

### 1.7 The angles 30°, 45° and 60°

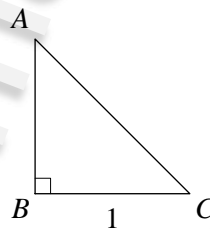
In this exercise you will learn how to:

- find exact values for the sine, cosine and tangent of 30°, 45° and 60°
- work with exact values in simple problems
- find the exact value of the area of a triangle using  $\text{area of triangle} = \frac{1}{2}ab \sin C$

*This is a non-calculator exercise.*

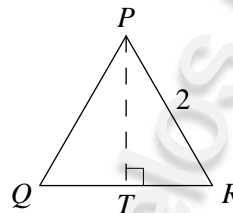
1 The diagram shows an isosceles triangle  $ABC$  with  $BC = 1$  unit.

- (a) Write down the length of  $AB$ .
- (b) Calculate the length of  $AC$ , leaving your answer as an exact value.
- (c) State the size of angle  $ACB$ .
- (d) Write down the exact values of  $\sin 45^\circ$ ,  $\cos 45^\circ$  and  $\tan 45^\circ$ .



2 The diagram shows an equilateral triangle  $PQR$  with  $PR = 2$  units.

- (a) Write down the length of  $PQ$  and  $QR$ .
- An axis of symmetry is drawn from  $P$  to  $QR$  meeting  $QR$  at  $T$  as shown in the diagram.
- (b) Write down the length of  $TR$ .
  - (c) Calculate the length of  $PT$ , leaving your answer as an exact value.
  - (d) State the size of angle  $PRT$  and the size of angle  $TPR$ .
  - (e) Write down the exact values of  $\sin 30^\circ$ ,  $\cos 30^\circ$  and  $\tan 30^\circ$ .
  - (f) Write down the exact values of  $\sin 60^\circ$ ,  $\cos 60^\circ$  and  $\tan 60^\circ$ .



3 Using your answers from Questions 1 and 2 copy and complete the table:

|     |     |     |     |
|-----|-----|-----|-----|
|     | 30° | 45° | 60° |
| sin |     |     |     |
| cos |     |     |     |
| tan |     |     |     |

In Higher Mathematics, you are required to know the exact values of the sine, cosine and tangent of 30°, 45° and 60°. These are not given on the formula sheet and so need to be memorised *either* by learning the information on the triangles in Questions 1 and 2 *or* by learning the table in Question 3.