

Final Exam Review

Name Key Hr.

Final Exam Information:

- The Final Exam consists of a Multiple-Choice Section and an Open-Response Section.
- You *may not* use notes of any kind on the Final Exam.
- This Exam Review is designed to *help* prepare you for the exam.
- In addition to successfully completing the exam review, you will need to study your notes.
- Being well-prepared for the exam is of utmost importance!
- All six parts of the Exam Review are required.

You will NOT be provided with these formulas on your exam.
Be sure to know the formulas below for your exam.

$$\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1}$$

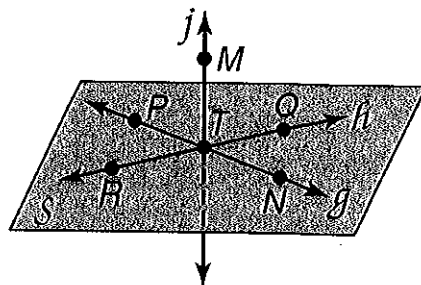
$$\text{Midpoint } \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{Distance } d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Unit 1

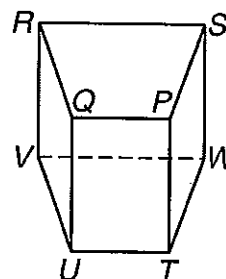
For Questions 1-4, use the figure at the right.

1. What is another name for \overrightarrow{RQ} ? \overleftrightarrow{TQ} \overleftrightarrow{RT}
2. What is another name for line g ? \overleftrightarrow{PT} \overleftrightarrow{PN} \overleftrightarrow{NT}
3. Name three noncollinear points. T, M, P
4. Name three collinear points. R, T, Q or P, T, N



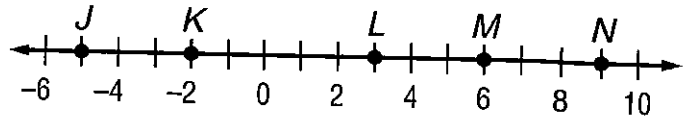
For Questions #5-7, use the figure at the right.

5. Name three coplanar points. R, Q, P
6. Name the intersection of planes RSP and PTW . \overline{PS}
7. Name the segment that is parallel to SW . \overline{PT} \overline{QU} \overline{RV}



8. Use the number line to find the measure.

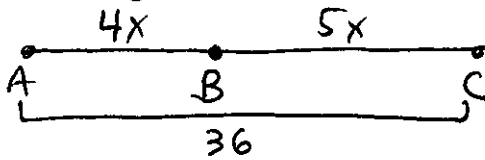
a) $JL = 8$



b) $KN = 11$

9. Suppose A , B , and C are collinear, B is between A and C , $AB = 4x$, $BC = 5x$, and $AC = 36$.

a) Draw and label the figure.



b) Find x .

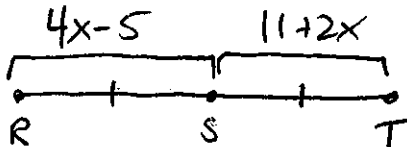
$$4x + 5x = 36 \quad 9x = 36 \quad \boxed{x = 4}$$

c) Find BC .

$$BC = 5(4) = 20 \quad \boxed{BC = 20}$$

10. Suppose S is the midpoint of \overline{RT} , $RS = 4x - 5$, and $ST = 11 + 2x$.

a) Draw and label the figure.



b) Find x .

$$\begin{array}{r} 4x - 5 = 11 + 2x \\ -2x \quad -2x \\ \hline 2x - 5 = 11 \end{array} \quad 2x = 16$$

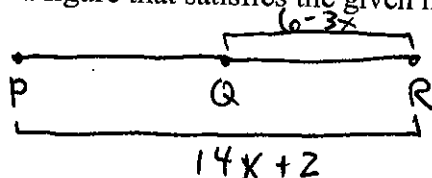
c) Find ST .

$$\begin{array}{r} 2x - 5 = 11 \\ +5 \quad +5 \\ \hline 2x = 16 \end{array} \quad \boxed{x = 8}$$

$$ST = 11 + 2(8) = 27 \quad \boxed{ST = 27}$$

11. Suppose Q is the midpoint of \overline{PR} , $QR = 6 - 3x$, and $PR = 14x + 2$.

a) Draw and label a figure that satisfies the given information.



b) Find x .

$$6 - 3x + 6 - 3x = 14x + 2 \rightarrow 12 - 6x = 14x + 2$$

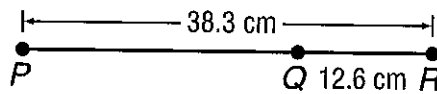
c) Find PR .

$$\begin{array}{r} 12 - 6x = 14x + 2 \\ +6x \quad +6x \\ \hline 12 = 20x + 2 \\ -2 \quad -2 \\ \hline 10 = 20x \\ \frac{10}{20} = \frac{20x}{20} \\ \boxed{x = .5} \end{array}$$

$$\begin{array}{r} 14(.5) + 2 = 9 \\ \boxed{PR = 9} \end{array}$$

12. Find the length of \overline{PQ} .

$$\begin{array}{r} x + 12.6 = 38.3 \\ -12.6 \quad -12.6 \\ \hline x = 25.7 \end{array}$$



$$PQ = 25.7 \text{ cm}$$

13. Find the distance between $Z(-1, 3)$ and $M(8, -7)$.

$$\sqrt{(8 - (-1))^2 + (-7 - 3)^2} = \sqrt{81 + 100} = \sqrt{181} = 13.5$$

$ZM = 13.5$

14. Find the coordinates of the midpoint of a segment having endpoints $A(0, 0)$ and $D(-2, -8)$.

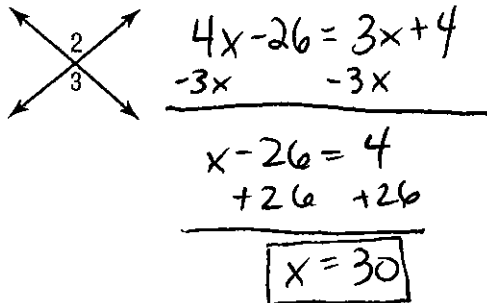
$$\left(\frac{0 + (-2)}{2}, \frac{0 + (-8)}{2} \right) \rightarrow \left(\frac{-2}{2}, \frac{-8}{2} \right) \rightarrow (-1, -4)$$

15. Find the coordinates of the midpoint of a segment having endpoints $R(-10, 5)$ and $S(8, 4)$.

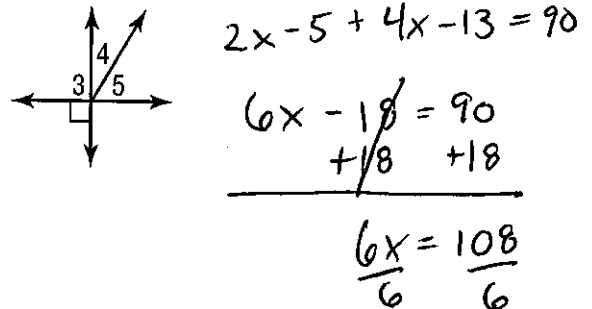
$$\left(\frac{-10 + 8}{2}, \frac{5 + 4}{2} \right) \rightarrow \left(\frac{-2}{2}, \frac{9}{2} \right) \rightarrow (-1, 4.5)$$

For Questions 16-18, find x and the measures of each numbered angle.

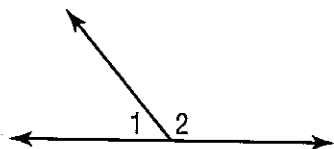
16. $m\angle 2 = 4x - 26 = 4(30) - 26 = 94$
 $m\angle 3 = 3x + 4 = 3(30) + 4 = 94$



17. $m\angle 4 = 2x - 5$
 $m\angle 5 = 4x - 13$



18. $m\angle 1 = x + 10$
 $m\angle 2 = 3x + 18$



$$x + 10 + 3x + 18 = 180$$

$$\begin{array}{r} 4x + 28 = 180 \\ -28 \quad -28 \\ \hline 4x = 152 \end{array}$$

$$4x = 152$$

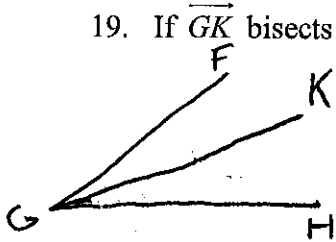
$x = 38$

$m\angle 3 = 90$ $x = 18$
 $m\angle 4 = 2(18) - 5 = 31$
 $m\angle 5 = 4(18) - 13 = 59$

$m\angle 1 = 38 + 10 = 48$
 $m\angle 2 = 3(38) + 18 = 132$

For Questions 19-21, draw and label a figure. Then, write an equation to answer the question.

19. If \overline{GK} bisects $\angle FGH$, $m\angle FGK = (3v - 4)^\circ$, and $m\angle KGH = (2v + 7)^\circ$, find $m\angle FGK$.



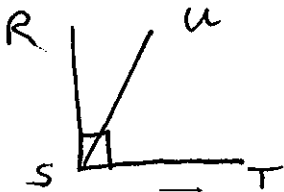
$$\begin{array}{r} 3v - 4 = 2v + 7 \\ -2v \quad -2v \\ \hline v - 4 = 7 \end{array}$$

$$\begin{array}{r} v - 4 = 7 \\ +4 \quad +4 \\ \hline v = 11 \end{array}$$

$$L 3(11) - 4$$

$$\boxed{m\angle FGK = 29^\circ}$$

20. Suppose $\angle RST$ is a right angle and point U is in the interior of $\angle RST$. If $m\angle RSU = 3(w - 4)^\circ$ and $m\angle UST = (6w + 3)^\circ$, find w .



$$3(w - 4) + 6w + 3 = 90$$

$$3w - 12 + 6w + 3 = 90$$

$$9w - 9 = 90$$

~~99 =~~

$$\frac{9w}{9} = \frac{99}{9}$$

$$\boxed{w = 11}$$

21. If \overline{BD} is in the interior of $\angle ABC$, $m\angle ABC = 55^\circ$, $m\angle ABD = (7x - 2)^\circ$, and $m\angle DBC = (3x + 7)^\circ$, find $m\angle ABD$.



$$7x - 2 + 3x + 7 = 55$$

$$\begin{array}{r} 10x + 5 = 55 \\ -5 \quad -5 \\ \hline \end{array}$$

$$\frac{10x}{10} = \frac{50}{10}$$

$$x = 5$$

Unit 2

Review the properties, definitions theorems, and postulates listed below.

reflexive property	subtraction property	distributive property
symmetric property	multiplication property	midpoint theorem
transitive property	division property	definition of a midpoint
addition property	substitution property	definition of an angle bisector
segment addition postulate	angle addition postulate	complement theorem
supplement theorem	vertical angles theorem	

For #22-27, state the property, definition, theorem, or postulate that justifies each statement.

22. $QA = QA$. Reflexive

23. If $AB = RS$ and $RS = WY$, then $AB = WY$. Transitive (or substitution)

24. If $AB = RS$, then $AB(+5) = RS(+5)$. Addition

25. If $80^\circ = m\angle A$, then $m\angle A = 80^\circ$. Symmetric

26. If E is the midpoint of \overline{XY} , then $\overline{XE} \cong \overline{EY}$. Midpoint Theorem

27. If \overline{BC} bisects $m\angle ABD$, the $\angle ABC \cong \angle CBD$. Def of \angle Bisector

Complete each proofs.

28. **Given:** $3x + 8 = 17$

Prove: $x = 3$

Statements	Reasons
1. $3x + 8 = 17$	1. Given
2. $3x + 8 = 17$ $-8 \quad -8$	2. Subtraction
3. $3x = 9$	3. Substitution
4. $\frac{3x}{3} = \frac{9}{3}$	4. Division
5. $x = 3$	5. Substitution

29. **Given:** $5x - 2 = 3x + 6$

Prove: $x = 4$

Statements	Reasons
1. $5x - 2 = 3x + 6$	1. Given
2. $5x - 2 = 3x + 6$ $-3x \quad -3x$	2. Subtraction
3. $2x - 2 = 6$	3. Substitution Property
4. $2x - 2 = 6$ $+2 \quad +2$	4. Addition Property
5. $2x = 8$	5. Substitution Property
6. $\frac{2x}{2} = \frac{8}{2}$	6. Division
7. $x = 4$	7. Substitution Property

Unit 3

30. Use the figure at the right.

a) Identify a pair of vertical angles.

$$\angle 1 + \angle 3$$

b) Identify a pair of corresponding angles.

$$\angle 2 + \angle 6$$

c) Identify a pair of alternate interior angles.

$$\angle 3 + \angle 5$$

d) Identify a pair of alternate exterior angles.

$$\angle 2 + \angle 12$$

e) Identify a pair of consecutive interior angles.

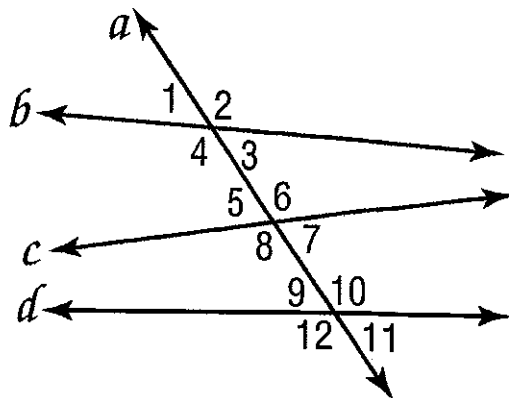
$$\angle 7 \text{ and } \angle 10$$

f) Identify a pair of supplementary angles.

$$\angle 5 \text{ and } \angle 6 \text{ or } \angle 4 \text{ and } \angle 1$$

g) Identify a linear pair.

$$\angle 9 \text{ and } \angle 10$$



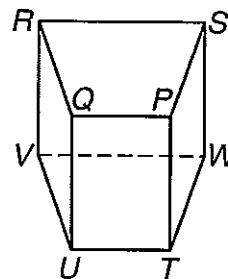
For Questions 31 and 32, use the figure at the right.

31. Identify the plane parallel to plane VWT .

RSP

32. Name a segment that intersects with \overline{QP} .

\overline{QU} \overline{QR} \overline{PS} \overline{PT}



For 33 and 34, use the figure at the right.

33. Which of the following could prove $j \parallel k$?

A. $\angle 1 \cong \angle 5$

C. $\angle 4 \cong \angle 10$ *AA*

B. $\angle 2 \cong \angle 4$

D. $\angle 3 \cong \angle 10$ (*Supp.*)

*Vertical
Angles*

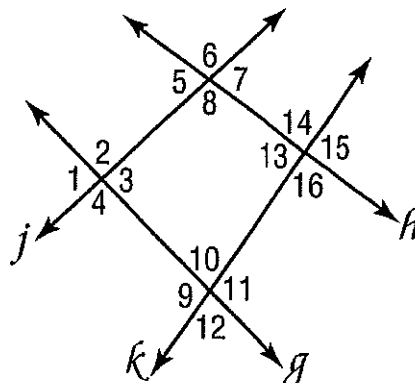
34. Which of the following could prove $g \parallel h$?

A. $\angle 9 \cong \angle 10$

C. $\angle 4 \cong \angle 10$

B. $\angle 1 \cong \angle 5$ *CA*

D. $\angle 3 \cong \angle 6$



For 35-38, suppose \overline{AB} has a slope = $\frac{2}{5}$, \overline{CD} has a slope = $\frac{5}{2}$, \overline{EF} has a slope = $-\frac{5}{2}$, \overline{GH} has a slope = 2.5 and \overline{JK} has a slope = $-\frac{2}{5}$.

35. Name two lines that are parallel.

$$\overline{CD} \parallel \overline{GH}$$

36. Name two lines that are perpendicular.

$$\overline{AB} \perp \overline{EF} \quad \text{or} \quad \overline{CD} \perp \overline{JK}$$

37. Name two lines that are neither parallel nor perpendicular.

$$\overline{AB} \text{ and } \overline{JK}$$

38. Determine if AB and EF are parallel, perpendicular or neither:

$A(1, 3), B(3, 6), E(1, 5)$ and $F(-5, 9)$
 $x_1, y_1, x_2, y_2 \quad | \quad x_1, y_1, x_2, y_2$

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

$$\frac{9-5}{-5-1} = \frac{4}{-6} = -\frac{2}{3}$$

$$\boxed{\overline{AB} \perp \overline{EF}}$$

Unit 4

For Questions 39 and 40 draw and label a figure. Then, write an equation to answer the question.

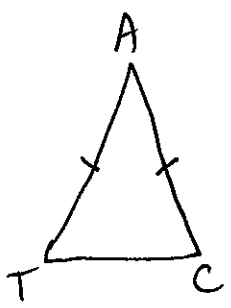
39. Find a and the measure of each side of equilateral triangle MNO if $MN = 5a$, $NO = 4a + 6$, and $MO = 7a - 12$.

$$\begin{array}{r} 4a + 6 = 7a - 12 \\ -4a \quad -4a \\ \hline 6 = 3a - 12 \\ +12 \quad +12 \\ \hline 18 = 3a \end{array}$$

$$\begin{array}{l} 5(6) \rightarrow MN = 30 \\ 4(6) + 6 \rightarrow NO = 30 \\ 7(6) - 12 \rightarrow MO = 30 \end{array}$$

$$\frac{18}{3} = \frac{3a}{3} \quad \boxed{a = 6}$$

40. Triangle TAC is an isosceles triangle with vertex angle A . If $TA = 3b + 1$, $AC = 4b - 11$, and $TC = 6b - 2$, find b , TA , AC , and TC .

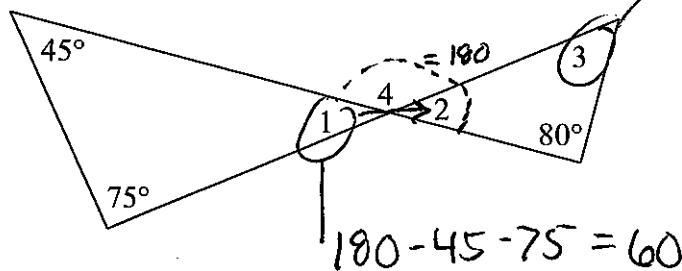


$$\begin{array}{r} 3b + 1 = 4b - 11 \\ -3b \quad -3b \\ \hline 1 = b - 11 \\ +11 \quad +11 \\ \hline 12 = b \end{array}$$

$$\boxed{b = 12}$$

$$\begin{array}{l} 3(12) + 1 \rightarrow TA = 37 \\ 4(12) - 11 \rightarrow AC = 37 \\ 6(12) - 2 \rightarrow TC = 70 \end{array}$$

41. Using the figure below, find the measures of the numbered angles.



$$180 - 80 - 60 = 40$$

$$m\angle 1 = 60^\circ$$

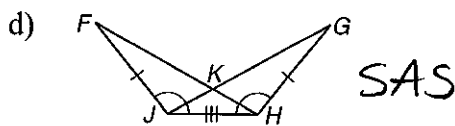
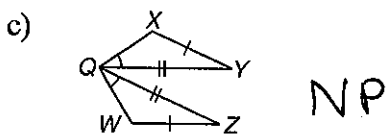
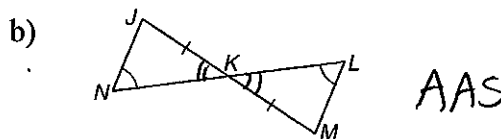
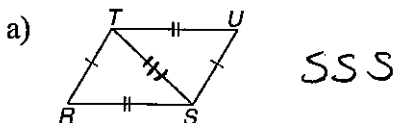
$$m\angle 2 = 60^\circ$$

$$m\angle 3 = 40^\circ$$

$$m\angle 4 = 120^\circ$$

$$180 - 45 - 75 = 60$$

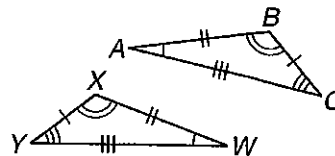
42. Name the postulate that could prove the two triangles are congruent (*SSS*, *SAS*, *ASA*, *AAS*). If there is not enough information, write *Not Possible*.



43. Identify the congruent triangles in the figure at the below right.

Be sure to name the corresponding vertices in the correct order!

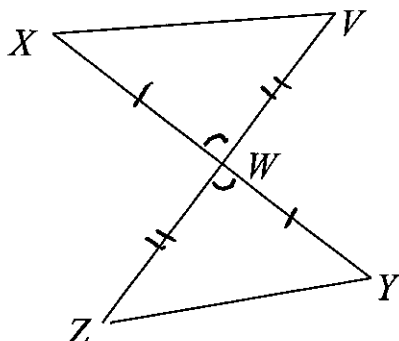
$$\triangle ABC \cong \triangle WXY$$



For Questions 44-46, write a two-column proof.

44. **Given:** W is the midpoint of \overline{XY}
 W is the midpoint of \overline{VZ}

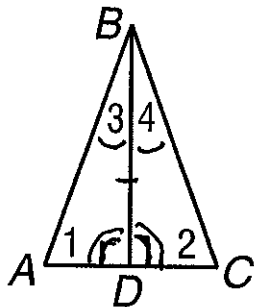
Prove: $\triangle XVW \cong \triangle YZW$



Statements	Reasons
1. W is the midpoint of \overline{XY}	1. Given
2. W is the midpoint of \overline{VZ}	2. Given
3. $\overline{XW} \cong \overline{YW}$	3. Midpoint Theorem
4. $\overline{VW} \cong \overline{WZ}$	4. Midpoint Theorem
5. $\angle XWV \cong \angle YWZ$	5. Vertical \angle Thm
6. $\triangle XVW \cong \triangle YZW$	6. SAS

45. **Given:** \overline{BD} bisects $\angle ABC$
 $\angle ADB \cong \angle CDB$

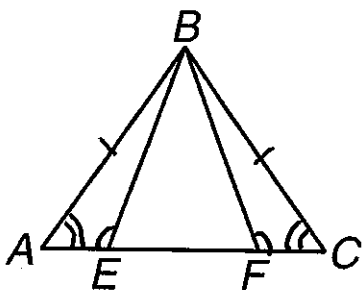
Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1. \overline{BD} bisects $\angle ABC$	1. Given
2. $\angle ADB \cong \angle CDB$	2. Given
3. $\angle 3 \cong \angle 4$	3. Def \angle bisector
4. $\overline{BD} \cong \overline{BD}$	4. Reflexive
5. $\triangle ABD \cong \triangle CBD$	5. ASA
6. $\angle 1 \cong \angle 2$	6. CPCTC

46. **Given:** $\triangle ABC$ is isosceles with base \overline{AC}
 $\angle AEB \cong \angle CFB$

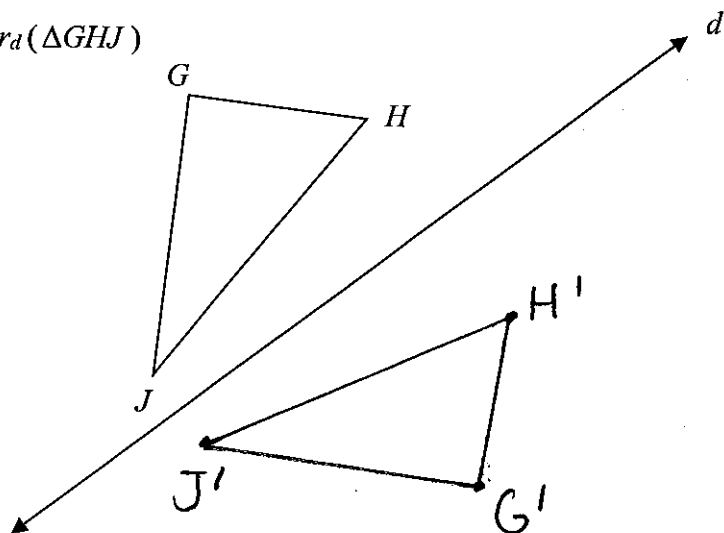
Prove: $\triangle ABE \cong \triangle CBF$



Statements	Reasons
1. $\triangle ABC$ is isosceles with base \overline{AC}	1. Given
2. $\angle AEB \cong \angle CFB$	2. Given
3. $\overline{AB} \cong \overline{CB}$	3. Def of isosceles \triangle
4. $\angle A \cong \angle C$	4. ITT
5. $\triangle ABE \cong \triangle CBF$	5. AAS

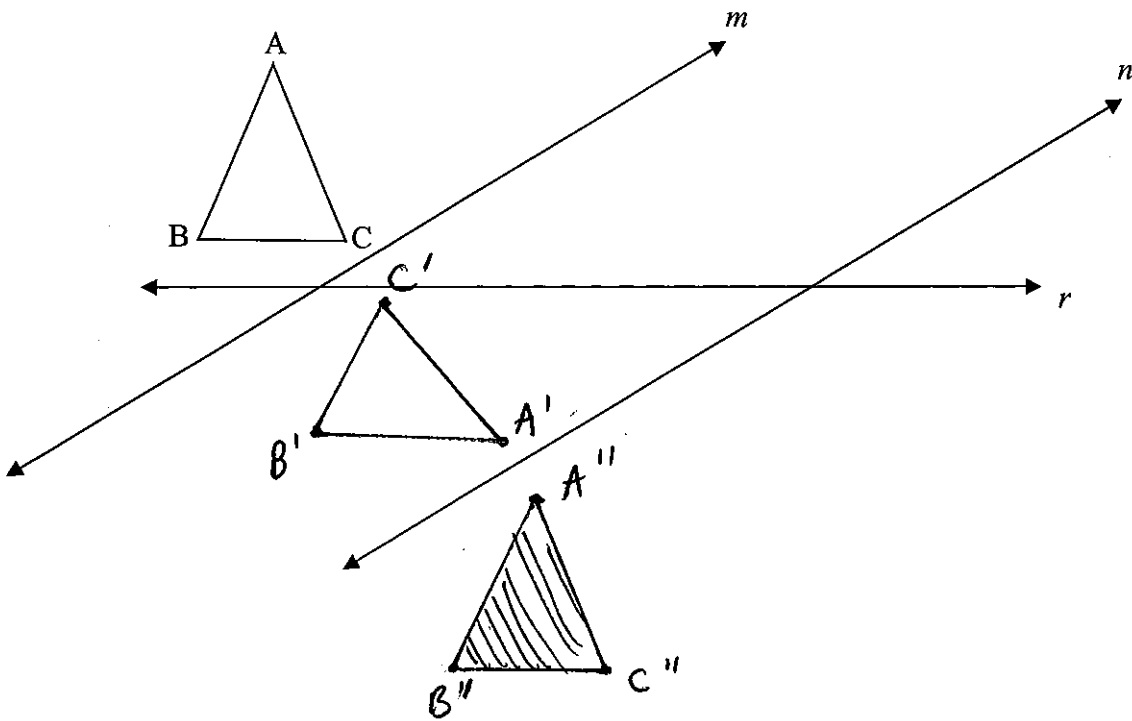
Unit 5

47. $r_d(\triangle GHJ)$

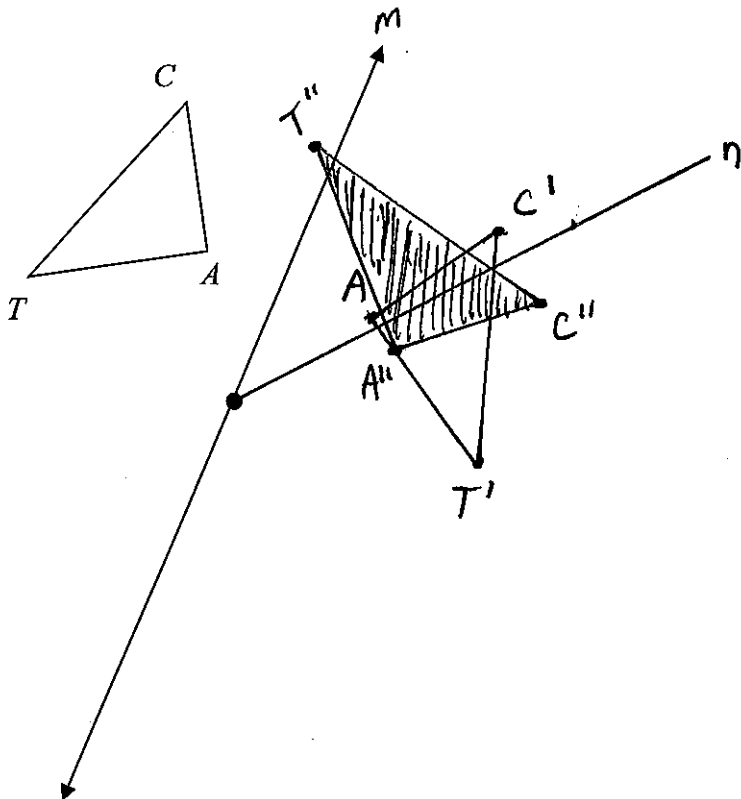


48. Perform the necessary reflections to translate $\triangle ABC$.

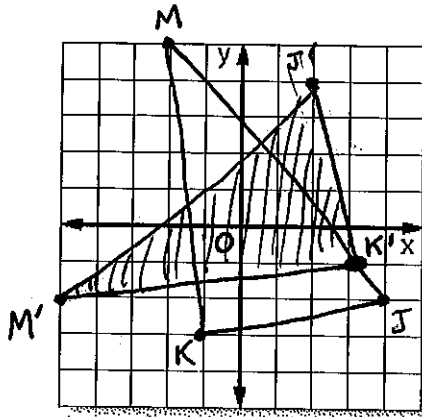
use // lines m and n



49. You are given figure $\triangle CAT$ and reflection line m . Draw $r_n \circ r_m$ (QUAD) by adding a second reflection line, n and performing the necessary reflections so that the magnitude of the rotation is $\frac{80^\circ}{2} = 40^\circ$

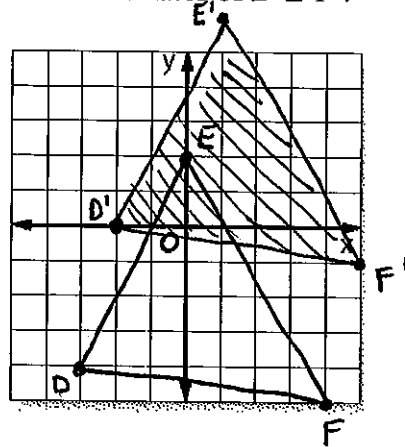


50. Suppose $\triangle JKM$ has vertices $J(4, 2)$, $K(-1, 3)$, and $M(-2, 5)$. Draw $R_{90^\circ}(\triangle JKM)$ and state the coordinates of $J'K'M'$.



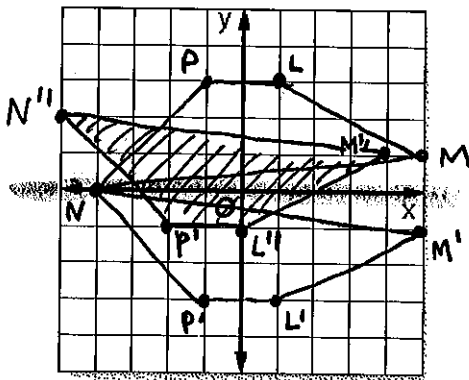
$J'(2, 4)$ $K'(3, -1)$ $M'(-5, -2)$

51. Suppose $\triangle DEF$ has vertices $D(-3, -4)$, $E(0, 2)$, and $F(4, -5)$ when $(x, y) \rightarrow (x + 1, y + 4)$. Draw $\triangle DEF$ and its image under $T_{(1, 4)}$. Then state the coordinates of $D'E'F'$.



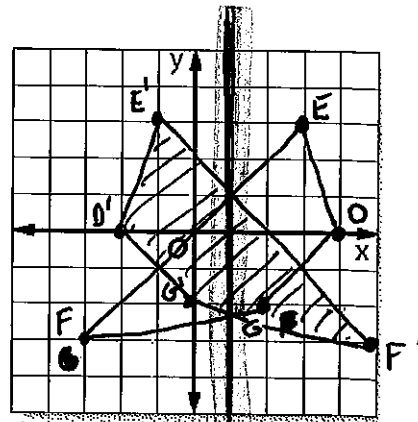
$D'(-2, 0)$ $E'(1, 6)$ $F'(5, -1)$

52. Graph quadrilateral $LMNP$ with $L(1, 3)$, $M(5, 1)$, $N(-4, 0)$ and $P(-1, 3)$. Draw $T_{(-1, 2)}$ or x -axis and state the coordinates for $L'M'N'P'$.



$L''(0, -1)$ $M''(4, 1)$
 $N''(-5, 2)$ $P''(-2, -1)$

53. Graph quadrilateral $DEFG$ with $D(4, 0)$, $E(3, 3)$, $F(2, -2)$, and $G(-3, -3)$. Draw $r_{x=1}$ ($DEFG$). Then state the coordinates for $D'E'F'G'$.



$D'(-2, 0)$ $E'(-1, 3)$
 $F'(5, -3)$ $G'(0, -2)$

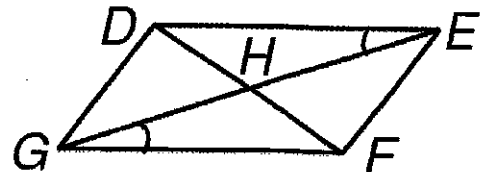
Unit 6

54. In parallelogram $DEFG$, $m\angle FGE = 4x + 1$ and $m\angle DEG = 6x - 15$. Find $m\angle FGE$.

$$\begin{array}{r} 4x + 1 = 6x - 15 \\ -4x \quad -4x \\ \hline 1 = 2x - 15 \\ +15 \quad +15 \\ \hline 16 = 2x \\ \frac{16}{2} = \frac{2x}{2} \end{array}$$

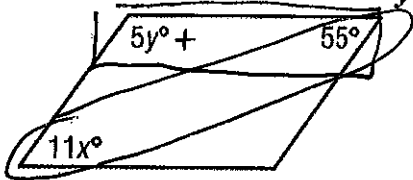
$$4(8) + 1 = 33$$

$m\angle FGE = 33^\circ$



For #55-56 find the values of x and y so that each figure is a parallelogram. Show all calculations.

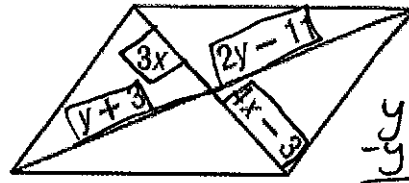
55.



$$11x = 55 \quad \# \quad 5y + 55 = 180$$

$$\boxed{x = 5} \quad \# \quad \begin{array}{r} 5y + 55 = 180 \\ -55 \quad -55 \\ \hline 5y = 125 \\ \boxed{y = 25} \end{array}$$

56.



$$3x = 4x - 3$$

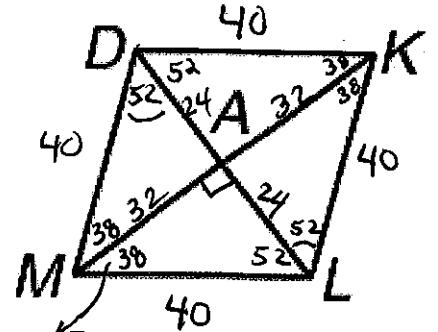
$$\begin{array}{r} 3x = 4x - 3 \\ -4x \quad -4x \\ \hline -x = -3 \end{array} \rightarrow \boxed{x = 3}$$

$$y + 3 = 2y - 11$$

$$\begin{array}{r} y + 3 = 2y - 11 \\ -y \quad -y \\ \hline 3 = y - 11 \\ +11 \quad +11 \\ \hline y = 14 \end{array} \quad \boxed{y = 14}$$

57. In rhombus $DKLM$, $ML = 40$, $MK = 64$, and $LA = 24$ and $m\angle MDA = 52^\circ$.

- a. $AM = \underline{32}$ f. $MD = \underline{40}$
 b. $KL = \underline{40}$ g. $KA = \underline{32}$
 c. $DL = \underline{40}$ h. $DK = \underline{40}$
 d. $AD = \underline{24}$ i. $m\angle DMA = \underline{38^\circ}$
 e. $m\angle DKA = \underline{38^\circ}$ j. $m\angle DKL = \underline{76^\circ}$



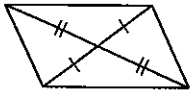
$$180 - 90 - 52 = 38$$

$$a^2 + 24^2 = 40^2$$

$$\begin{array}{r} a^2 + 24^2 = 40^2 \\ -24^2 \quad -24^2 \\ \hline a^2 = 1024 \\ \sqrt{a^2} = \sqrt{1024} = 32 \end{array}$$

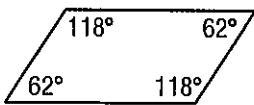
For #58-61, determine whether each quadrilateral is a parallelogram based on the given information. Justify your answer.

58. Is there enough information to state that the figure at the left is a parallelogram? yes



Justification diagonals bisect each other

59. Is there enough information to state that the figure at the left is a parallelogram? yes



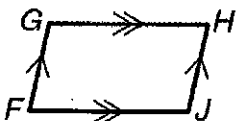
Justification opposite \angle s are \cong
consecutive \angle s are supplementary

60. Is there enough information to state that the figure at the left is a parallelogram? yes



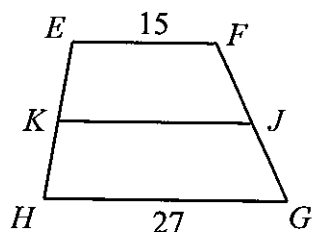
Justification opposite sides are \cong

61. Is there enough information to state that the figure at the left is a parallelogram? yes



Justification opposite sides are \parallel

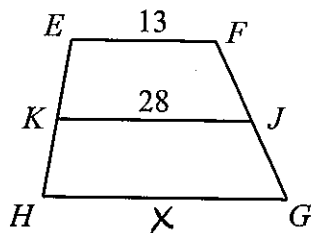
62. For trapezoid $EFGH$, J and K are the midpoints of the legs. Find JK . Show all calculations.



$$\frac{15 + 27}{2} = 21$$

$$\boxed{JK = 21}$$

63. For trapezoid $EFGH$, J and K are the midpoints of the legs. Find HG . Show all calculations.



$$2 \left(\frac{13 + x}{2} \right) = (28) \cdot 2$$

$$\begin{array}{r} 13 + x = 56 \\ -13 \quad -13 \\ \hline x = 43 \end{array}$$

$$\boxed{HG = 43}$$

For #64-65, determine whether the quadrilateral with the given vertices is a parallelogram, rectangle, rhombus, or square. List all that apply and justify your answer. Show all calculations.

64. $B(0, 3), E(6, -2), F(1, -8), G(-5, -3)$ $BE = \sqrt{(-1)^2 + (11)^2} = \sqrt{122}$

BF

$$\frac{0+1}{2}, \frac{3+-8}{2}$$

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

EG

$$\frac{6+-5}{2}, \frac{-2+-3}{2}$$

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

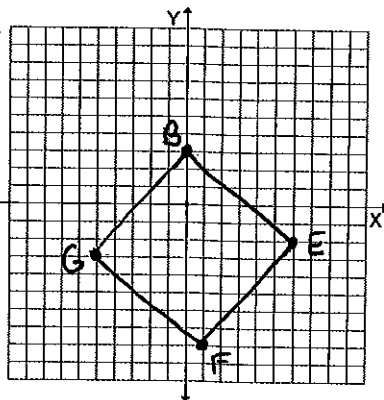
$$EG = \sqrt{(11)^2 + (11)^2} = \sqrt{122}$$

BE

$$\frac{3--8}{0--1} = \frac{11}{-1}$$

EG

$$\frac{-2--3}{6--5} = \frac{1}{11} \checkmark$$



What type of figure(s) is $BEFG$? parallelogram, rectangle, rhombus, square

65. $R(-2, 5), S(1, 3), M(-3, -4), Y(-6, -2)$

RSMY is a parallelogram

RM

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

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

SY

$$\left(\frac{1+-6}{2}, \frac{3+-2}{2} \right)$$

$$\left(-\frac{5}{2}, \frac{1}{2} \right) \checkmark$$

$$RM = \sqrt{(-3--2)^2 + (-4-5)^2}$$

$$= \sqrt{(-1)^2 + (-9)^2} = \sqrt{82}$$

$$SY = \sqrt{(-6-1)^2 + (-2-3)^2}$$

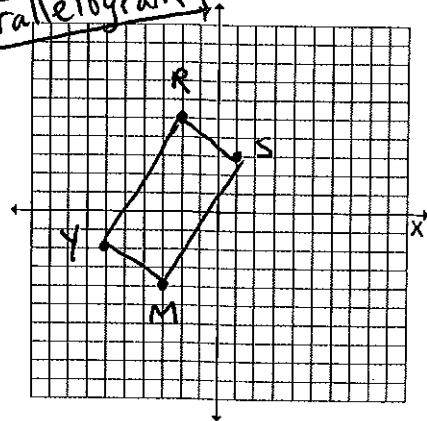
not \approx

$$= \sqrt{(-7)^2 + (-5)^2} = \sqrt{74}$$

$$RM = \frac{-4-5}{-3--2} = \frac{-9}{-1} = \frac{9}{1}$$

$$SY = \frac{-2-3}{-6-1} = \frac{-5}{-7} = \frac{5}{7}$$

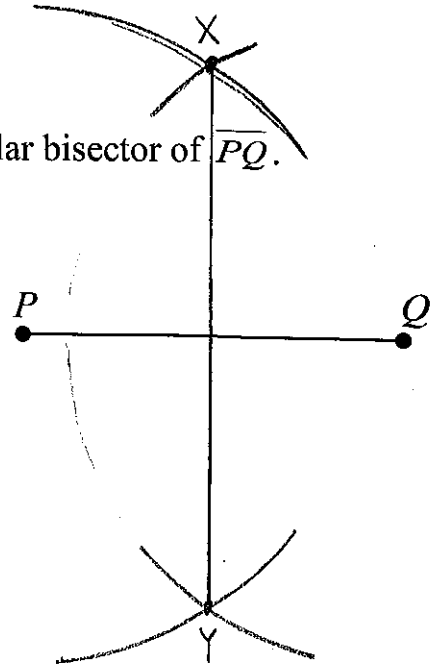
not \perp



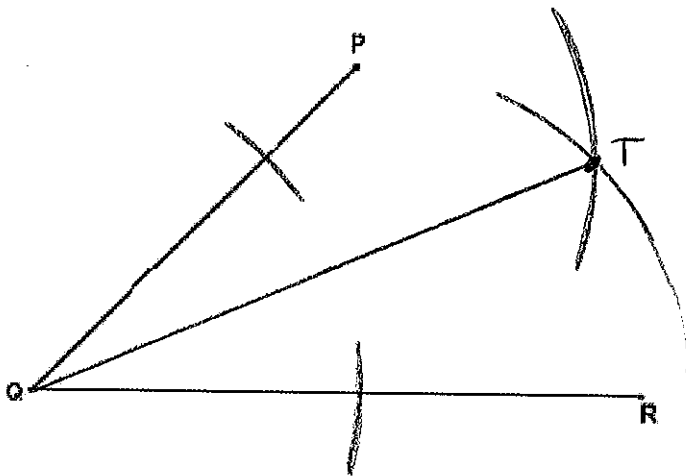
Constructions Review

Show all compass work for each construction.

66. Given: \overline{PQ} . Construct: \overline{XY} so that \overline{XY} is the perpendicular bisector of \overline{PQ} .
<http://www.mathopenref.com/constbisectline.html>

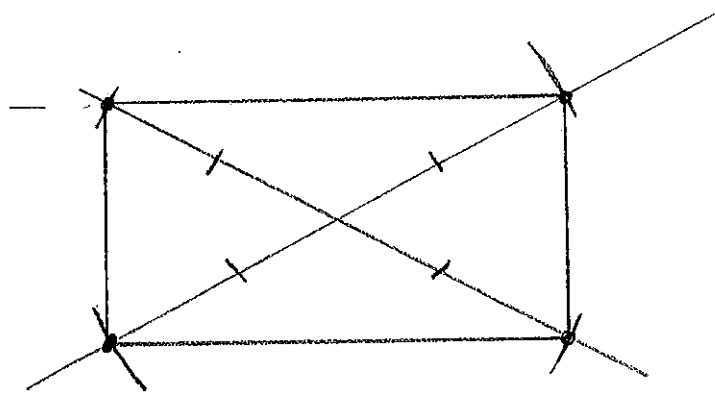


67. Given: $\angle PQR$. Construct: \overrightarrow{QT} , the bisector of $\angle PQR$.
<http://www.mathopenref.com/constbisectangle.html>



68. Use a compass to construct the following shapes.

a) rectangle



b) parallelogram

