## EXERCISES 16.4

1. (a) Area $= \frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 35{\cdot}94 \times 128{\cdot}46 \sin 120^\circ$ cm$^2$

$\simeq \underline{1999{\cdot}2 \text{ cm}^2}$

[Alternatively:

Area $= \frac{1}{2}bc\sin A$

$= \frac{1}{2} \times 128{\cdot}46 \times 149{\cdot}70 \sin 12^\circ$ cm$^2$

$\simeq \underline{1999{\cdot}1 \text{ cm}^2}$

or:

Area $= \frac{1}{2}ca\sin B$

$= \frac{1}{2} \times 149{\cdot}70 \times 35{\cdot}94 \sin 48^\circ$ cm$^2$

$\simeq \underline{1999{\cdot}1 \text{ cm}^2}$.]

Any one of the three versions of the formula can be used to work each part of Question 1. Refer to the text book for answers.

2. Area of car park

$= 2$(area of $\Delta$)

$= 2 \times \frac{1}{2} \times 275 \times 320 \sin 52^\circ$ m$^2$

$\simeq \underline{69\,345 \text{ m}^2}$

3. $\angle ACB = 90^\circ$ (angle in semi-circle)

$\therefore BC^2 = AB^2 - AC^2$

$\therefore BC = \sqrt{20^2 - 6^2} = 2\sqrt{91}$ cm.

Area of $\Delta = \frac{1}{2}AC \cdot BC$

$= \frac{1}{2} \times 6 \times 2\sqrt{91}$ cm$^2$.

$= 6\sqrt{91}$ cm$^2$.

Area of circle $= \pi r^2 = 100\pi$ cm$^2$.

Area of shaded region

$= \underline{(100\pi - 6\sqrt{91}) \text{ cm}^2}$.

4. Area of $\Delta = \frac{1}{2} \cdot 14x \sin 65^\circ = 110$ cm$^2$

$\therefore x = \frac{110}{7\sin 65^\circ} \simeq \underline{17{\cdot}34}$

5. (a) Area $= \frac{1}{2} \times 8 \times 12 \sin 50^\circ$ sq. units

$\simeq \underline{36{\cdot}77 \text{ sq. units}}$

(b) $s = \frac{6+5+7}{2} = 9$.

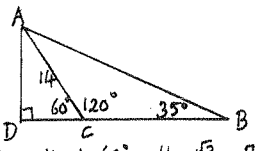
Area $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{9 \times 3 \times 4 \times 2}$ sq. units

$= \underline{6\sqrt{6} \text{ sq. units}}$

$\simeq \underline{14{\cdot}70 \text{ sq. units}}$

(c)




$AD = 14\sin 60^\circ = 14 \cdot \frac{\sqrt{3}}{2} = 7\sqrt{3}$

$DC = 14\cos 60^\circ = 14 \cdot \frac{1}{2} = 7$

$DB = \frac{AD}{\tan 35^\circ} \simeq \frac{7\sqrt{3}}{\tan 35^\circ} \simeq 17{\cdot}315$

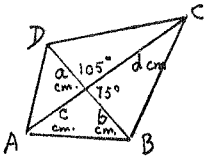
$CB = DB - DC \simeq 10{\cdot}315$.

Area of $\Delta = \frac{1}{2}$ base $\times$ height

$= \frac{1}{2} \times 10{\cdot}315 \times 7\sqrt{3}$ sq. units.

$\simeq \underline{62{\cdot}53 \text{ sq. units}}$

6.




$a + b = 9$

$c + d = 12$.

Area of quadrilateral ABCD (napkin)

$= \frac{1}{2}cb\sin 105^\circ + \frac{1}{2}bd\sin 75^\circ$

$+ \frac{1}{2}da\sin 105^\circ + \frac{1}{2}ca\sin 75^\circ$

$= \frac{1}{2}\sin 75^\circ (cb + bd + da + ca)$

$= \frac{1}{2}\sin 75^\circ (a+b)(c+d) = \frac{1}{2} \times 9 \times 12 \sin 75^\circ$ cm$^2$

$\simeq \underline{52{\cdot}16 \text{ cm}^2}$

7. Area of $\Delta = \frac{1}{2} \times 10 \times 22 \sin\theta \cdot cm^2$

$= 50\ cm^2$

$\therefore \sin\theta = \frac{50}{110} = \frac{5}{11}$

$\therefore \theta \simeq 27°2'.$

Included angle is $27°2'$.

8. Equation of AB is

$y - b = -\tan\theta(x - a)$

$\therefore x\tan\theta + y = a\tan\theta + b.$

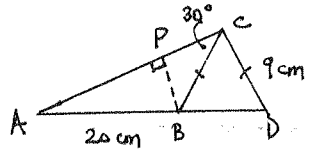
$y = 0;\ x = \frac{a\tan\theta + b}{\tan\theta} = OA.$

$x = 0;\ y = a\tan\theta + b = OB.$

Area of $\Delta OAB = \frac{1}{2} OA \cdot OB$

$= \frac{(a\tan\theta + b)^2}{2\tan\theta}$

9.




$CP = 9\cos 30° \simeq 7.7942$

$BP = 9\sin 30° = 4.5$

$AP^2 = AB^2 - BP^2$

$\therefore AP = \sqrt{20^2 - 4.5^2} \simeq 19.4872$

$AC = AP + PC = 27.2814$

Area of $\Delta ABC = \frac{1}{2} \cdot AC \cdot BP$

$= \frac{1}{2} \times 27.2814 \times 4.5$

$= 61.38\ cm^2$

EXERCISES 16.5.1

The working is shown for a few of these questions. For the other questions, refer to the answers in the text book.

1. Using $\frac{b}{\sin B} = \frac{c}{\sin C}$,

$\frac{b}{\sin 29°} = \frac{48.2}{\sin 141°}$

$\therefore b = \frac{48.2 \sin 29°}{\sin 141°}$

$\simeq 37.1318$

$= \underline{37.1}$ (correct to 1 d.p.)

$A = 180° - (29° + 141°) = \underline{10°}$

Using $\frac{a}{\sin A} = \frac{c}{\sin C}$,

$a = \frac{48.2 \sin 10°}{\sin 141°}$

$\simeq 13.2998$

$= \underline{13.3}$ (correct to 1 d.p.)

2. Using $\frac{a}{\sin A} = \frac{b}{\sin B}$,

$a = \frac{1.2 \sin 74°}{\sin 25°}$

$\simeq 2.729$

$= \underline{2.7}$ (correct to 1 d.p.)

$C = 180° - (74° + 25°) = \underline{81°}$

Using $\frac{c}{\sin C} = \frac{b}{\sin B}$,

$c = \frac{1.2 \sin 81°}{\sin 25°}$

$\simeq 2.804$

$= \underline{2.8}$ (correct to 1 d.p.)