

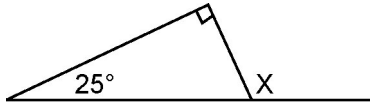
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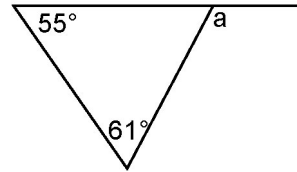
BLM 7.1.1
(page 1)**Practice: Angle Relationships in Triangles**

1. Find the measure of each indicated exterior angle.

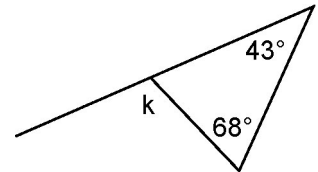
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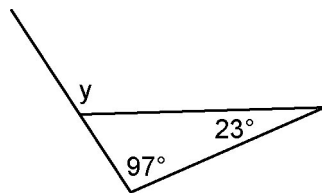
b)



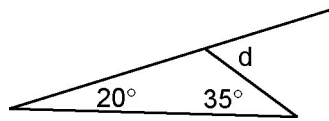
c)



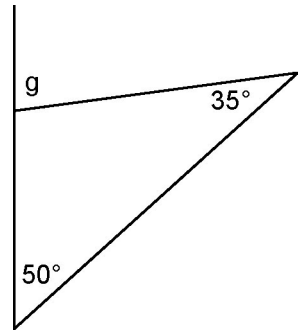
d)



e)

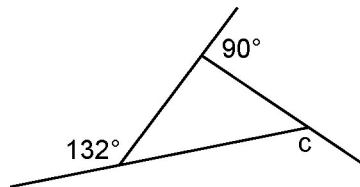


f)

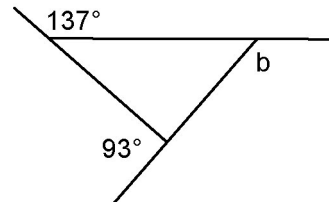


2. Find the measure of each indicated exterior angle.

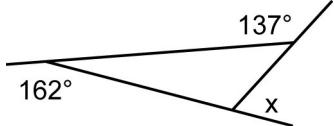
a)



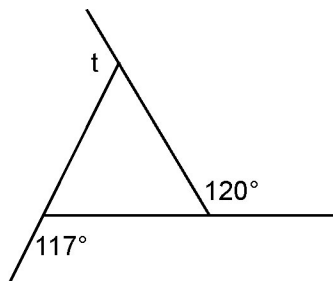
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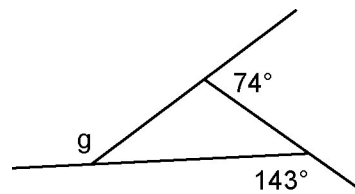
c)



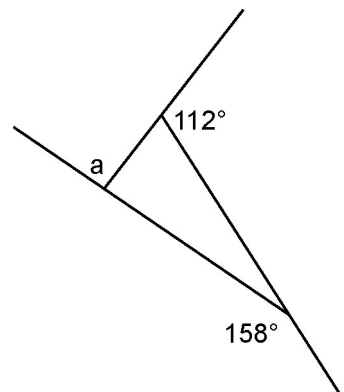
d)



e)



f)

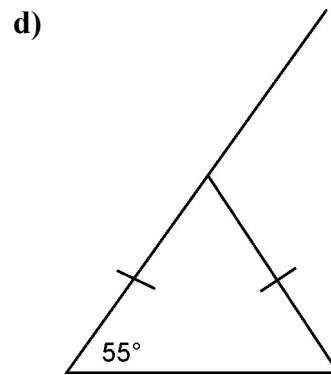
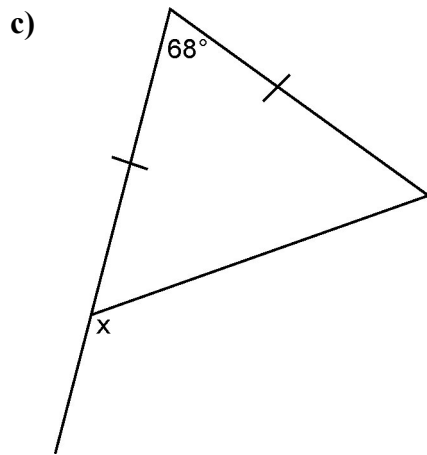
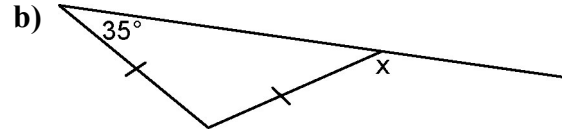
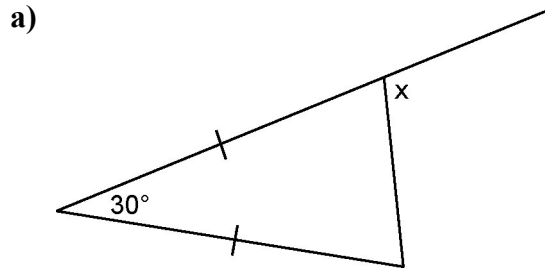


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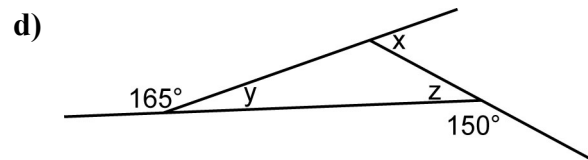
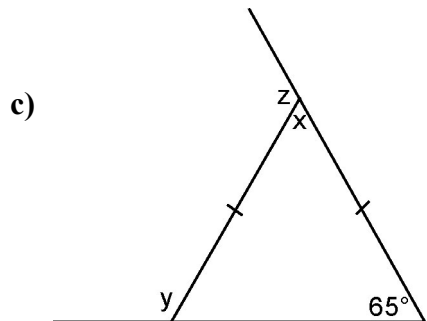
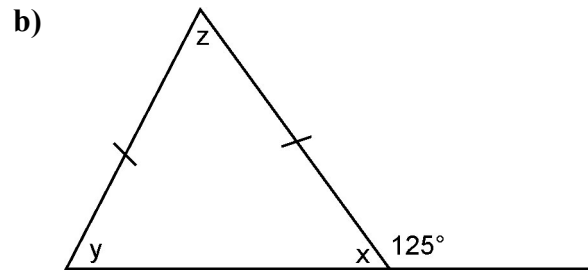
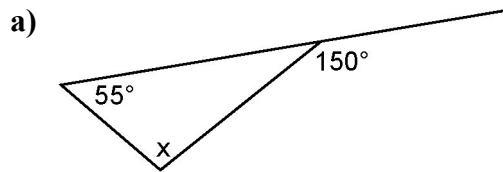
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BLM 7.1.1
(page 2)

3. Find the measure of each indicated exterior angle.



4. Find the measure of each indicated angle.



5. One interior angle in an isosceles triangle measures 42° . Find the possible measures for the exterior angles.

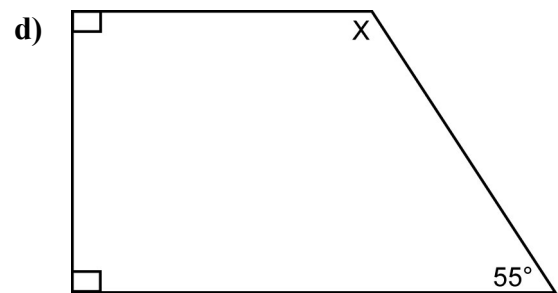
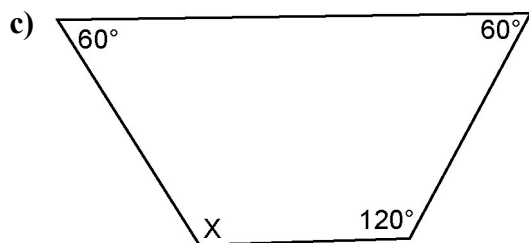
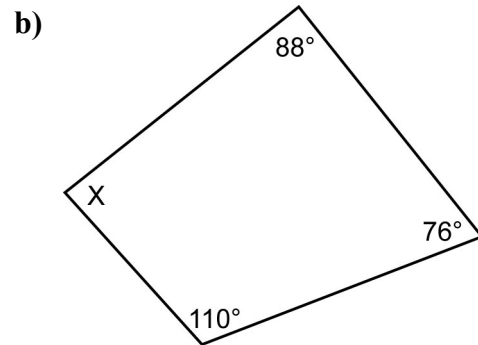
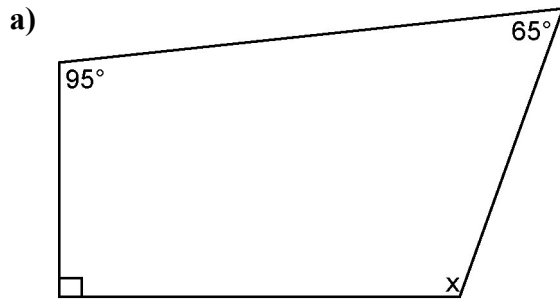
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Date: _____

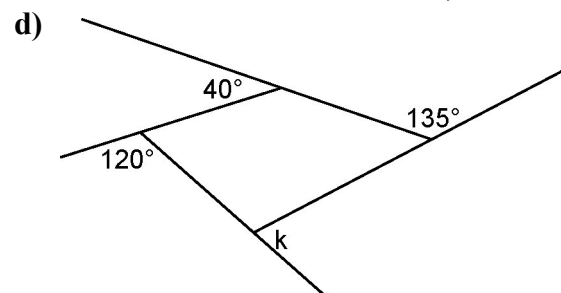
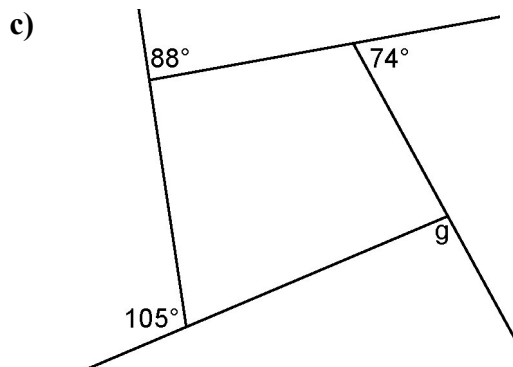
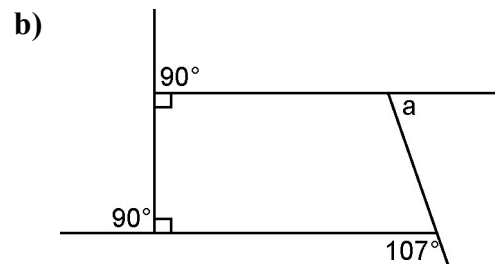
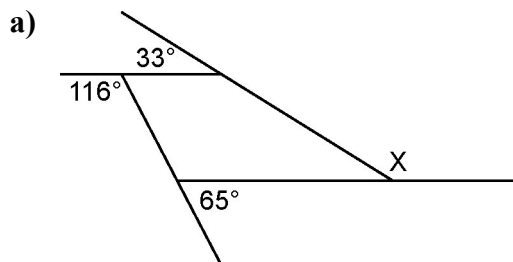
BLM 7.2.1
(page 1)

Practice: Angle Relationships in Quadrilaterals

1. Find the measure of each indicated angle.



2. Find the measure of each indicated exterior angle.



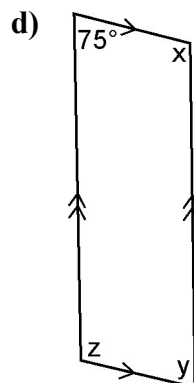
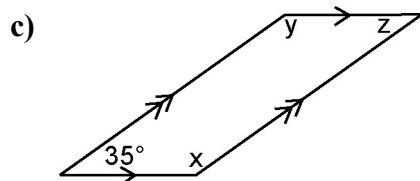
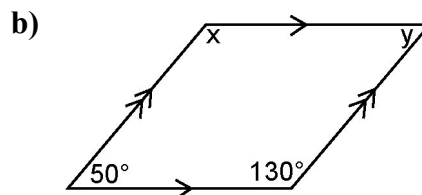
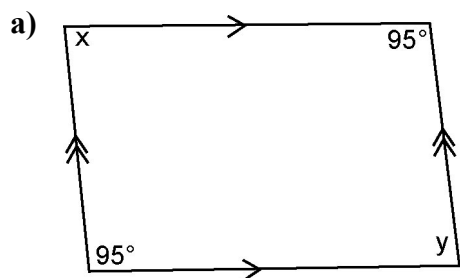
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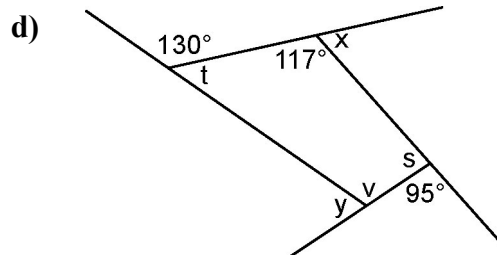
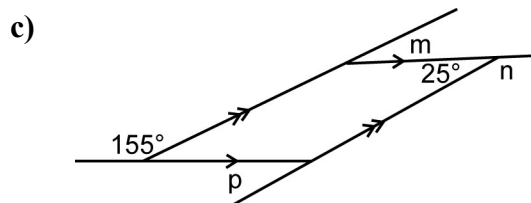
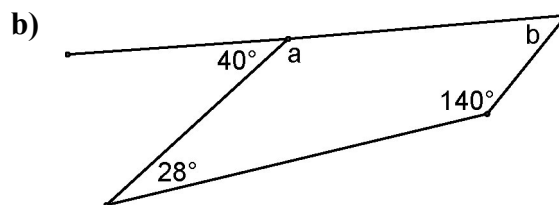
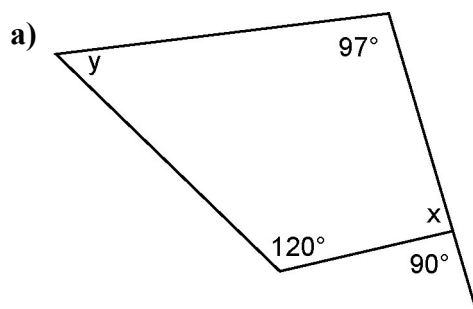
BLM 7.2.1

(page 2)

3. The measures of three interior angles of some quadrilaterals are given. Find the measure of the fourth interior angle for each quadrilateral.
- a) $110^\circ, 80^\circ, 75^\circ$ b) $95^\circ, 95^\circ, 150^\circ$ c) $68^\circ, 29^\circ, 103^\circ$ d) $132^\circ, 48^\circ, 67^\circ$
4. The measures of the exterior angles at three vertices of some quadrilaterals are given. Find the measure of the exterior angle at the fourth vertex.
- a) $75^\circ, 125^\circ, 35^\circ$ b) $50^\circ, 145^\circ, 85^\circ$ c) $76^\circ, 34^\circ, 178^\circ$ d) $93^\circ, 83^\circ, 121^\circ$
5. Find the measure of each indicated angle.



6. Find the measure of each indicated angle.

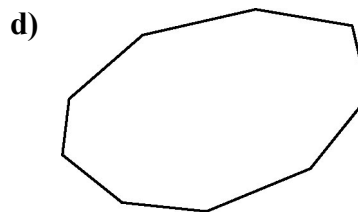
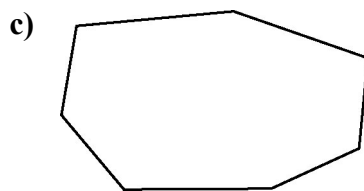
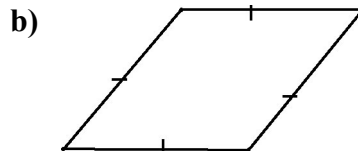
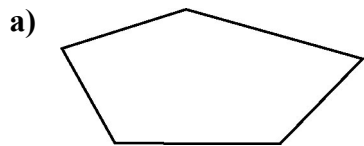


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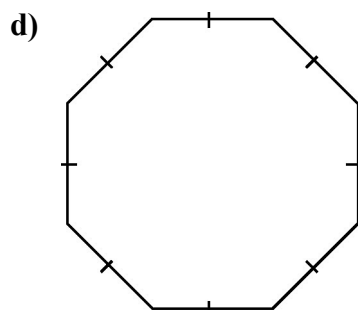
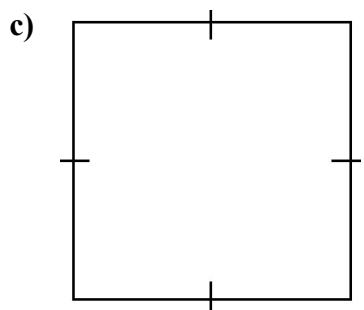
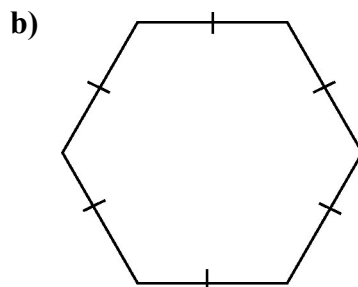
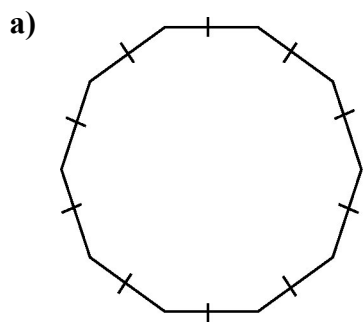
Date: _____

BLM 7.3.1**Practice: Angle Relationships in Polygons**

1. Find the sum of the interior angles of each polygon.



2. Find the sum of the interior angles of each polygon.



3. Find the sum of the interior angles of a polygon with each number of sides.

a) 11 sides

b) 14 sides

c) 18 sides

d) 24 sides

4. Find the measure of each interior angle of a regular polygon with each number of sides.

a) 3 sides

b) 20 sides

c) 9 sides

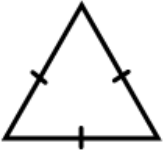
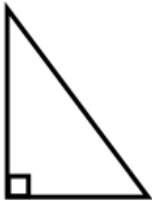


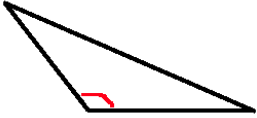
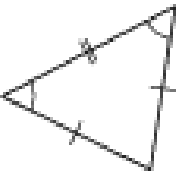

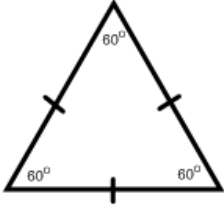
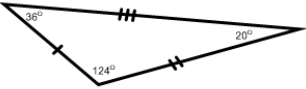
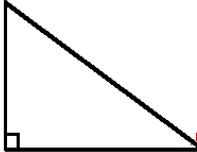

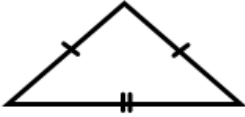


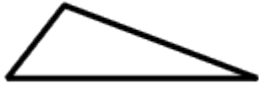
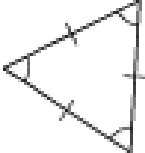
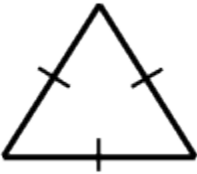
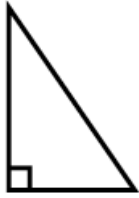
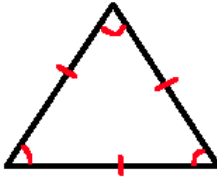
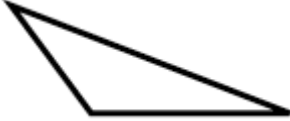

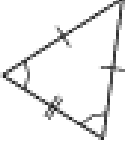
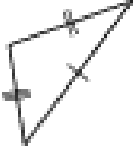
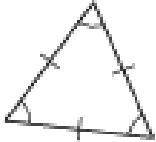
d) 16 sides

5. Find the number of sides each polygon has given the sum of its interior angles.

a) 720° b) 1980° c) 2340° d) 4140°

Classifying Triangles

Classify each triangle by side length AND by angle

1 	2 	3 	4 
5 	6 	7 	8 
9 	10 	11 	12 
13 	14 	15 	16 
17 	18 	19 	20 
21 	22 	23 	24 

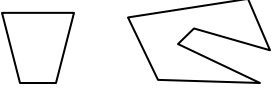
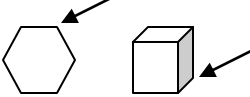


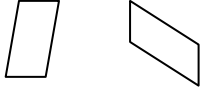
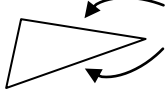
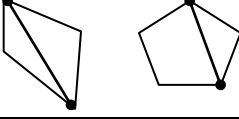

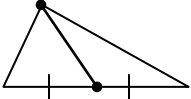
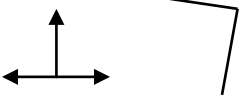
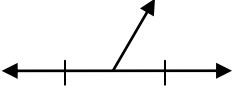
Midpoints, Medians, and Diagonals in Polygons

Adjacent
Bisect
Diagonal

Median
Midpoint
Parallelogram

Perpendicular
Polygon
Quadrilateral

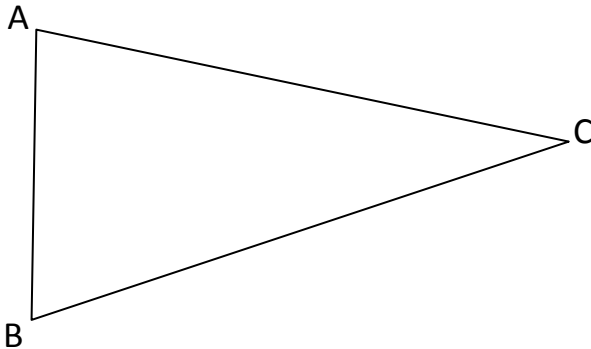
Triangle
Vertex

Term	Definition	Examples	Non-Examples
	Any enclosed 2D shape made up of straight lines		
	A corner of a 2D or 3D shape		
	Any enclosed figure with three straight sides. The sum of the interior angles is 180°		
	Any enclosed figure with four straight edges. The sum of the interior angles is 360°		
	Any 4-sided figure with two pairs of parallel sides		
	Next to; beside		
	A line joining two vertices of a polygon that are not next to each other		
	The points on a line segment that is in the middle of the two endpoints		
	A line segment joining a vertex of a triangle to the opposite side's midpoint		
	Two lines that meet at a 90° angle		
	To divide in half		

Midpoints and Medians in Triangles

Connecting adjacent midpoints:

Connect the midpoints of AB and AC. Label it DE.



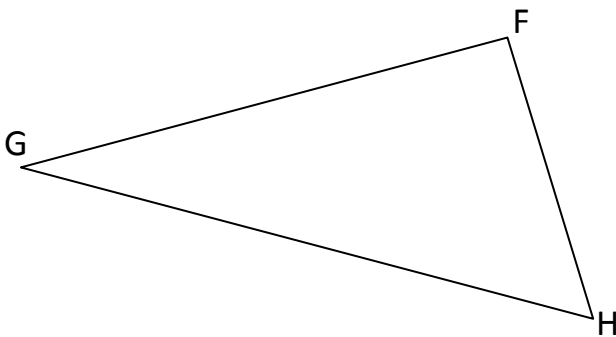
What do you notice about BC and DE?

What do you notice about the distance from points A to DE, and the distance between DE and BC?

RULE:

Drawing medians:

Draw a median from Point F. Label the new point I.



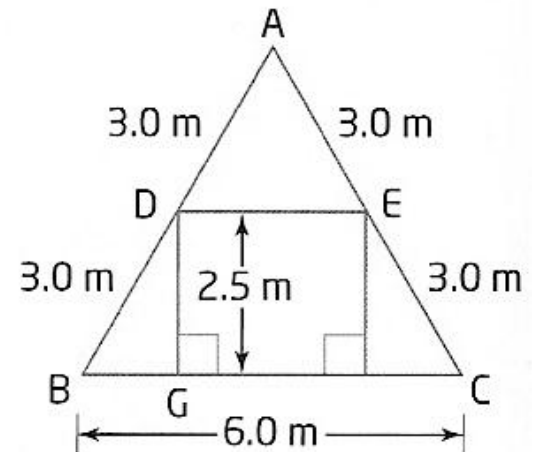
Now $\triangle FGI$ and $\triangle FHI$ have...

RULE:

Midpoints and Medians in Triangles

1. In areas that get a lot of snow, cottages are often built with a triangular shape called an A-frame. This shape helps prevent damage from heavy loads of snow on the roof.

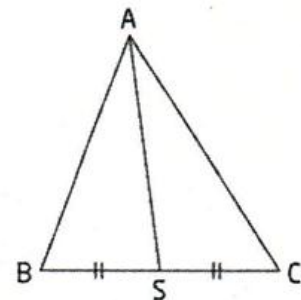
- a) Find the width of the floor of the upper room in this cottage.



- b) Find the height of the upper room.

2. The area of $\triangle ABC$ is 45cm

- a) Calculate the area of $\triangle ABS$.



- b) Calculate the area of $\triangle ACS$.

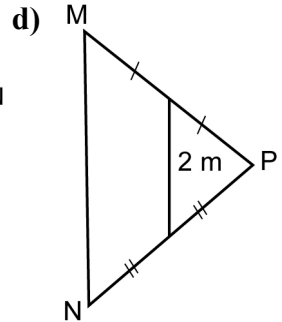
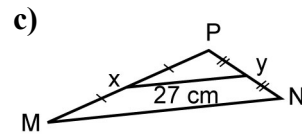
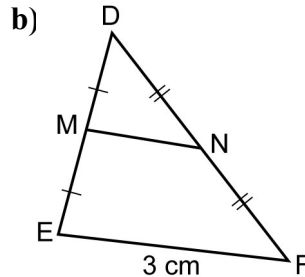
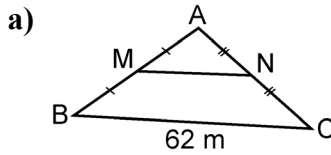
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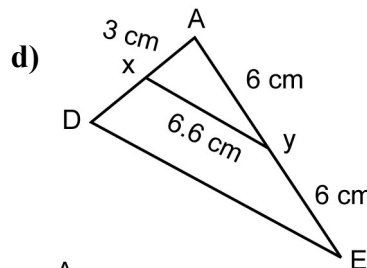
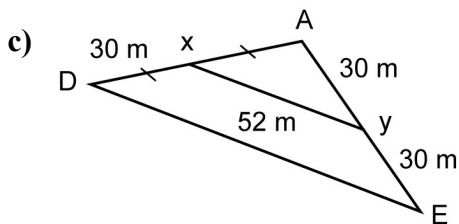
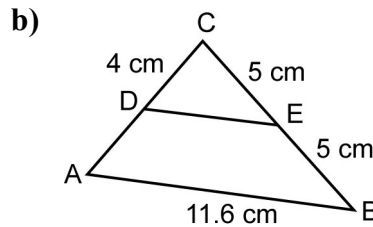
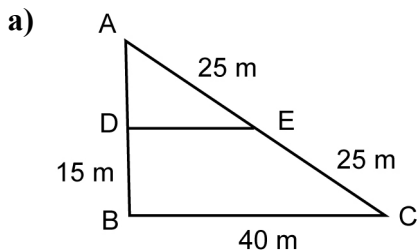
BLM 7.4.1

Practice: Midpoints and Medians in Triangles

1. Find the length of line segment MN in each triangle.

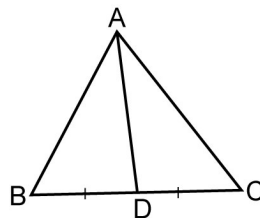


2. Find the lengths of line segments AD and DE in each triangle.



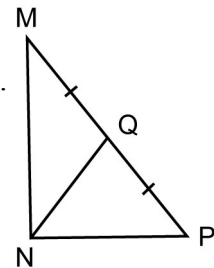
3. The area of $\triangle ABC$ is 10 cm^2 . Calculate the area of each triangle.

- a) $\triangle ABD$
- b) $\triangle ADC$



4. Calculate the area of each triangle given the area of $\triangle MNQ$ is 12 cm^2 .

- a) $\triangle MNP$
- b) $\triangle NPQ$



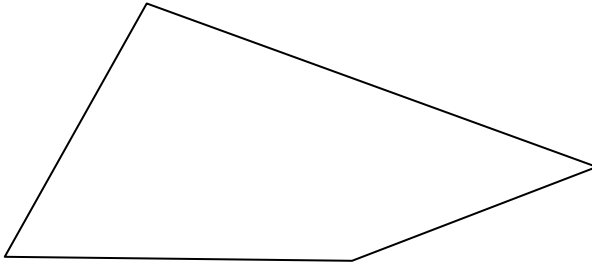
5. Here are two conjectures about a median in an isosceles triangle. For each conjecture, explain why the conjecture is true, or draw a counterexample to show it is false.

- a) The median to the vertex opposite the unequal side bisects the angle.
- b) The median to a vertex opposite one of the equal sides bisects the angle.

Midpoints and Diagonals in Quadrilaterals

Connecting adjacent midpoints:

Draw line segments to connect the adjacent midpoints in this quadrilateral.

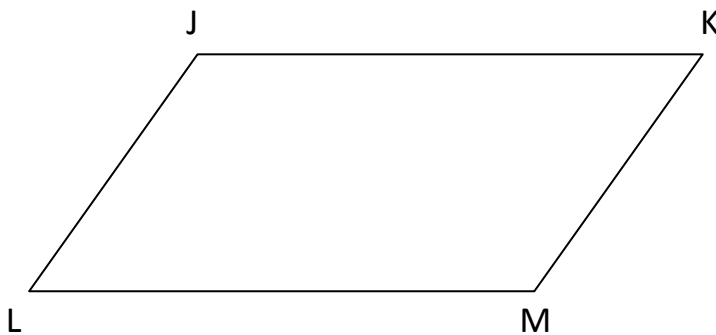


What do you notice about the new shape you made?

RULE:

Drawing diagonals:

Draw diagonals for this parallelogram. Label the point where they intersect as N.

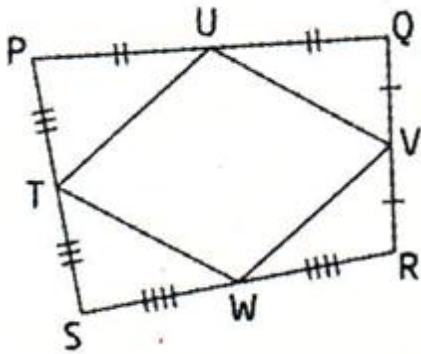


What do you notice about the length of JN and NM?

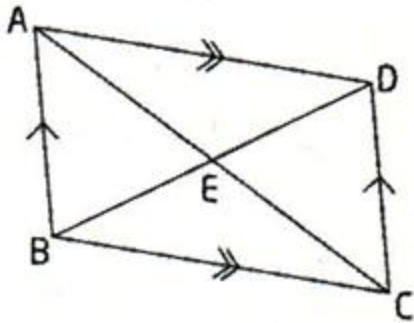
RULE:

Midpoints and Diagonals in Quadrilaterals

1. Which line segments are parallel in the following diagram?



2. Calculate the lengths of EC and ED given that AC measures 88cm and BD measures 80cm.



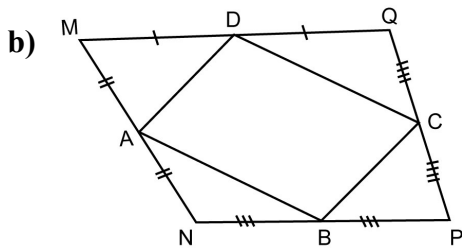
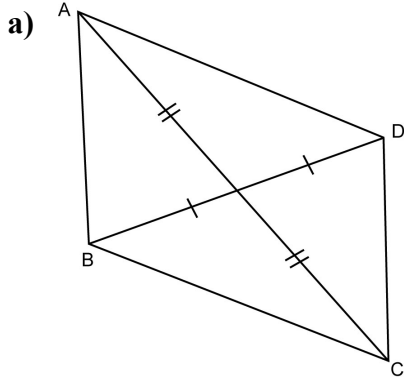
Name: _____

Date: _____

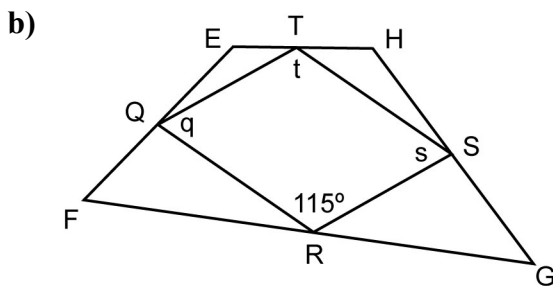
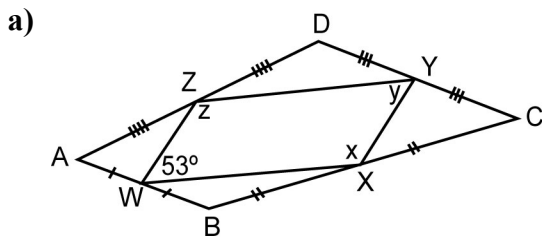
BLM 7.5.2

Practice: Midpoints and Diagonals in Quadrilaterals

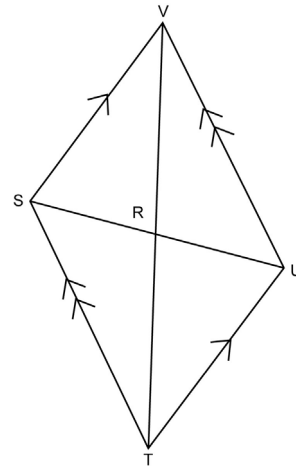
1. Which line segments in each diagram are parallel?



2. Find the measures of the indicated angles.

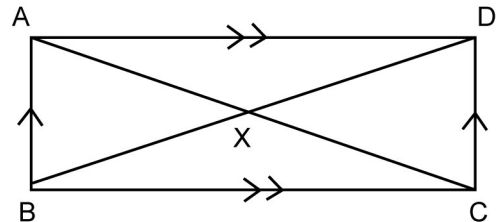


3. Calculate the length of each line segment given that $RU = 3.6$ cm and $RT = 6$ cm.



- a) SR
- b) SU
- c) VR
- d) VT

4. Calculate the length of each line segment given that $AC = 13.2$ m and $XD = 6.6$ m.



- a) AX
- b) XC
- c) BX
- d) BD

5. Explain why each statement is true or draw a counterexample to show it is false.

- a) The diagonals of a rectangle are perpendicular to one another.
- b) The diagonals of a square are perpendicular to one another.

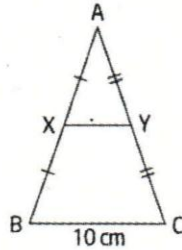
7.4 Midpoints and Medians in Triangles

Principles of Mathematics 9, pages 394–400

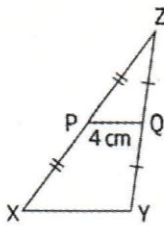
A

1. Calculate the length of line segment XY in each triangle.

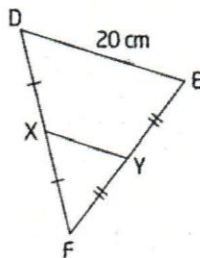
a)



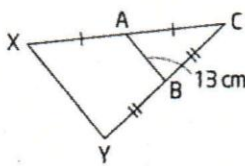
b)



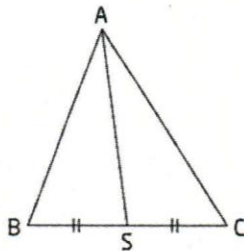
c)



d)



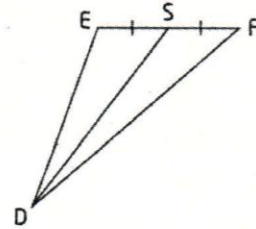
2. The area of $\triangle ABC$ is 20 cm^2 .



- a) Calculate the area of $\triangle ABS$.
b) Calculate the area of $\triangle ACS$.

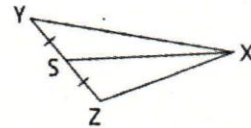
B

3. The area of $\triangle DEF$ is 26 cm^2 .



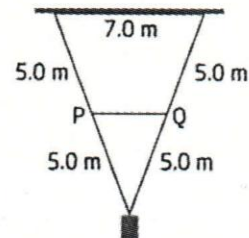
- a) Calculate the area of $\triangle DES$.
b) Calculate the area of $\triangle DFS$.

4. The area of $\triangle XYZ$ is 15 cm^2 .

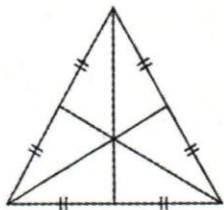


- a) Calculate the area of $\triangle XYS$.
b) Calculate the area of $\triangle XZS$.

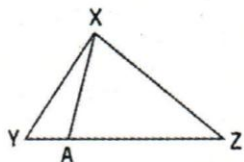
5. Calculate the length of the cross-brace PQ in this bridge support.



6. a) Make a conjecture about whether the medians in an equilateral triangle bisect each angle at the vertex.

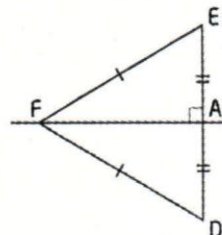


- b) Describe how you can see if your conjecture is correct by folding a diagram of an equilateral triangle.
- c) Describe how you could use geometry software to see if your conjecture is correct.
- d) Use one of the two methods you described to test your conjecture. Describe your results.
7. Virginia conjectures that $\angle AXZ$ in this diagram will be obtuse when point A is located anywhere on the side YZ. Use a counter-example to show that this conjecture is false.



8. Here are two conjectures about isosceles triangles with an 80° interior angle. For each conjecture, either draw a counter-example or explain why you think the conjecture is true.
- a) The 80° angle is always opposite one of the two equal sides.
- b) The 80° angle is always opposite the unequal side.

9. Carey constructed $\triangle DEF$ with $DE = EF = DF$. He then constructed the midpoint of DE at A and drew a perpendicular line through DE at A. Will this right bisector pass through the vertex F? Justify your answer.



C

10. Determine whether the right bisectors of the sides of a triangle intersect at a single point.
- If you are using pencil and paper, draw the right bisectors in at least one example of each type of triangle.
 - If you are using geometry software, construct a triangle and the right bisector of each side. Drag each vertex to various new locations. Does changing the shape of the triangle affect how the right bisectors intersect?
- Do you think that the right bisectors intersect at a single point in all triangles? Explain your reasoning.

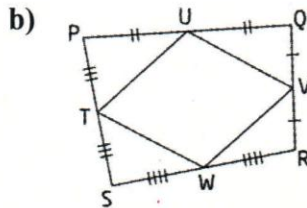
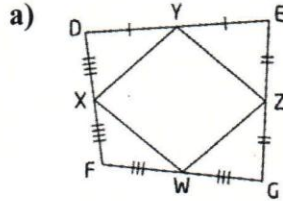
11. a) Investigate whether the three medians of a triangle intersect at a single point. Describe your findings.
- b) Draw a triangle in which the medians of the sides intersect at a single point. Can you draw a circle that has this point as its centre and intersects the triangle at exactly three points? If so, describe the properties of the circle.

7.5 Midpoints and Diagonals in Quadrilaterals

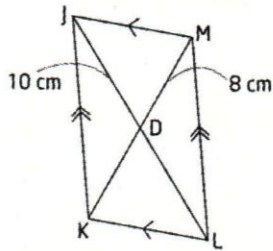
Principles of Mathematics 9, pages 401–407

A

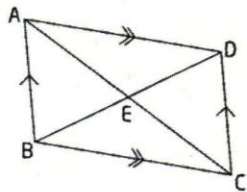
1. Which line segments in the following diagrams are parallel?



2. Calculate the lengths of KD, LD, KM and LJ.



3. Calculate the lengths of AE and BE given that AC measures 22 cm and BD measures 20 cm.

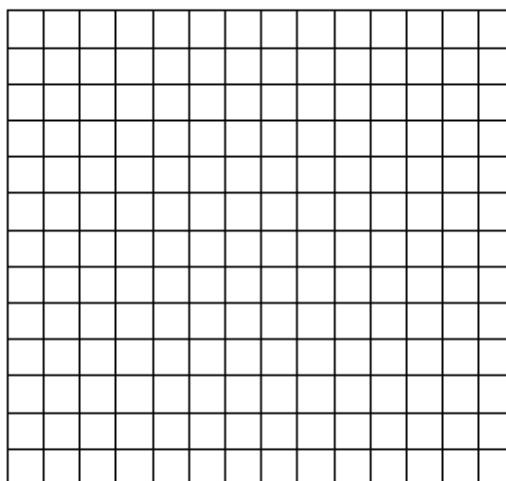


7. For each statement, either explain why it is true or draw a counter-example to show that it is false.

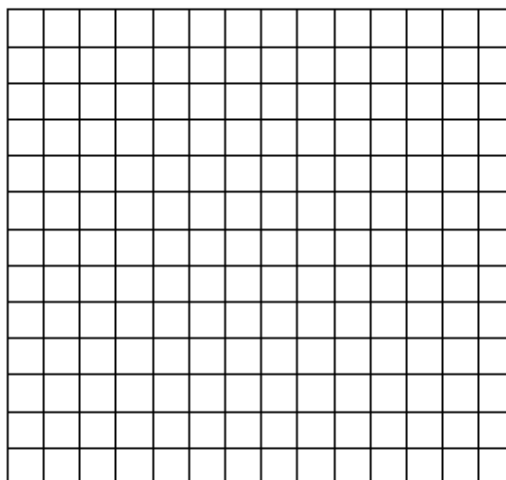
- a) Any diagonal of a trapezoid bisects its area.
 b) Any line segment joining the midpoints of opposite sides of a rectangle bisects its area.

8. On grid paper, draw a rectangle ABCD and mark the midpoints of the four sides. Label these midpoints W, X, Y, and Z.

- What type of quadrilateral is WXYZ?
- How is the area of WXYZ related to the area of ABCD? Explain your reasoning.
- What shape will WXYZ become if ABCD is shrunk to form a square? Support your answer with a drawing.
- Will the relationship between the areas of WXYZ and ABCD change when ABCD is shrunk into a square. Explain.



9. a) Draw a quadrilateral STUV with $ST = SV$ and $UT = UV$.
- At what angle do the diagonals of the quadrilateral intersect?
 - Join the midpoints of the sides of the quadrilateral to form a smaller quadrilateral WXYZ. What type of quadrilateral is WXYZ?
 - Make a conjecture about how the area of WXYZ is related to the area of STUV.



12. Use congruent triangles to show that the diagonals of a rhombus bisect each other.

13. a) Draw a quadrilateral EFGH with $EF = GH$ and $EH = GF$.
- Show that this quadrilateral must be a parallelogram.

14. For the regular pentagon in the diagram shown, show that $AC = AD$.

