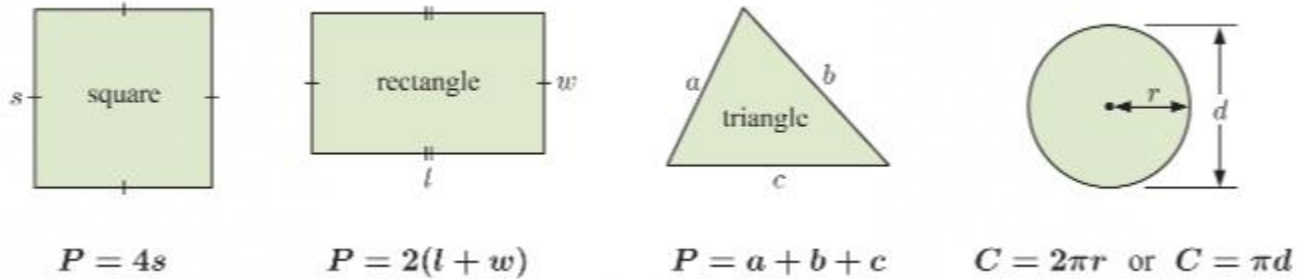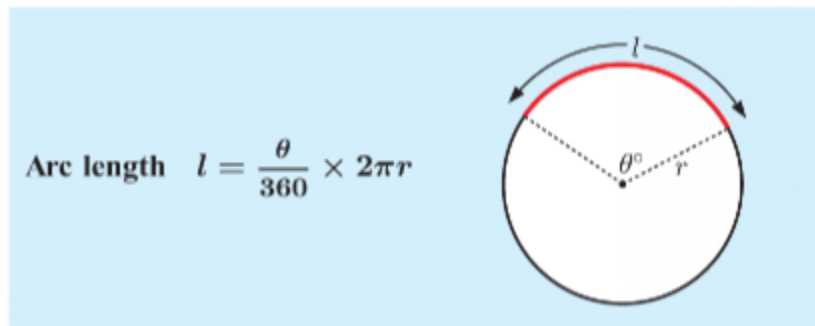Lesson 2.4 – Perimeter and Area (Math 9/10 Book pages 115-127)

I.   Perimeter
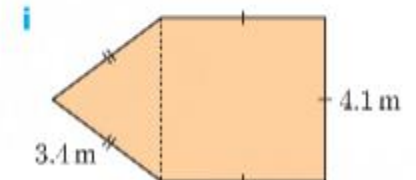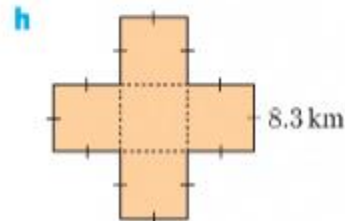
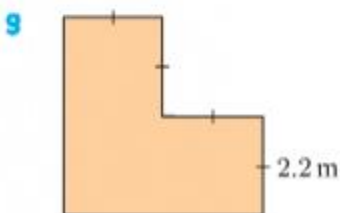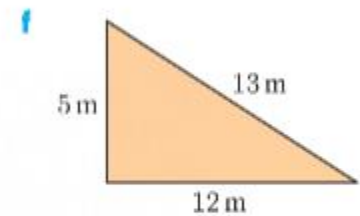The **perimeter** of a closed figure is the total distance around its **boundary**. The perimeter of a polygon is the sum of the length of its sides. For a circle, the perimeter is called the **circumference.**

square

rectangle w

a b triangle c

r d

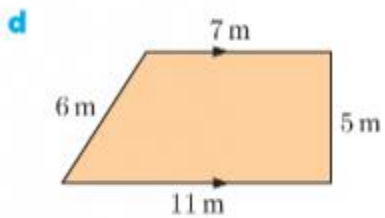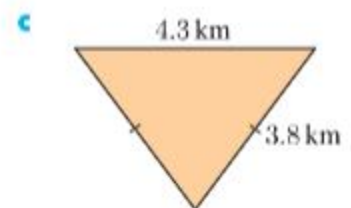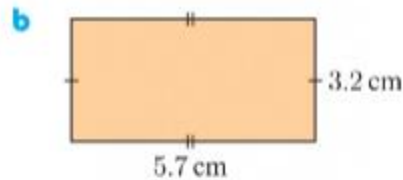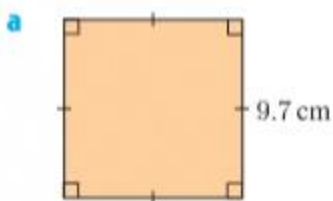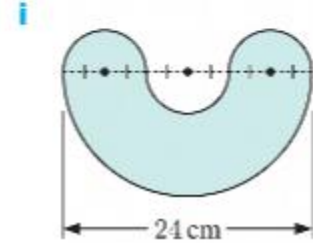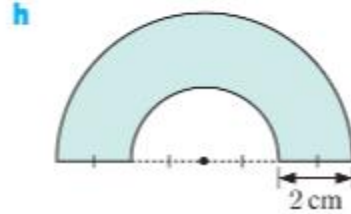$P = 4s$ $P = 2(l + w)$ $P = a + b + c$ $C = 2\pi r$ or $C = \pi d$

The **arc length** of part of a circle is a fraction of the circumference of the circle.

Arc length $l = \dfrac{\theta}{360} \times 2\pi r$

1. Find the perimeter of the following figures.

a   9.7 cm

b   3.2 cm   5.7 cm

c   4.3 km   3.8 km

d   7 m   6 m   5 m   11 m

e   2.9 cm

f   5 m   13 m   12 m

g   2.2 m

h   8.3 km

i   4.1 m   3.4 m

2. Find the perimeter of the following figures.

a

7 cm

b

4 m

c

5 cm

d

3 m

e

80 m

95 m

f

4 cm

g

6 cm

h

2 cm

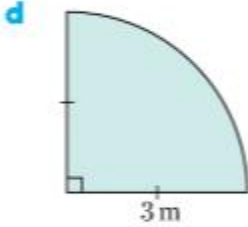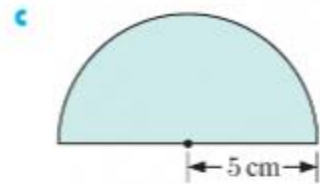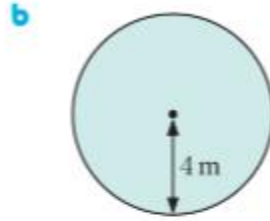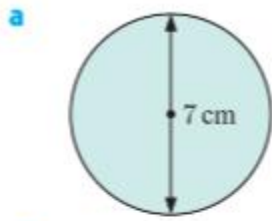**i**

24 cm
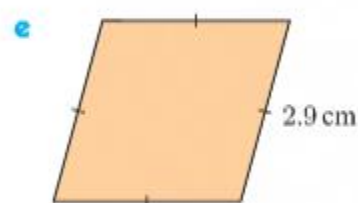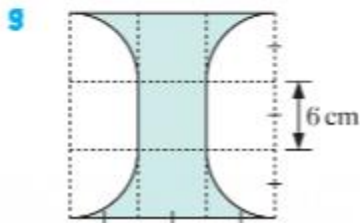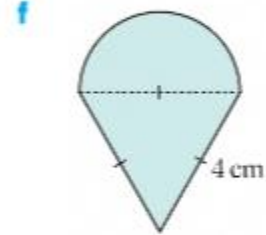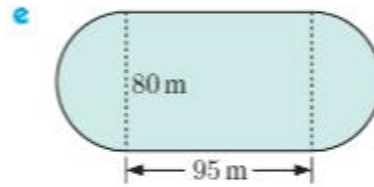
3. Find the perimeter of the following figures.

a

40° 3 cm

b

5 mm

110°

c

2 cm

60°
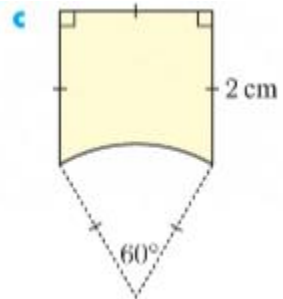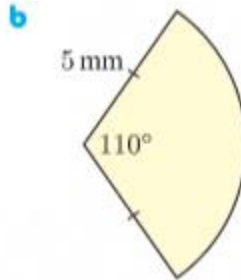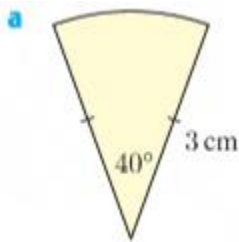
4. Find the total length of ribbon used to tie the present to the right. Assume the bow part takes an additional 25 cm.

12 cm

16 cm

25 cm

5. What is the perimeter of the figure created on the coordinate plane with the points A(-4,-1), B(4,5), and C(4,-2)?
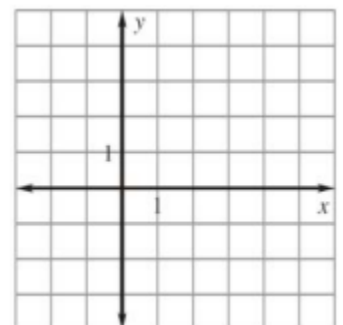
II.   Area

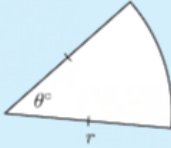The **area** of a region is the amount of surface within its boundaries. It is measured in terms of the number of square units that it encloses.
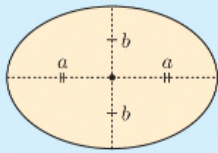
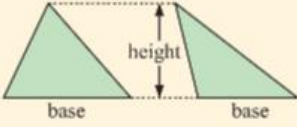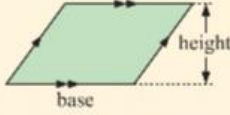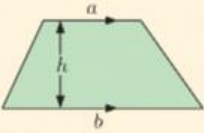The area of a **sector** is the fraction of the area of the circle it is taken from.

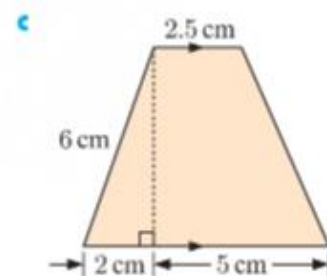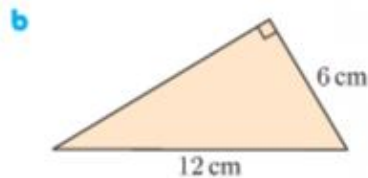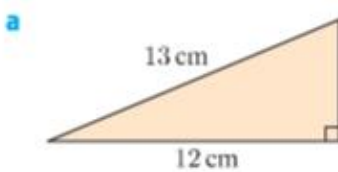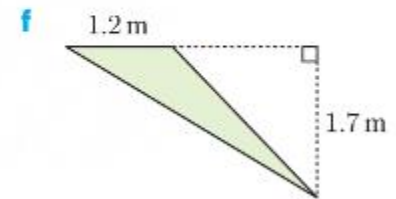$$\text{Area of sector} = \left(\frac{\theta}{360}\right) \times \pi r^2$$

The area of an **ellipse** with semi-axes is given by the formula.

$$\text{Area}\quad A = \pi ab$$

Shape	Figure	Formula
Rectangle	width / length	Area = length × width
Triangle	height, base, base	Area = ½ × base × height
Parallelogram	height, base	Area = base × height
Trapezium	a, h, b	Area = $\left(\frac{a+b}{2}\right) \times h$
Circle	r	Area = πr^2

6. Find the area of the following figures.

a 7 cm

b 3 mm, 5 mm

c 4 cm, 6.5 cm

d 12.1 mm, 15.4 mm

e 3.4 cm, 2.6 cm, 0.8 cm

f 1.2 m, 1.7 m

a 13 cm, 12 cm

b 6 cm, 12 cm

c 2.5 cm, 6 cm, 2 cm, 5 cm
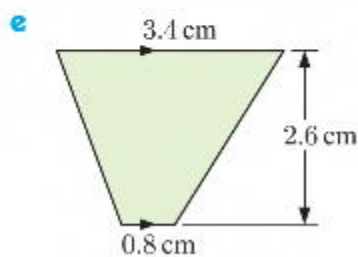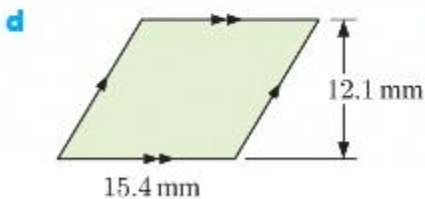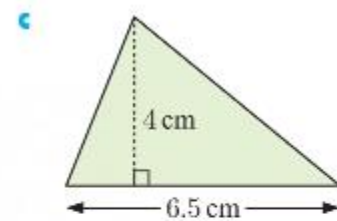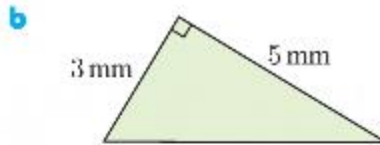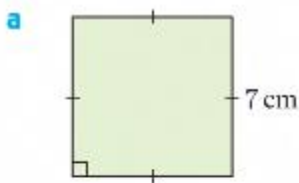
7. Find the shaded area of the following shapes.

a

b

3 m

7 cm

c
|← 12 m →|

d

4 cm

e

120°

5 m

f

•6 cm

11 cm

g

36°

9.8 cm

h

3.5 m

5.7 m

quarter ellipse
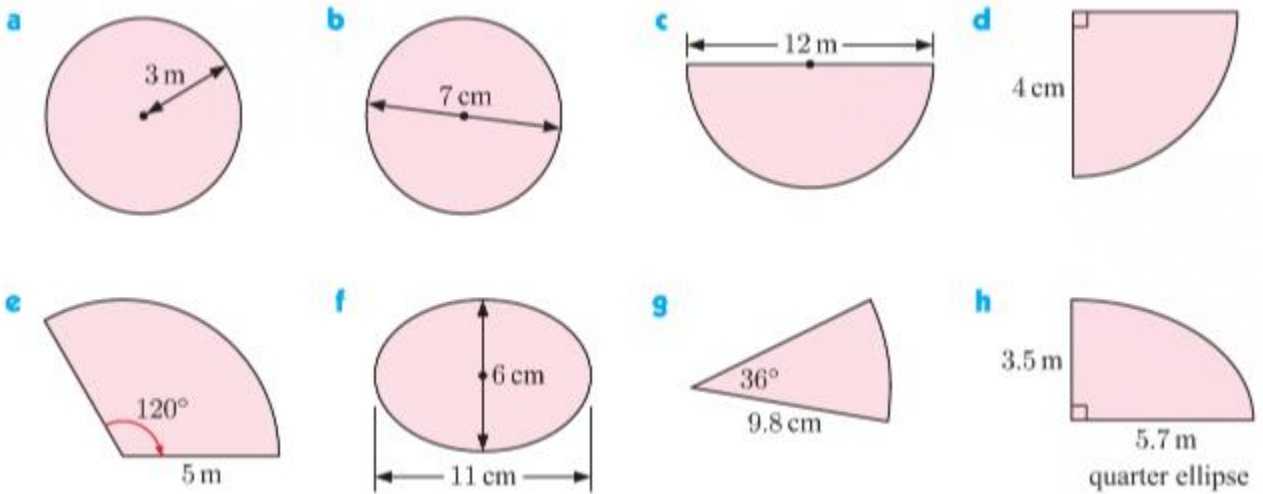
8. Find the shaded area of the following compound shapes:

d

6 cm

12 cm

10 cm

e

3 cm

3 cm

7 cm

f   3 cm

14 cm

18 cm

g

4.9 cm

h

5 cm

8 cm

i

6 cm

j

60 m

k

6 cm

l

|← 6 cm →|

5 cm

8 cm
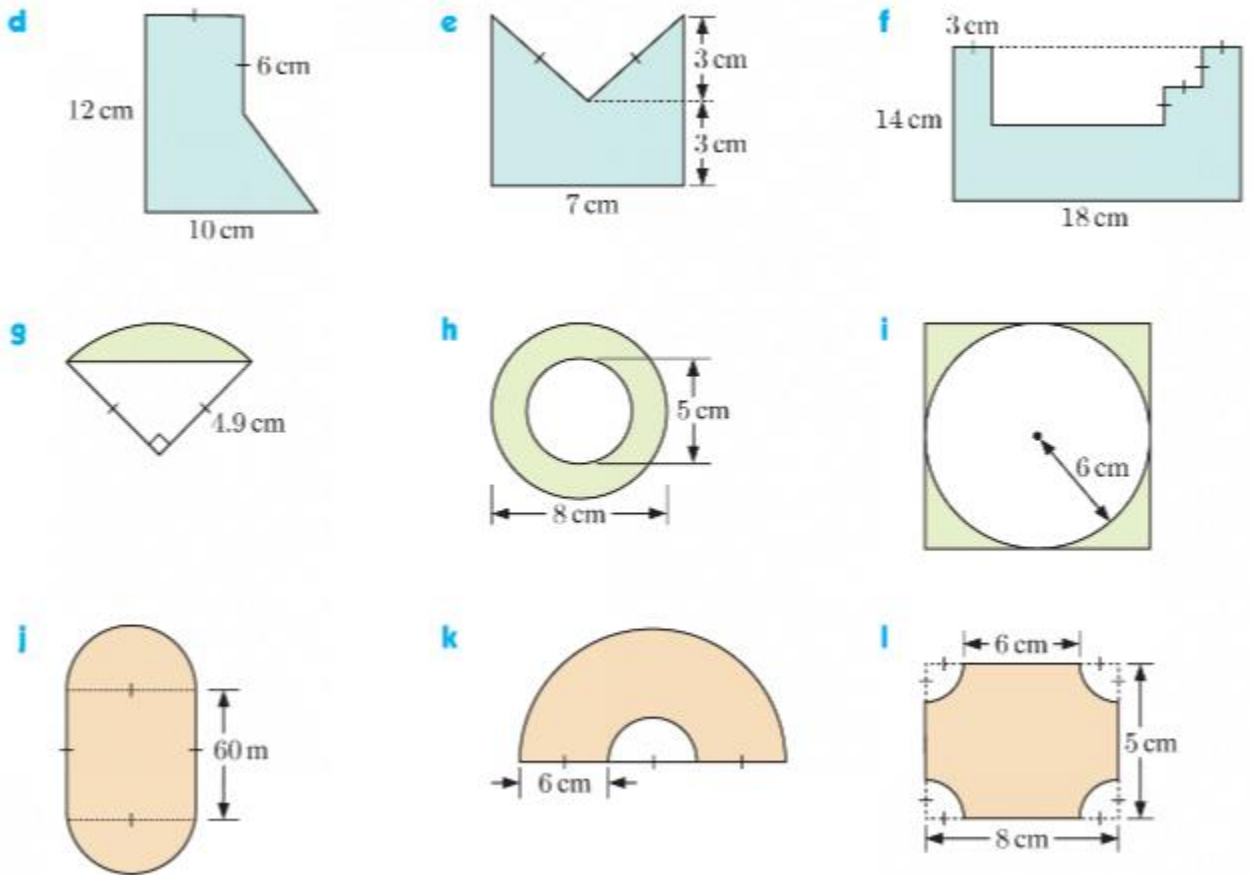
9. The diagram shows the dimensions of a table-top. A protective cloth is cut from a roll 1.6m wide to exactly fit the table-top. The cloth costs $18.40 per meter of length.

1.6 m

2.4 m
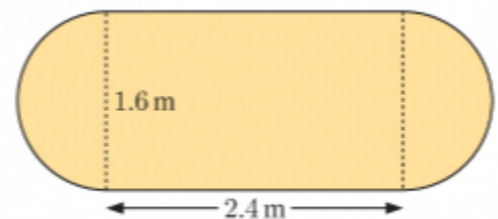
a. What length of cloth must be purchased?
b. Calculate the cost of the fabric.
c. Find the area of the table-top.
d. Calculate the percentage of cloth that is wasted.