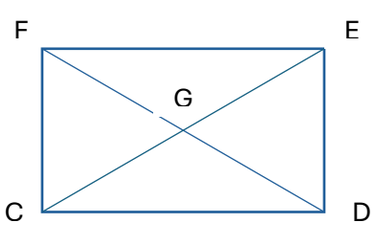
**MTAP SATURDAY PROGRAM IN MATHEMATICS GRADE 9 SESSION 4**
**PROPORTION/PARALLELOGRAM**

A. Determine if each statement is true or false. Write T on the space provided if the statement is true and F if it is false.

_____1. All squares are rectangles.
_____2. The diagonals of a rectangle are congruent.
_____3. Not every rectangle is a rhombus.
_____4. Parallelograms have four sides.
_____5. All parallelograms are rhombus.
_____6. The diagonals of a rhombus are perpendicular.
_____7. Rectangles are always square.
_____8. The diagonals of a square are are perpendicular.
_____9. Parallelogram is always a square.
_____10. A square is an equilateral and equiangular polygon.
_____11. All rhombi are rectangles.
_____12. A rectangle is an equiangular polygon.
_____13. Squares are sometimes rhombi.
_____14. The diagonals of a rhombus are never congruent.
_____15.Rectangles are always parallelogram.
_____16. A kite has one pair of opposite angles that are congruent.
_____17. An isosceles trapezoid has congruent legs.
_____18. A trapezoid has exactly one pair of parallel sides.
_____19. A kite has two distinct pairs of adjacent congruent sides.
_____20. The area of a kite is determined using its diagonals.

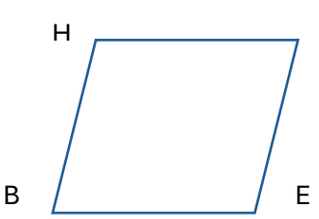
B. Carefully examine each of the given quadrilaterals . Then, answer the questions that follow.

1.



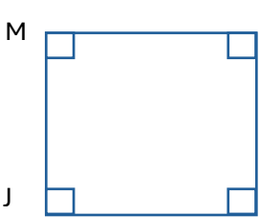

CDEF is a rectangle. Solve each.
a. $CG = 5x + 2 \; and \; EG = 3x + 20. \; Find \; FD.$
b. $FD = 4(x + 1) \; and \; CE = 3(x + 4). \; Find \; GC.$
c. $CF = 4x + 20 \; and \; DE = 6x \; - \; 50. \; Find \; CF.$

2.




BETH is a rhombus. Solve each.
a . $If \; m\angle B = 2x + 20 \; and \; m\angle H = \; 6x, what \; is \; m\angle T$
b. $If \; m\angle HTE = 3x - 10 \; and \; m\angle HBE = 4x \; - \; 40,$
$what \; is \; m\angle HTB?$

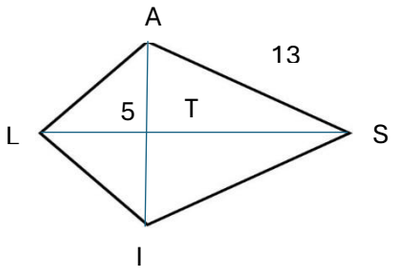
3.




JKLM is a square. Solve each.
a. $If \; ML = 2x - 1 \; and \; JK = 4x - 11, find \; its \; perimeter$
b. $If \; MJ = 2x + 1 \; and \; JK = x + 4, find \; its \; area.$

4.


ABCD is a trapezoid with a median $\overline{EF}$
a. $If \; DC = 2x + 10, AB = 3x + 20, and$
$EF = 4x, what \; is \; EF?$
b. $If \; DC = 2x + 3, EF = 6x, and \; AB = 8x + 5,$
$what \; is \; AB?$

5. 


Quadrilateral LISA is a kite with diagonals $\overline{LS}$ and $\overline{AI}$.
If $\overline{AS} = 13, \overline{LT} = 5, and\ \overline{IT} \cong \overline{LT}, find\ the\ following.$

a. $The\ area\ of\ kite\ LISA$

b. $The\ perimeter\ of\ kite\ LISA.$

C. Find the value of $x$ in each of the following:

1. $3:5 = x:10$ 3. $18:(x+2) = 6:1$ 5. $5:12 = (x+2):(3x+6)$
2. $2:x = 6:15$ 4. $(x-1):8 = 3:(x+4)$ 6. $4(x+1):(x+5) = 8:3$

D. Find the positive mean proportional between each pair of numbers below:

1. 3 and 12 2. 5 and 20 3. 7 and 28 4. 6 and 24 5. 10 and 40 6. 18 and 50

E. Solve the following problems.

1. What is the length of a diagonal of a television screen if the screen is $408\ mm$ wide and $544\ mm$ high? Give your answer to the nearest centimeter.
2. One side of a triangle is $36\ m$ long. The side opposite the right angle is $50\ m$ long. Find the length of the third side.
3. A plane is flying at an altitude of $30{,}000\ m$. The horizontal distance of the plane to the airport is $10\ km$. What distance is the plane from the airport if it flies directly in a straight line towards the airport?
4. The ratio of the angles in a triangle is 3:4:5. Find the measure of each angle.
5. In a school, the number of boys is fewer than the number of girls by 120. If every group of 7 boys is matched with 8 girls, all students will be grouped without leftovers. How many students are there in total?
6. **KITE** is a park shaped like an isosceles trapezoid. The perimeter of the park is **100 cm**. The legs of the park, **KI** and **TE**, are congruent and each measure $(2x+4)\ cm$. The bases are $IT = x\ cm$ and $KE = (x+2)\ cm$. What are the lengths of all the sides of the park?
7. Quadrilateral ABCD is an isosceles trapezoid with $AD \cong BC$. If $m\angle A = x + 30$ and $m\angle B = 3x - 10$, what is $m\angle B$?
8. What is the area of a kite with diagonals 18 and 24?

**Challenge!**

1. TIME is a trapezoid with $\underline{TI} \parallel \underline{EM}$ and its median is $\underline{JK}$ which divides the area of the trapezoid in the ratio 2:5. Find the of $\underline{TI}\ to\ \underline{EM}$,
2. Points U,H,R,A divide the sides of a rectangle in the ratio 1:2 with the points U,H,R,A being nearer to E,P,O,I respectively. Find the ratio of the area of rectangle to the area of a parallelogram UHRA.
3. STAR is a square and $\Delta STR$ is an equilateral triangle outside the square. Find the measure of $\angle RBA$.

Figure for number 1

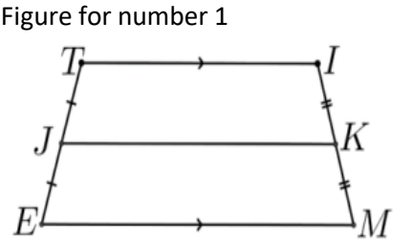



Figure for number 2

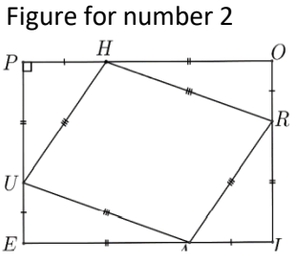
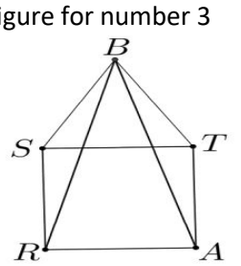



Figure for number 3

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