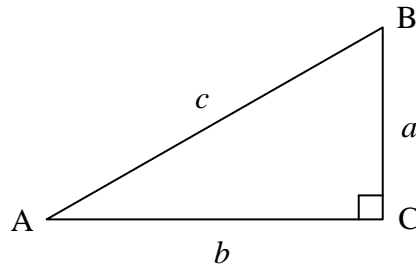## Worksheet 3-4: Tangent Ratio

In a right triangle, the tangent ratio of each non-right angle is given by:

$$\textbf{tangent of angle} = \frac{\text{Length of the Side Opposite to Angle}}{\text{Length of the Side Adjacent to Angle}} = \frac{\text{opposite}}{\text{adjacent}}$$

$$\textbf{tan A} = \frac{Opposite}{Adjacent} = \underline{\quad\quad} \qquad\qquad \textbf{tan B} = \frac{Opposite}{Adjacent} = \underline{\quad\quad}$$

1. Find the tangent ratio of a **given angle** to **3** decimal places.

   Hint: Use the **TAN** [TAN] key on your calculator to find the tangent ratio for the given angle.

(a) 40°   **(b) 88°**   **(c) 55°**

2. Find the angle to the **nearest degree** of a **given tangent ratio**.

   Hint: Use the **TAN**$^{-1}$ [**2**nd] [TAN] key on your calculator to find the degree measure of the
   angle for the given tangent ratio.

(a) Find ∠A when tan A = 1.7825   (b) Find ∠B when tan B = 0.5096

(c) Find ∠C when tan C = 28.6363   **(d) Find ∠D when tan D = 1.4281**

The value of the tangent ratio for a given angle depends only on the measure of the acute angle. The value of the tangent ratio does not depend on the size of the right triangle in which the angle is found. **A non-right or acute angle of a given measure has a unique tangent ratio.**
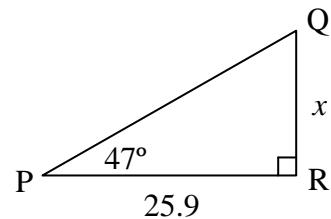
$\triangle ABC \sim \triangle EFG$, What do you know about the tangent ratios for the corresponding $\angle A$ and $\angle E$?

B

5 cm

A

6 cm

C

F

10 cm

E

12 cm

G
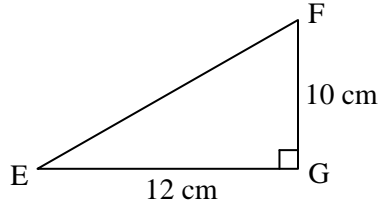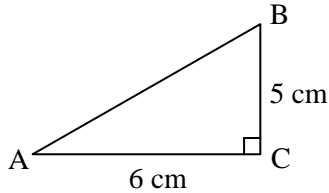
3. Find acute angle using tangent ratio. Correct to the nearest degree.

E

14

D

x

29

F
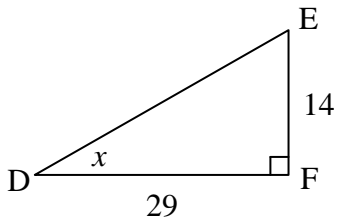
4. Find side length given an acute angle. Correct to the nearest unit.

Q

x

47°

P

25.9

R

Solve Right Triangles Using Tangent Ratios

5. For $\triangle PQR$, find x, $\angle P$ and $\angle R$, to 2 decimal places.

R

15

9

P

x

Q

Answers: 1. (a) 0.8391, (b) 28.6363, (c) 1.4281; **2.** (a) 61°, (b) 27°, (c) 88°, (d) 55°; **3.** 26°; **4.** 28;
   5. $x = 12$, $\angle P = 36.87°$, $\angle R = 53.13°$