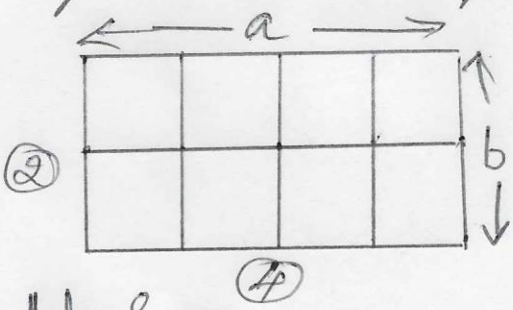
Chapter (10) T.B. p-616.

Areas of Parallelograms and Triangles. 10.1

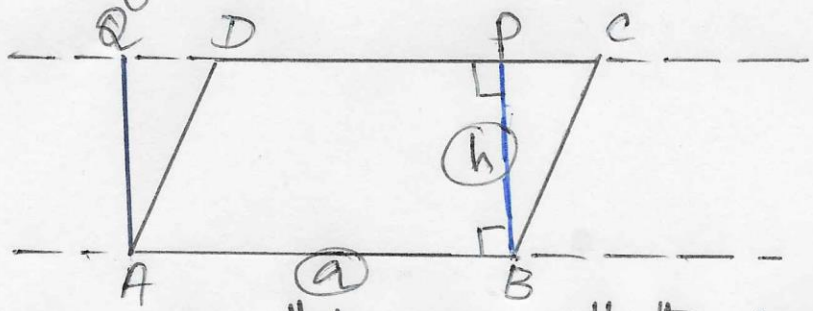
Rectangle:



$A = 4 \times 2 = 8$

$A = a \cdot b$

Area of a parallelogram:

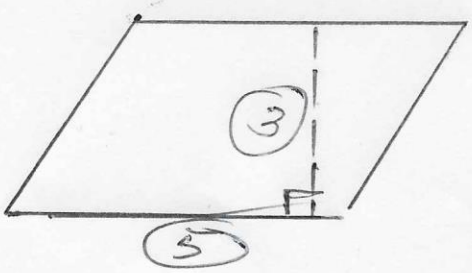


Areas of parallelograms with the same base and between the same parallels is the same.

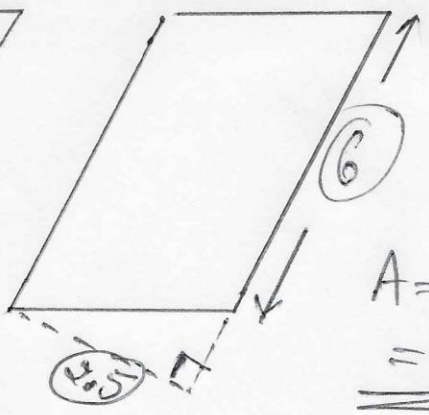
So ar (ABCD) = ar (ABPQ)

But area of ABPQ, rectangle is ab

∴ Area of parallelogram → $A = ab$

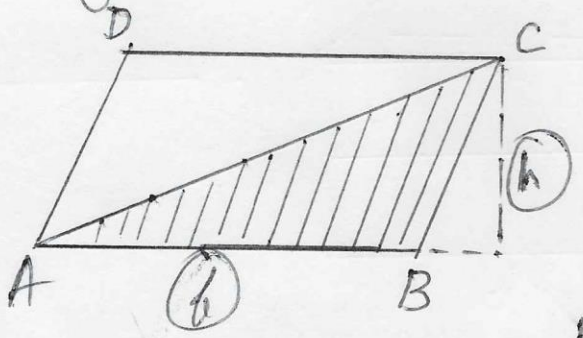


$A = 5 \times 3$
$= 15$ sq. units



$A = 6 \times 2.5$
$= 15$ sq. units

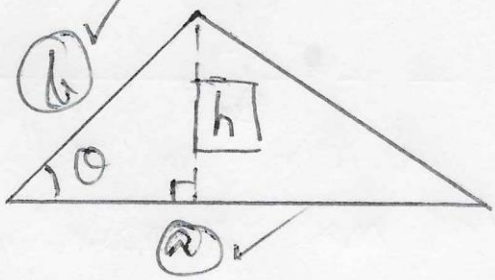
Area of a triangle. (Page 618)



$$Ar(ABC) = \frac{1}{2}(Ar(ABCD))$$

$$A = \frac{1}{2}bh$$

When two sides and included angle given:
(height not given)



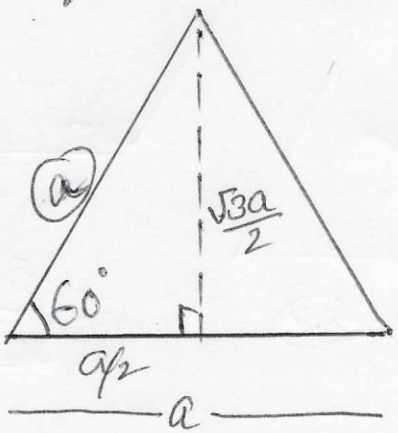
$$\sin\theta = \frac{h}{b}$$

$$h = b\sin\theta$$

Now $A = \frac{1}{2}ah$

$$= \frac{1}{2}a \cdot b\sin\theta$$

Area of equilateral △

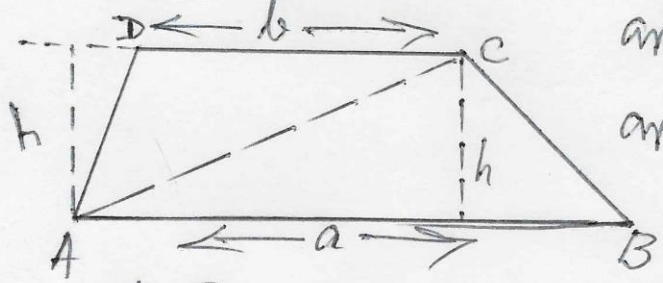


$$A = \frac{1}{2}a \cdot \frac{\sqrt{3}a}{2}$$

$$= \frac{\sqrt{3}}{4}a^2$$

10.2 Areas of Trapezoids, Rhombuses and Kites.

① Trapezoid:



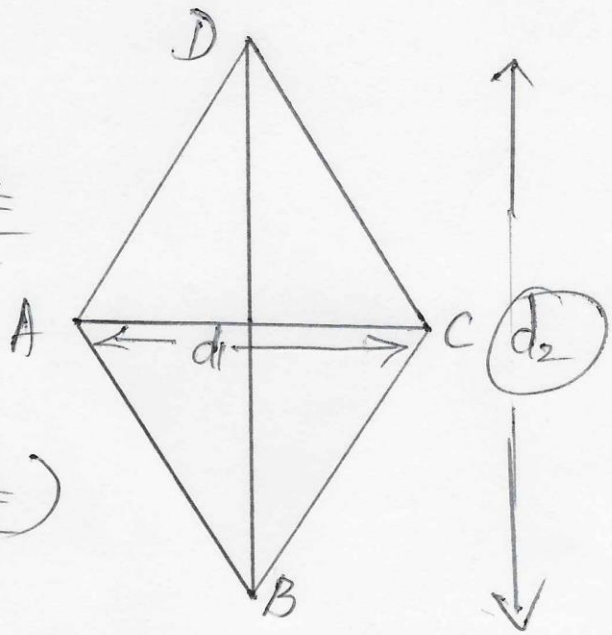
$ar(ABC) = \frac{1}{2}ah$

$ar(ACD) = \frac{1}{2}bh$

$Ar(ABCD) = \frac{1}{2}ah + \frac{1}{2}bh = \frac{1}{2}h(a+b)$

or $\left(\frac{a+b}{2}\right)h$

② Rhombus



$ar(ACD) = \frac{1}{2} d_1 \cdot \frac{d_2}{2}$

$ar(ABCD)$

$= 2 \times \left(\frac{1}{2} d_1 \frac{d_2}{2}\right)$

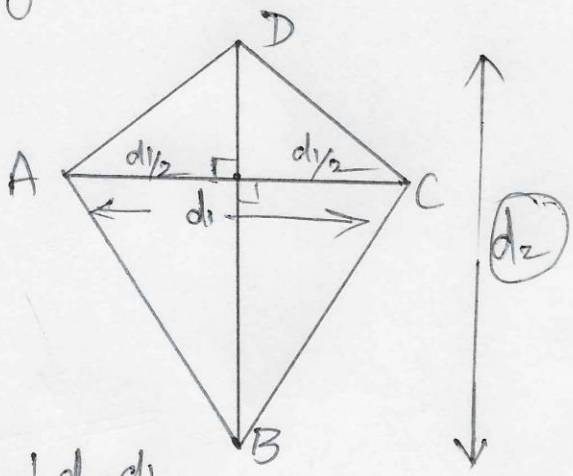
$= \boxed{\frac{d_1 d_2}{2}}$

↳ Half the product of the diagonals.

Note: Rhombus is a parallelogram too.

$A = bh$

Area of a Kite



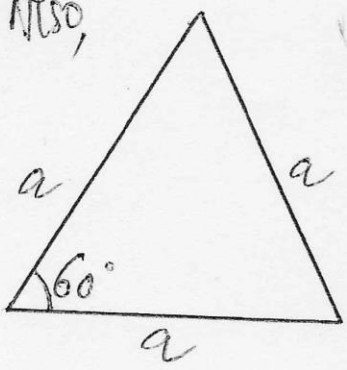
$ar(ABD) = \frac{1}{2} d_2 \cdot \frac{d_1}{2}$

$ar(ABCD) = 2 \times \left(\frac{1}{2} d_2 \frac{d_1}{2}\right)$

$$A = \frac{d_1 d_2}{2}$$

Problems

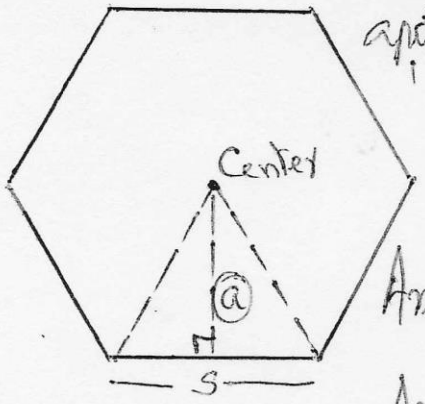
Also,



$$A = \frac{1}{2} a \cdot a \cdot \sin 60$$

$$= \frac{1}{2} a^2 \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4} a^2$$

Area of a Regular Polygon



Side = s

apothem, a

n' sides

Area of one triangle $= \frac{1}{2} s a$

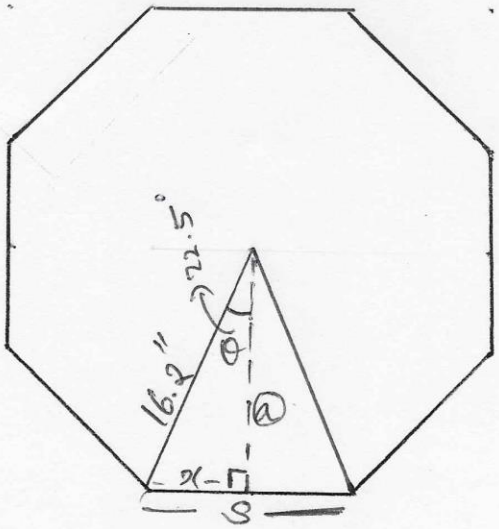
Area of the polygon $= \frac{1}{2} s \cdot a \cdot n$

But $s \cdot n = P$, perimeter

$$A = \frac{1}{2} P a$$

Problem:

Area of the stop sign when radius alone given:



- Central angle $= \frac{360}{8} = 45°$

$$\theta = 22.5°$$

$$\sin\theta = \frac{x}{16.2} \Rightarrow x = 16.2 \sin\theta$$

$$\cos\theta = \frac{a}{16.2} \Rightarrow a = 16.2 \cos\theta$$

$$s = 2x$$

$$A = \frac{1}{2} 8 \cdot 2x \cdot a$$

$$\sim 742 \text{ sq in}$$