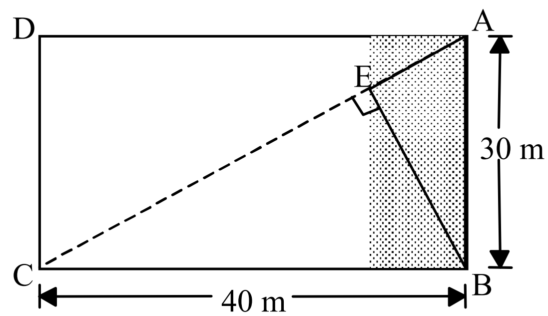
Answers

1 3.60 m

2 The length of diagonal BD is **25** cm.

3



Measure of segment AC

Pythagorean theorem

$$m\,\overline{AC} = \sqrt{(m\,\overline{BC})^2 + (m\,\overline{AB})^2}$$
$$m\,\overline{AC} = \sqrt{40^2 + 30^2}$$
$$m\,\overline{AC} = 50\text{ m}$$

Measure of segment BE

In a right triangle, the product of the measures of the legs is equal to the product of the measures of the hypotenuse and the altitude drawn to the hypotenuse.

$$m\,\overline{AB} \times m\,\overline{BC} = m\,\overline{AC} \times m\,\overline{BE}$$
$$30 \times 40 = 50 \times m\,\overline{BE}$$
$$m\,\overline{BE} = 24\text{ m}$$

Measure of segment AE

Pythagorean theorem

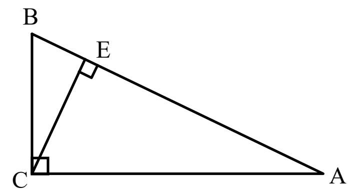
$$m\,\overline{AE} = \sqrt{(m\,\overline{AB})^2 - (m\,\overline{BE})^2}$$
$$m\,\overline{AE} = \sqrt{30^2 - 24^2}$$
$$m\,\overline{AE} = 18\text{ m}$$

Area of triangle ABE

$$\text{Area} = \frac{m\,\overline{AE} \times m\,\overline{BE}}{2}$$
$$\text{Area} = \frac{18 \times 24}{2}$$
$$\text{Area} = 216\text{ m}^2$$

Result : The area of the piece of land is 216 m^2.

4 Measure of $\overline{BC}$



$$m\,\overline{BC} = \sqrt{15^2 - 12^2} = 9$$

Measure of $\overline{CE}$

$$m\,\overline{CE} \times m\,\overline{AB} = m\,\overline{AC} \times m\,\overline{BC}$$

$$m\,\overline{CE} \times 15 = 12 \times 9$$

$$m\,\overline{CE} = \frac{12 \times 9}{15} = 7.2$$

Measure of $\overline{AE}$

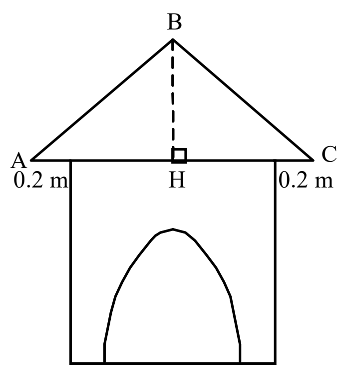
$$m\,\overline{AE} = \sqrt{12^2 - (7.2)^2} = 9.6$$

Perimeter of triangle ACE : 12 + 7.2 + 9.6 = 28.8

Result : The perimeter of triangle ACE is 28.8 cm.

5

Measure the roof's base, AC



$$\left(m\,\overline{AC}\right)^2 = 1^2 + 1^2$$

$$m\,\overline{AC} \approx 1.41$$

Measure of one side of square

$$1.41 - 2 \times 0.2 = 1.01$$

Height BH of roof

$$m\,\overline{AB} \times m\,\overline{BC} = m\,\overline{AC} \times m\,\overline{BH}$$

$$1 \times 1 \approx 1.41 \times m\,\overline{BH}$$

$$m\,\overline{BH} \approx 0.71$$

Full height of kennel

$$1.01 + 0.71 = 1.72$$

Answer : The full height of the kennel is 1.72 m.

7 7.1 cm

8

$$(m\,\overline{BC})^2 = m\,\overline{CD} \times m\,\overline{CA}$$

$$(m\,\overline{BC})^2 = 10 \times 12{,}5$$

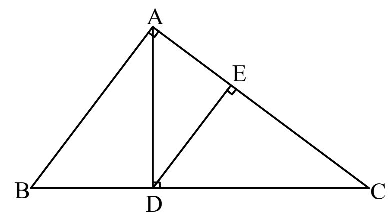
$$(m\,\overline{BC})^2 = 125$$

$$m\,\overline{BC} = 5\sqrt{5}\text{ m} \approx 11.2\text{ m}$$

Result : $m\,\overline{BC} = 5\sqrt{5}$ m or $m\,\overline{BC} \approx 11.2$ m.

9

In right triangle ADC, we apply the Pythagorean relation.



$$(m\,\overline{AC})^2 = (m\,\overline{AD})^2 + (m\,\overline{DC})^2$$
$$20^2 = 12^2 + \left(m\,\overline{DC}\right)^2$$
$$m\,\overline{DC} = 16$$

a) $\angle ADC \cong \angle AED$ Right angles.
b) $\angle DAC \cong \angle DAE$ Angles common to both triangles
c) $\Delta ADE \sim \Delta ACD$ Two triangles are similar if they have two corresponding angles congruent.

In two similar triangles, the corresponding sides are proportional.

$$\frac{m\,\overline{DE}}{m\,\overline{DC}} = \frac{m\,\overline{AD}}{m\,\overline{AC}}$$
$$\frac{m\,\overline{DE}}{16} = \frac{12}{20}$$
$$m\,\overline{DE} = \frac{16 \times 12}{20} = 9.6$$

Result : 9.6 cm.

10

Measure of segment BD
$$(m\,\overline{BD})^2 = m\,\overline{AD} \times m\,\overline{DC}$$
$$m\,\overline{BD} = 12$$

In a right triangle, the altitude from the hypotenuse is the proportional mean between the two segments it determines on the hypotenuse.

$$m\,\overline{BC} = \sqrt{(m\,\overline{BD})^2 + (m\,\overline{DC})^2}$$
$$= \sqrt{12^2 + 9^2} = 15$$

Pythagorean theorem

$$m\,\overline{BD} \times m\,\overline{DC} = m\,\overline{BC} \times m\,\overline{DE}$$
$$16 \times 9 = 15 \times m\,\overline{DE}$$
$$m\,\overline{DE} = 144 \div 15 = 7.2$$

In a right-angled triangle, the product of the measures of the legs is equal to the product of the measures of the hypotenuse and the altitude drawn to the hypotenuse.

$$m\,\overline{BE} = \sqrt{(m\,\overline{BD})^2 - (m\,\overline{DE})^2}$$
$$= \sqrt{12^2 - 7.2^2} = 9.6$$

Pythagorean theorem

Perimeter of rectangle FBED
$$P = 2\,m\,\overline{BE} + 2\,m\,\overline{DE}$$
$$= 2 \times 9.6 + 2 \times 7.2 = 19.2 + 14.4 = 33.6$$

Result : Rounded to the nearest tenth, the perimeter of rectangle FBED is 33.6 m.

11

Calculate m $\overline{DF}$

$$\sqrt{\left(m\ \overline{BF}\right)^2 - \left(m\ \overline{BD}\right)^2} = m\ \overline{DF}$$
$$\sqrt{5^2 - 2^2} = m\ \overline{DF}$$
$$\sqrt{21} = m\ \overline{DF}$$

Calculate m $\overline{CD}$

$$M\ \overline{BD} \bullet m\ \overline{CD} = \left(m\ \overline{DF}\right)^2$$
$$2 \bullet m\ \overline{CD} = 21$$
$$m\ \overline{CD} = \frac{21}{2} = 10.5$$

Area of triangle FDC

$$\frac{m\ \overline{CD} \times m\ \overline{DF}}{2} = \frac{10.5 \times \sqrt{21}}{2} \approx 24.06$$

Answer The area of triangle FDC is 24.06 cm^2.