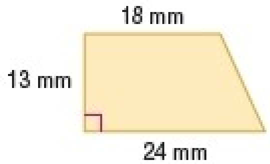
ORGANIZE IDEAS Find the area of each trapezoid, rhombus, or kite.

8. 

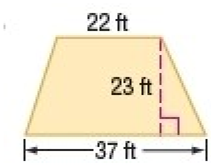
SOLUTION:

$h = 13$, $b_1 = 18$ and $b_2 = 24$

$$A = \frac{1}{2}(b_1 + b_2)h$$
$$= \frac{1}{2}(18 + 24)13$$
$$= \frac{13}{2}(42)$$
$$= 273$$

ANSWER:

273 mm^2

9. 

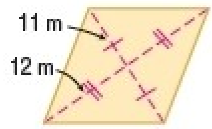
SOLUTION:

$h = 23$, $b_1 = 22$ and $b_2 = 37$

$$A = \frac{1}{2}(b_1 + b_2)h$$
$$= \frac{1}{2}(22 + 37)23$$
$$= \frac{23}{2}(59)$$
$$= 678.5$$

ANSWER:

678.5 ft^2

10. 

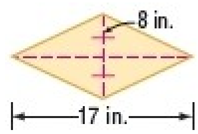
SOLUTION:

$d_1 = 22$ and $d_2 = 24$

$$A = \frac{1}{2}(d_1 \times d_2)$$
$$= \frac{1}{2}(22 \times 24)$$
$$= \frac{1}{2}(528)$$
$$= 264$$

ANSWER:

264 m^2

11. 

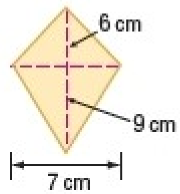
SOLUTION:

$d_1 = 16$ in. and $d_2 = 17$ in.

$$A = \frac{1}{2}(d_1 \times d_2)$$
$$= \frac{1}{2}(16 \times 17)$$
$$= \frac{1}{2}(272)$$
$$= 136$$

ANSWER:

136 in^2

12. 

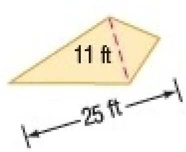
SOLUTION:

d_1 = 7 cm. and d_2 = 6 + 9 = 15 cm

$$\begin{aligned} A &= \frac{1}{2}(d_1 \times d_2) \\ &= \frac{1}{2}(7 \times 15) \\ &= \frac{1}{2}(105) \\ &= 52.5 \end{aligned}$$

ANSWER:

52.5 cm^2

13. 

SOLUTION:

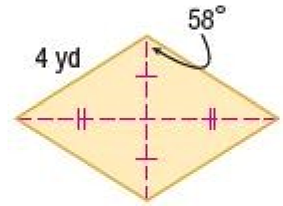
d_1 = 11 ft. and d_2 = 25 ft

$$\begin{aligned} A &= \frac{1}{2}(d_1 \times d_2) \\ &= \frac{1}{2}(11 \times 25) \\ &= \frac{1}{2}(275) \\ &= 137.5 \end{aligned}$$

ANSWER:

137.5 ft^2

DIMENSIONAL ANALYSIS Find the perimeter and area of each figure in feet. Round to the nearest tenth, if necessary.

30. 

SOLUTION:

Both diagonals are perpendicular bisectors, so the figure is a rhombus and all four triangles are congruent. All of the sides are 12 feet, so the perimeter is 48 feet.

Use trigonometry to find the lengths of the diagonals.

$$\begin{aligned} \sin x &= \frac{\text{opposite}}{\text{hypotenuse}} \\ \sin 58 &= \frac{x}{4} \\ 4\sin 58 &= x \\ 8\sin 58 &= 2x \\ 8\sin 58 &= d_1 \end{aligned}$$

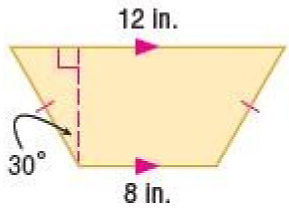
$$\begin{aligned} \cos y &= \frac{\text{adjacent}}{\text{hypotenuse}} \\ \cos 58 &= \frac{y}{4} \\ 4\cos 58 &= y \\ 8\cos 58 &= 2y \\ 8\cos 58 &= d_2 \end{aligned}$$

Now find the area.

$$\begin{aligned} A &= \frac{1}{2}d_1 d_2 \\ A &= \frac{1}{2}(8\sin 58)(8\cos 58) \\ A &= 14.4\text{yd}^2 \\ A &= 14.4 \times 9 \\ A &= 129.4\text{ft}^2 \end{aligned}$$

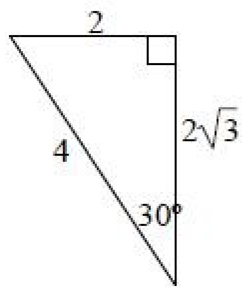
ANSWER:

48 ft; 129.4 ft^2

31. 

SOLUTION:

Use the 30-60-90 triangle to find the dimensions of the isosceles trapezoid. The base of the triangle is 0.5 (12 – 8) = 2.



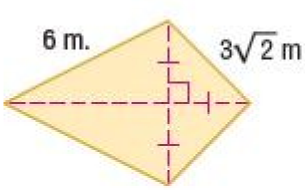
Don't forget to use dimensional analysis to convert the units to feet.

$$\begin{aligned} P &= 2(4)+8+12 \\ &= 28\text{in} \\ &= \tfrac{28}{12}\text{ft} \\ &\approx 2.3\text{ft} \end{aligned}$$

$$\begin{aligned} A &= \tfrac{1}{2}(b_1+b_2)h \\ &= \tfrac{1}{2}(12+18)\left(2\sqrt{3}\right) \\ &= 30\sqrt{3} \\ &= \frac{30\sqrt{3}}{144}\text{in}^2 \\ &\approx 0.24\text{ft}^2 \end{aligned}$$

ANSWER:

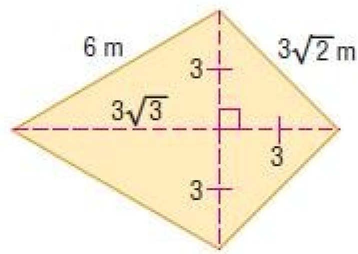
2.3 ft; 0.24 ft^2

32. 

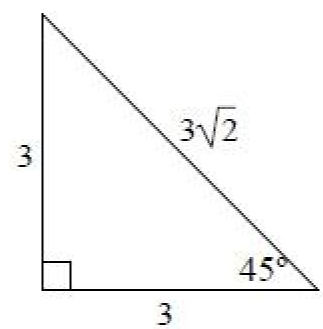
SOLUTION:

The figure is a kite because one of the diagonals is a perpendicular bisector. Find the perimeter. Convert the units to feet.

$$\begin{aligned} P &= 6+6+3\sqrt{2}+3\sqrt{2} \\ &= 12+6\sqrt{2}\text{m} \\ &= \frac{12+6\sqrt{2}\text{m}}{1}\cdot\frac{1.1\text{yd}}{1\text{m}}\cdot\frac{3\text{ft}}{1\text{yd}} \\ &\approx 67.6\text{ft} \end{aligned}$$



Use the 45-45-90 triangle to find the lengths of the congruent parts of the diagonals.



d_1 = 3 + 3 = 6

Use the Pythagorean theorem to find the other piece of d_2.

$$\begin{aligned} a^2+b^2 &= c^2 \\ 3^2+b^2 &= 6^2 \\ b^2 &= 6^2-3^2 \\ b^2 &= 36-9 \\ b &= \sqrt{27} \\ b &= 3\sqrt{3} \end{aligned}$$

$$d_2 = 3+3\sqrt{3}$$

Now find the area of the kite.

$A = \frac{1}{2}d_1d_2$

$A = \frac{1}{2}(6)\left(3 + 3\sqrt{3}\right)$

$A = 9 + 9\sqrt{3}\text{m}^2$

$A = \frac{9+9\sqrt{3}\text{m}^2}{1} \cdot \frac{(1.1)^2\text{yd}^2}{1\text{m}^2} \cdot \frac{3^2\text{ft}^2}{1\text{yd}^2}$

$A \approx 267.8$

ANSWER:

67.6 ft; 267.8 ft^2