Date:

Round all answers in the exercise to 1 decimal place unless instructed otherwise.

1. Solve ΔABC given that: (Draw a diagram for each first)

   a) $\angle C = 90°, a = 8, b = 12$

   b) $\angle A = 90°, \angle B = 32°, a = 12$

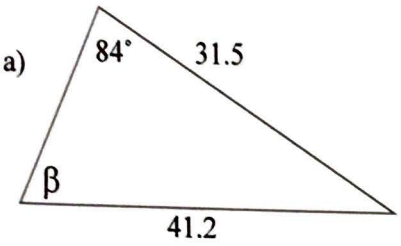
   c) $\angle A = 80°, b = 3, c = 8$

   d) $\angle B = 31°, \angle C = 81°, a = 9$

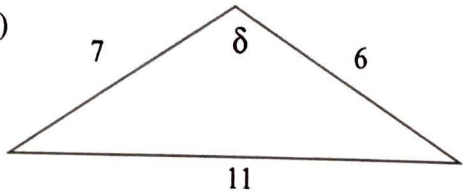
   e) $a = 8,\ b = 7,\ c = 6$

2. In each of the following triangles, determine the value of the marked unknown.

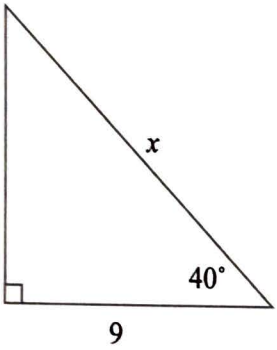
a)



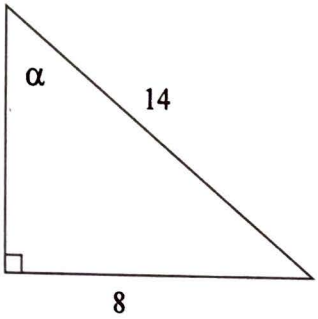
b)



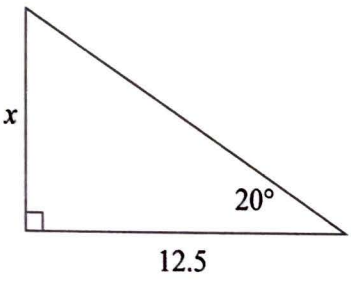
c)



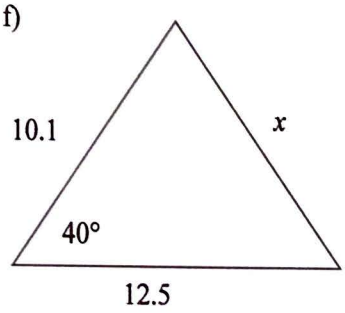
d)



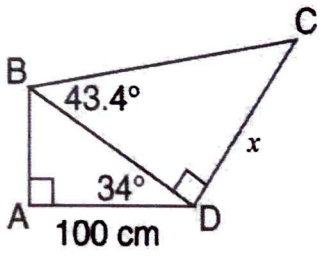
e)



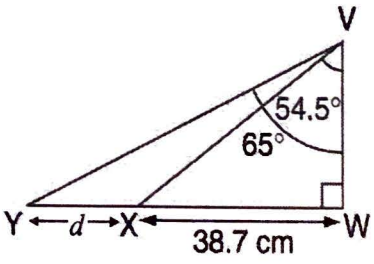
f)



g)



h)



3. In a given right triangle, $\tan\theta = \frac{2}{3}$. Determine the values of $\sin\theta$ and $\cos\theta$. Express your answer in square root form (exact answer).
4. The angle of depression of a ship from the "look-out" deck of a lighthouse is 16°. How far is the ship from the base of the lighthouse if the deck is 22.5 metres above the water?
5. From a point A, the angle of elevation of the top of a tower is 28°. From another point B, **on the opposite side** of the tower, the angle of elevation is 35°. Assuming that the tower and the two points are in a direct line on level ground, determine the height of the tower, given that the distance between A and B is 410 metres.
6. Determine the area of ΔABC if $\angle B = 32°$, $a = 31.5\,cm$ and $c = 26.3\,cm$.
7. A ladder is in an unsafe position if it makes an angle of less than 14.5° with the wall. A 6 metre ladder is placed with its base 1.2 metres from the bottom of the wall. Is the ladder in a safe position?
8. Determine the area of a triangle which has sides with lengths 17 cm, 29 cm and 23 cm.
9. Two ships, A and B, are 25 km apart. Ship A sights a distress flare at [S 6° W]. Ship B sights the same flare at [S 34° W]. Ship A is [N 78° W] of ship B. Which ship is closer and by how many km?
10. A boat leaves Kingston and heads [E] at 10 km/h km. At the same time, a second boat travel in a direction [S 19° W] from Kingston for 17 km/H. How far apart are the boats 2.6 hours later?
11. A plane flies 1500 m above a long straight road. Ahead of the plane on the road are two trucks. The angles of depression to the two trucks are 70° and 50°. How far apart are the two trucks?
12. Lighthouse L is 19 km [W] of lighthouse H. Both lighthouses are on the south shore of Lake Ontario. A ship is sighted [N 60° E] of L and [N 20° E] of H. How far is the ship from the nearest point on the shore? *(Assume that the shoreline is a straight E–W line.)*

Answers:

1. *a)* $c \doteq 14.4$, $\angle A \doteq 33.7°$, $\angle B \doteq 56.3°$
   b) $\angle C = 58°$, $b \doteq 6.4$, $c \doteq 10.2$
   c) $a \doteq 8.0$, $\angle B \doteq 21.6°$, $\angle C \doteq 78.4°$
   d) $\angle A = 68°$, $b \doteq 5.0$, $c \doteq 9.6$
   e) $\angle A \doteq 75.5°$, $\angle B \doteq 57.9°$, $\angle C \doteq 46.6°$
2. a) 49.5° b) 115.4° c) 11.7 d) 34.8°
   e) 4.5 f) 8.1 g) 114.1 cm h) 20.5 cm
3. $\sin\theta = \frac{2}{\sqrt{13}}$ $\cos\theta = \frac{3}{\sqrt{13}}$
4. The ship is about 78.5 metres away.
5. The tower is about 123.9 meters tall.
6. The area of the triangle is about 219.5 cm^2.
7. The ladder is in a unsafe position because the angle is about 11.5°.
8. The area of the triangle is about 195.4 square units.
9. A is closer by 3.6 km
10. 58.1 km
11. 712.7 m
12. 13.9 km