Welcome Back!

Warm-up:

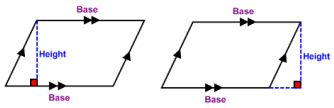
- Pick up Area packet and Warm-Up Sheet
- Slide next to shoulder partner and share with them the following:
  - > your name
  - > one fun thing you did on break
  - > one thing you know about area
  - > be prepared to share out to the class

Reminders:

- Only 33 days left in the school year (plus 3 are late starts)!
- Bellwork is to help introduce or reinforce lesson
- Review packets are to help prepare for test
- Only 2 more chapters to go!

Area of Parallelograms

AREA OF A PARALLELOGRAM

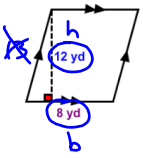


2 cm x 4 cm
8 cm²

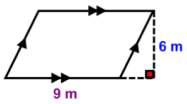
The height can be inside or outside of the parallelogram.
Area is always measured in $units^2$.

AREA OF A PARALLELOGRAM = (base)(height)

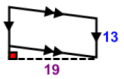
Find the area of the parallelogram.

1. 

96 yd²

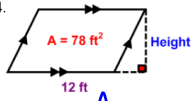
2. 

54 m²

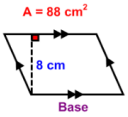
3. 

247 units²

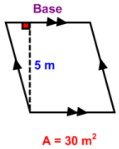
Find the missing measure of the parallelogram (working backwards using the area of parallelogram).

4. 

$h = \frac{A}{b}$
$h = \frac{78}{12}$
$h = 6.5$ ft

5. 

b = 11cm

6. 

b = 6m

Finding Perimeter and Area of a Parallelogram

Perimeter
Perimeter = sum of all the measures of its sides.
Perimeter = 2(32) + 2(24)
Perimeter = 112 in.

$P = 2l + 2w$

Area of Parallelogram

Step 1: Find the height of the parallelogram by using the properties of a $30° - 60° - 90°\Delta$.
ΔAED is a right triangle where $\overline{AD}$ is the hypotenuse.

$Hypotenuse = 2 \bullet Short\ Leg$
$Long\ Leg = Short\ Leg \bullet \sqrt{3}$

Using $Hypotenuse = 2 \bullet Short\ Leg$ ..... $24 = 2 \bullet Short\ Leg$

$\frac{24}{2} = \frac{2 \bullet Short\ Leg}{2}$

$12 = Short\ Leg$

Step 2: Then can find the height of parallelogram $ABCD$ by using $Long\ Leg(Height) = Short\ Leg \bullet \sqrt{3}$.

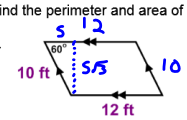
$Long\ Leg(Height) = 12\sqrt{3}$

Step 3: Find the area of the parallelogram by using $base \bullet height$.

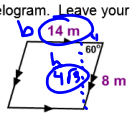
$32 \cdot 12\sqrt{3}$

$Area\ of\ parallelogram$
$Area\ of\ parallelogram\ \ ABCD = 384\sqrt{3}\ in^2$

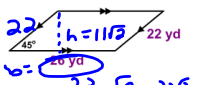
Find the perimeter and area of the parallelogram. Leave your answer in radical form.

7. 

b = 12
$h = 5\sqrt{3}$
$A = 12 \cdot 5\sqrt{3}$
$A = 60\sqrt{3}$ ft²
P = 44 ft

8. 

$A = 14 \cdot 4\sqrt{3}$
$A = 56\sqrt{3}$ m²
P = 44m

9. 

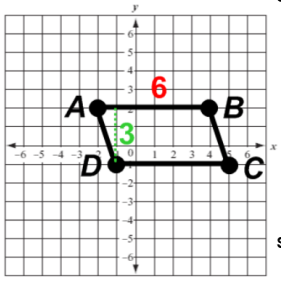
$h = \frac{22}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{22\sqrt{2}}{2}$
$= 11\sqrt{2}$
$A = 26 \cdot 11\sqrt{2}$
$A = 286\sqrt{2}$ yd²
P = 96yd

Parallelograms on the Coordinate Plane

Example

Given the coordinates of the vertices of a quadrilateral, determine whether the quadrilateral is a square, a rectangle, or a parallelogram. Then find the area.

A(-2, 2), *B*(4, 2), *C*(5, -1) and *D*(-1, 1).



Step 1: Determine the slope of each side to find the specific quadrilateral.

$\text{slope of } \overline{AB} = \frac{2-2}{4-(-2)} = 0$ $\text{slope of } \overline{CD} = \frac{-1-(-1)}{-1-5} = 0$

$\text{slope of } \overline{AD} = \frac{2-(-1)}{-2-(-1)} = -3$ $\text{slope of } \overline{BC} = \frac{-1-2}{5-4} = -3$

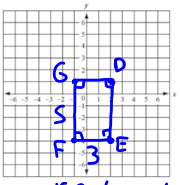
Opposite sides have the same slopes. The slopes of consecutive sides are not negative reciprocals of each other, so consecutive sides are not perpendicular. Therefore *ABCD* is a parallelogram and not a rectangle or a square.

Step 2: Use the distance formula or just count the number of spaces to find the base and height.

Area of Parallelogram $= 6 \bullet 3 = 18\ units^2$

---

14. D(2, 1), E(2, -4), F(-1, -4), and G(-1, 1)

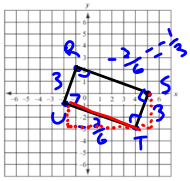


horiz. = 0 slope
vert. = undefined slope

rectangle

A = 15 units²

15. R(-1, 2), S(5, 0), T(4, -3), and U(-2, -1)



$-\frac{2}{6} = -\frac{1}{3}$

Rectangle

$A = \sqrt{40} \cdot \sqrt{10}$

$A = \sqrt{400} = 20$

$= 20u^2$

$UT^2 = 2^2 + 6^2$

$UT^2 = 40$

$UT = \sqrt{40}$

$ST^2 = 1^2 + 3^2$

$ST^2 = 10$

$ST = \sqrt{10}$