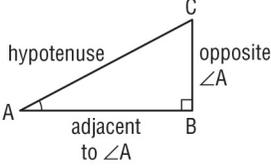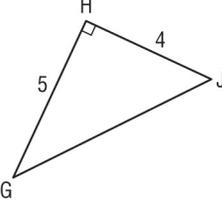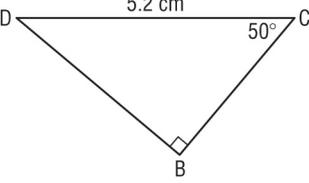Name: _____   Date: _____

Master 6.1a   Activate Prior Learning: Primary Trigonometric Ratios

In a right triangle, the ratio of any two sides is constant when the triangle is enlarged or reduced. This leads to the definitions of the three primary trigonometric ratios.

	$\tan A = \dfrac{\text{opposite}}{\text{adjacent}}$ $\sin A = \dfrac{\text{opposite}}{\text{hypotenuse}}$ $\cos A = \dfrac{\text{adjacent}}{\text{hypotenuse}}$

These trigonometric ratios can be used to determine the measure of an angle or a side in a right triangle.

In ΔGHJ below, determine the measure of ∠G:	In ΔBCD below, determine the length of BC:
   $\tan G = \dfrac{\text{opposite}}{\text{adjacent}}$ $\quad = \dfrac{4}{5}$ $\angle G = \tan^{-1}\left(\dfrac{4}{5}\right)$ $\quad\quad = 38.6598\ldots°$ ∠G is approximately 39°.	 $\cos C = \dfrac{\text{adjacent}}{\text{hypotenuse}}$ $\cos 50° = \dfrac{BC}{5.2}$ $\quad BC = 5.2 \cos 50°$ $\quad\quad = 5.2(0.6427\ldots)$ $\quad\quad = 3.3424\ldots$ BC is approximately 3.3 cm.

Check Your Understanding

Sketch each right triangle, then determine the indicated values.

1. In ΔDEF, ∠E = 90°, EF = 9 cm, and DF = 20 cm;
   determine the measure of ∠D to the nearest degree.

2. In ΔXYZ, ∠Y = 90°, ∠Z = 63°, and XZ = 16.5 cm;
   determine the length of XY to the nearest tenth of a centimetre.

3. In ΔRST, ∠S = 90°, ∠R = 27°, and RS = 21.3 m;
   determine the length of ST to the nearest tenth of a metre.

4. In ΔMNP, ∠M = 90°, MN = 4.7 cm, and PN = 8.1 cm;
   determine the measure of ∠N to the nearest degree.

# Master 6.1b   Activate Prior Learning: Applying Trigonometric Ratios

When a problem can be represented by a right triangle, the Pythagorean Theorem or the primary trigonometric ratios may be used to determine the measures of angles or sides.

A tree casts a shadow that is 27.8 m long when the angle between the sun's rays and the ground is 33°. What is the height of the tree to the nearest metre?

Sketch a diagram.
The height of the tree is represented by TR.
Since TR is opposite the 33° angle,
use the tangent ratio.
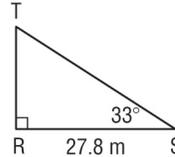
$$\tan S = \frac{\text{opposite}}{\text{adjacent}}$$

$$\tan 33° = \frac{TR}{27.8}$$

$$TR = 27.8 \tan 33°$$
$$= 18.0535…$$

The tree is approximately 18.1 m high.

Check Your Understanding

1. A tree is supported by a guy wire, which is anchored to the ground 5.8 m from the base of the tree. The angle between the wire and the level ground is 54°. To the nearest tenth of a metre, how far up the tree does the wire reach?

2. A ski jump is 109 m long. Its height is 54 m. To the nearest degree, what is the angle of inclination of the jump?

3. At a point 23 ft. from the base of a totem pole, the angle of elevation of the top of the pole is 47°. To the nearest foot, how high is the totem pole?

4. A height of a road increases by 6 m for every 90 m of horizontal distance. To the nearest degree, what is the angle of inclination of the road?

5. Isosceles ∆PQR has equal sides PQ = PR. The height of the triangle is 7.5 cm and ∠R = 37°. To the nearest centimetre, what is the perimeter of the triangle?