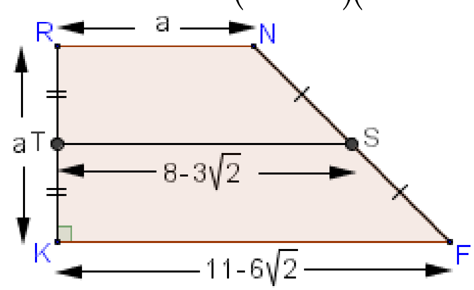
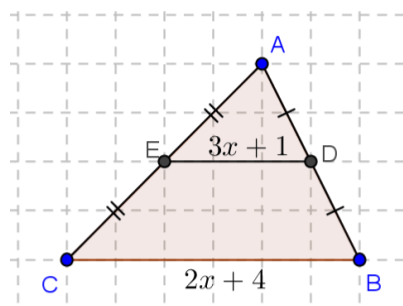
A- Given the numbers: $S=\left(2-3\sqrt{2}\right)^2-\left(3-\sqrt{2}\right)^2$ *and* $W=\left(5+\sqrt{2}\right)\left(4-2\sqrt{2}\right)$. *(5-pts)*

1. Simplify the numbers $S\,\&\,W$.
2. Verify that $S-W$, is an integer.
3. Now, consider the right trapezoid $RNFK$.
   - *i.* What does the segment TS represent?
   - *ii.* Compute the value of a.
   - *iii.* Work out the area of trapezoid $RNFK$, and write your answer in the form $x+y\sqrt{2}$.



B- Consider the triangle ABC.

1. For what values of x is $[BC]$ valid?
2. Is $[ED]$ defined for every natural integer? Justify.
3. Calculate the numerical value of x for which $E\,\&\,D$ are the respective midpoints of $[AC]\,\&\,[AB]$.
4. Form this part on, let $x=\dfrac{1}{2}$ and F be the orthogonal projection of A on $[BC]$, (AF) cuts (ED) at K.
   - *i.* What is the relative position of (AF) with respect to $[AF]$?
   - *ii.* What is the nature of triangle AEK ?
   - *iii.* Find area of trapezoid $BCED$ in two different ways, take $AF=8cm$.



C- Consider a circle (*C*) of center *O*, and radius 5cm, and diameter [*AB*]. Let (*xy*) be the tangent at *A* to (*C*), and *M* is a variable point on (*C*). (*MP*) is the perpendicular to [*AB*] and (*MQ*) is the perpendicular to (*xy*)

- *a.* Draw figure an then show that *AM=PQ*.
- *b.* *I* is the midpoint of [*AM*].
  - *i.* Show that *OIA* is a right triangle at *I*.
  - *ii.* Find the locus of *I*, when *M* moves on (*C*).
- *c.* Show that [*MA*) is the bisector of angle *QMO*.
- *d.* [MO]& [BI] intersect at *G*.
  - *i.* What is the relative position of G with respect to the triangle *AMB*
  - *ii.* Find the locus of *G*, as *M* describes (*C*).

Mastering problems		
Chapter	*Exercises*	*Pages*
CH-: midpoint theorem	1,3,5 & 8	169