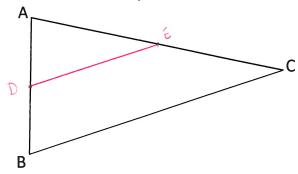
### **Midpoints and Medians in Triangles**

#### Connecting adjacent midpoints:

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



What do you notice about BC and DE?

1) Tuy are parallel 2) Tue dength of DE is half the length of BC

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

It is the same

RULE: When you connect the midpoints of 2 sides of a triangle:

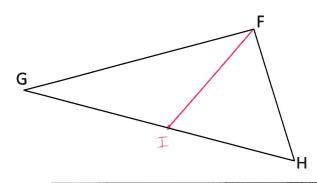
1) The line you make is parallel to the 3rd side

2) It is half the length of the 3rd side

3) The distance from the 3rd side to the line is the same as the distance from the line to the opposite vertex

#### **Drawing medians:**

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



Now ΔFGI and ΔFHI have...

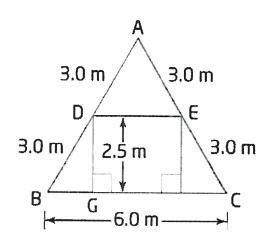
The same area.

RULE: A median in a triangle splits it into 2 smaller triangles with the same area.

## **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.

3m

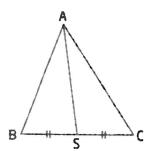


b) Find the height of the upper room.

2.5m

- 2. The area of  $\triangle$ ABC is 45cm<sup>2</sup>
  - a) Calculate the area of  $\triangle ABS$ .

22.5cm2



b) Calculate the area of ΔACS

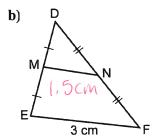
22.5cm2

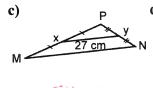
BLM 7.4.1

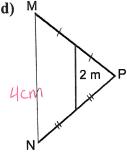
## Practice: Midpoints and Medians in Triangles

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

a) A N C S M C S M C

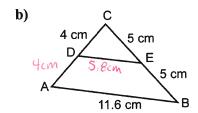


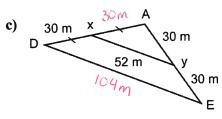


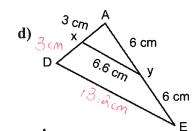


2. Find the lengths of line segments AD and DE in each triangle.

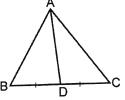
a) A 25 m D E 25 m



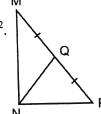




- 3. The area of  $\triangle$ ABC is 10 cm<sup>2</sup>. Calculate the area of each triangle.
  - a)  $\triangle ABD 5 cm^2$
  - b)  $\triangle ADC 5cm^2$



- **4.** Calculate the area of each triangle given the area of  $\triangle$ MNQ is 12 cm<sup>2</sup>.
  - a) AMNP 24cm
  - b) ANPQ la cm2

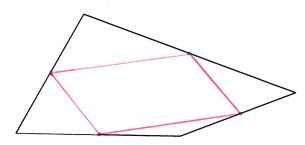


- 5. Here are two conjectures about a median in an isosceles triangle. For each conjecture, explain why the conjecture is true, or draw a counterexample to show it is false.
  - a) The median to the vertex opposite the unequal side bisects the angle. True
  - b) The median to a vertex opposite one of the equal sides bisects the angle. False

## **Midpoints and Diagonals in Quadrilaterals**

#### Connecting adjacent midpoints:

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



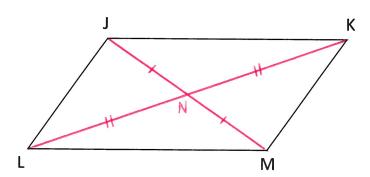
What do you notice about the new shape you made?

It is a parallelogram

RULE: For any quadrilateral, connecting the adjacent midpoints will always produce a parallelogram.

#### **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?

They are the same length

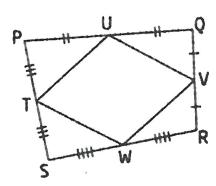
**RULE:** 

Diagonals of a parallelogram will always bisect each other.

#### 12

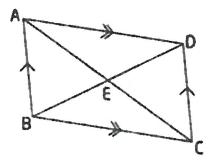
# **Midpoints and Diagonals in Quadrilaterals**

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



- UV + TW
- UT & VW

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

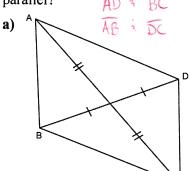


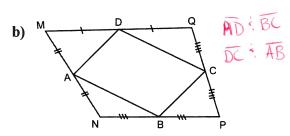
- FC is 44cm
- ED is 40 cm

BLM 7.5.2

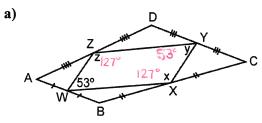
# **Practice: Midpoints and Diagonals in Quadrilaterals**

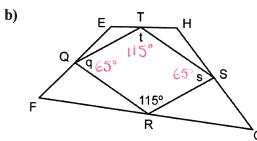
1. Which line segments in each diagram are parallel?



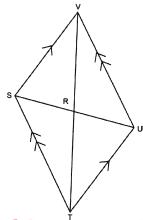


2. Find the measures of the indicated angles.

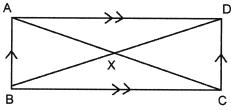




3. Calculate the length of each line segment given that RU = 3.6 cm and RT = 6 cm.



- a) SR 3.6cm
- b) SU 7.2cm
- c) VR 6cm
- d) VT 12 cm
- **4.** Calculate the length of each line segment given that AC = 13.2 m and XD = 6.6 m.

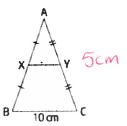


- a) AX 6.6 m
- b) XC 6.6m
- c) BX 6.6m
- d) BD 132 m
- **5.** Explain why each statement is true or draw a counterexample to show it is false.
  - a) The diagonals of a rectangle are perpendicular to one another.
  - b) The diagonals of a square are perpendicular to one another.

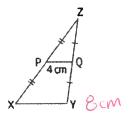
A

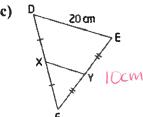
1. Calculate the length of line segment XY in each triangle.

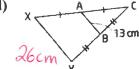
a)



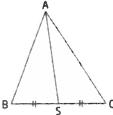
b)







2. The area of  $\triangle$  ABC is 20 cm<sup>2</sup>.

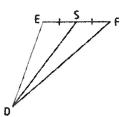


a) Calculate the area of  $\triangle$  ABS.

b) Calculate the area of  $\triangle$  ACS.  $|\bigcirc$  cm<sup>2</sup>

B

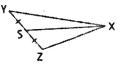
3. The area of  $\triangle$  DEF is 26 cm<sup>2</sup>.



a) Calculate the area of  $\Delta$  DES. 13cm<sup>2</sup>

**b)** Calculate the area of  $\Delta$  DFS. |3cm<sup>2</sup>

4. The area of  $\triangle XYZ$  is 15 cm<sup>2</sup>.



a) Calculate the area of  $\triangle XYS = 7.5 \text{ cm}^2$ 

**b)** Calculate the area of  $\Delta XZS 7.5 \text{ cm}^2$ 

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

