle 2 = 104^\circ$

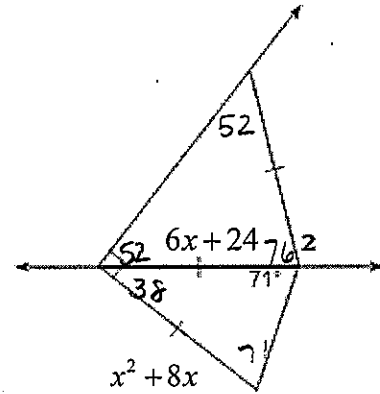
b) Find the value of x .

$$6x + 24 = x^2 + 8x$$

$$x^2 + 2x - 24 = 0$$

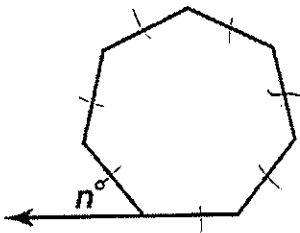
$$(x + 6)(x - 4)$$

$$x = -6, 4 \quad x = 4$$



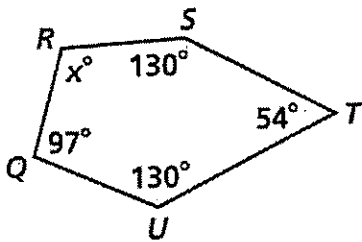
Chapter 6 Polygons and Quadrilaterals

1) Find the values of the variable for the regular polygon below.



$$360 / 7 = 51.43^\circ$$

2) Find the missing angle measure.



$$130 + 130 + 54 + 97 + x = 540$$

$$411 + x = 540$$

$$(5-2)180 = 540$$

$$x = 129^\circ$$

3) What is the interior angle sum of a convex 22-gon?

$$(22-2)180 = 3,600$$

4) What is the measure of an exterior angle of a regular 13-gon?

$$360 / 13 = 27.692^\circ$$

5) The measure of an interior angle of a regular polygon is 135° . Find the number of sides.

$$135n = (n-2)180$$

$$135n = 180n - 360$$

$$n = 8$$

6) A parallelogram is a quadrilateral with 2 pairs of parallel sides.

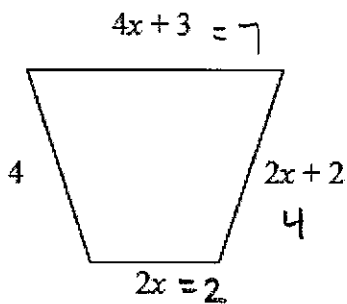
7) A trapezoid is a quadrilateral with exactly 1 pair of parallel sides.

9) A rectangle is a parallelogram with 4 congruent angles.

10) A rhombus is a parallelogram with 4 congruent sides.

11) A quadrilateral that is both a rhombus and a rectangle is called a square.

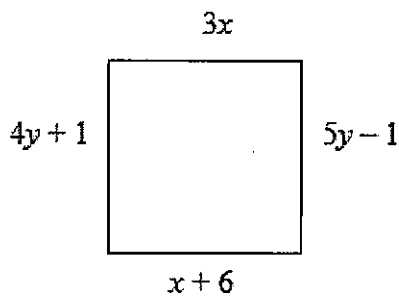
12) Find the perimeter of this isosceles trapezoid.



$$\begin{aligned} 2x+2 &= 4 \\ 2x &= 2 \\ x &= 1 \end{aligned}$$

$$7 + 4 + 4 + 2 = \boxed{17}$$

13) Find x and y for the square.



$$\begin{aligned} 3x &= x+6 \\ 2x &= 6 \\ \boxed{x &= 3} \end{aligned}$$

$$\begin{aligned} 4y+1 &= 9 \\ 4y &= 8 \\ \boxed{y &= 2} \end{aligned}$$

14) Find the perimeter of parallelogram WXYZ.

$$b = a+2$$

$$2b+2 = 4a$$

$$2(a+2) + 2 = 4a$$

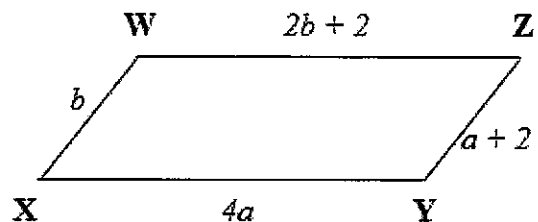
$$2a+4+2 = 4a$$

$$2a+6 = 4a$$

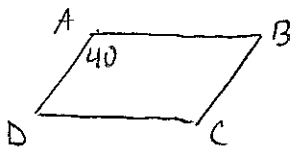
$$6 = 2a$$

$$\boxed{a = 3}$$

$$\boxed{b = 5}$$



15) Given parallelogram ABCD and $m\angle A = 40^\circ$, find $m\angle B$, $m\angle C$, and $m\angle D$.

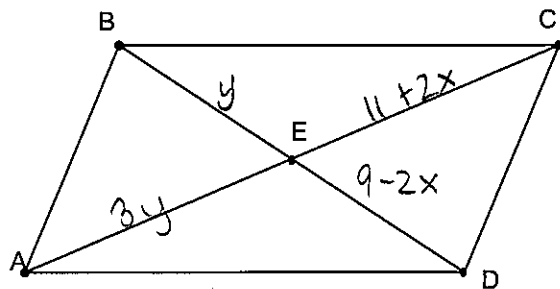


$$\angle C = 40^\circ$$

$$\angle B, \angle D = 140^\circ$$

16) Determine the values of x and y for which quadrilateral ABCD would be a parallelogram.

$BE = y$ $ED = 9 - 2x$ $AE = 3y$ $EC = 11 + 2x$



$$y = 9 - 2x$$

$$3y = 11 + 2x$$

$$3(9 - 2x) = 11 + 2x$$

$$27 - 6x = 11 + 2x$$

$$16 = 8x$$

$x = 2$
 $y = 5$

17) Determine the values of x and y for which quadrilateral ABCD would be a parallelogram.

$m\angle A = x^\circ$ $m\angle B = (x + 30)^\circ$ $AB = 4y - 1$ $CD = 3y + 3$

$$x + x + 30 = 180$$

$$2x + 30 = 180$$

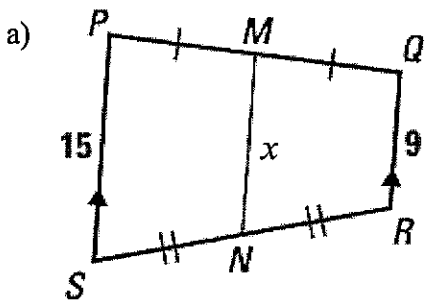
$$2x = 150$$

$x = 75$

$$4y - 1 = 3y + 3$$

$y = 4$

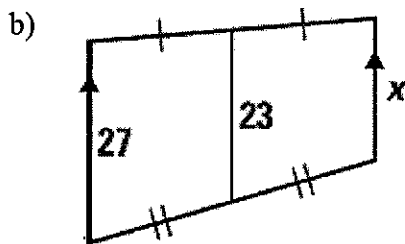
18) Find x in each trapezoid.



$$\frac{15 + 9}{2} = x$$

$$\frac{24}{2} = x$$

$x = 12$

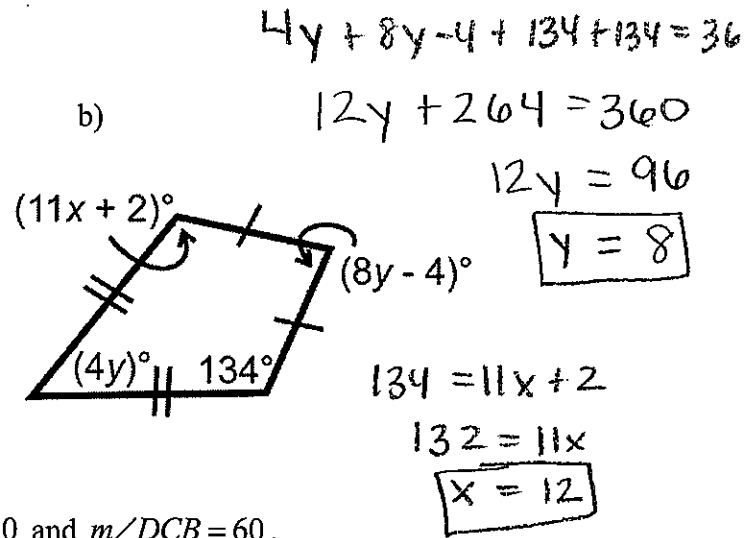
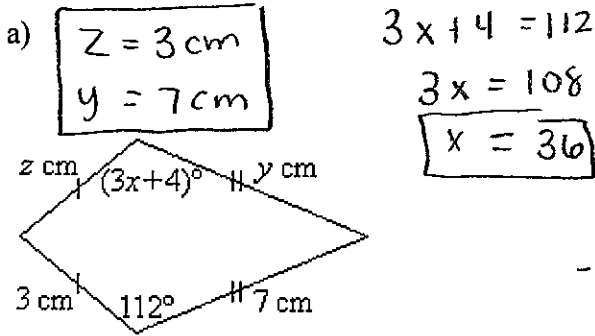


$$\frac{27 + x}{2} = 23$$

$$27 + x = 46$$

$x = 19$

19) Find the values of variables.



20) ABCD is a kite and $m\angle DAB = 80$, $m\angle ADC = 110$ and $m\angle DCB = 60$.

a) Find $m\angle ABC$.

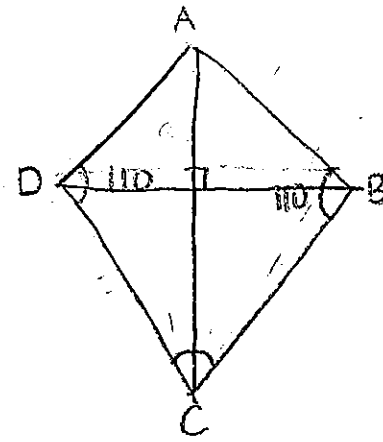
110°

b) Find $m\angle CAB$

40°

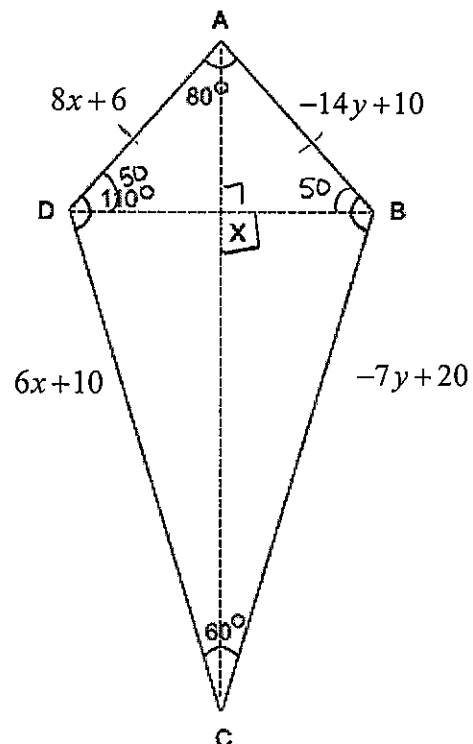
c) Find $m\angle AXB$

90°



d) Set up a system of equations, solve for the variables, and find AD and DC.

$$\begin{aligned}
 & [6x + 10 = -7y + 20] - 2 \\
 & 8x + 6 = -14y + 10 \\
 & -12x - 20 = 14y - 40 \\
 \hline
 & -41x \quad -14 = -30 \\
 & -4x = -16 \\
 & \boxed{x = 4} \\
 & -7y + 20 = 24 + 10 \\
 & -7y = 14 \\
 & \boxed{y = -2}
 \end{aligned}$$



21) TRAP is an isosceles trapezoid. If $TA = x^2 + 7x$ and $PR = 30$, find the value of x , and lengths of each diagonal.

$$x^2 + 7x = 30$$

$$x^2 + 7x - 30 = 0$$

$$(x + 10)(x - 3)$$

$$x = -10, 3$$

