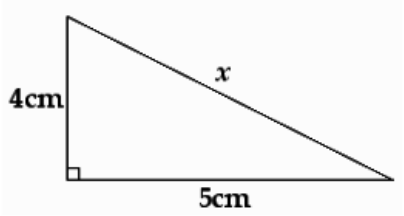
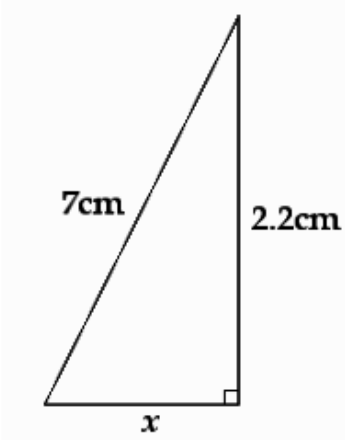
Pythagoras REVIEW

In the Trigonometry unit, you might need to use Pythagoras for certain questions. Here's a quick review of *how Pythagoras' formula works* ***in right triangles only***.

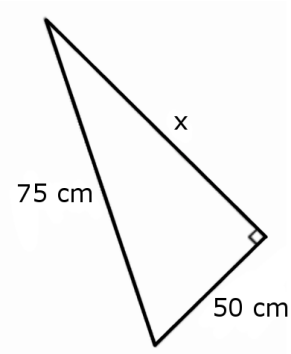
1. Label the sides, write the formula, then solve for 'x'



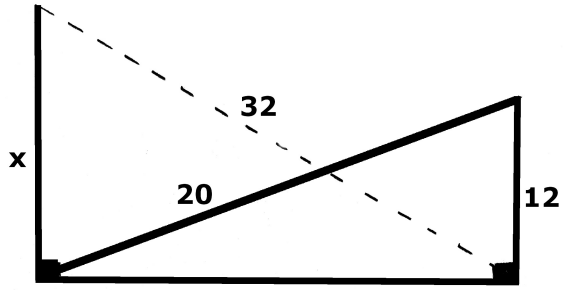
2. Label the sides, write the formula, then solve for 'x'
Round your answer to the nearest **hundredth** of a centimeter.



3. Label the sides, write the formula, then solve for 'x'.
Round your answer to the nearest **hundredth** of a centimeter.

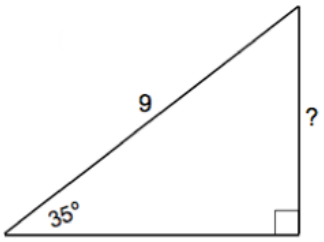


4. What is the value of 'x'?
Round your answer to the nearest **hundredth**.

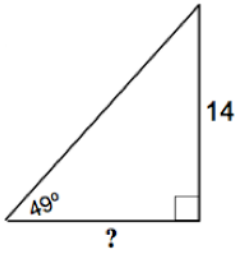


Missing side lengths and angles in *RIGHT TRIANGLES – 01*
(using *sin*, *cos* and *tan*)

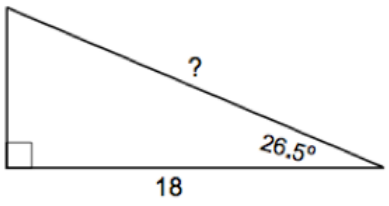
1. Find the length of the edge marked '?' the right triangle below.



2. Find the length of the edge marked '?' the right triangle below.



3. Find the length of the edge marked '?' the right triangle below.

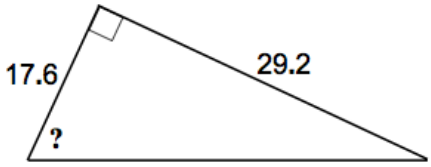


4. A flagpole is 12 m tall. How far away is an observation point which has an angle of elevation of 25° to the top of the pole?

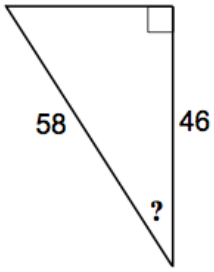
5. Sam is standing on level ground 70m away from a tower. From where she's standing, the angle of elevation from the ground to the top of the tower is 38°. What is the height of the tower?

Missing side lengths and angles in *RIGHT TRIANGLES – 02*
(using *sin*, *cos* and *tan*)

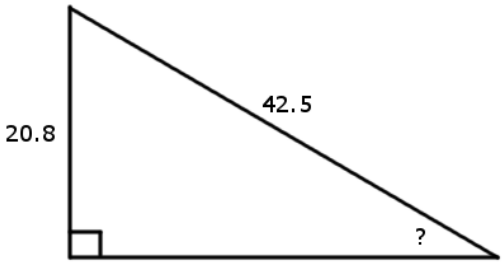
1. Find the length of the angle marked '?' the right triangle below.



2. Find the length of the angle marked '?' the right triangle below.



3. Find the length of the angle marked '?' the right triangle below.

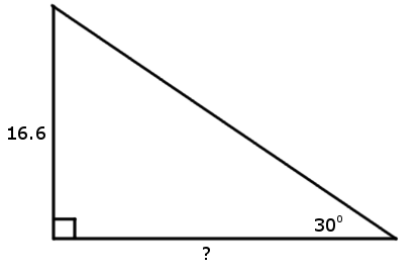


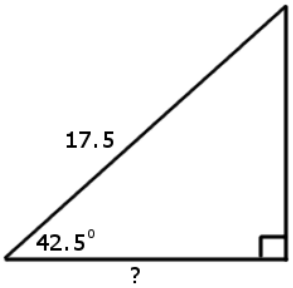
4. A construction crane is 65 m tall. A worker is standing 215 m away from the crane. What is the angle of elevation between the ground in front of the worker and the top of the crane?

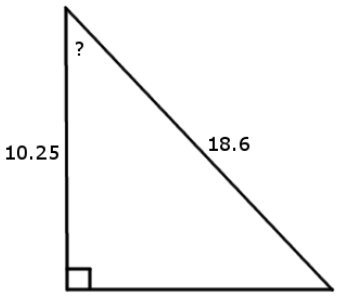
5. A ladder is 8 m long. It is leaning up against the wall of a house and reaches 5 m up the wall. If the angle at which the ladder meets the ground is less than 35 degrees, it may slip and cause injury. Is it safe to climb the ladder?

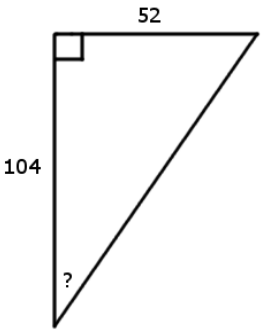
Missing side lengths and angles in *RIGHT TRIANGLES – 03*
(using *sin*, *cos* and *tan*)

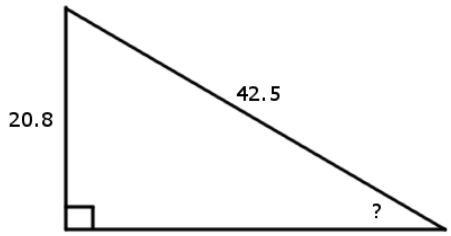
1. Find the missing value marked '?' the right triangles below.

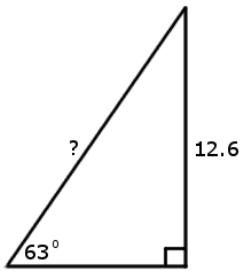


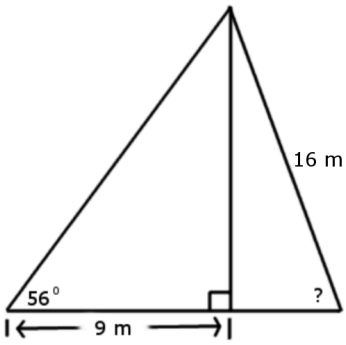







20.8
42.5
?


?
12.6
63°

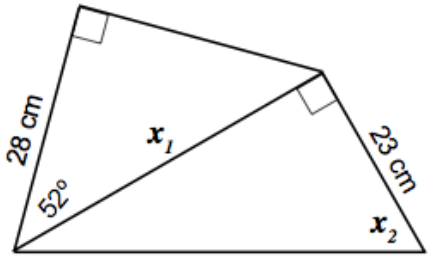

16 m
56°
?
9 m

2. Tammy is flying a kite using a 68m long string. When the kite is at its highest point, the string meets the ground at an angle of 52°. What is the vertical height of the kite at its highest point?

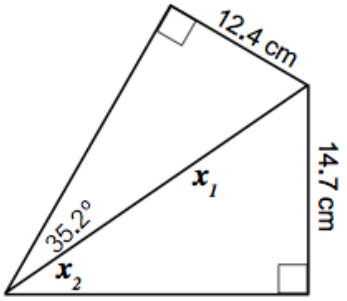
3. One section of a mountain railway is 550m long (hypotenuse). In that length, the railway rises through a vertical height of 140 meters. Calculate the angle of inclination of the track (between level ground and the railway track).

Missing side lengths and angles in *RIGHT TRIANGLES – 04*
(using *sin*, *cos* and *tan*)

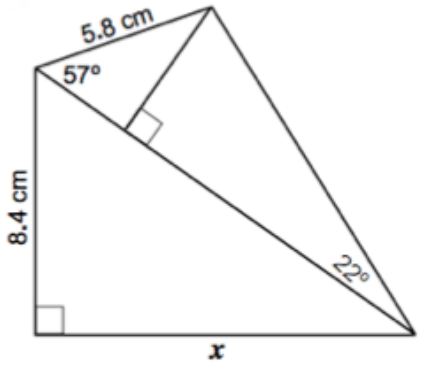
1. Find the value of x_1 and x_2.



2. Find the value of x_1 and x_2.



3. Find the value of x.



4. A drilling platform is moored (with an anchor) in the sea at a point where the sea is 130 m deep. The angle of the anchor cable with the horizontal platform is 28°. What length of cable is needed to connect the anchor to the platform?

5. A surveyor takes a sighting of the top of a hill, which, according to her map, is 2760 meters away from her position. From where she stands, the angle of elevation of the top of the hill with the ground is 52.8°. What is the vertical height of the hill?

6. An upright stick, 1 m tall, casts a shadow that is 1.85 m long along the ground.

    a. What is the angle the sun makes with the horizontal ground?

    b. At the same time, the shadow of a building is found to be 127 meters long. What is the height of the building?

Missing side lengths and angles in *RIGHT TRIANGLES – 05*

(using *sin*, *cos* and *tan*)

1. A firefighter is rescuing a cat in a tree. The branch that the cat is on is 15 feet above the ground. The ladder makes an angle of 63° with the ground. How long is the ladder?

2. An airplane has flown 4150 total meters (in a straight line) from the airport where it had taken off. At this point, it has covered a horizontal distance (measured on the ground) of 3660m. What is the angle at which the plane rose from the ground, to the nearest degree?

3. A surveyor needs to find out how far away she is from a 3000m tall cliff. Looking up at the cliff, the angle of elevation is 22°.
How far is the surveyor from the base of the cliff?

4. A 20-foot-long ladder is safe if the angle it makes with the ground is between 60° and 80°. Assuming the ladder is placed safely, what is the minimum distance between its base and the base of the wall?

5. To calculate the height of a building, Jim measures the angle of elevation to be 34°. Jim is 15.75 metres from the base of the building.
How tall is the building?

6. A cable is used to support a TV tower that is 245 metres tall. The angle where the cable meets the ground is 78°. How long is the cable?

7. A beam measuring 4.5 metres leans against a wall and reaches a point 3.75 meters above the ground.
What is the angle the beam makes with the ground to the nearest degree?

8. From the top of a building, you look down at an object on the ground. Your eyes are 55 feet above the ground. The angle of depression is 50°. What is the distance between the object and the base of the building (round your answer to the nearest foot)?

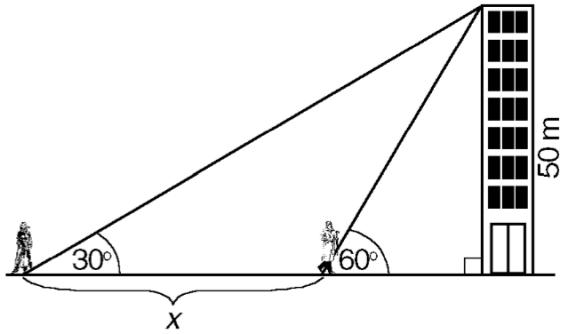
Missing side lengths and angles in *RIGHT TRIANGLES – 06*

(using *sin*, *cos* and *tan*)

1. A pilot is travelling at a height of 30 000 feet above level ground. The pilot looks down at an angle of depression of 6° and spots the runway. As measured along the ground, how many miles away is the plane from the runway? Round your answer to one decimal place.

2. A parasail is towed behind a boat. The rope that is attached to the parasail is 84 feet long. The rope is connected to the boat at a point 1 foot above the surface of the water. The angle of elevation from the boat to the parasail is 28°. How high above the water is the parasailer?

3. Chuck and Larry are standing some distance apart on the same side of a 50m tall building. From where Chuck stands, the angle of elevation to the top of the building is 30°. From where Larry stands, the angle of elevation is 60°. To the nearest tenth of a metre, what is the distance between Chuck and Larry?



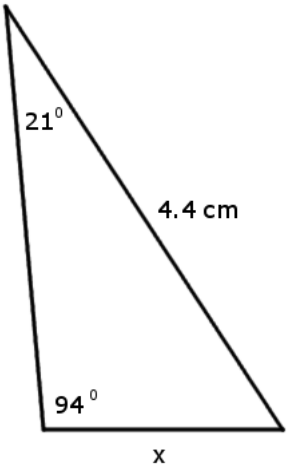
4. Two observers on the ground are looking at the top of the same tree from two different points. The first observer, who is 83 metres away from the base of the tree, looks up at an angle of elevation of 58°. The second observer is standing only 46 meters from the base of the tree.

a) How tall is the tree, to the nearest tenth of a meter?

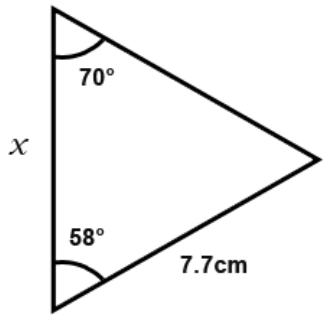
b) At what angle of elevation must the second observer look up to see the top of the tree?

Finding missing sides and angles in *NON-RIGHT TRIANGLES – 01*
(using *sine law*)

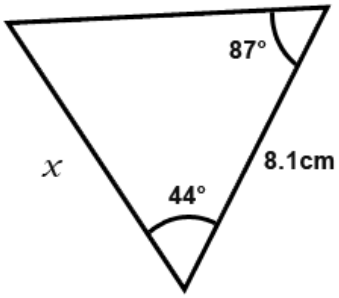
1. Find the value of 'x' in the triangle below.
   Round your answer to 1 decimal place.



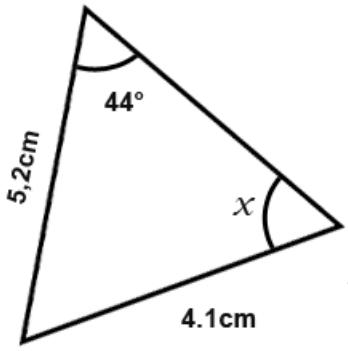
2. Find the value of 'x' in the triangle below.
   Round your answer to 1 decimal place.



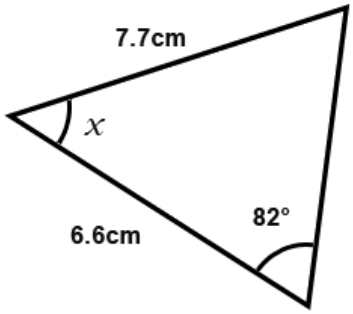
3. Find the value of ‘x’ in the triangle below.
   Round your answer to 1 decimal place.



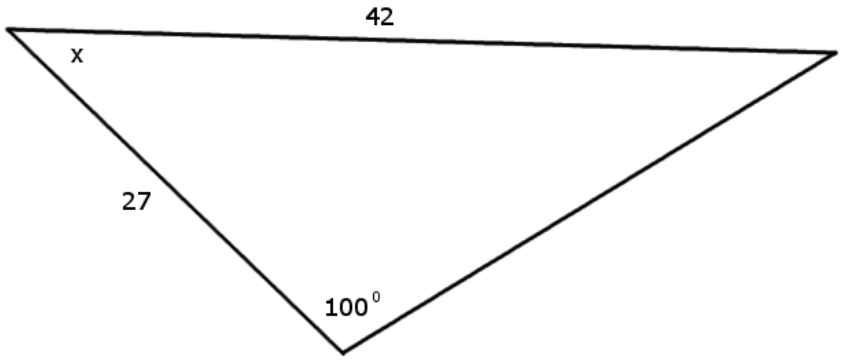
4. Find the value of ‘x’ in the triangle below.
   Round your answer to 1 decimal place.



5. Find the value of ‘x’ in the triangle below.
   Round your answer to 1 decimal place.

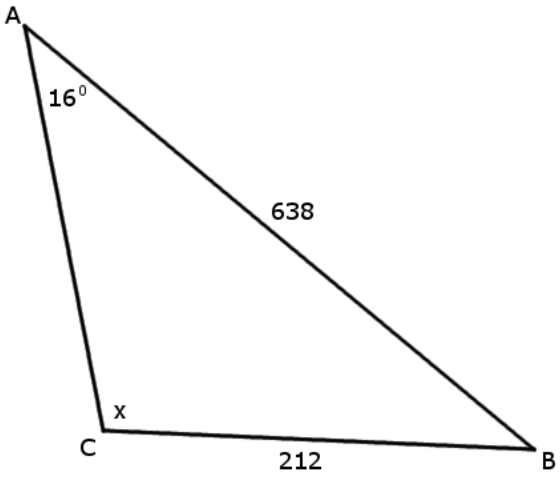


6. Find the value of ‘x’ in the triangle below.
Round your answer to 1 decimal place.

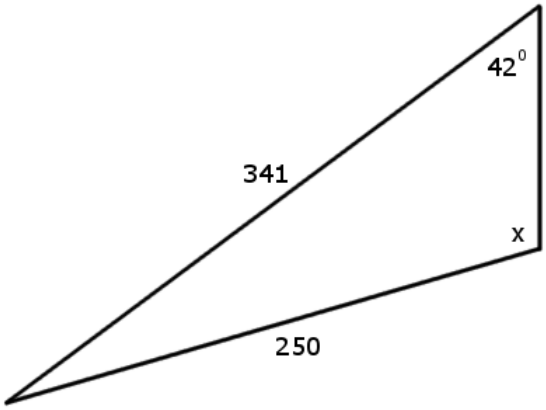


Finding missing sides and angles in *NON-RIGHT TRIANGLES – 02*
(using *sine law*)

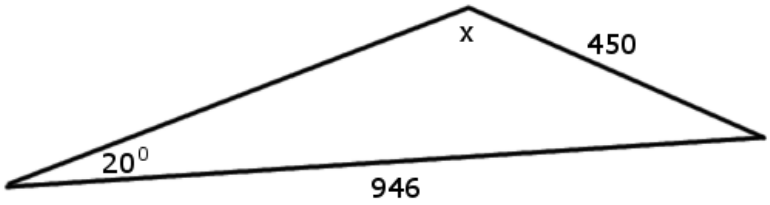
1. Find the value of the missing obtuse angle marked 'x'. Round your answer to 1 decimal place.



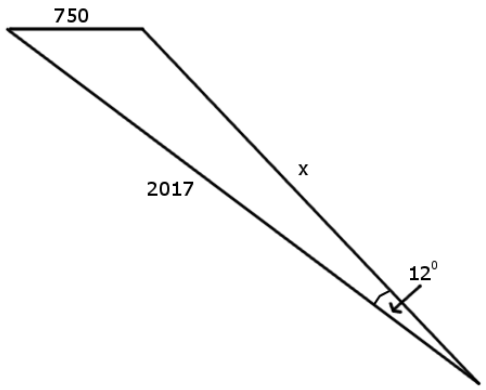
2. Find the value of the missing obtuse angle marked 'x'. Round your answer to 1 decimal place.



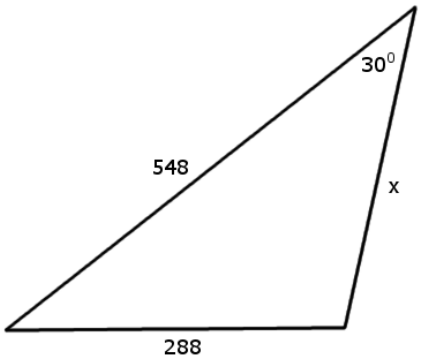
3. Find the value of the missing obtuse angle marked ‘x’. Round your answer to 1 decimal place.



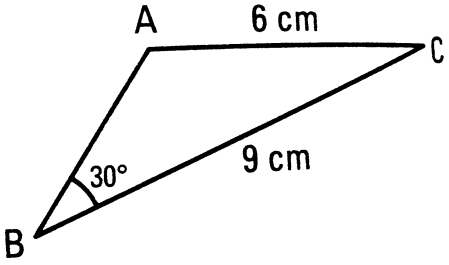
4. Find the value of the missing side marked ‘x’. Round your answer to 1 decimal place.



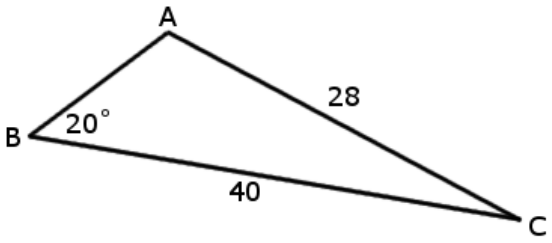
5. Find the value of the missing side marked ‘x’. Round your answer to 1 decimal place.



6. What is the measure of obtuse angle A? Round your answer to 1 decimal place.

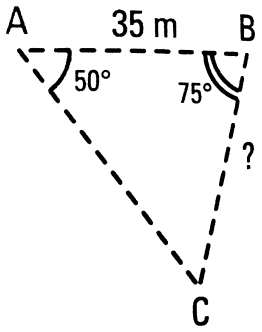


7. In the triangle below, find the measure of obtuse angle A then find the perimeter. Round your answers to 1 decimal place.

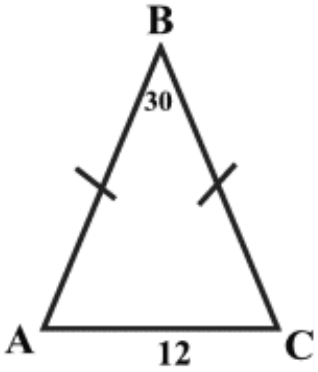


Finding missing sides and angles in *NON-RIGHT TRIANGLES – 03*
(using *sine law*)

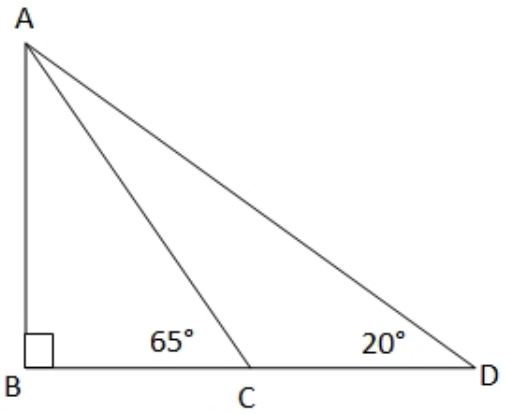
1. Three boats are near each other. What distance separates B and C? Round your answer to one decimal place.



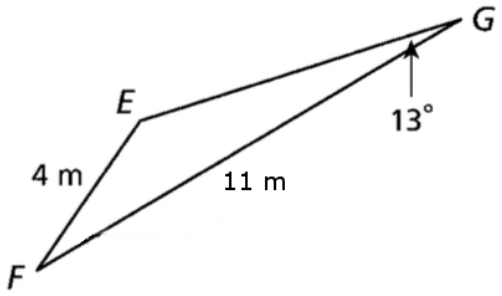
2. In the isosceles triangle below, angle B measures 30° and the base measures 12 cm. Find the perimeter of the triangle to the nearest integer.



3. If the distance from point C to point D is 15 m, what is the distance from point B to point C? *Hint: A straight line makes an angle of 180°.*

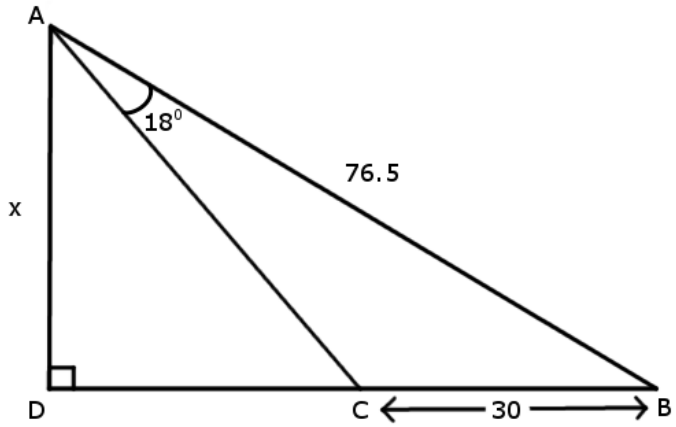


4. In the triangle below, find the measure of obtuse angle E then find the perimeter. Round your answers to 1 decimal place.

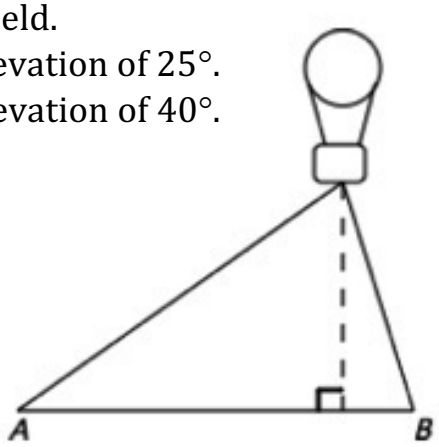


Finding missing sides and angles in *NON-RIGHT TRIANGLES* – 04
(using *sine law*)

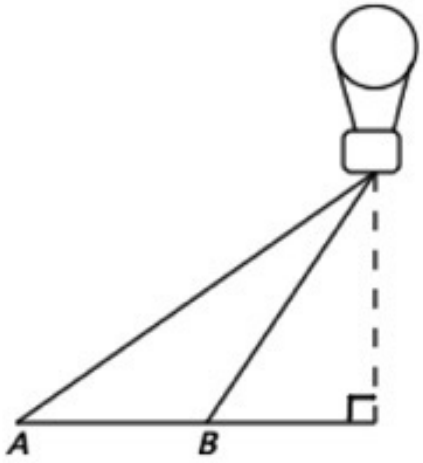
1. Find the value of the missing side marked ‘x’. Round to nearest tenth.



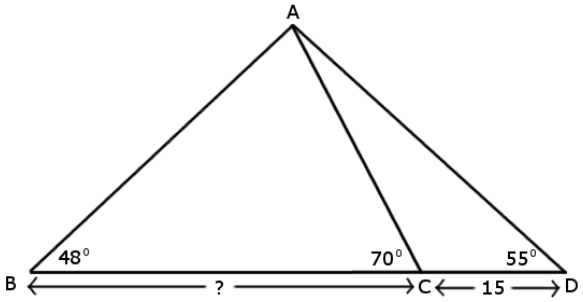
2. A hot air balloon is hovering over a soccer field.
   Person *A* views the balloon at an angle of elevation of 25°.
   Person *B* views the balloon at an angle of elevation of 40°.
   Person *A* and person *B* are 4000 feet apart.
   Find the height of the balloon.



3. A hot air balloon is hovering over a soccer field.
Person *A* views the balloon at an angle of elevation of 25°.
Person *B* views the balloon at an angle of elevation of 40°.
Person *A* and person *B* are 4000 feet apart and on the same side of the balloon. Find the height of the balloon.



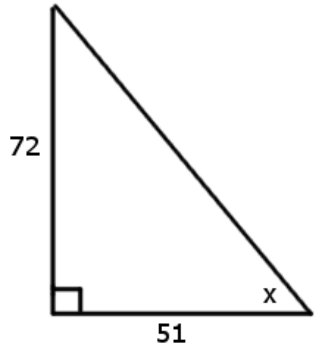
4. Find the value of the missing side length marked '?'. Round your answer to the nearest integer.



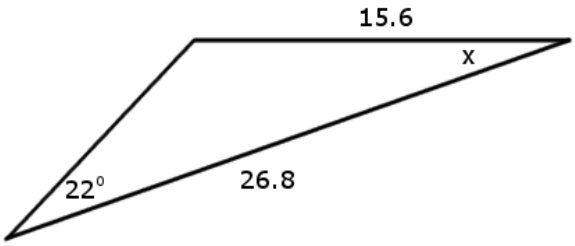
Finding missing sides and angles in *TRIANGLES* – 01

(using *SOH CAH TOA* and *sine law*)

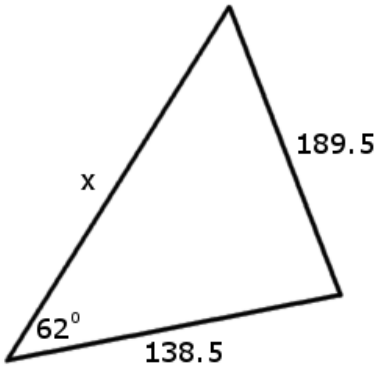
1. Find the value of the missing angle marked 'x'.
   Round your answer to the nearest tenth.



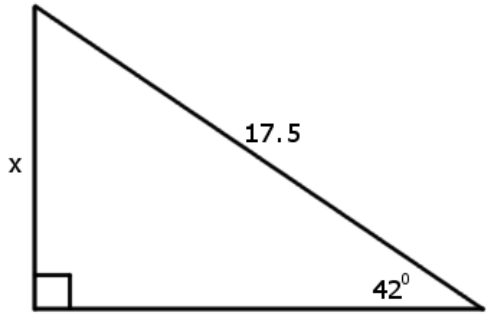
2. Find the value of the missing angle marked 'x'.
   Round your answer to 1 decimal place.



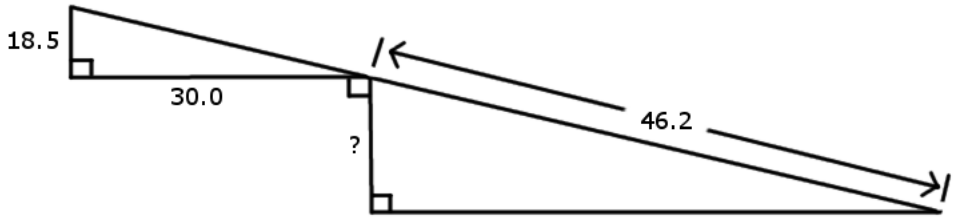
3. Find the value of the missing side length marked ‘x’.
   Round your answer to 1 decimal place.



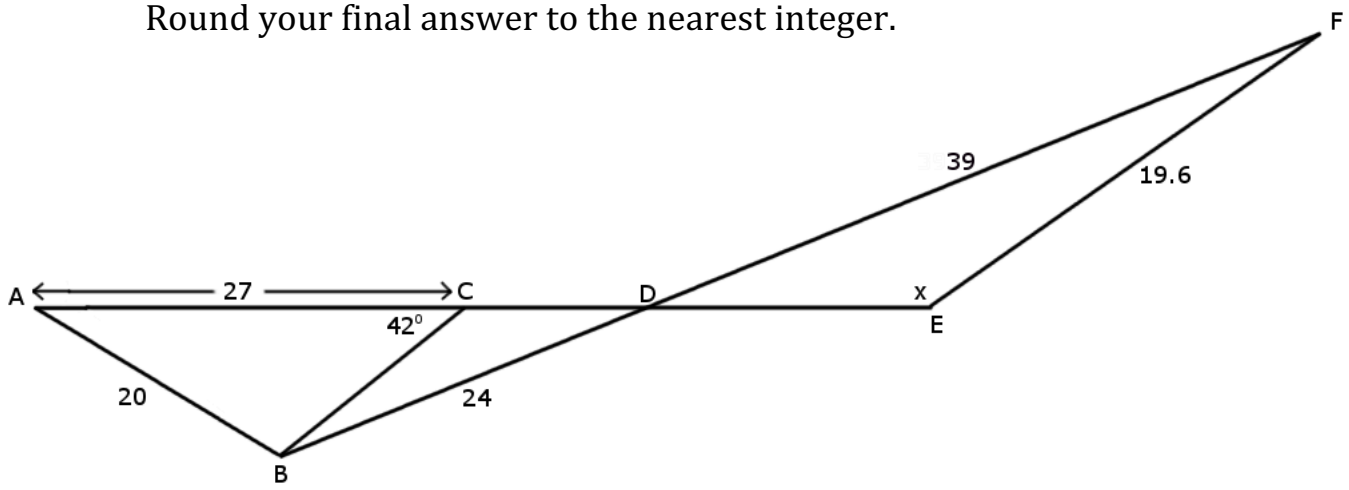
4. Find the value of the side marked ‘x’. Round to the nearest tenth.



5. Find the value of the missing side marked '?'
   Round your final answer to the nearest integer.

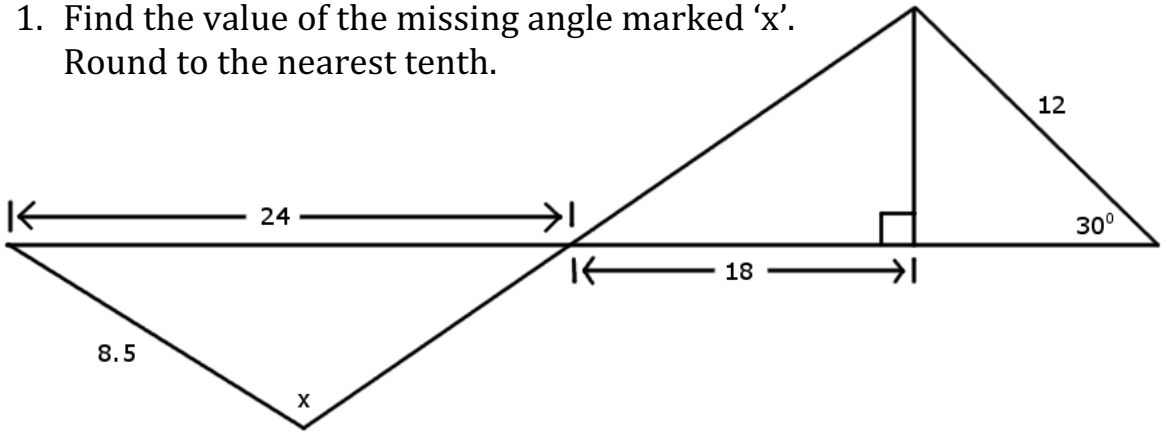


6. Find the value of the missing obtuse angle marked ‘x’
   Round your final answer to the nearest integer.

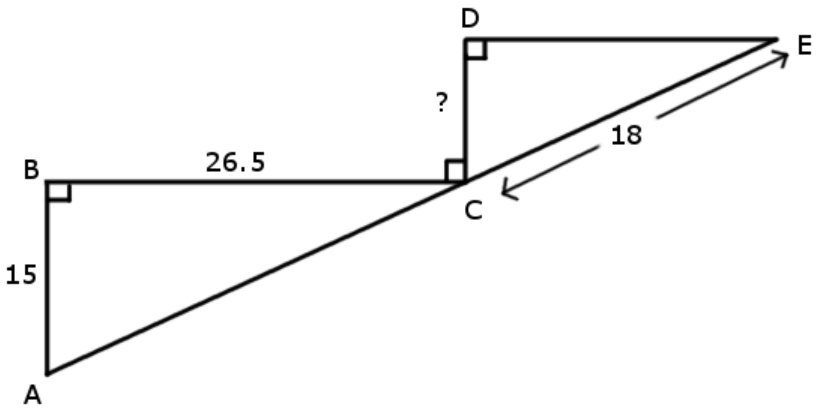


Finding missing sides and angles in *TRIANGLES* – 02
(using *SOH CAH TOA* and *sine law*)

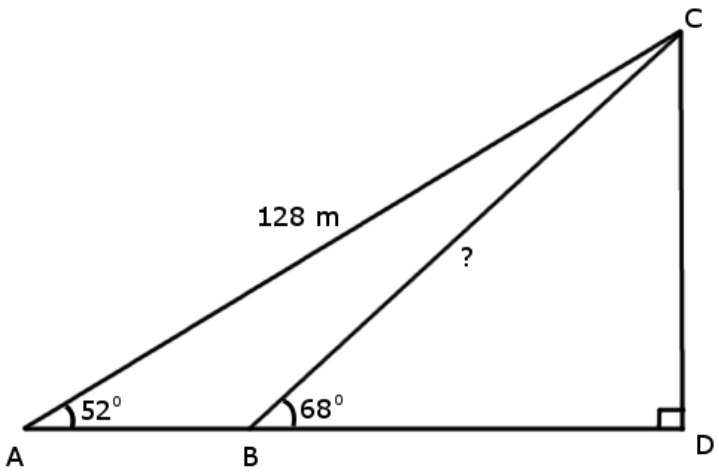
1. Find the value of the missing angle marked 'x'.
   Round to the nearest tenth.



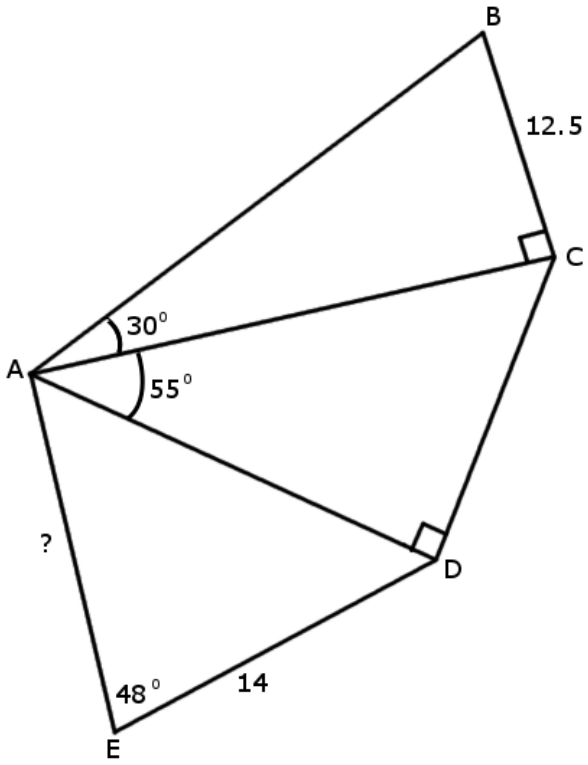
2. Find the length of line segment CD. Round to the nearest tenth.



3. Find the length of line segment BC. Round to the nearest tenth.

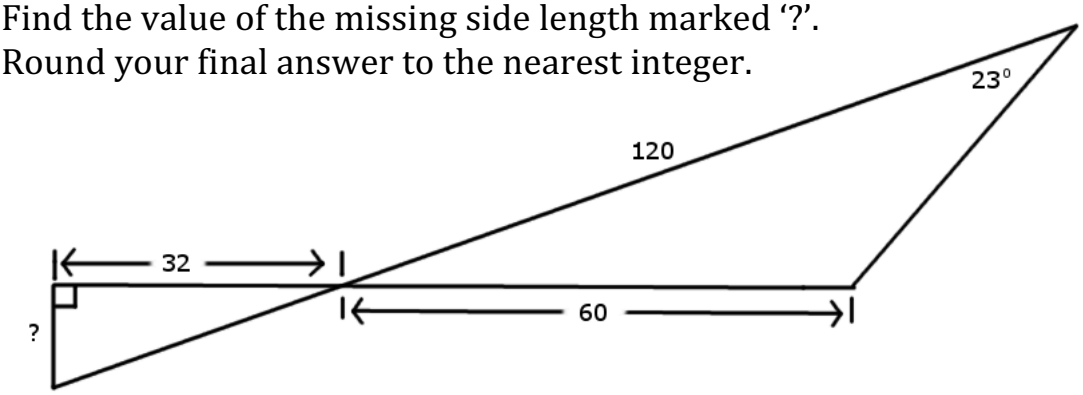


4. Find the length of line segment AE. Round to the nearest tenth.

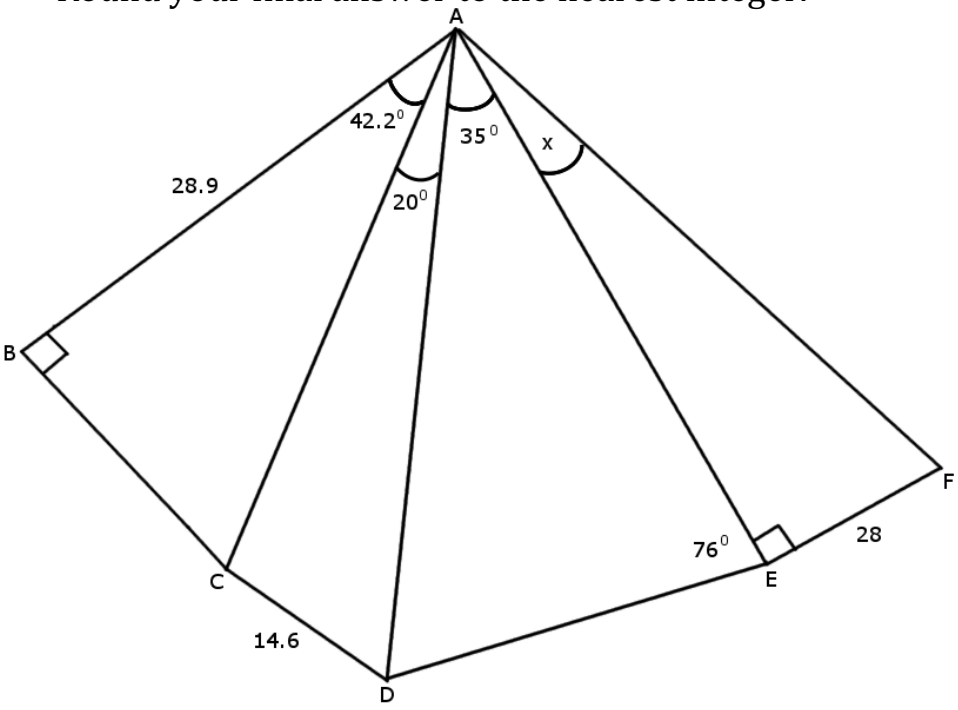


Finding missing sides and angles in *TRIANGLES* – 03
(using *SOH CAH TOA* and *sine law*)

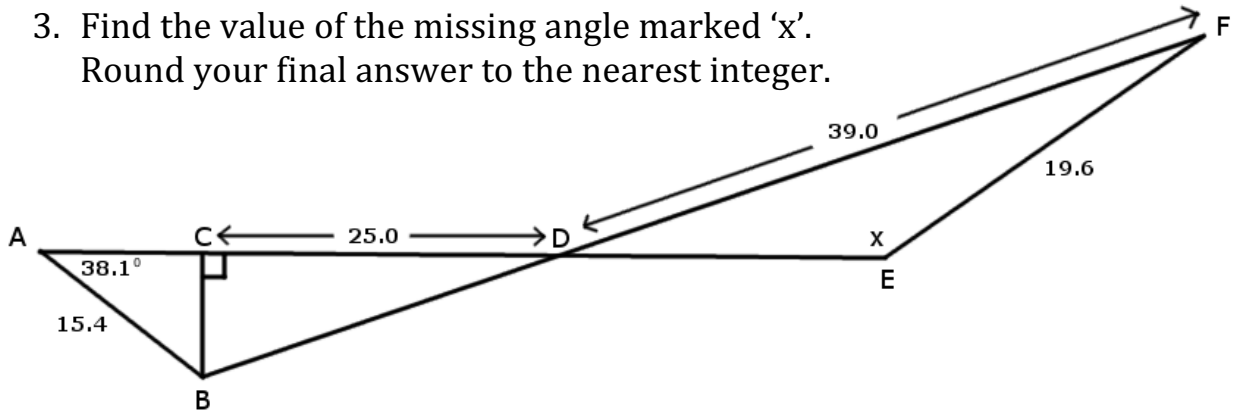
1. Find the value of the missing side length marked '?'.
   Round your final answer to the nearest integer.



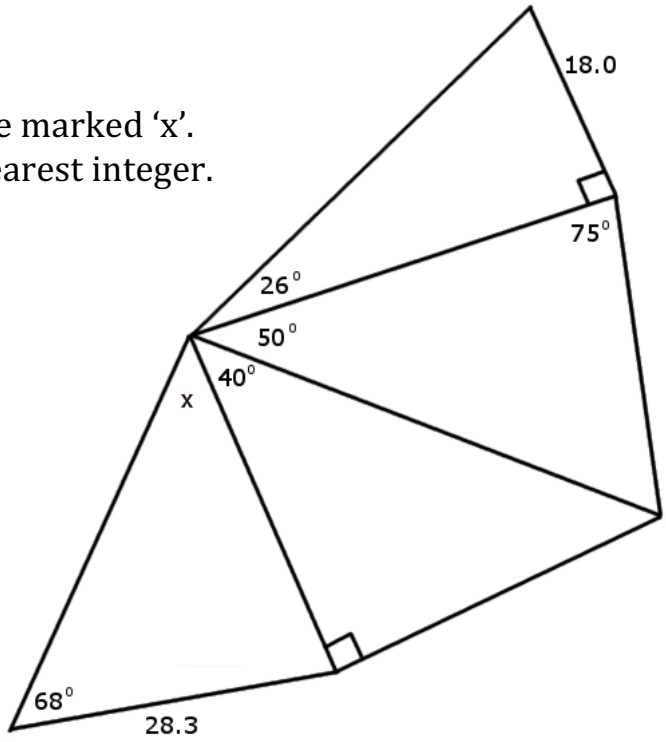
2. Find the value of the missing angle marked ‘x’.
   Round your final answer to the nearest integer.



3. Find the value of the missing angle marked ‘x’.
   Round your final answer to the nearest integer.



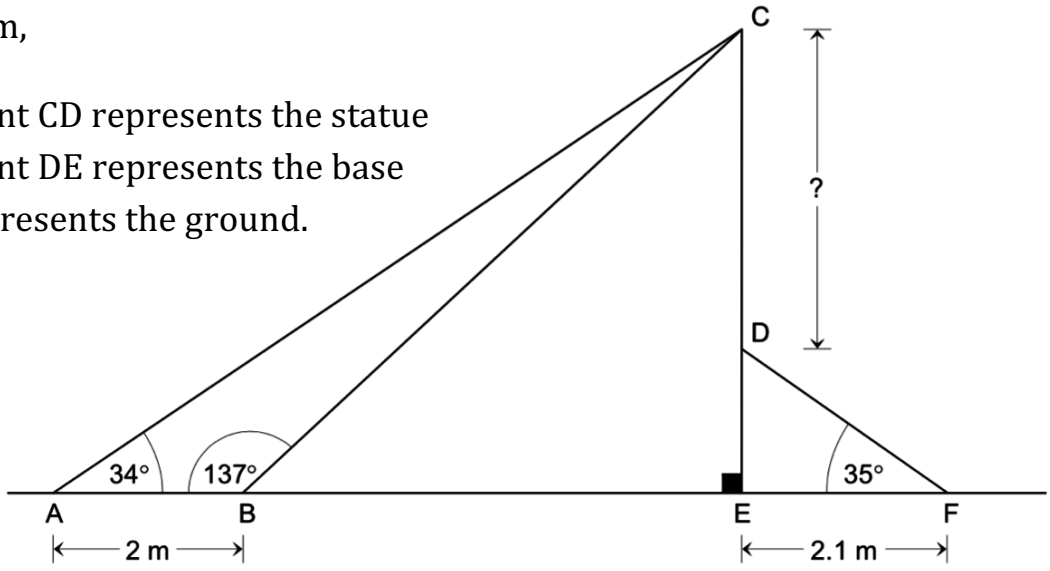
4. Find the value of the missing angle marked ‘x’.
   Round your final answer to the nearest integer.



5. A statue is secured to a base.
   Rick used the measurements in the diagram below to find the height of the statue without the base.

In this diagram,

- line segment CD represents the statue
- line segment DE represents the base
- line AF represents the ground.

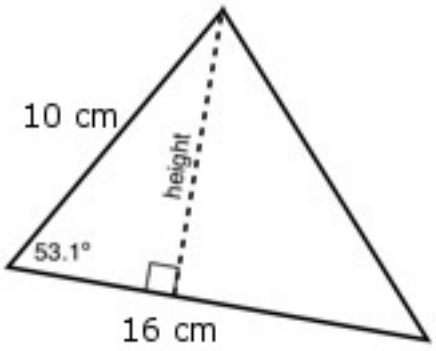


To the nearest ***tenth*** of a metre, what is the **height** of the statue ***without the base***?

Finding the area of a triangle using TWO SIDES AND A CONTAINED ANGLE – 01

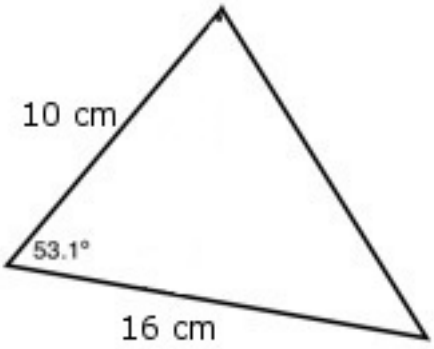
1. Solve for the height of the triangle below, then solve for the area.

   Remember, the area formula for triangles is $Area = \frac{\boldsymbol{base \times height}}{\mathbf{2}}$

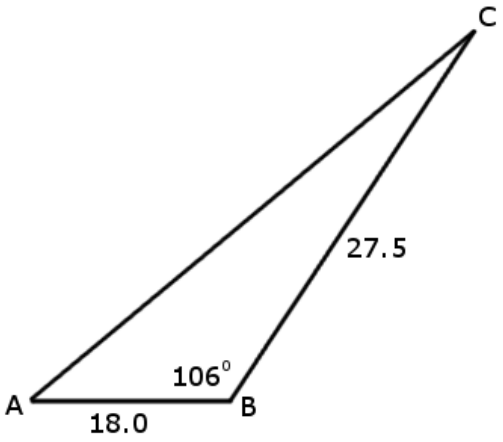


2. For the same triangle, calculate the area using the new formula:

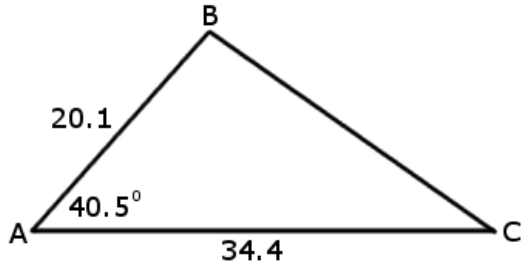
$$Area = \frac{a \cdot b \cdot \sin C}{2}$$



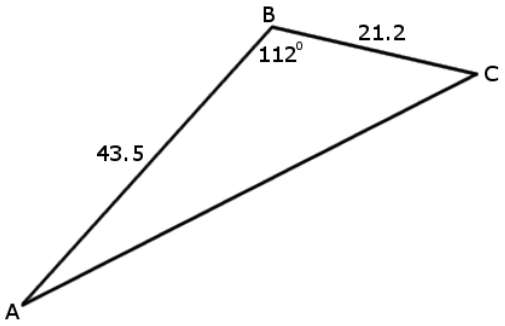
3. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



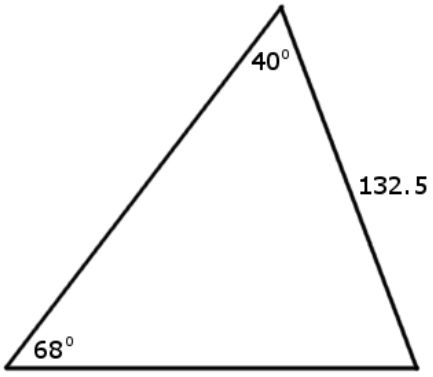
4. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



5. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.

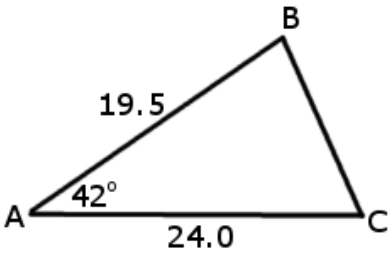


6. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.

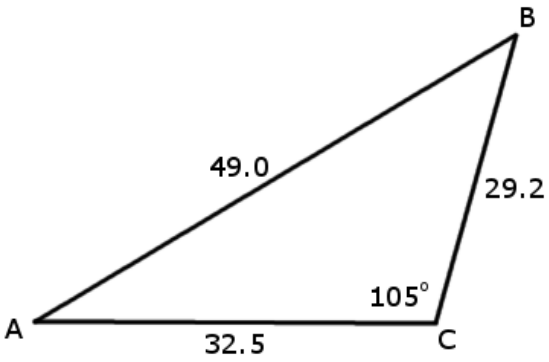


Finding the area of a triangle using TWO SIDES AND A CONTAINED ANGLE – 02

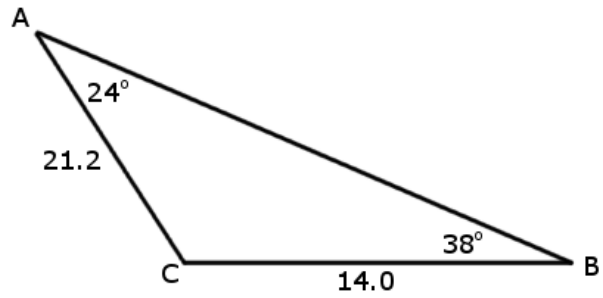
1. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



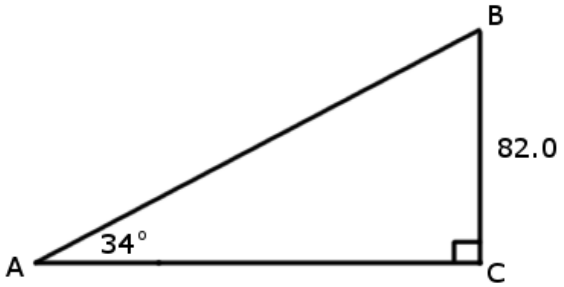
2. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



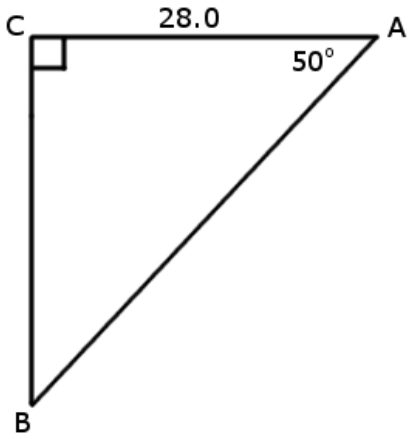
3. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



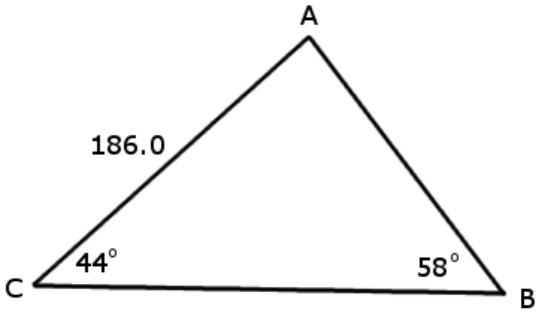
4. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



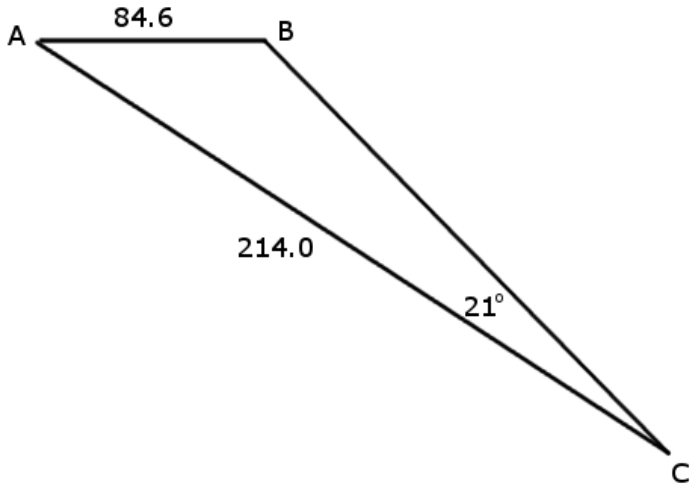
5. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



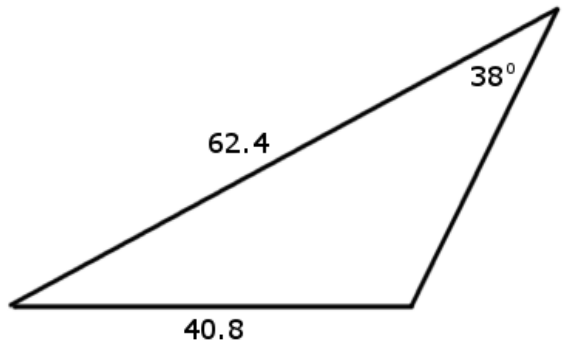
6. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



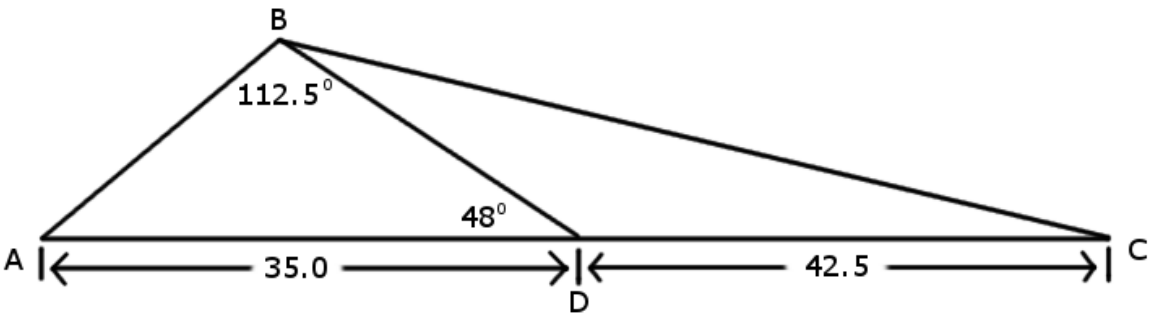
7. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.



8. What is the area of the triangle below?
   Round your answer to the nearest tenth of a unit.

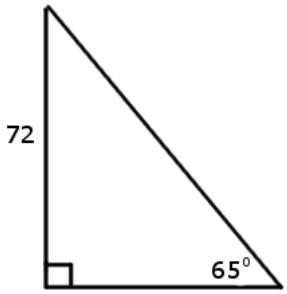


9. What is the area of triangle ABC below?
   Round your answer to the nearest tenth of a unit.

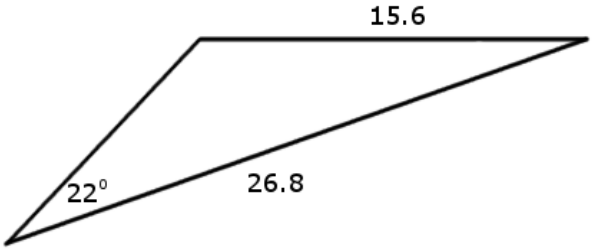


Finding the area of a triangle using TWO SIDES AND A CONTAINED ANGLE – 03

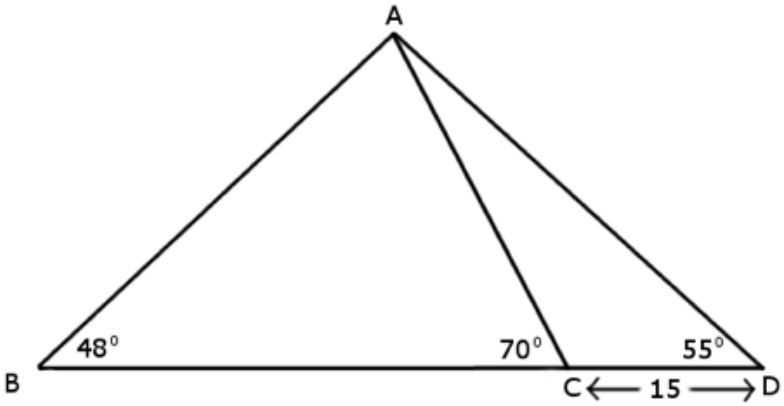
1. Find the area of the triangle below.
   Round your final answer to 1 decimal place.



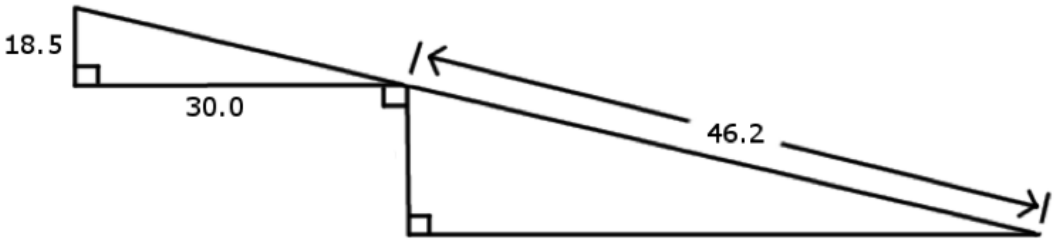
2. Find the area of the triangle below.
   Round your final answer to 1 decimal place.



3. Find the area of triangle ABD below.
   Round your final answer to the nearest integer.

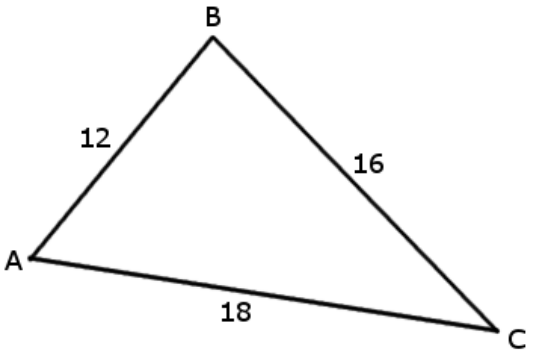


4. Find the combined area of the two triangles below.
   Round your final answer to the nearest integer.

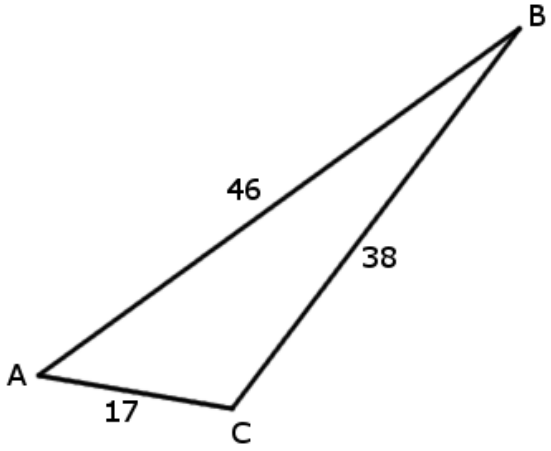


Finding the area of a triangle using HERO'S FORMULA – 01

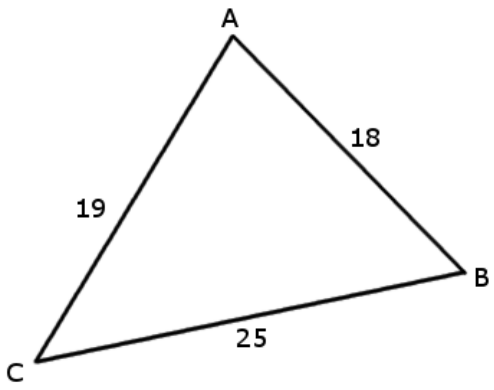
1. Determine the area of the triangle below.
   Round your answer to the nearest integer.



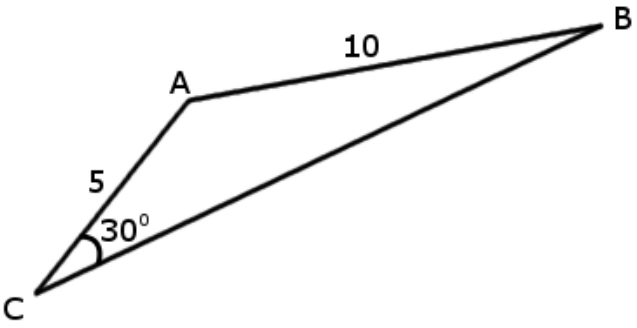
2. Determine the area of the triangle below.
   Round your answer to the nearest integer.



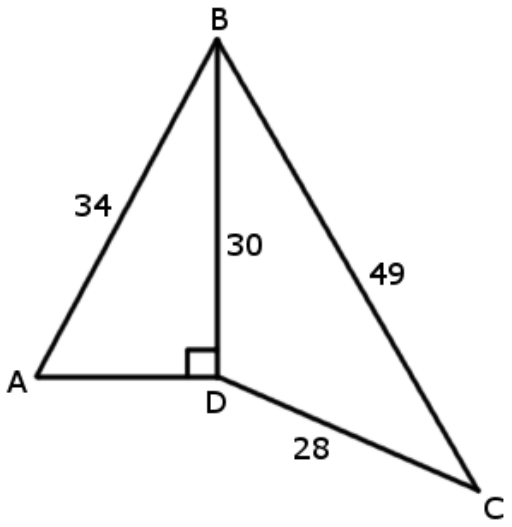
3. Determine the area of the triangle below.
   Round your answer to the nearest integer.



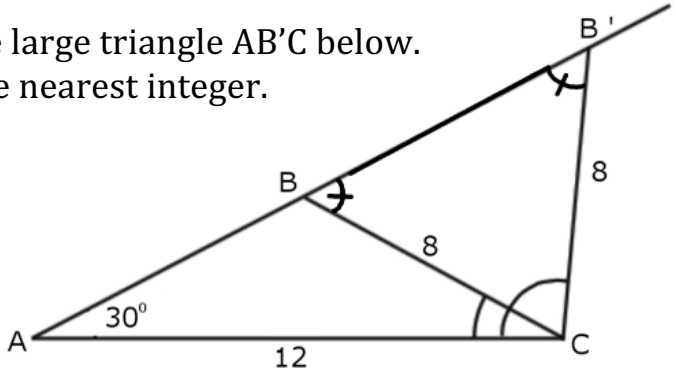
4. Determine the area of the triangle below.
   Round your answer to the nearest integer.



5. Determine the area of the complex shape ABCD below. Round your answer to the nearest integer.

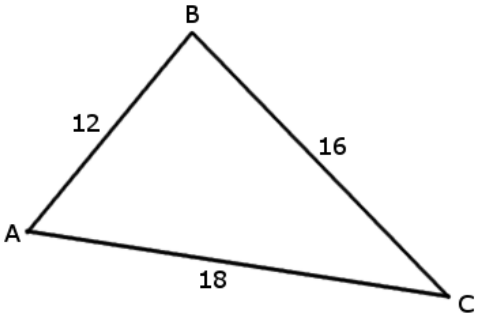


6. Determine the area of the large triangle AB'C below. Round your answer to the nearest integer.

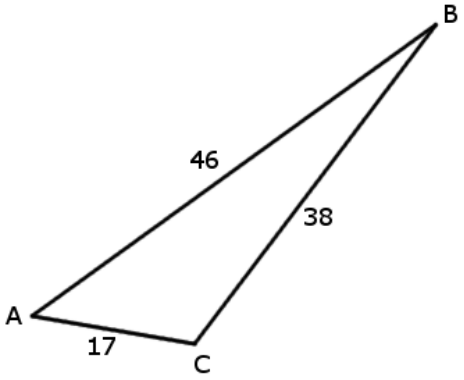


Finding the area of a triangle using HERO'S FORMULA – 02

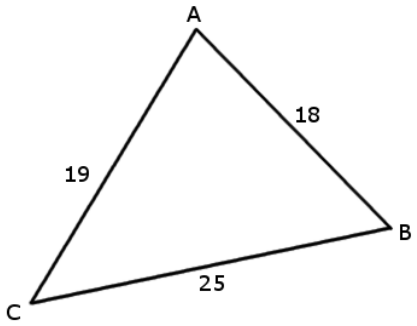
1. Determine the area of the triangle below.
   Round your answer to the nearest integer.



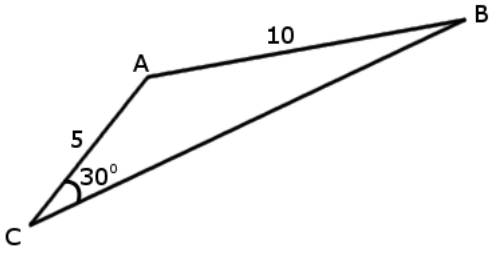
2. Determine the area of the triangle below.
   Round your answer to the nearest integer.



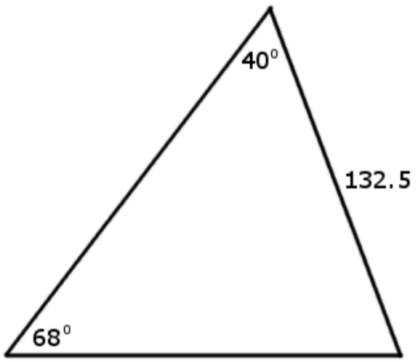
3. Determine the area of the triangle below.
   Round your answer to the nearest integer.



4. Determine the area of the triangle below.
   Round your answer to the nearest integer.

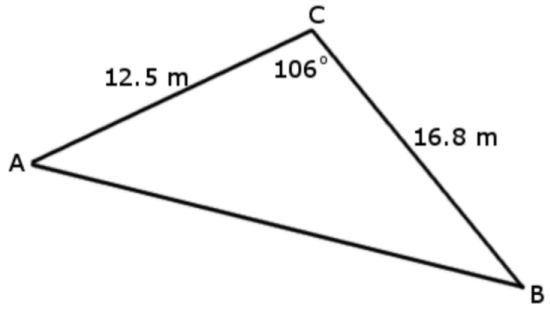


5. Determine the area of the triangle below.
   Round your answer to the nearest integer.

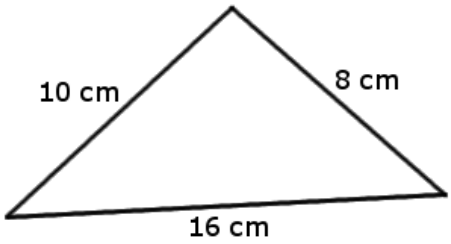


Finding the area of a triangle – MIXED PROBLEMS – 01

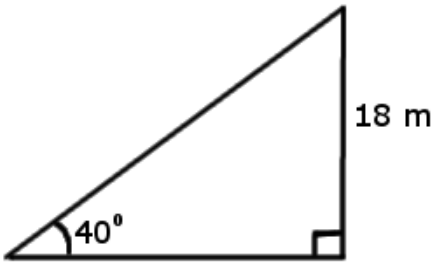
1. Determine the area of the triangle below.
   Round your answer to the nearest integer.



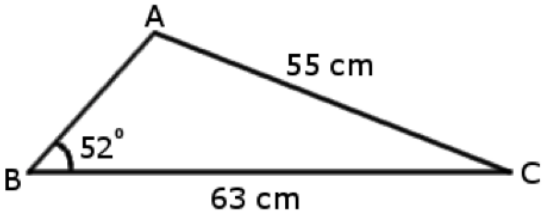
2. Determine the area of the triangle below.
   Round your answer to the nearest integer.



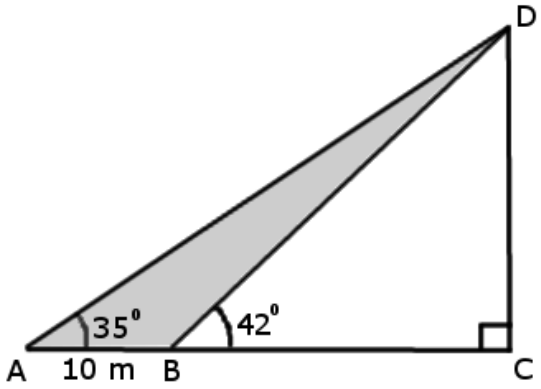
3. Determine the area of the triangle below.
   Round your answer to the nearest integer.



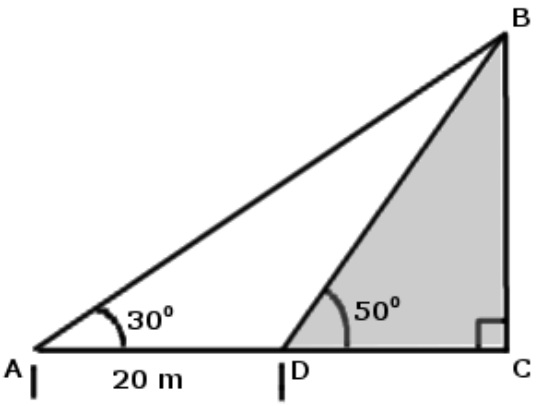
4. Determine the area of the triangle below.
   Round your answer to the nearest integer.



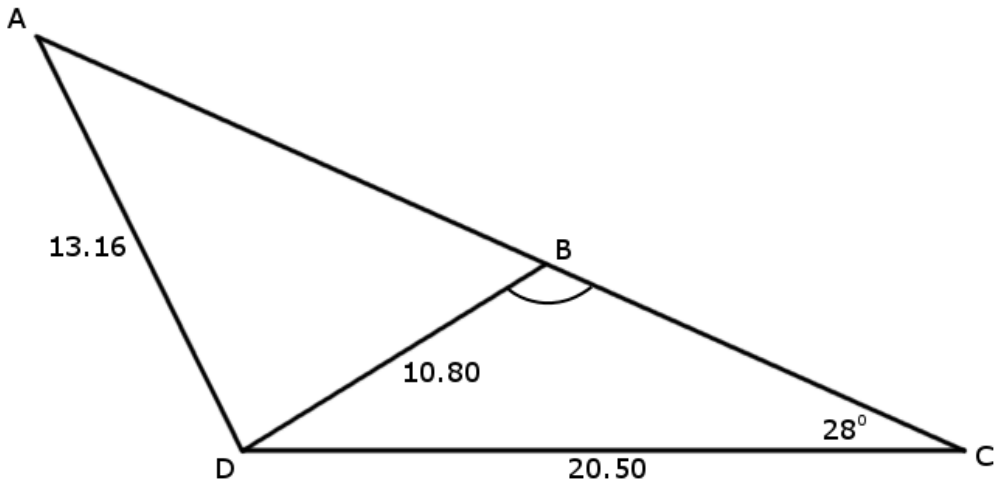
5. Determine the area of triangle ABD.
   Round your answer to the nearest integer.



6. Determine the area of triangle BCD.
   Round your answer to the nearest integer.



7. Determine the area of the large triangle ACD below. Round your answer to the nearest integer.



Look back at the 7 questions from “Finding the area of a triangle – MIXED PROBLEMS – 01” and explain how you chose the proper formula for each question.

Memory Aid:
Formulas, Notes & Reminders