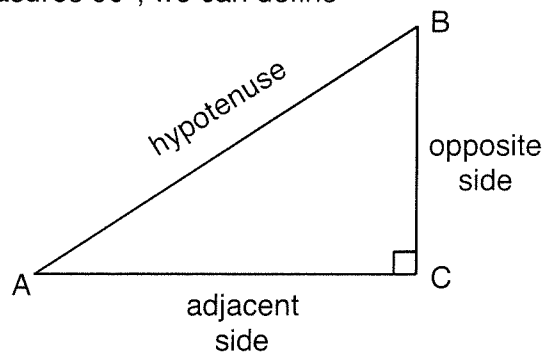# Trigonometric Ratios

In any triangle *ABC* where angle *C* measures 90°, we can define
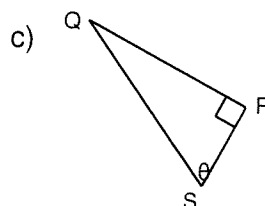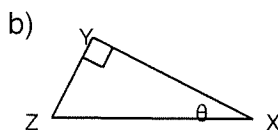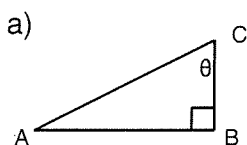
$$\sin A = \frac{\text{side opposite } A}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{side adjacent to } A}{\text{hypotenuse}}$$

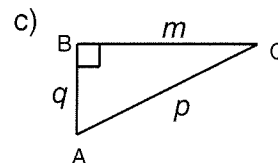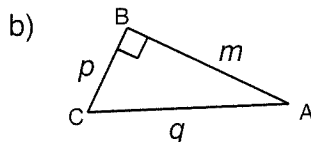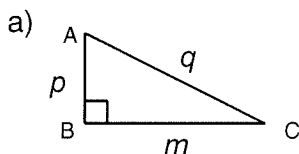$$\tan A = \frac{\text{side opposite } A}{\text{side adjacent to } A}$$

1. For each diagram, name (i) the hypotenuse, (ii) the side opposite θ, (iii) the side adjacent to θ

   a)

   b)

   c)

2. In △TRA, ∠R is a right angle.

   a) In terms of *TR, RA,* and *TA,* find sin *T*, cos *T*, tan *T*.

   b) In terms of *TR, RA,* and *TA,* find sin *A*, cos *A*, tan *A*.

3. Find sin *A*, cos *A*, and tan *A* in terms of *p, q,* and *m* for each figure.

   a)

   b)

   c)

4. Find the following trigonometric ratios. Give you answers correct to the ten-thousandth place.

a) $\sin(20°)$	*b)* $\sin(25.3°)$	*c)* $\sin(42.7°)$
d) $\cos(20°)$	*e)* $\cos(20.4°)$	*f)* $\cos(28.4°)$
g) $\tan(45°)$	*h)* $\tan(64.4°)$	*i)* $\tan(50.5°)$
j) $\sin(46°)$	*k)* $\tan(35°)$	*l)* $\cos(28°)$
m) $\sin(24.5°)$	*n)* $\tan(43.4°)$	*o)* $\cos(54.8°)$

5. Find ∠A to the nearest tenth of a degree if:

   a) $\sin A = 0.3542$ b) $\cos A = 0.3542$ c) $\tan A = 1.2450$

   d) $\sin A = 0.8702$ e) $\cos A = 0.8702$ f) $\tan A = 10.4569$

   g) $\sin A = 0.5000$ h) $\cos A = 0.5000$ i) $\tan A = 25.5000$

   j) $\sin A = 0.1452$ k) $\cos A = 0.1452$ l) $\tan A = 63.9800$

   m) $\sin A = 0.7249$ n) $\cos A = 0.7249$ o) $\tan A = 1543.2555$

6. Find the measure of ∠A to the nearest tenth of a degree if:

   a) $\sin A = \cos(25°) \cdot \tan(10°)$ b) $\cos A = \tan(45°) \cdot \tan(30°)$

   c) $\cos A = \cos(53°) \cdot \tan(46°)$ d) $\sin A = \sin(30°) \cdot \tan(30°)$

   e) $\tan A = \cos(63°) \cdot \tan(82°)$ f) $\tan A = \tan(17°) \cdot \tan(73°)$

   g) $\tan A = \tan(25°) \cdot \tan(65°)$ h) $\tan A = \tan(70°) \cdot \cos(45°)$

7. In the given right triangles, find the values of x and y. Give your answers correct to the hundredths place.

   a)

   25
   x
   43°
   y

   b)

   10
   y
   63°
   x

   c)

   37°
   y
   75
   x

   d)

   100
   10°
   x
   y
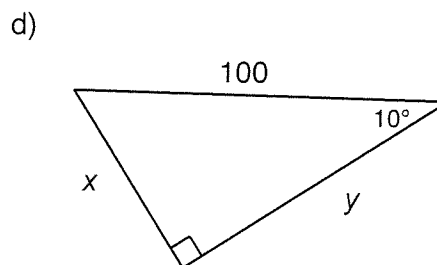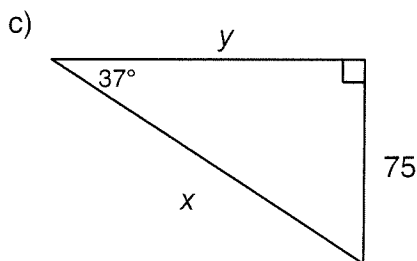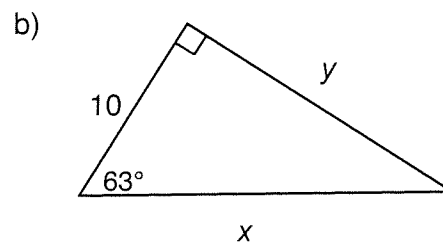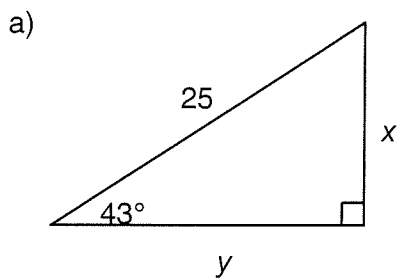
8. In the given triangles, use trigonometry to find the values of x and y to the nearest tenth. Check your answers by other means.

a)

13   x

y

7

b)

y

78

x

8

c)

15

y

x

34

d)

x

55

67

y

e)

3.5

x 6.5

y

f)

y

45

34

x
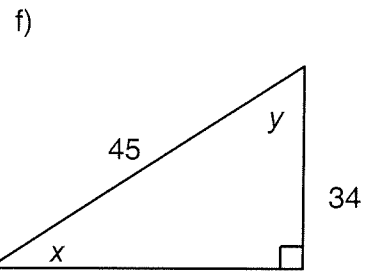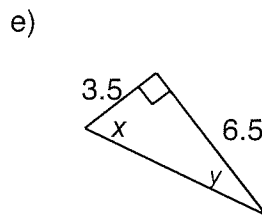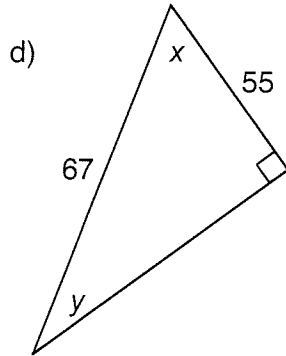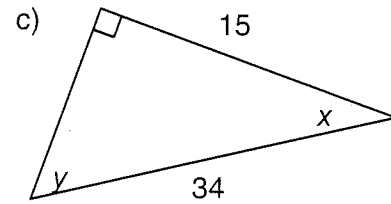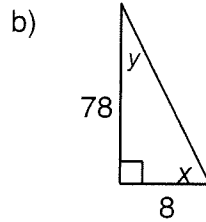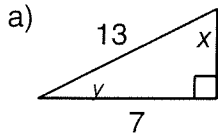
9. Use trigonometry to answer each of the following:

a)   A ladder, 6 m long, leans against a wall and makes an angle of 60° with the ground. How high up the wall does the ladder reach? How far from the wall is the foot of the ladder?

b)   A man starts at O and wishes to reach a point P, 300 m northeast of O. If he gets to P by first walking due north and then due east, how far will he have to walk in each direction?

c)   From the top of a building 20 m high, a man watches people walking along the street. If the angle of depression of the foot of a pedestrian is 60°, how far is the pedestrian from the foot of the building?

d)   The shadow of a pole is 4 m long when the angle of elevation of the sun is 60°. Find the length of the shadow when the angle of elevation of the sun is 45°.

e)   The length of the shadow of a 16 m tall tree is 8 m. What is the angle of elevation of the sun?

f)   A man whose eye is 1.5 m above the ground is standing 15 m from a tree which is 12 m high. What is the angle of elevation of the top of the tree from his eye? Give your answer correct to the nearest degree.