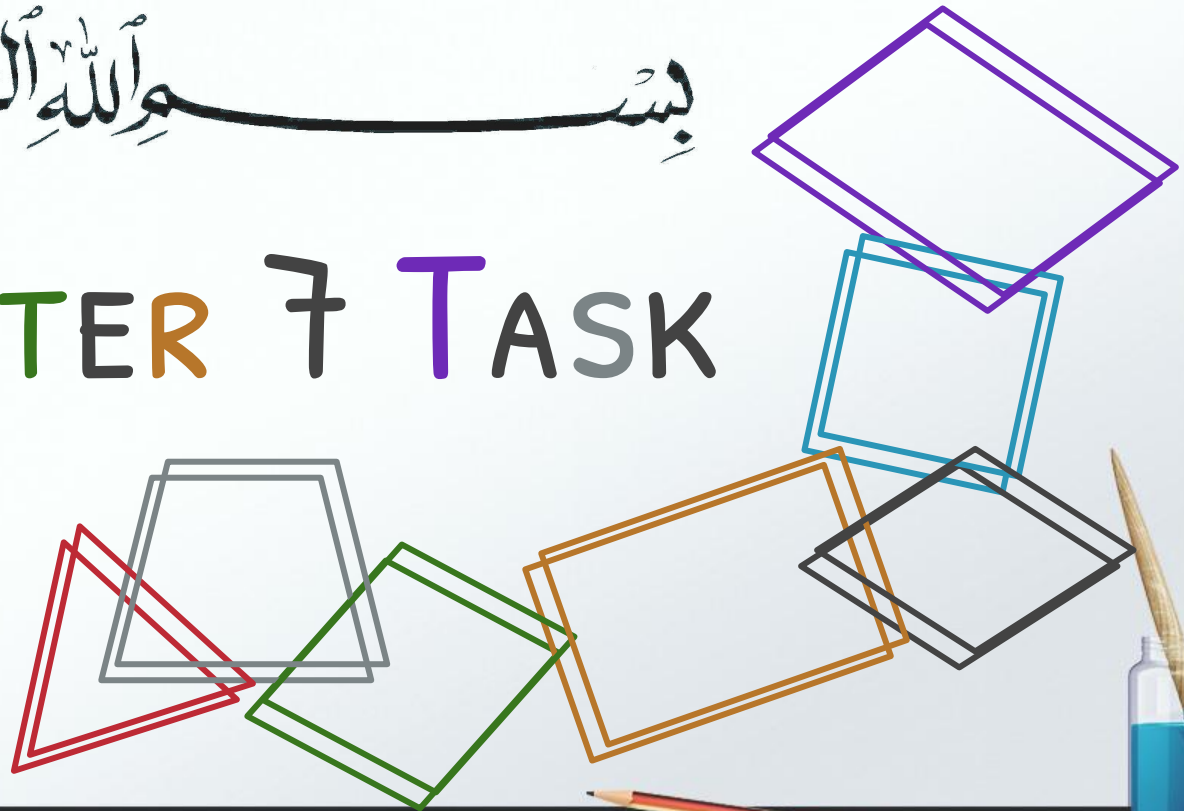


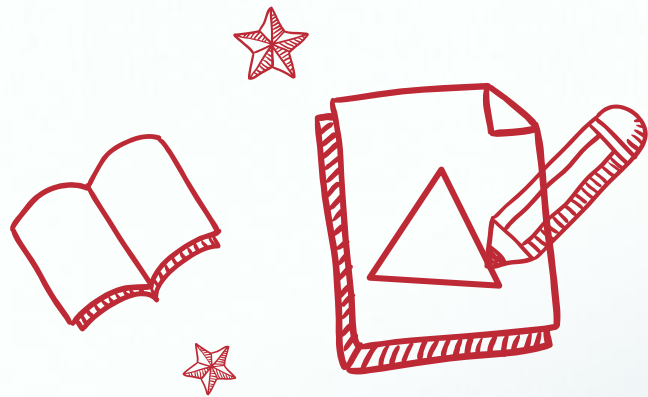
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# CHAPTER 7 TASK



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# TRIANGLE

And its characteristics...

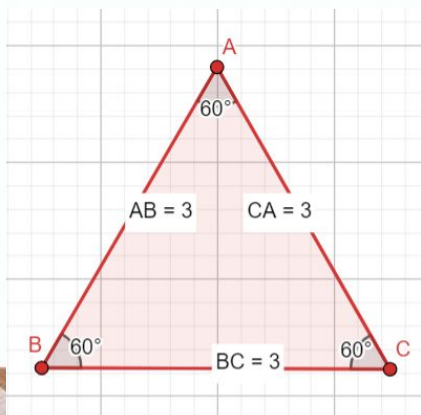


## equilateral

All sides and angles are congruent.

$$AB = BC = AC = 3 \text{ units}$$

$$\angle A = \angle B = \angle C = 60^\circ$$

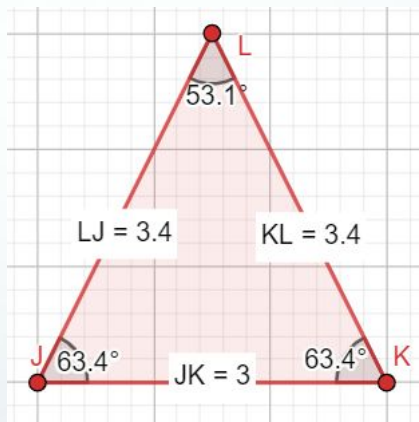


## isosceles

Two sides and two angles are congruent.

$$JL = KL = 3.4 \text{ units}$$

$$\angle J = \angle K = 63.4^\circ$$

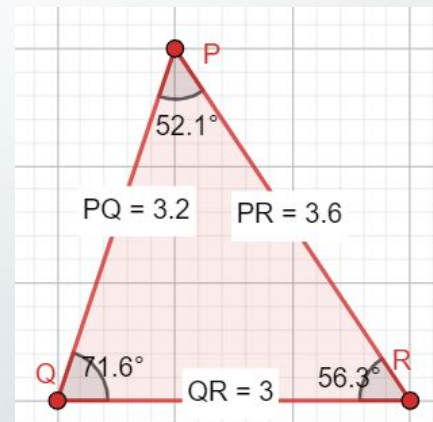


## scalene

None of the sides and angles are congruent.

$$PQ \neq PR \neq QR$$

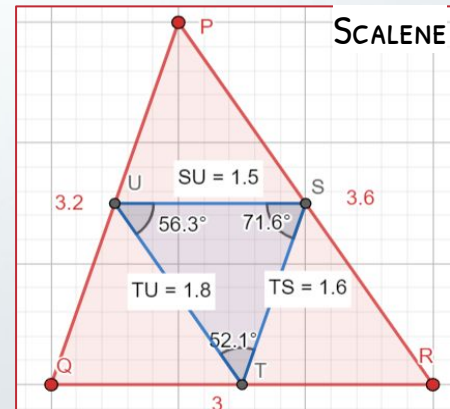
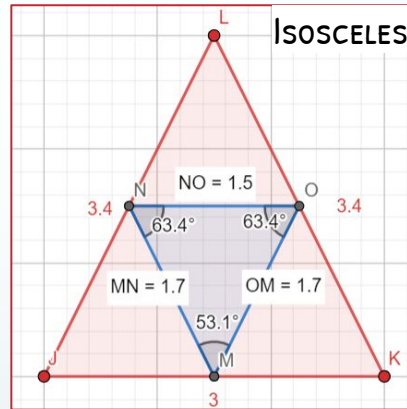
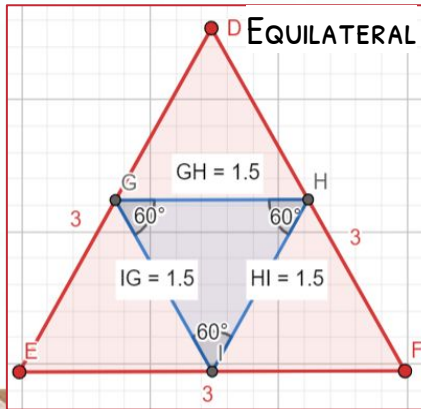
$$\angle P \neq \angle Q \neq \angle R$$





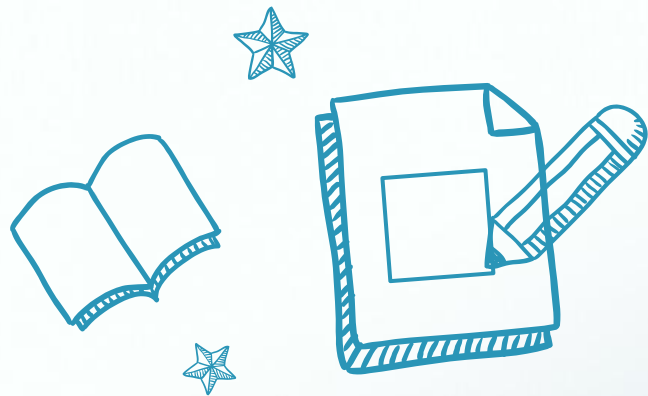
# MIDSEGMENTS OF TRIANGLES

Equilateral, Isosceles, and Scalene ----->



	Equilateral	Isosceles	Scalene
Congruency of Sides & Angles	<b>ALL SIDES &amp; ANGLES ARE EQUAL.</b> $GI = HI = GH = 1.5$ units $\angle A = \angle B = \angle C = 60^\circ$	<b>TWO SIDES &amp; ANGLES ARE EQUAL.</b> $MN = MO = 1.5$ units $\angle N = \angle O = 63.4^\circ$	<b>NO SIDES/ANGLES ARE EQUAL.</b> $ST \neq TU \neq SU$ $\angle S \neq \angle T \neq \angle C$
Midsegments are Parallel to the Triangle's Sides	<b>EACH MIDSEGMENT IS PARALLEL TO A SIDE OF THE TRIANGLE:</b> $HI \parallel DE, GH \parallel EF,$ $GI \parallel DF$	<b>EACH MIDSEGMENT IS PARALLEL TO A SIDE OF THE TRIANGLE:</b> $MN \parallel KL, MO \parallel JL,$ $NO \parallel JK$	<b>EACH MIDSEGMENT IS PARALLEL TO A SIDE OF THE TRIANGLE:</b> $ST \parallel KL, TU \parallel JL,$ $SU \parallel JK$
Midsegments are half the length of its parallel.	<b>EXAMPLE:</b> $HI = \frac{1}{2} DE$ $1.5 = \frac{1}{2} (3)$	<b>EXAMPLE:</b> $MN = \frac{1}{2} KL$ $1.7 = \frac{1}{2} (3.4)$	<b>EXAMPLE:</b> $TU = \frac{1}{2} PR$ $1.8 = \frac{1}{2} (3.6)$

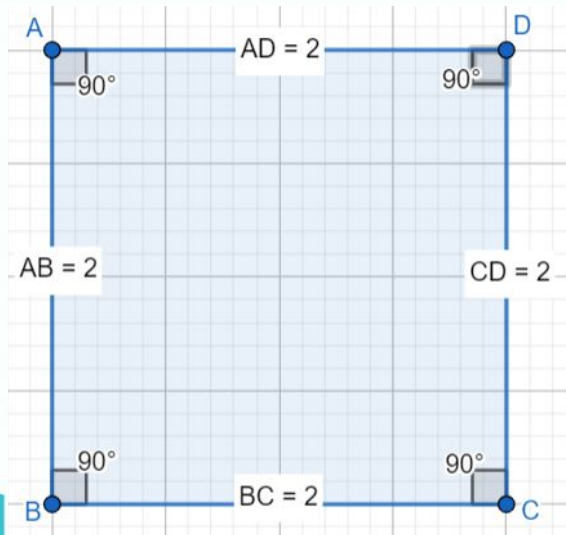
**\*REFER TO THE PREVIOUS SLIDE FOR THE FIGURES\***



# SQUARES

And its characteristics...





## FEATURES OF A SQUARE

All 4 sides of a square are equal.  
 $AB = BC = CD = AD = 2$  units

Likewise, all 4 angles of a square are equal.  
 $\angle A = \angle B = \angle C = \angle D = 90^\circ$

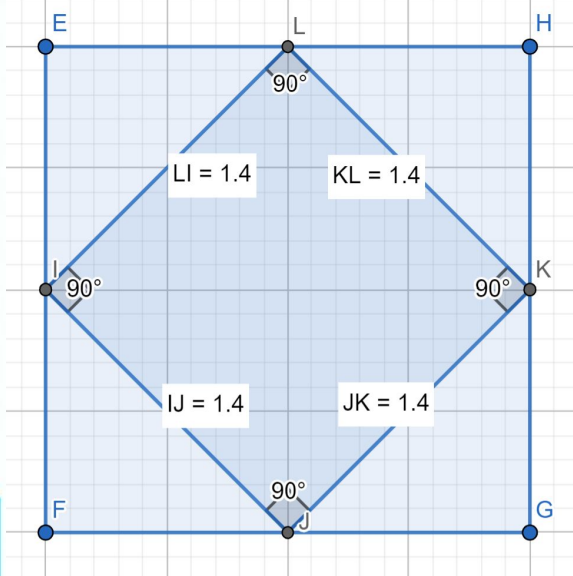
A square has 2 pairs of opposite parallel sides.

$AB \parallel CD$  ;  $AD \parallel BC$

Each side of a square is perpendicular to its adjacent side.

$AB \perp AD$  ;  $AB \perp BC$  ;  $BC \perp CD$  ;  $CD \perp AD$





## MIDSEGMENTS OF A SQUARE

The midsegments are perpendicular to each other.

$$JK \perp KL \ ; \ IJ \perp IL \ ; \ KL \perp IL \ ; \ JK \perp IJ$$

Angles formed by the midsegments are equal.

$$\angle KML = \angle IML = \angle JMK = \angle IMJ = 90^\circ$$

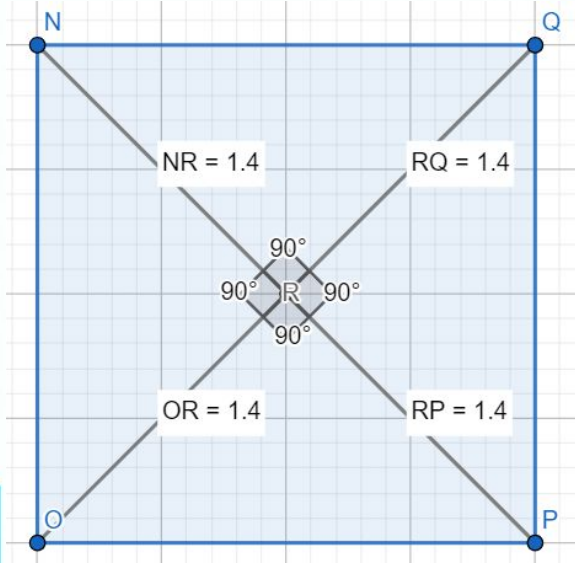
All midsegments are equal in length.

$$JK = KL = IL = IJ = 1.4 \text{ units}$$

Hence, the midsegments of a square create another square.

$$JK = KL = IL = IJ = 1.4 \text{ units}$$

$$\angle KML = \angle IML = \angle JMK = \angle IMJ = 90^\circ$$



## DIAGONALS OF A SQUARE

The diagonals are equal in length.

$$NR = RQ = RP = OR = 1.4 \text{ units}$$

The angles formed by the diagonals are equal.

$$\angle NRQ = \angle PRQ = \angle ORP = \angle NRO = 90^\circ$$

The diagonals bisect each other.

$$NR = PR = 1.4 \text{ units} \quad ; \quad OR = QR = 1.4 \text{ units}$$

The diagonals are perpendicular to each other.

$$OQ \perp NP$$

Hence, four congruent triangles are formed.

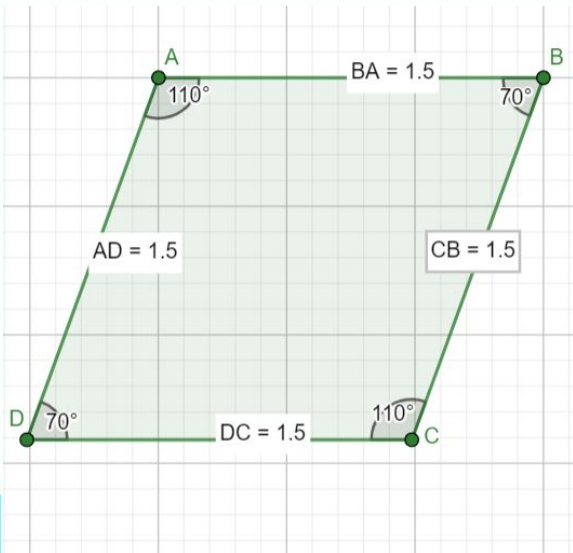
$$\triangle ORP = \triangle PRQ = \triangle NRQ = \triangle NRO$$



# RHOMBUS

And its characteristics...





## FEATURES OF A RHOMBUS

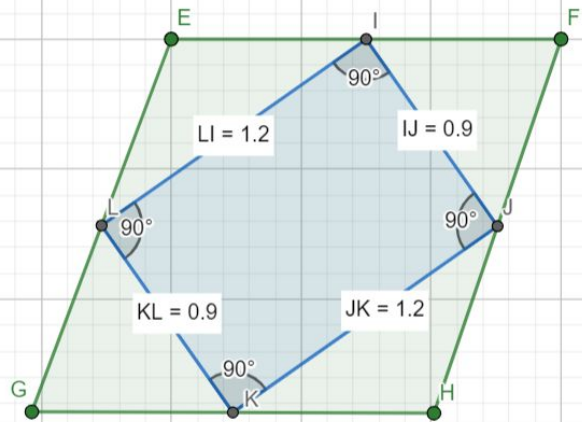
All 4 sides of a rhombus are equal in length.  
 $AB = BC = CD = AD = 1.5$  units

A rhombus has 2 pairs of opposite equal angles.

$$\sphericalangle A = \sphericalangle C = 110^\circ \quad ; \quad \sphericalangle B = \sphericalangle D = 70^\circ$$

A rhombus has 2 pairs of opposite parallel sides, which is why it is also a parallelogram.

$$AB \parallel CD \quad ; \quad AD \parallel BC$$



## MIDSEGMENTS OF A RHOMBUS

The angles formed by the midsegments are equal.

$$\angle ILK = \angle JIL = \angle IJK = \angle JKL = 90^\circ$$

Opposite midsegments are parallel.

$$EG \parallel IK \parallel FH \quad ; \quad EF \parallel JL \parallel GH$$

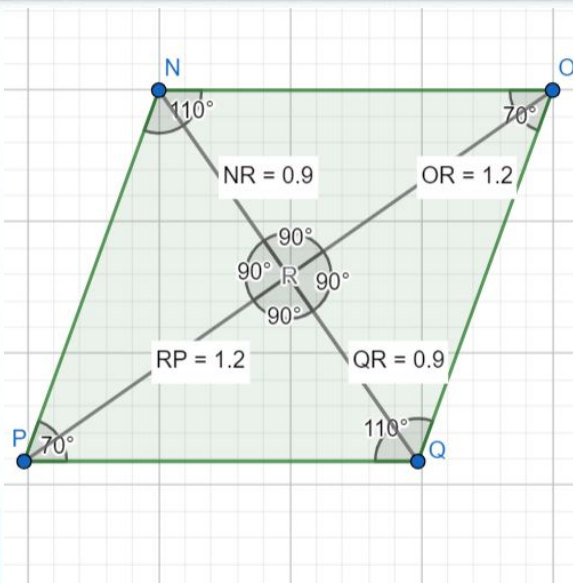
Opposite midsegments are equal in length.

$$JK = IL = 1.2 \text{ units} \quad ; \quad KL = IJ = 0.9 \text{ units}$$

Hence, the midsegments of a rhombus form a rectangle.

$$\angle ILK = \angle JIL = \angle IJK = \angle JKL = 90^\circ$$

$$JK = IL = 1.2 \text{ units} \quad ; \quad KL = IJ = 0.9 \text{ units}$$



## DIAGONALS OF A RHOMBUS

The angles formed by the diagonals are equal.  
 $\angle NRP = \angle QRP = \angle QRO = \angle NRO = 90^\circ$

The diagonals bisect each other.  
 $NR = QR = 0.9$  units ;  $PR = OR = 1.2$  units

The diagonals are perpendicular to each other.  
 $NQ \perp OP$

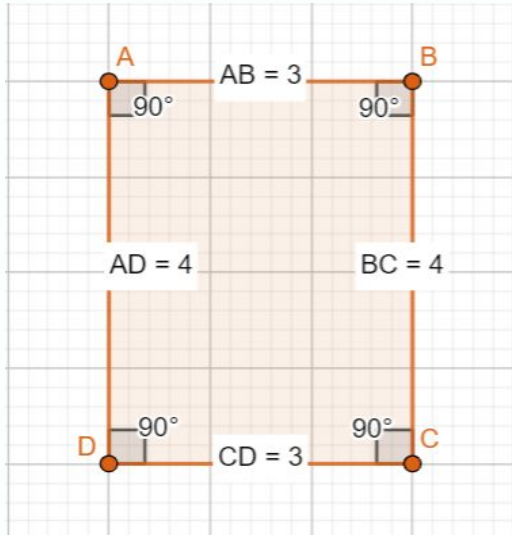
Hence, four congruent triangles are formed.  
 $\triangle QRO = \triangle QRP = \triangle NRP = \triangle NRO$



# RECTANGLE

And its characteristics...





## FEATURES OF A RECTANGLE

There are two pairs of equal sides.  
 $AB = CD = 3$  ;  $BC = AD = 4$  units

All angles in a rectangle are equal.  
 $\sphericalangle A = \sphericalangle B = \sphericalangle C = \sphericalangle D = 90^\circ$

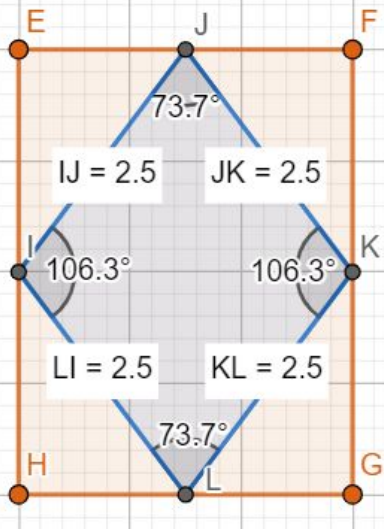
A rectangle has 2 pairs of opposite parallel sides.

$AB \parallel CD$  ;  $AD \parallel BC$

Each side of a rectangle is perpendicular to its adjacent side.

$AB \perp AD$  ;  $AB \perp BC$  ;  $BC \perp CD$  ;  $CD \perp AD$





## MIDSEGMENTS OF A RECTANGLE

The opposite angles formed by the midsegments are equal.

$$\angle IKL = \angle IJK = 73.7^\circ \quad ; \quad \angle JKL = \angle JIL = 106.3^\circ$$

Opposite midsegments are parallel to each other.

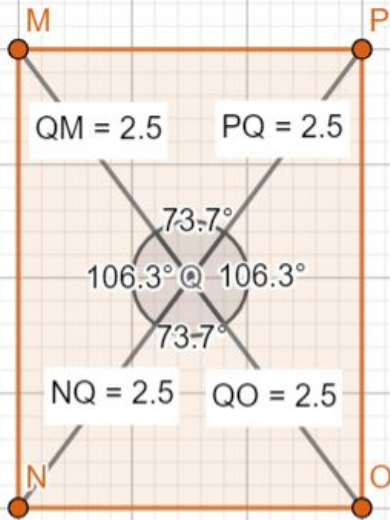
$$IJ \parallel KL \quad ; \quad IL \parallel JK$$

All midsegments are equal in length.

$$IJ = JK = IL = KL = 2.5 \text{ units}$$

Midsegments of a rectangle form a rhombus.

Sides are congruent and there are 2 pairs of parallel sides as mentioned above.



## DIAGONALS OF A RECTANGLE

Opposite angles are equal.

$$\angle MQP = \angle NQO = 73.7^\circ ; \angle OQP = \angle MQN = 106.3^\circ$$

The diagonals bisect each other.

$$MQ = OQ = 2.5 \text{ units} ; NQ = PQ = 2.5 \text{ units}$$

The diagonals are equal in length.

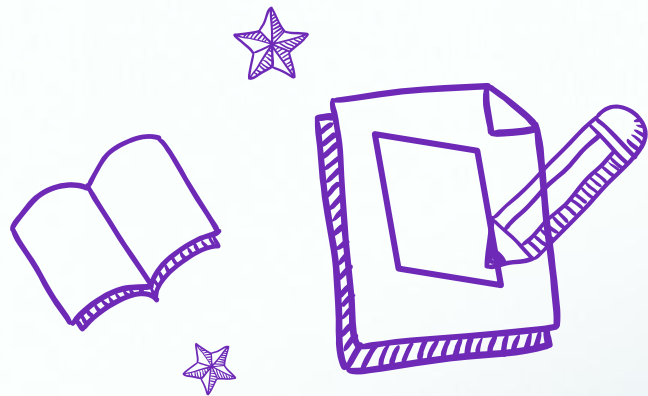
$$NQ = MQ = OQ = PQ = 2.5 \text{ units}$$

Two pairs of congruent triangles are formed.

$$\triangle MQN = \triangle OQP ; \triangle NQO = \triangle PQM$$

Adjacent angles are supplementary.

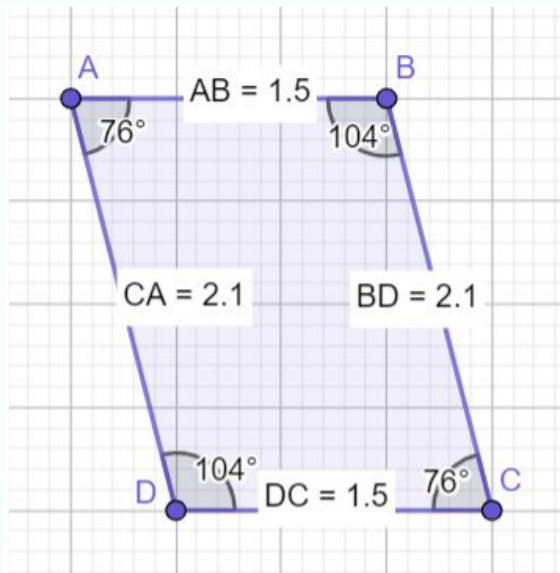
$$\begin{aligned} \angle MQP + \angle OQP &= 180^\circ ; \angle NQO + \angle MQN = 180^\circ \\ 73.7^\circ + 106.3^\circ &= 180^\circ ; 73.7^\circ + 106.3^\circ = 180^\circ \end{aligned}$$



# PARALLELOGRAM

And its characteristics...





## FEATURES OF A PARALLELOGRAM

Opposite sides are equal in length.

$$AB = CD = 1.5 \text{ units} \quad ; \quad BD = AC = 2.1 \text{ units}$$

Opposite angles are equal.

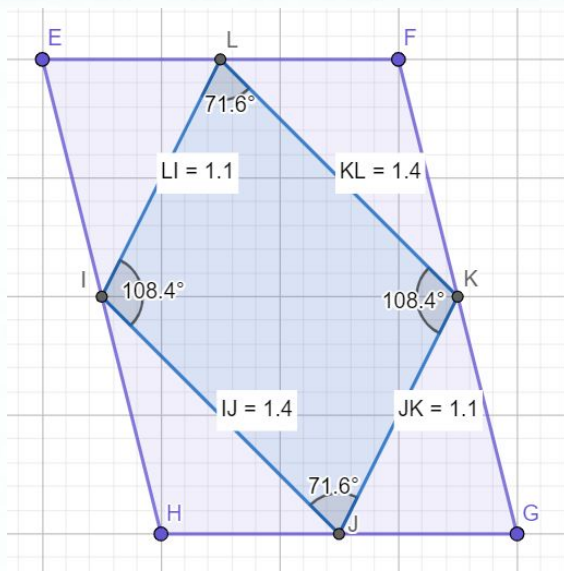
$$\angle A = \angle D = 76^\circ \quad ; \quad \angle B = \angle C = 104^\circ$$

There are 2 pairs of opposite parallel sides.

$$AB \parallel CD \quad ; \quad AC \parallel BD$$

Adjacent angles are supplementary.

$$\begin{aligned} \angle A + \angle C & \quad ; \quad \angle B + \angle D \\ = 76^\circ + 104^\circ & \quad ; \quad = 104^\circ + 76^\circ \\ = 180^\circ & \quad ; \quad = 180^\circ \end{aligned}$$



## MIDSEGMENTS OF A PARALLELOGRAM

The opposite angles formed by the midsegments are equal.

$$\angle IJK = \angle ILK = 71.6^\circ \quad ; \quad \angle JKL = \angle JIL = 108.4^\circ$$

Opposite midsegments are parallel to each other.

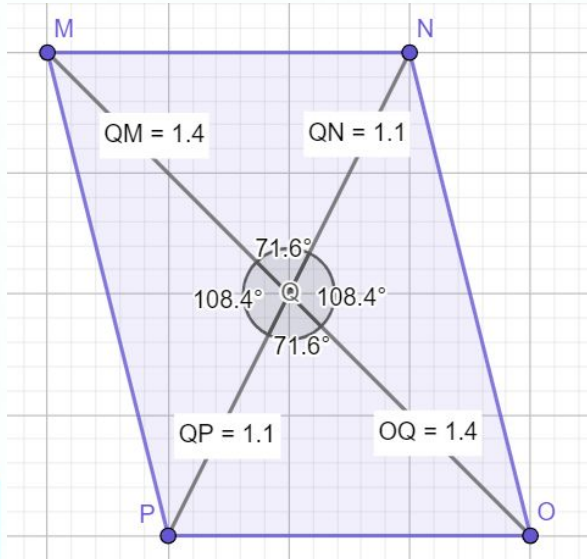
$$IJ \parallel KL \quad ; \quad IL \parallel JK$$

Opposite midsegments are equal in length.

$$IJ = KL = 1.4 \text{ units} \quad ; \quad JK = IL = 1.1 \text{ units}$$

$\therefore$  the midsegments of a parallelogram form another parallelogram.

Opposite angles and sides are congruent.



## DIAGONALS OF A PARALLELOGRAM

Opposite angles are equal.

$$\angle MQN = \angle OQP = 71.6^\circ ; \angle MQP = \angle NQO = 108.4^\circ$$

The diagonals bisect each other.

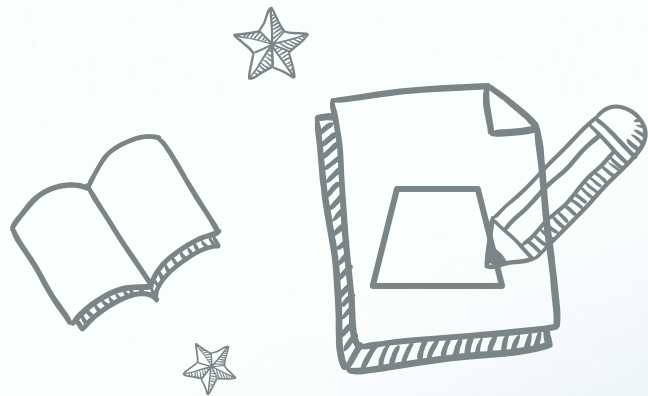
$$MQ = OQ = 1.4 \text{ units} ; NQ = PQ = 1.1 \text{ units}$$

Two pairs of congruent triangles are formed.

$$\triangle MQN = \triangle OQP ; \triangle NQO = \triangle MQP$$

Adjacent angles are supplementary.

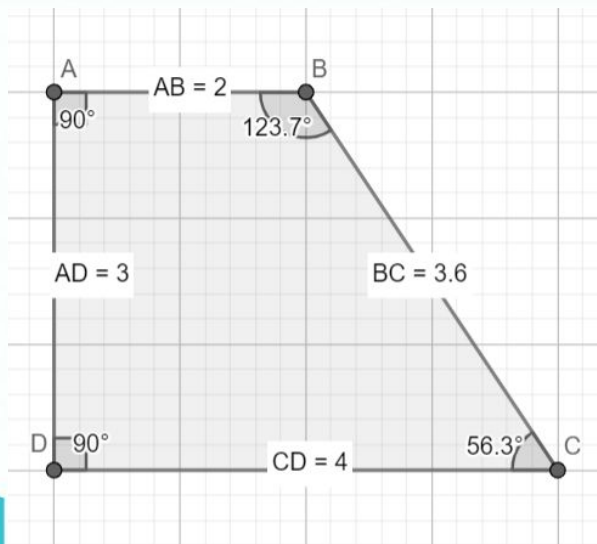
$$\begin{aligned} \angle MQP + \angle OQP & ; & \angle NQO + \angle MQN \\ = 108.4^\circ + 71.6^\circ & ; & = 108.4^\circ + 71.6^\circ \\ = 180^\circ & ; & = 180^\circ \end{aligned}$$



# TRAPEZOID

And its characteristics...





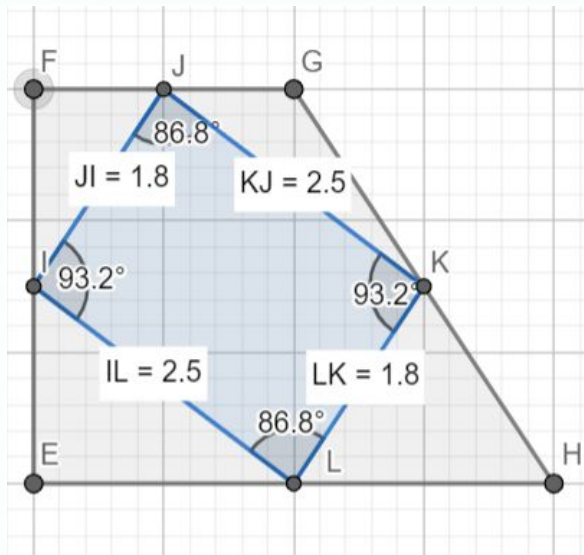
## FEATURES OF A TRAPEZOID

There is only one pair of parallel sides.  
 $AB \parallel CD$

There are different types of trapezoids!  
The most popular ones are listed here-----

- + Right Trapezoid
  - + has a right angle
- + Isosceles Trapezoid
  - + has congruent legs
  - + has two pairs of congruent angles





## MIDSEGMENTS OF A TRAPEZOID

The opposite angles formed by the midsegments are equal.

$$\angle IJK = \angle ILK = 86.8^\circ ; \quad \angle JKL = \angle JIL = 93.2^\circ$$

Opposite midsegments are parallel.

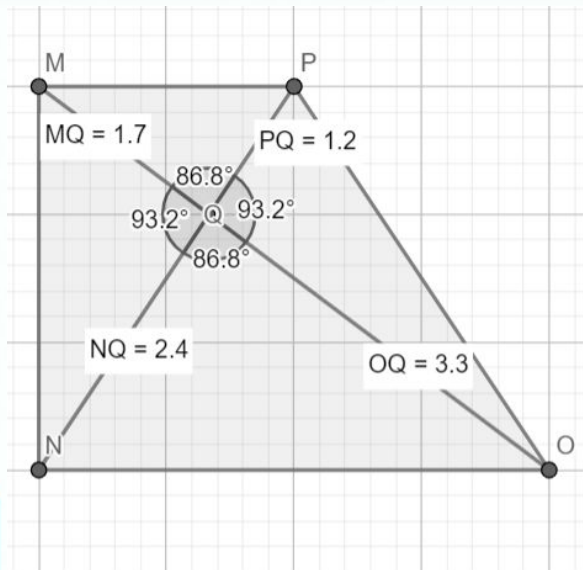
$$IJ \parallel KL ; \quad IL \parallel JK$$

Opposite midsegments are congruent.

$$IJ = KL = 1.8 \text{ units} ; \quad JK = IL = 2.5 \text{ units}$$

Hence, the midsegments of a trapezoid form another parallelogram.

Opposite angles and sides are congruent.



## DIAGONALS OF A TRAPEZOID

Opposite angles are equal.

$$\angle MQN = \angle OQP = 93.2^\circ ; \angle MQP = \angle NQO = 86.8^\circ$$

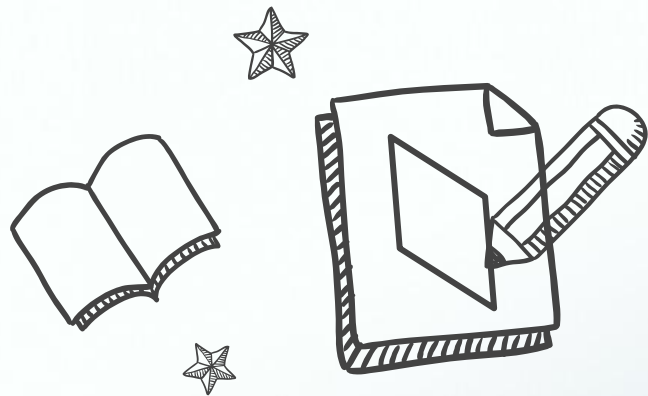
The diagonals do NOT bisect each other.

$$MQ \neq OQ ; PQ \neq NQ$$

Adjacent angles are supplementary.

$$\begin{aligned} \angle MQP + \angle OQP & ; \quad \angle NQO + \angle MQN \\ = 86.8^\circ + 93.2^\circ & ; \quad = 86.8^\circ + 93.2^\circ \\ = 180^\circ & ; \quad = 180^\circ \end{aligned}$$

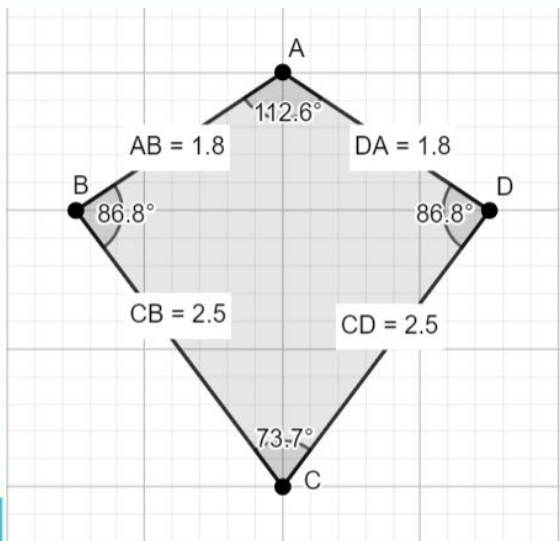
\*Isosceles trapezoid: diagonals are equal in length.  
Only one pair of congruent triangles is created.



# KITE

And its characteristics...





Adjacent sides are equal in length.

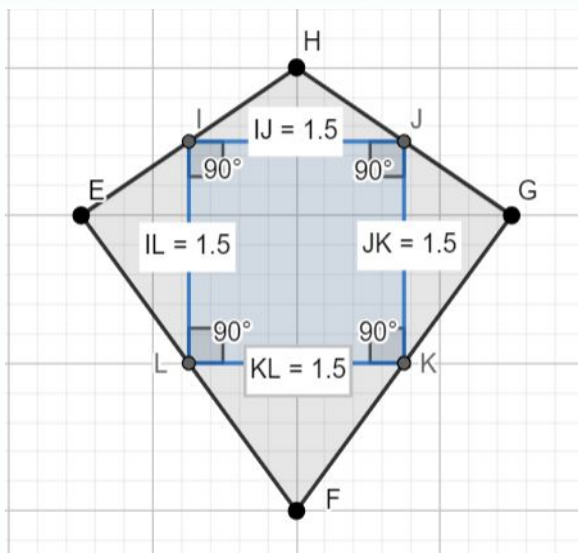
$AB = AD = 1.8$  units ;  $CB = CD = 2.5$  units

There is one pair of congruent angles.

$\angle B = \angle D = 86.8^\circ$

Fun fact... the kite is the only quadrilateral from those in this presentation that can also be concave if in the shape of a dart!

## FEATURES OF A KITE



## MIDSEGMENTS OF A KITE

The midsegments are perpendicular to each other.

$$JK \perp KL ; IJ \perp IL ; KL \perp IL ; JK \perp IJ$$

Angles formed by the midsegments are equal.

$$\angle KML = \angle IML = \angle JMK = \angle IMJ = 90^\circ$$

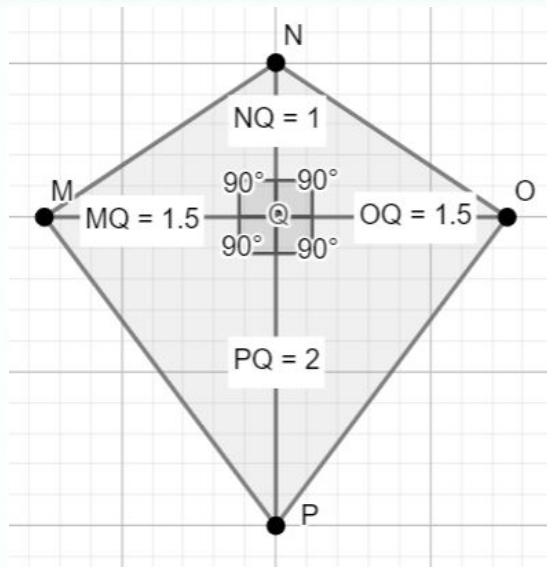
Opposite midsegments are equal in length.

$$JK = IL = 1.5 \text{ units} ; KL = IJ = 1.5 \text{ units}$$

Hence, the midsegments of a kite create a rectangle.

$$JK = IL = 1.5 \text{ units} ; KL = IJ = 1.5 \text{ units}$$

$$\angle KML = \angle IML = \angle JMK = \angle IMJ = 90^\circ$$



## DIAGONALS OF A KITE

The diagonals are sometimes equal in length.  
 $NP = MO = 3$  units

The angles formed by the diagonals are equal.  
 $\angle NQO = \angle OQP = \angle MQN = \angle MQP = 90^\circ$

Only one diagonal is bisected by the other.  
 $MQ = OQ$  ;  $NQ \neq PQ$

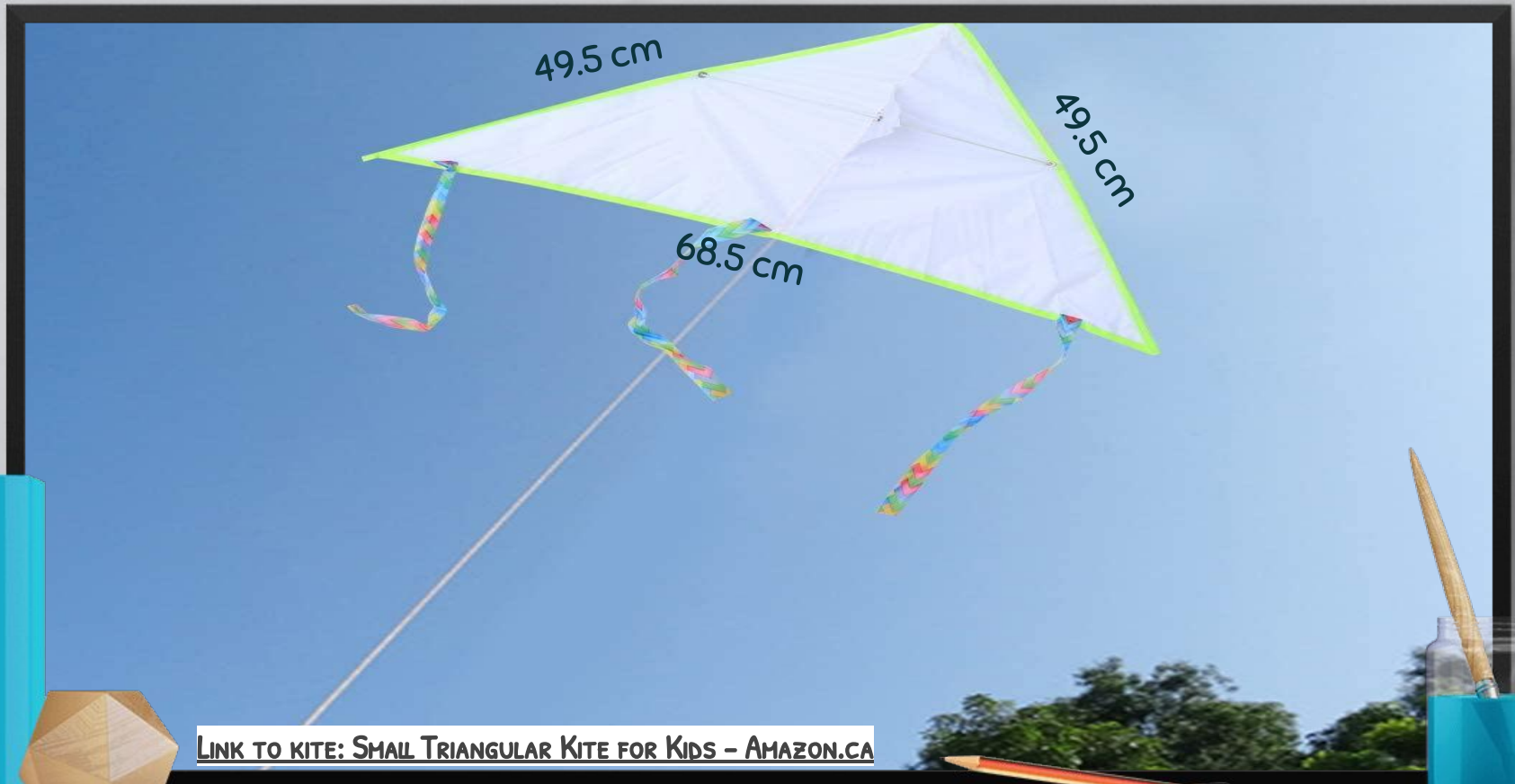
The diagonals are perpendicular to each other.  
 $MO \perp NP$

Two pairs of congruent triangles are formed.  
 $\triangle OQP = \triangle MQP$  ;  $\triangle NQM = \triangle NQO$

# AFTER HOURS 'IN THE STORE'...

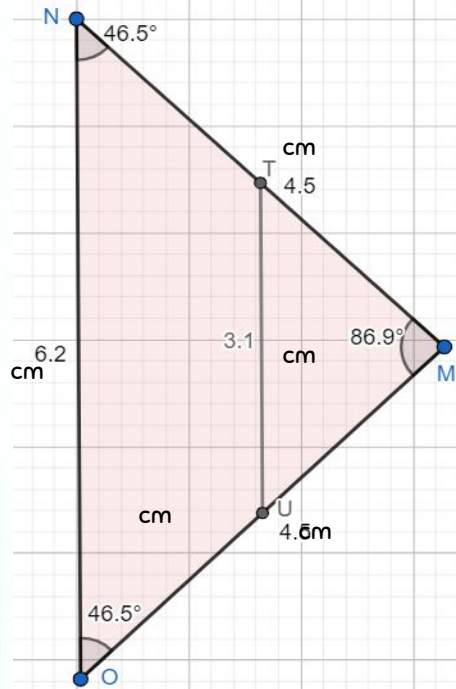
I finally found a triangular kite! ----->





[LINK TO KITE: SMALL TRIANGULAR KITE FOR KIDS - AMAZON.CA](#)





Original dimensions: 68.5cm , 49.5 cm

Ratioed dimensions: 6.2cm , 4.5cm

Ratio  
1:11

The plastic rod is the midsegment connecting sides MN and MO. It is parallel to Side NO. We know that the midsegment of a triangle is half in length of its parallel. Hence, segment TU is half of NO.

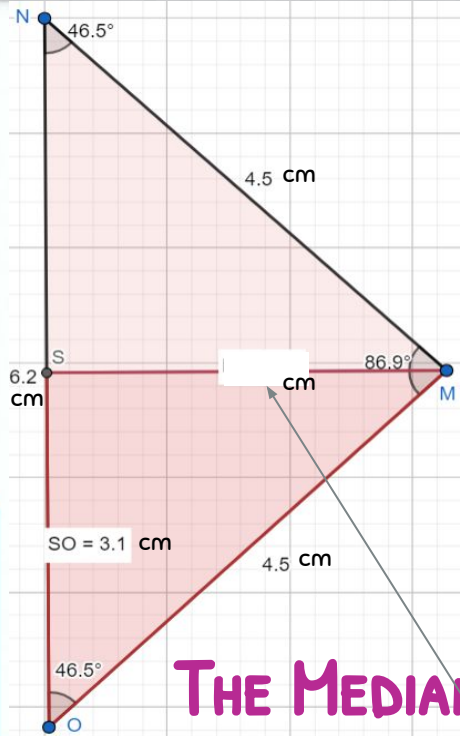
$$TU = \frac{1}{2} NO$$

$$TU = \frac{1}{2} (6.2)$$

$$TU = 3.1$$

∴ the plastic rod is 3.1 cm in the diagram. In reality it would be (3.1 x 11) 34.1 cm.

## LENGTH OF THE PLASTIC ROD OF THIS KITE



THE MEDIAN  
OF THIS  $\triangle$ .

Original dimensions: 68.5cm , 49.5 cm

$$\downarrow \div 11 \quad \downarrow \div 11$$

Ratioed dimensions: 6.2cm , 4.5cm

The **pythagorean theorem** can find the length of a missing side in a right triangle. The formula goes like this:  $a^2 + b^2 = c^2$  where a and b are the base and height. In the dark shaded triangle, we are given the value of a and c. If we **sub in...**

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

$$(3.1)^2 + b^2 = (4.5)^2$$

$$9.61 + b^2 = 20.25$$

$$b^2 = 10.64$$

$$b \approx 3.3$$

$\therefore$  The median of the plastic rod is around 3.3 cm.



JAZAK ALLAHU KHAIRUN!

الْحَمْدُ لِلَّهِ

