

Non-Right-Angled Trigonometry Worksheet

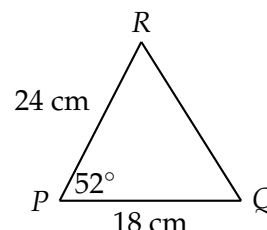
Cosine Rule and Area of a Triangle

I Do

The diagram shows triangle PQR with $PQ = 18$ cm, $PR = 24$ cm, and $\angle QPR = 52^\circ$.

(a) Calculate the length of QR . Give your answer correct to 3 significant figures.

(b) Calculate the area of triangle PQR . Give your answer correct to 3 significant figures.

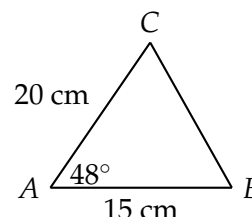


We Do

The diagram shows triangle ABC with $AB = 15$ cm, $AC = 20$ cm, and $\angle BAC = 48^\circ$.

(a) Calculate the length of BC . Give your answer correct to 3 s.f.

(b) Calculate the area of triangle ABC . Give your answer correct to 3 s.f.

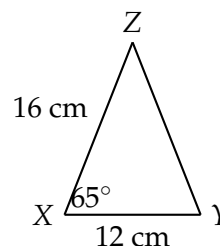


You Do

The diagram shows triangle XYZ with $XY = 12$ cm, $XZ = 16$ cm, and $\angle YXZ = 65^\circ$.

(a) Calculate the length of YZ . Give your answer correct to 3 s.f.

(b) Calculate the area of triangle XYZ . Give your answer correct to 3 s.f.



Challenge

In triangle LMN , $LM = 10$ cm, $LN = x$ cm, and $\angle MLN = 60^\circ$.

The area of the triangle is $45\sqrt{3}$ cm².

Calculate the exact value of x , and then find the length of MN correct to 3 significant figures.

Answers & Worked Solutions

• I Do:

$$(a) QR^2 = 18^2 + 24^2 - 2(18)(24) \cos(52^\circ) = 324 + 576 - 864 \cos(52^\circ)$$

$$QR^2 \approx 368.07 \implies QR = \sqrt{368.07} \approx 19.185 \quad \text{Answer: } 19.2 \text{ cm}$$

$$(b) \text{Area} = \frac{1}{2} \times 18 \times 24 \times \sin(52^\circ) = 216 \sin(52^\circ) \approx 170.21 \quad \text{Answer: } 170 \text{ cm}^2$$

• We Do:

$$(a) BC^2 = 15^2 + 20^2 - 2(15)(20) \cos(48^\circ) = 225 + 400 - 600 \cos(48^\circ)$$

$$BC^2 \approx 223.51 \implies BC = \sqrt{223.51} \approx 14.95 \quad \text{Answer: } 15.0 \text{ cm}$$

$$(b) \text{Area} = \frac{1}{2} \times 15 \times 20 \times \sin(48^\circ) = 150 \sin(48^\circ) \approx 111.47 \quad \text{Answer: } 111 \text{ cm}^2$$

• You Do:

$$(a) YZ^2 = 12^2 + 16^2 - 2(12)(16) \cos(65^\circ) = 144 + 256 - 384 \cos(65^\circ)$$

$$YZ^2 \approx 237.71 \implies YZ = \sqrt{237.71} \approx 15.418 \quad \text{Answer: } 15.4 \text{ cm}$$

$$(b) \text{Area} = \frac{1}{2} \times 12 \times 16 \times \sin(65^\circ) = 96 \sin(65^\circ) \approx 87.005 \quad \text{Answer: } 87.0 \text{ cm}^2$$

• Challenge:

$$Area = \frac{1}{2}(10)(x) \sin(60^\circ) = 45\sqrt{3} \implies 5x \left(\frac{\sqrt{3}}{2}\right) = 45\sqrt{3} \implies 2.5x = 45 \implies$$

$$x = 18$$

$$MN^2 = 10^2 + 18^2 - 2(10)(18) \cos(60^\circ) = 100 + 324 - 360(0.5) = 424 - 180 = 244$$

$$MN = \sqrt{244} \approx 15.620 \quad \text{Answer: } x = 18, MN = 15.6 \text{ cm}$$