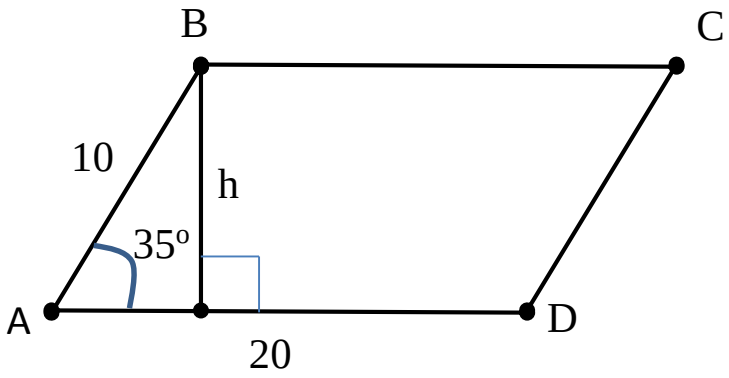
Answer on Question #57001 – Math – Geometry

Question

Find the height of a parallelogram with 10 sides and 20 inches long, and an included angle of 35 degrees. Also, calculate the area of the figure.

Solution



From the rectangle triangle we can find h:

$$\sin(35°) = \frac{h}{AB}$$

$$h = AB \cdot \sin(35°) = 10\sin(35°)$$

Now, the area of parallelogram is given by

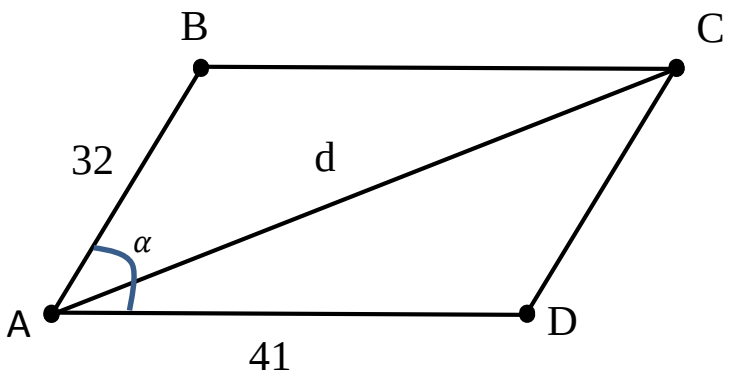
$$S = AD * h = 20 * 10\sin(35°) = 200 * \sin(35°) \approx 114.72$$

Answer: $10\sin(35°)$ in, 114.72 in^2

Question

A certain city block is in the form of a parallelogram. Two of its sides measures 32 ft and 41 ft. If the area of the land in the block is 656 ft^2, what is the length of its longer diagonal?

Solution



We know the formula of area of parallelogram:

$S = AB * AD * \sin(\alpha)$,

hence

$$\sin(\alpha) = \frac{S}{AB*AD} = \frac{656}{32*41} = 0.5,$$

therefore

$$\alpha = 30°$$

Using the cosine rule a larger diagonal is equal to

$d = \sqrt{AB^2 + BC^2 - 2 \cdot AB \cdot BC \cdot cos(180^\circ - \alpha)} ==$

$\sqrt{AB^2 + AD^2 + 2 * AB * AD * \cos\alpha} = \sqrt{1024 + 1681 + 1312 * 0.866} \approx 62,$

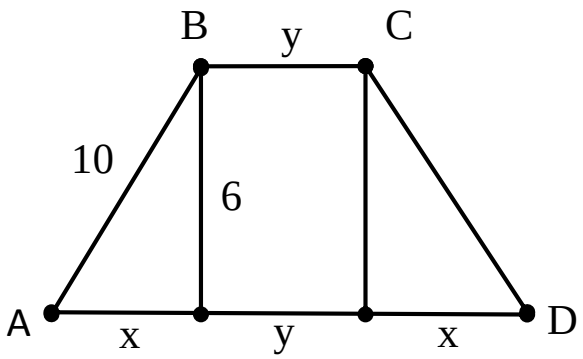
BC and *AD* are congruent, $cos(180^\circ - \alpha) = -cos(\alpha)$.

Answer: 62 ft.

Question

The area of an isosceles trapezoid is 246 m^2. If the height and the length of one of its congruent sides measures 6m and 10m, respectively, find the length of the two bases.

Solution



We can find x using the Pythagorean Theorem from the rectangle triangle:

$$10^2 = x^2 + 6^2$$

$$x = \sqrt{100 - 36} = 8$$

Area of trapezoid is given by

$$S = \frac{1}{2}(BC + AD)h = \frac{1}{2}(2x + 2y)h$$

$$S = (x + y) \cdot 6 = 246,$$

hence

$$x + y = 41$$

$$y = 41 - x = 33$$

So

$$BC = y = 33, \qquad AD = y + 2x = 33 + 2 \cdot 8 = 49$$

Answer: 33 m, 49 m.