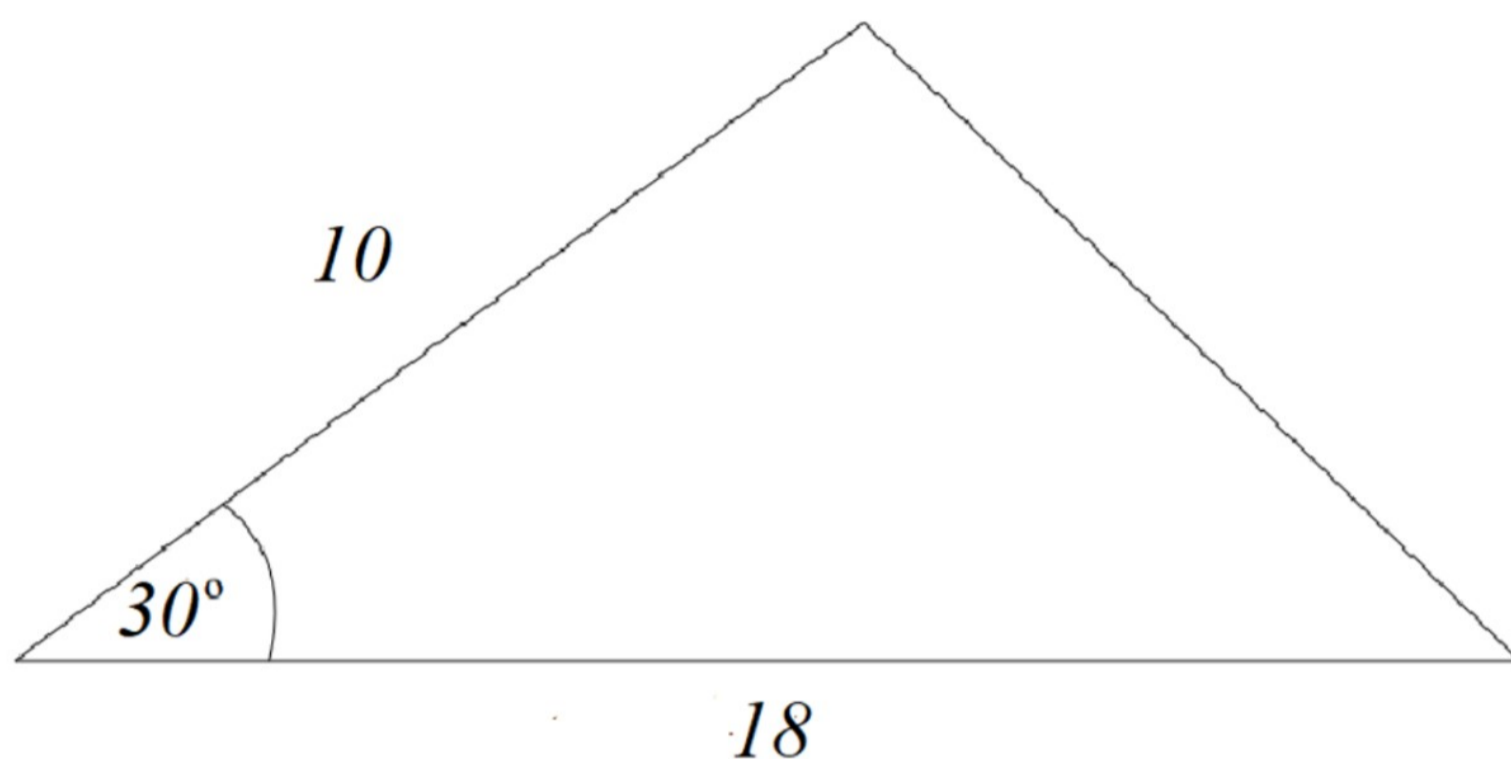




Finding the Area of any Triangle Exam Practice

Q1. Find the area of the triangle below to 1 decimal place.

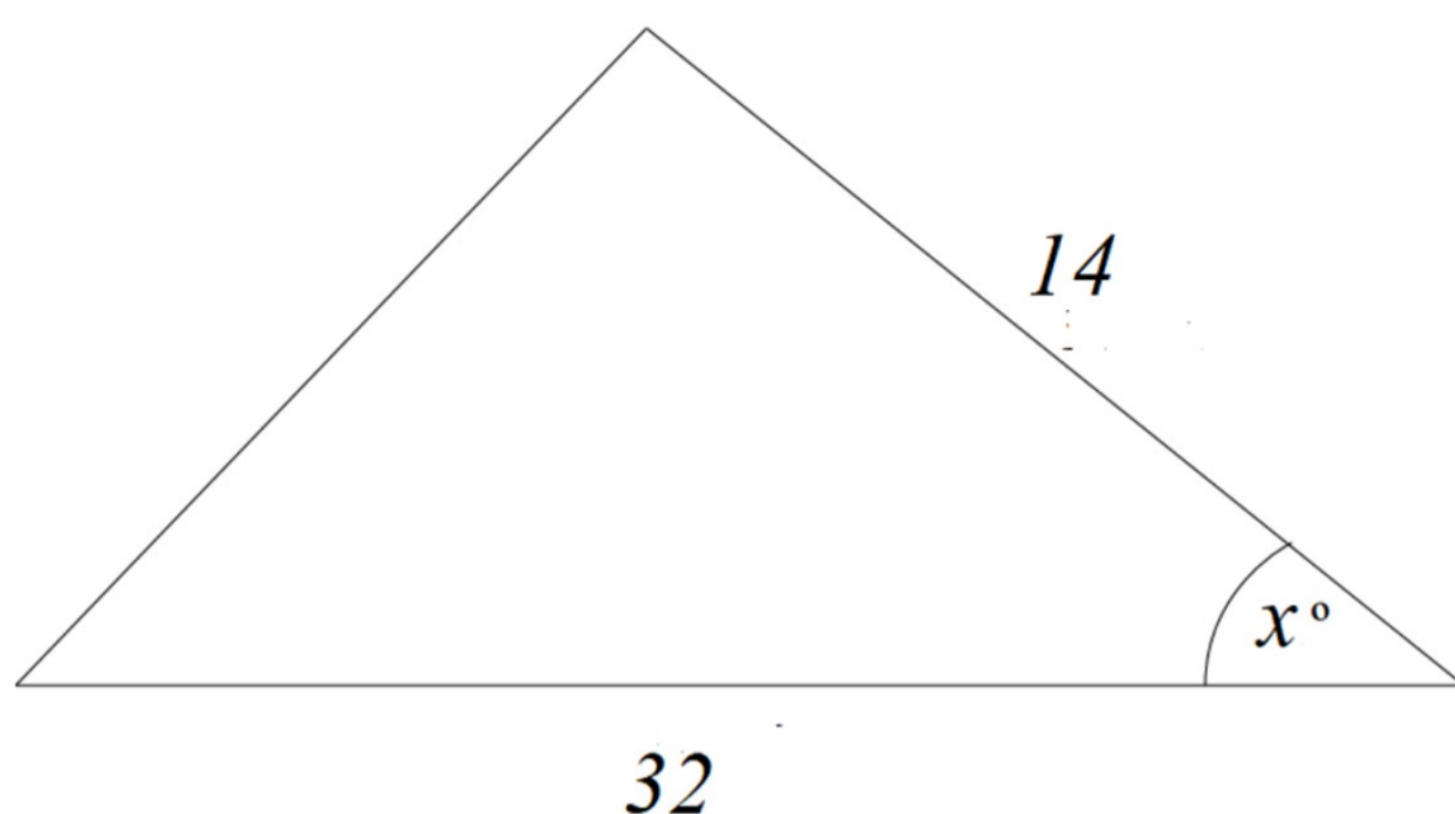


$$\begin{aligned} \text{Area} &= \frac{1}{2} (10)(18) \sin 30 \\ &= 45.0 \text{ m}^2 \end{aligned}$$

Answer: 45.0 m²
(2 marks)



Q2. The area of the triangle below is 175 square units.
Find the size of angle x to 1 decimal place.



$$\frac{1}{2}(32)(14)\sin(x) = 175$$

$$224\sin(x) = 175$$

$$\sin x = \frac{175}{224}$$

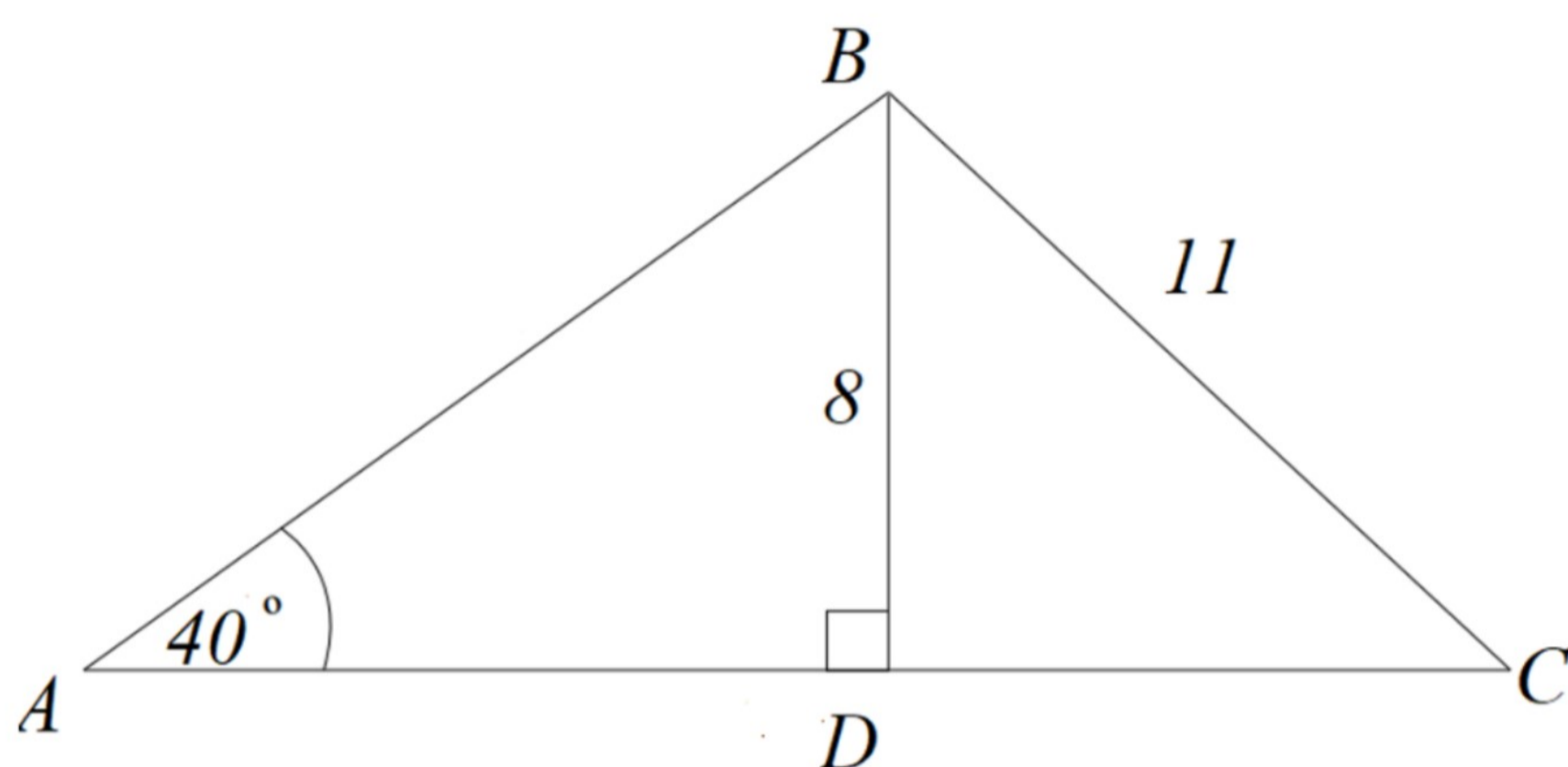
$$x = \sin^{-1}\left(\frac{175}{224}\right)$$

$$x = 51.375\dots$$

Answer: 51.4°
(3 marks)



Q3. Find the area of the triangle ABC to 2 decimal places.



$$\begin{aligned} \tan(40) &= \frac{8}{AD} \Rightarrow AD = \frac{8}{\tan 40} \\ &= 9.534 \end{aligned}$$

$$\begin{aligned} \hat{BCD} &= \sin^{-1}\left(\frac{8}{11}\right) \\ &= 46.658 \end{aligned}$$

$$\begin{aligned} \Rightarrow \tan(46.658) &= \frac{8}{DC} \\ \Rightarrow DC &= 7.549 \dots \end{aligned}$$

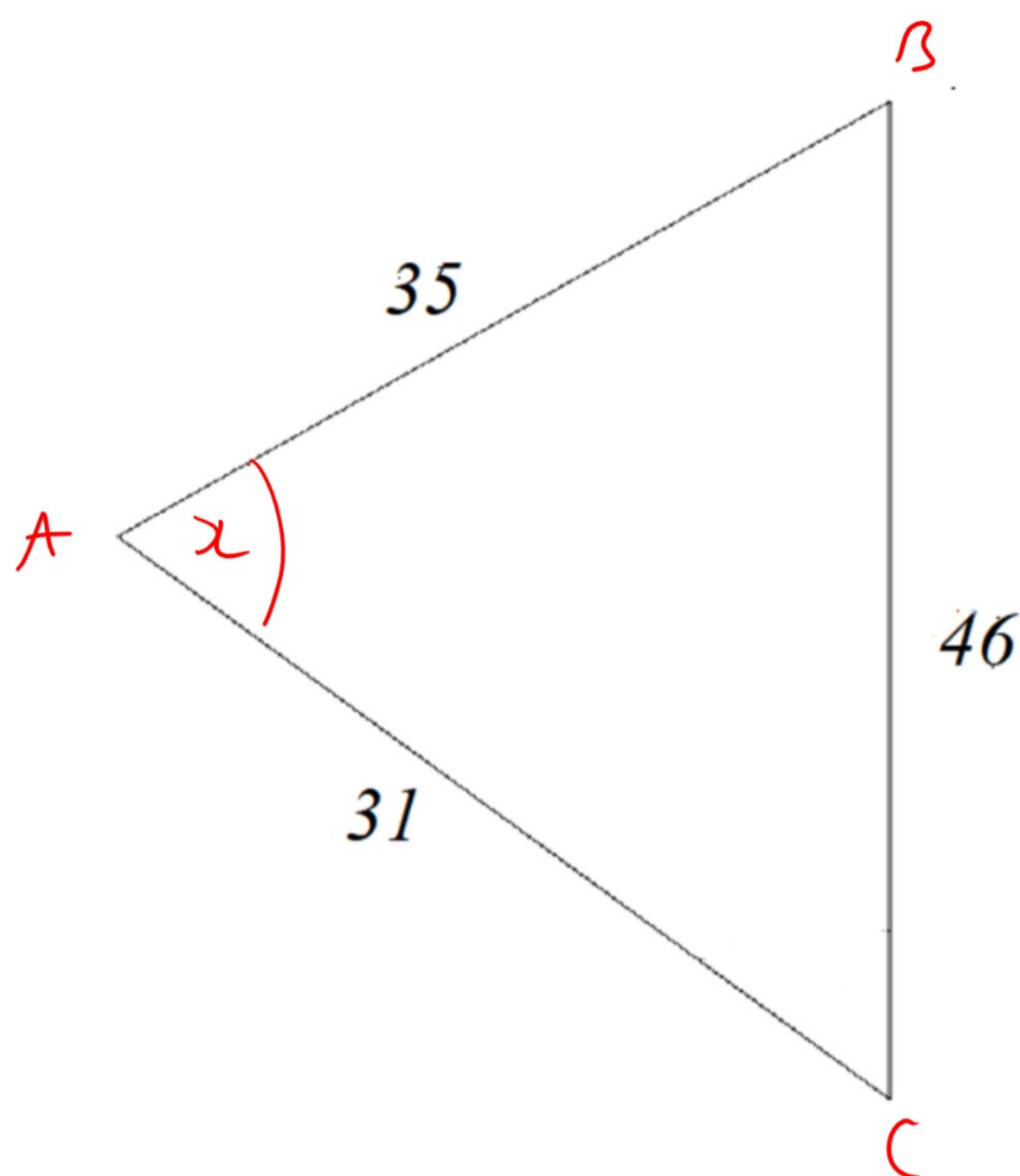
$$\begin{aligned} \Rightarrow AC &= AD + CD \\ &= 9.534 + 7.549 \\ &= 17.083 \end{aligned}$$

$$\begin{aligned} \text{Area } ABC &= \frac{1}{2}(11)(17.083) \sin(46.658) \\ &= 68.331 \end{aligned}$$

Answer: 68.33 m²
(4 marks)



Q4. Find the area of the triangle below to 3 significant figures:



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos A = \frac{31^2 + 35^2 - 46^2}{2(31)(35)}$$

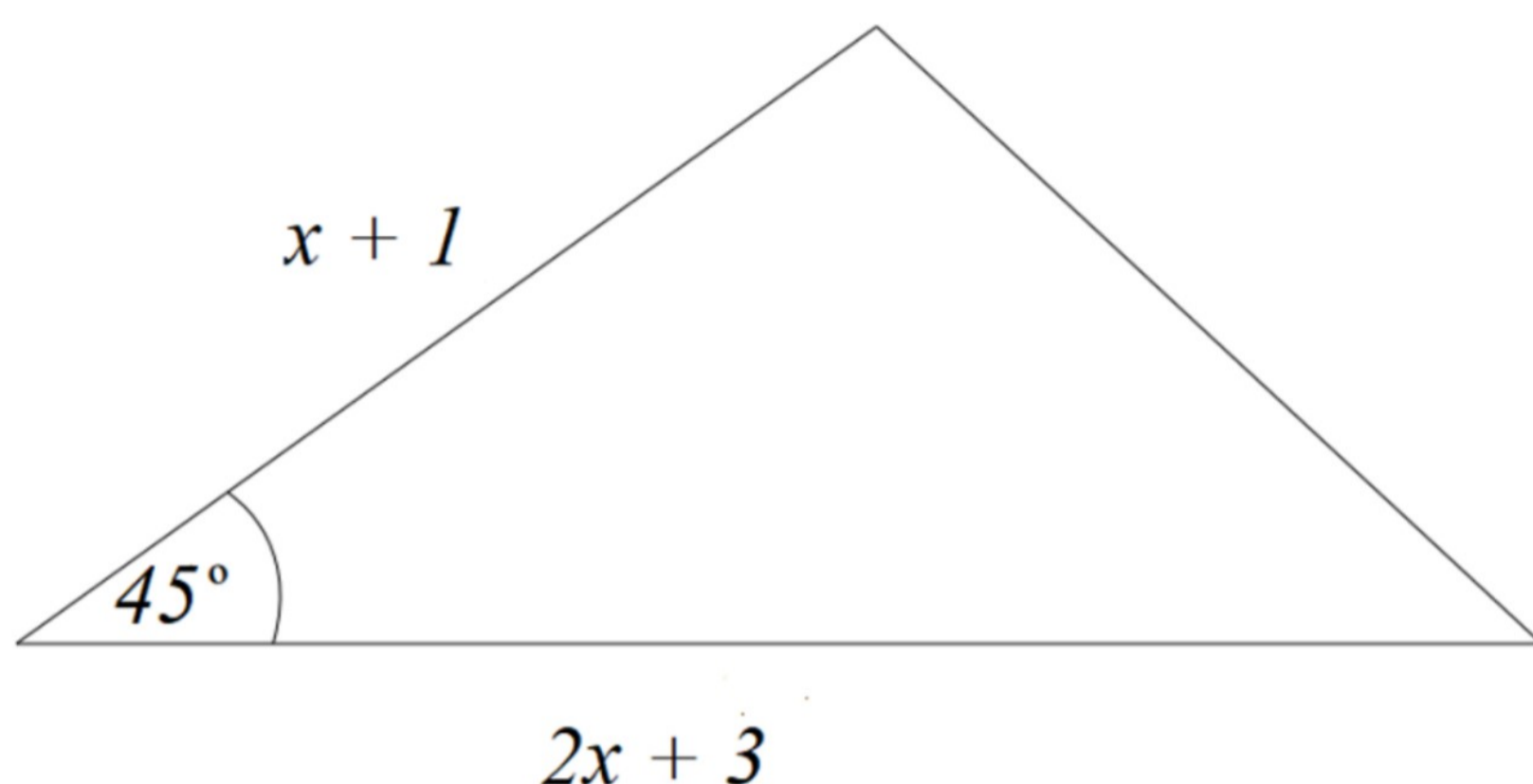
$$\Rightarrow A = 88.151\dots$$

$$\begin{aligned}\Rightarrow \text{Area} &= \frac{1}{2}(35)(31) \sin(88.151\dots) \\ &= 542.2\dots \\ &= 542 \quad (3 \text{ s.f.})\end{aligned}$$

Answer: 542 m²
(6 marks)



Q5. The area of the triangle below is $\frac{3\sqrt{2}}{2}$ square units. Find the value of x .



$$\frac{1}{2}(x+1)(2x+3)\sin(45) = \frac{3\sqrt{2}}{2}$$

$$(x+1)(2x+3)\sin(45) = 3\sqrt{2}$$

$$(x+1)(2x+3)\frac{\sqrt{2}}{2} = 3\sqrt{2}$$

$$(x+1)(2x+3) = 6$$

$$2x^2 + 5x - 3 = 0$$

$$(2x-1)(x+3) = 0$$

$$x = \frac{1}{2}, -3$$

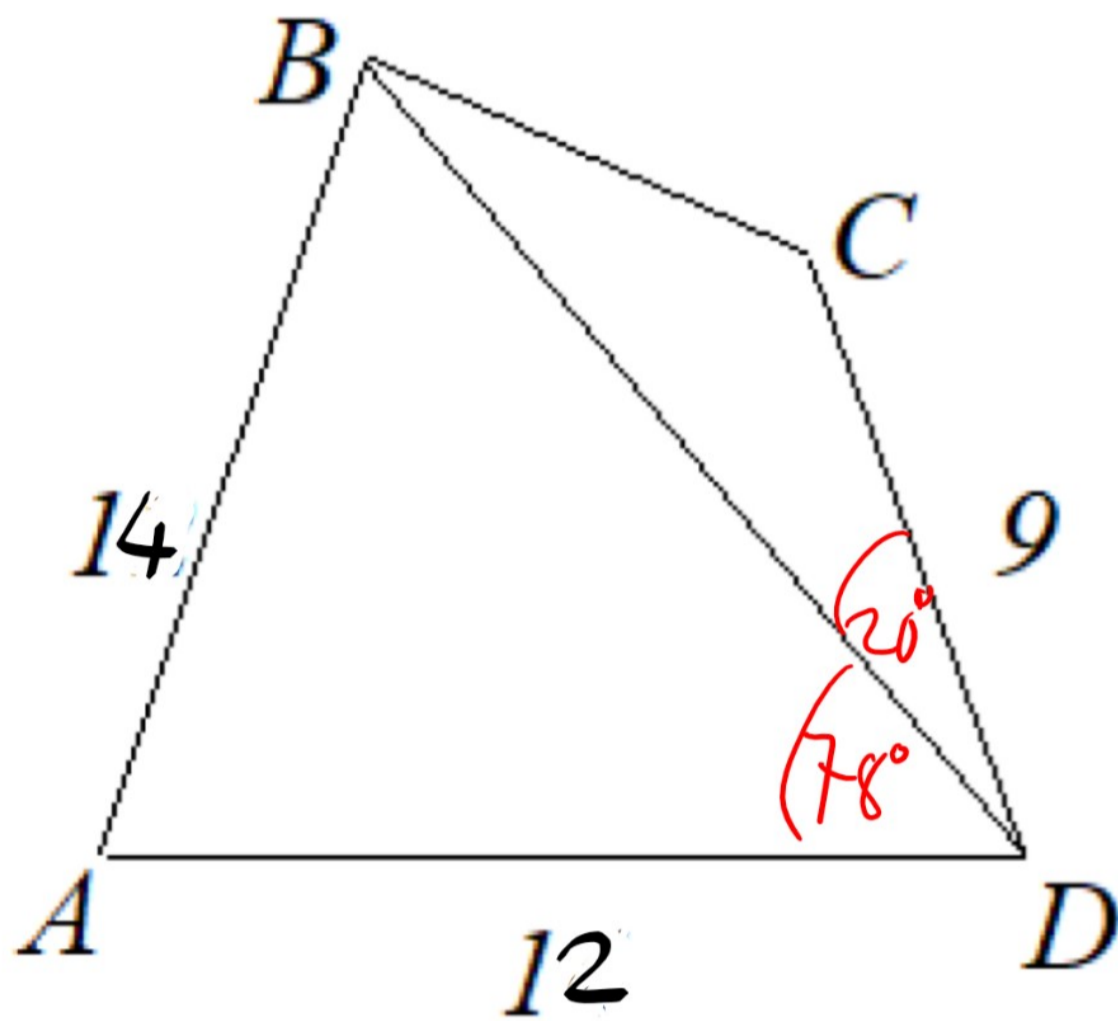
reject -3 ($x+1$ is negative)

Answer: $\frac{1}{2}$

(5 marks)



Q6. In the quadrilateral ABCD below, angles $BDC = 20^\circ$, $ADB = 78^\circ$.
Find the area of triangle BCD.



$$\frac{\sin \beta}{12} = \frac{\sin 78}{14}$$

$$\beta = 56.97$$

$$\Rightarrow A = 180 - 56.97 - 78 \\ = 45.03$$

• Now find BD : $BD^2 = 14^2 + 12^2 - 2(14)(12)\cos(45.03)$
 $\Rightarrow BD = 10.13$

• Area BCD = $\frac{1}{2}(10.13)(9)\sin(20)$
 $= 15.58$

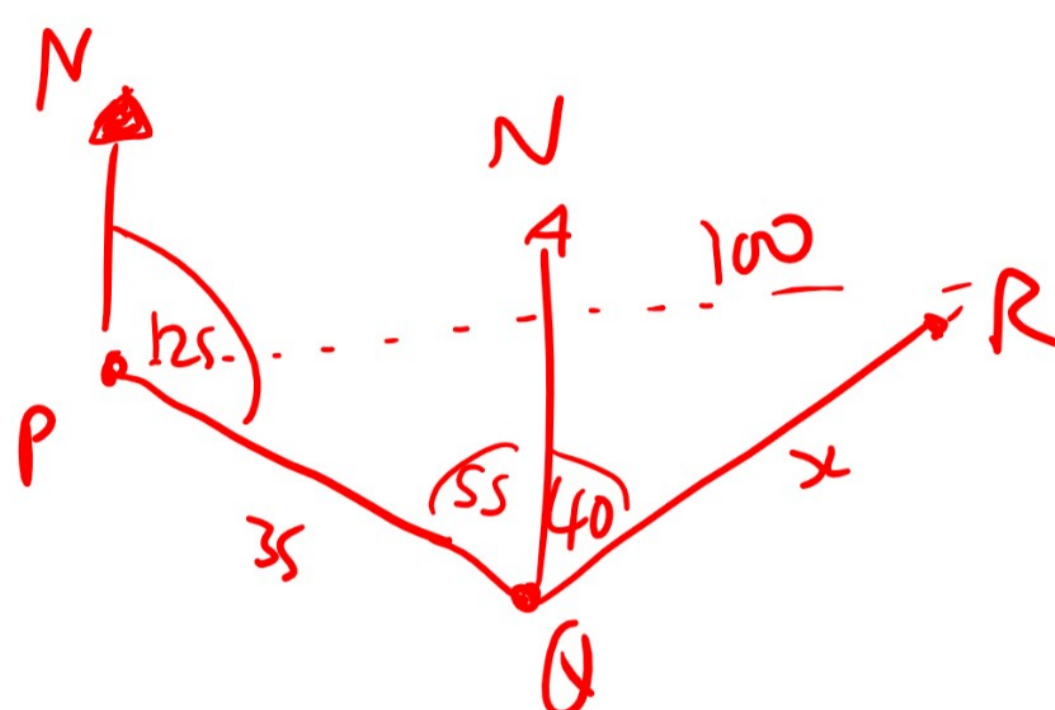
Answer: 15.6 units²
(5 marks)



Problem Questions:

Q7. A ship sets off from port P on a bearing of 125° . After 35 miles it reaches port Q. It then changes direction and proceeds on a bearing of 40° for x miles until it reaches point R. The direct distance PR is 100 miles.

Find the area of the triangle PRQ to 2 decimal places.



$$\cdot \text{ Find } \angle PRQ : \frac{\sin(\angle PRQ)}{35} = \frac{\sin(95)}{100}$$

$$\angle PRQ = 20.406^\circ$$

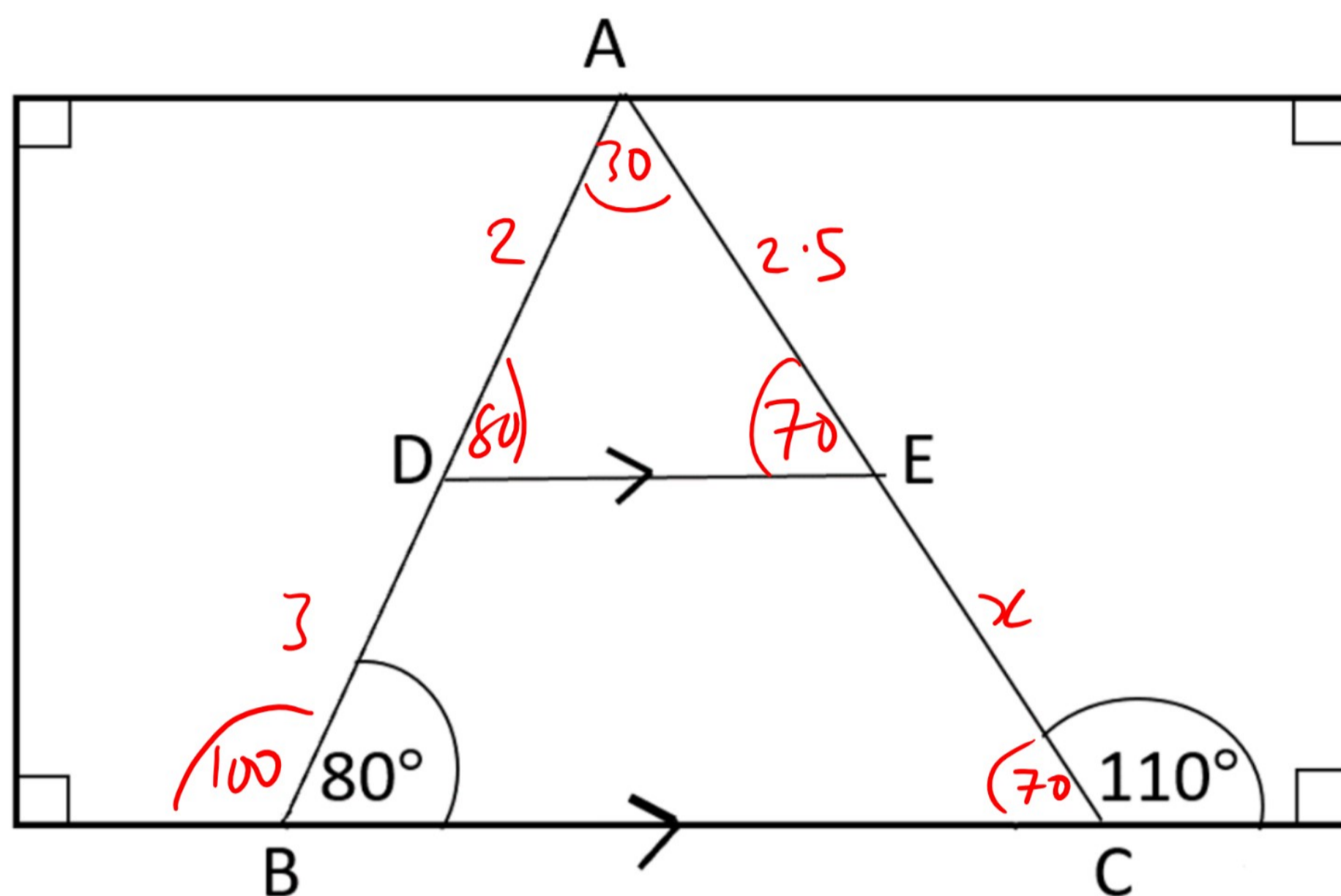
$$\cdot \Rightarrow \angle QPR = 180 - 95 - 20.406^\circ \\ = 64.594^\circ$$

$$\cdot \text{ Area} = \frac{1}{2} (35)(100) \sin(64.594) \\ = 1580.759 \dots \\ = 1580.76 \text{ miles}^2$$

Answer: 1580.76 miles²
(4 marks)



Q8. Below $AD = 2$ cm, $BD = 3$ cm and $AE = 2.5$ cm. Find the area of the triangle ABC to 2 decimal places.



- ADE and ABC are similar; let $x = EC$

$$\frac{AD}{AB} = \frac{AE}{AC} \Rightarrow \frac{2}{5} = \frac{2.5}{2.5+x}$$

$$\Rightarrow 5 + 2x = 12.5$$

$$\Rightarrow 2x = 7.5$$

$$x = 3.75 \text{ (so } AC = 5.75)$$

$$\text{Area } ABC = \frac{1}{2}(5)(5.75)\sin(30)$$

$$= 7.1875$$

$$= 7.2 \text{ m}^2$$

Answer: 7.2 m²
(5 marks)