Number 3

3 Complete the following table using the adjacent right triangle.

Length of segments
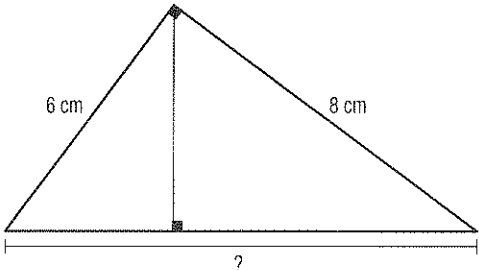
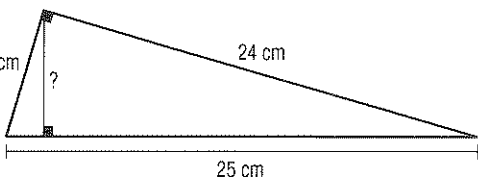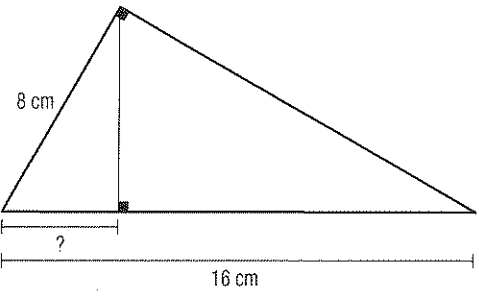|	a	b	c	m	n	h
a)	9	12				
b)				4		8
c)	10					6
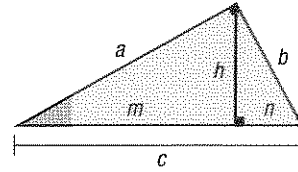
Metric relations

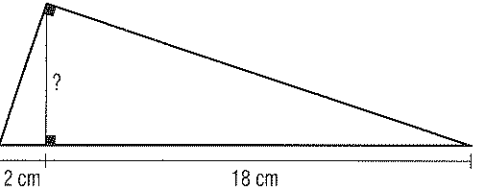**1** Consider each of the right triangles below. For each case, do the following:

1) Find the missing value.
2) Identify the geometric statement that supports your calculations.
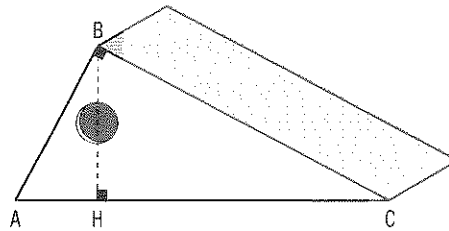
a)

1) _____

2) _____

b)

1) _____

2) _____

c)

1) _____

2) _____

d)

1) _____

2) _____

3 A furniture maker is building a bird feeder. As shown in the adjacent illustration, she must make a hole that will allow birds to enter through the centre of the upper part of the feeder. The base of the feeder AC is 26 cm long and the side BC, 23 cm.

a) How far from point A should the furniture maker place her square in order to draw altitude BH?

b) How far from the base of the feeder should the centre of the entry hole be located?

4 Beatrice and Tina are standing on different sides of a vertical tower. Beatrice is 214.22 m from the base of the tower and can see the top at an angle of elevation of 35°. Tina is 105.03 m from the base of the tower and can see the top of the tower at an angle of elevation of 55°. Each woman's eye level is 1.5 m from the ground.

a) Use a diagram to represent this situation and indicate the measurements.

b) How high is the tower?

c) Identify the geometric statement that allows this calculation.

5 In the adjacent illustration of a roof truss, the braces FE and FD are respectively perpendicular to the rafters AB and BC, and the king post (central support beam) BF is perpendicular to the ridge beam (base) AC. Considering that the rafters AB and BC are respectively 2.3 m and 1.93 m long, and that the ridge beam is 3 m long, what is the length of the following:
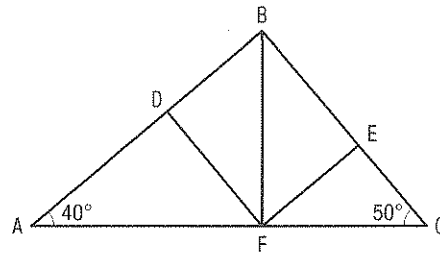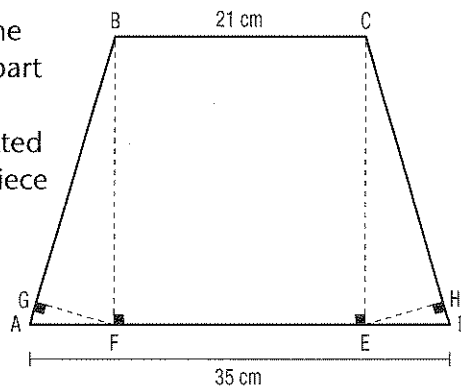
a) the king post BF?

b) the brace FD?

c) the brace FE?

6 A tinsmith has to fold a piece of aluminum into the shape of an isosceles triangle in order to make a part for a ventilation system. As shown in the adjacent illustration, he has to fold the piece along the dotted lines BF, CE, GF and HE. The surface area of the piece of aluminum is 672 cm².

a) What is the distance between points A and G?

b) What is the total length of the four fold lines?

1 **ROOF TRUSSES** A carpenter has to construct three roof trusses which resemble those illustrated below. The dimensions of the Type 1 roof truss are 75% of those of the Type 2 roof truss. The dimensions of the Type 2 roof truss are 75% of those of the Type 3 roof truss. The ridge beam of the largest roof truss is 3.65 m in length.

Roof trusses

| Type 1 | Type 2 | Type 3 |

3.65 m
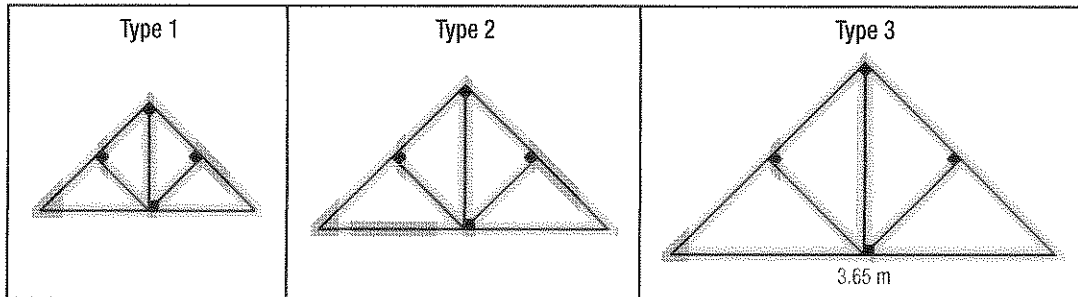
The beams used to construct these roof trusses, which are in the shape of isosceles triangles, are available in three lengths: 2.45 m, 3.05 m and 4.25 m. How many beams of each length should the carpenter buy in order to have the least possible waste?

2 **A SPIRAL STAIRCASE** A company builds spiral staircases which are 160 cm in diameter. Figure 1 represents the shape of the wooden steps and Figure 2 shows the view from the top of a spiral staircase. All the steps of this staircase are congruent. In order to fulfill the specifications for the construction of a 20-step spiral staircase, calculate the total area of the base of all the steps.
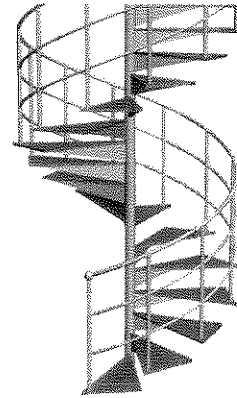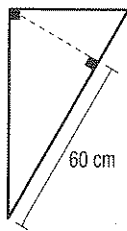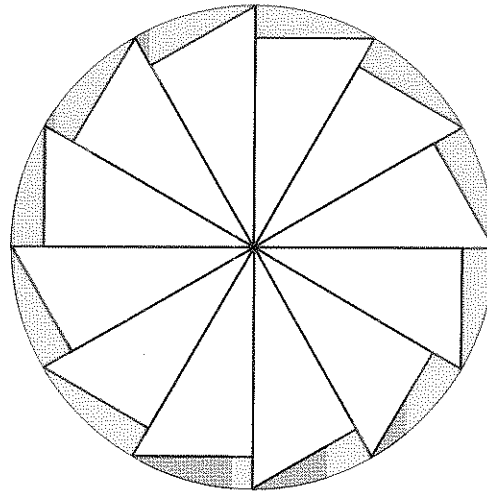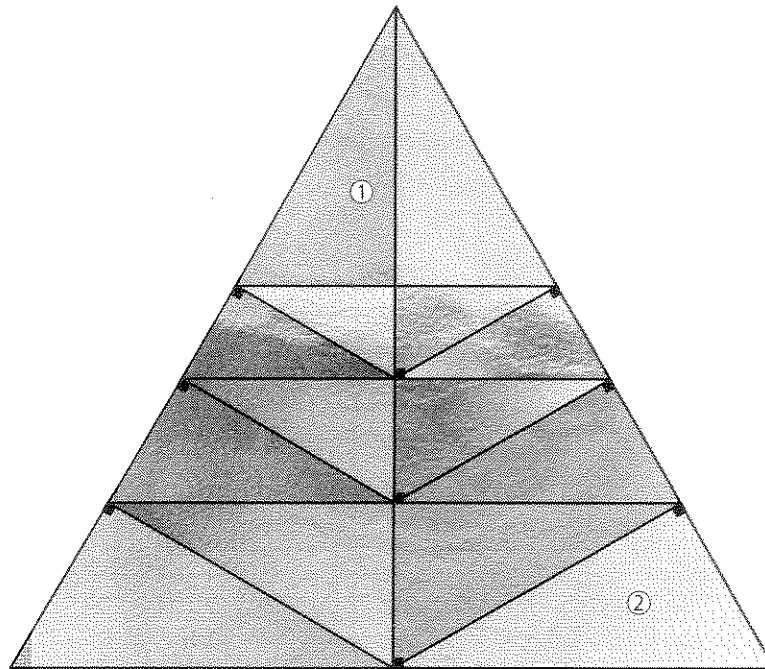
Figure 1

60 cm

Figure 2

3 **A SYMMETRICAL STAINED GLASS WINDOW** An artist produces the stained glass window illustrated below. The symmetrical stained glass window is in the shape of an equilateral triangle that has sides each measuring 24 cm. Calculate the difference between the areas of Triangles ① and ②.

4 **THE GARDEN** The owner of a garden divides it into 4 plots according to the diagram illustrated below. Show that the area of Plots ① and ④ each measures 19.44 m² and that the area of Plots ② and ③ each measures 34.56 m².
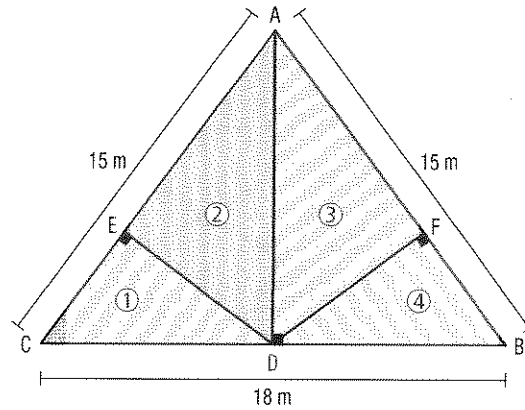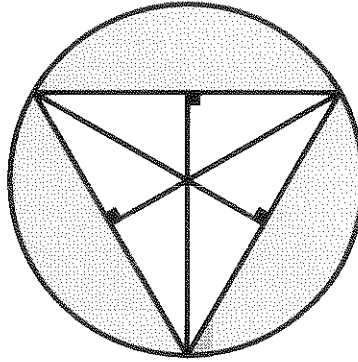

Hypothesis:	
Conclusion:	

STATEMENT	JUSTIFICATION

5 **A DISTINCTIVE MARK** Municipal vehicles bear the logo below. Each of the sides of the large equilateral triangle inscribed in the circle measures 32 cm, and the 6 smaller triangles all have the same area. Is it possible to state that the area of the shaded region is greater than 600 cm²? Explain your reasoning.

Hypothesis:	
Conclusion:	

STATEMENT	JUSTIFICATION

6 **THE RIGHT SUPPORT** A toboggan manufacturer makes a sketch of a model for his employees. With the objective of making this model of toboggan safer, he must include in his sketch a vertical support between points B and F. Point F coincides with the midpoint of segment BC. At what distance from point B should he draw the vertical support so that this distance is identical to that between points F and G?