Important Concepts . . .

Preview Review

Mathematics Grade 7 TEACHER KEY

W3 - Lesson 2: Area of Triangles and Parallelograms

Important Concepts of Grade 7 Mathematics

Materials Required

Math Setr
Calculator

No Textbook Required

This is a stand-alone course.

Mathematics Grade 7
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Preview/Review Concepts for Grade Seven Mathematics

Teacher Key

W3 – Lesson 2:

Area of Triangles and Parallelograms

Introductory Information for Teachers

Preview/Review courses are aimed mainly at students who have completed the regular course but who need to review some of the material before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new concepts they will study in their next grade.

No Preview/Review course is intended to replace the regular course because each covers only what the writers have decided are the top 15 concepts from the Program of Studies for that course.

Preview/Review materials are intended for use by teachers and students in one-subject and one-grade classrooms. This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons. A short quiz is provided at the end of each section to test student knowledge of the material studied. In a classroom the course will likely be completed in three weeks.

This Preview/Review course is written to be stand-alone. There is no textbook required.

W3 – Lesson 2: Area of Triangles and Parallelograms

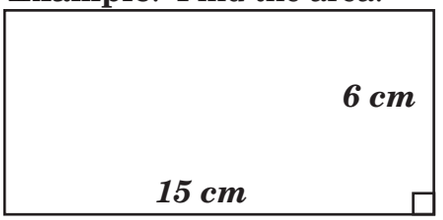
Review:

- *I can find the area of a rectangle.*

Calculating the area of a rectangle

The area of a rectangle can be found by multiplying **base** times **height**.

Example: Find the area.



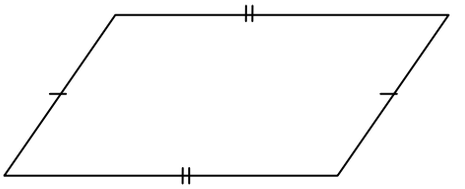
Area = base × height
= 15 cm × 6 cm
= 90 cm2

An area is always written as a unit squared.

Objective:

- *I can find the area of a parallelogram.*

Parallelograms



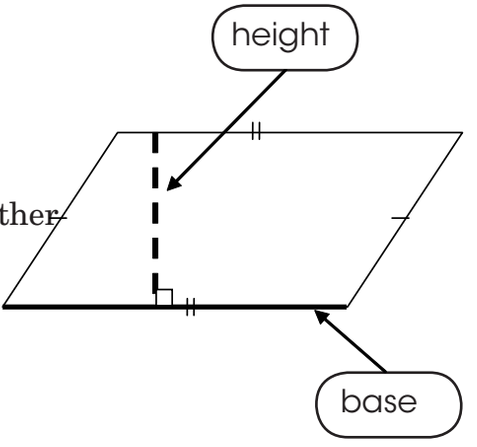
What is a parallelogram?

A parallelogram has two sets of parallel sides. Each set of sides are the same length.

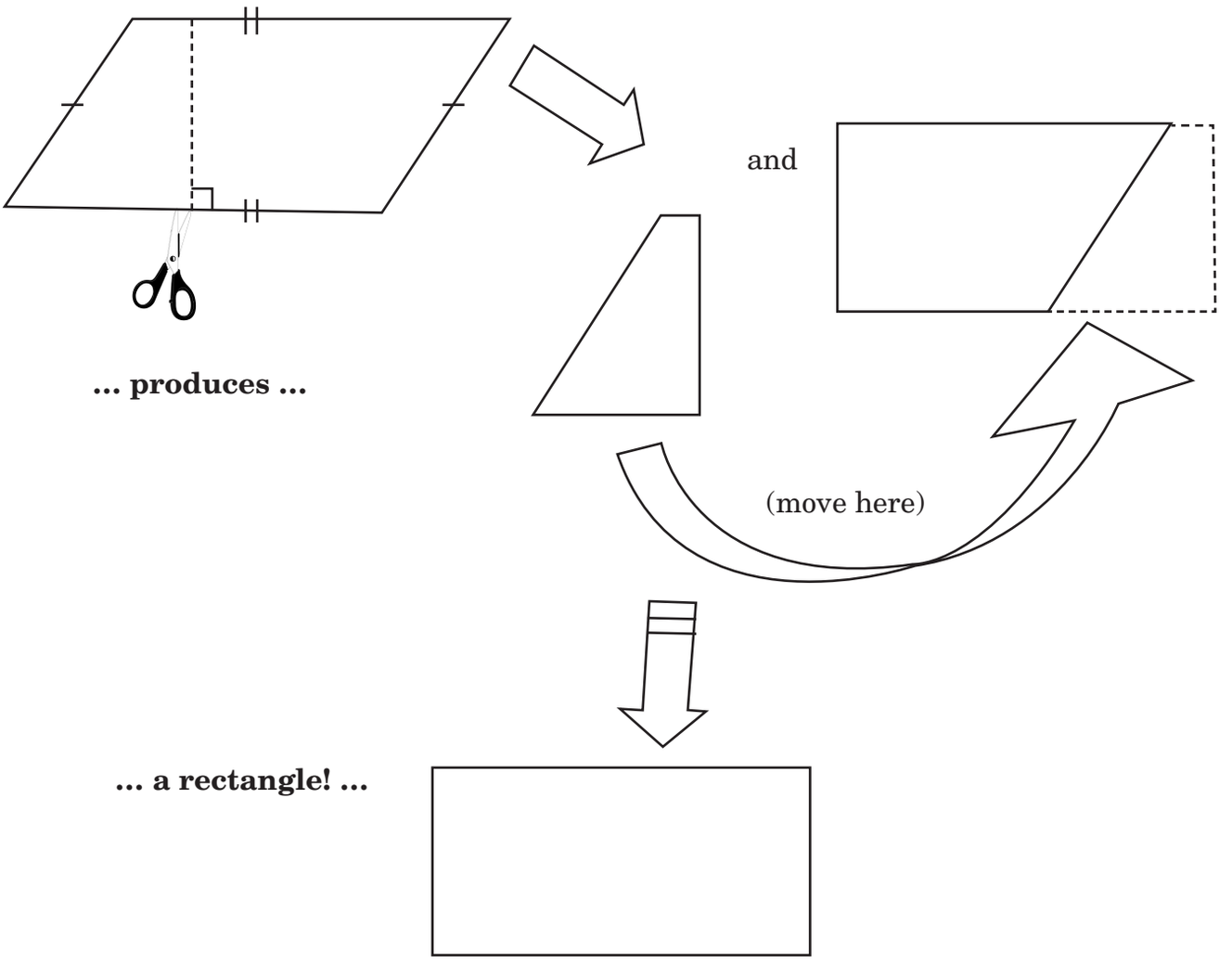
Base and Height of a parallelogram

The **base** can be any one of the sides.

The **height** must be 90° to the base and must touch the other.



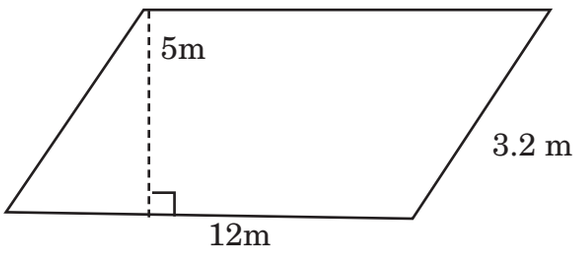
Cutting the parallelogram along the height, and then rearranging the pieces…



Therefore, the area of a parallelogram can be calculated using the same formula as the area of a rectangle.

Area = base × height

Example: Find the area of:



Area = base × height
= 12 m × 5 m
= 60 m2

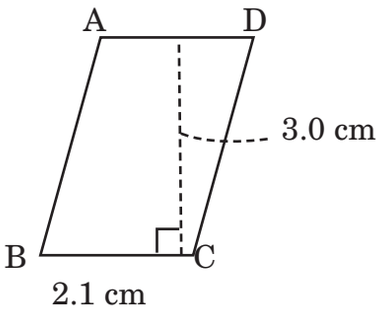
Example 2: A parallelogram has a height of 4m and an area of 24 m2. What is the length of the base?

Area = b × h
(24) = 4b
24 ÷ 4 = 4b ÷ 4
6 = b

The base is 6 m long.

Practice:

1. Calculate the area of parallelogram ABCD.



Area = b × h
= 2.1 × 3
= 6.3 cm²

The area is 6.3 cm²

2. A parallelogram has a height of 0.8 m and an area of 5.6 m². What is the base of the parallelogram?

Area = b × h
5.6 = (0.8)b
b = 7 m

The base is 7 m.

3. A parallelogram has a base of 2.5 cm and an area of 40 cm2. What is the height of the parallelogram?

Area = b × h
40 = (2.5)h
h = 16 cm

The height is 16 cm.

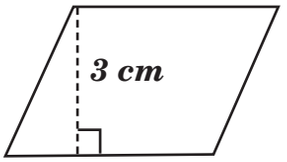
4. A parallelogram has a base of 0.9m and a height of 1.6m. What is the area of the parallelogram?

Area = b × h
Area = (0.9)(1.6)
Area = 1.44 m^2

The area is 1.44 m^2

5. A parallelogram has a base of 2.7 cm and a height of 3.0 cm.

   a. Sketch the parallelogram with the height and base measurements clearly labeled.



2.7 cm

   b. Calculate the area of the parallelogram, show all work.

Area = b × h
Area = (2.7)(3)
Area = 8.1 cm^2

The area is 8.1 cm^2

Objective:

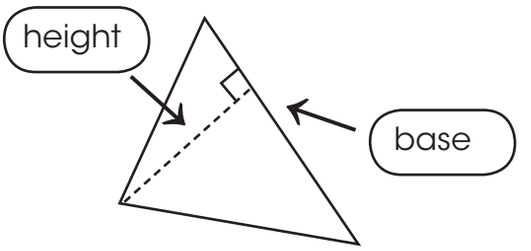
- *I can find the area of a triangle.*

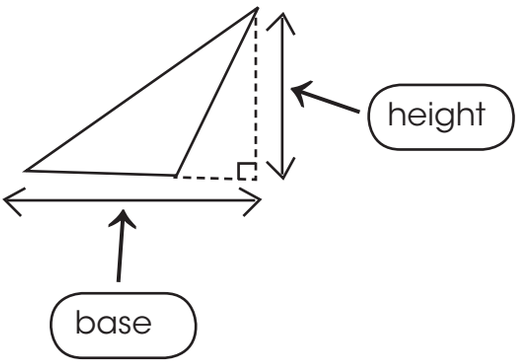
Triangles

Base and Height of a triangle

The **base** can be any one of the sides.

The **height** must be 90° to the base and must touch the angle on the opposite side.



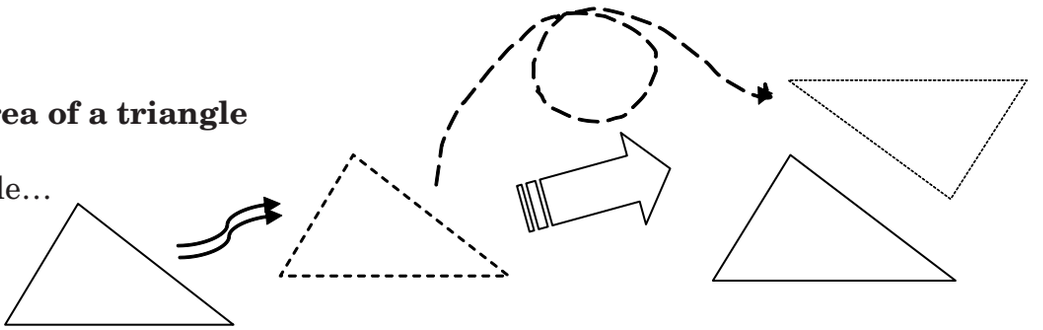


Getting a right angle sometimes means going outside the triangle, or using a different side as the base.

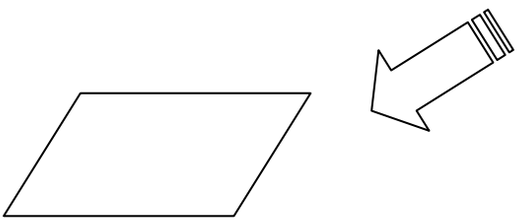
Formula for the area of a triangle

Duplicating a triangle…

… rearranging the pieces …



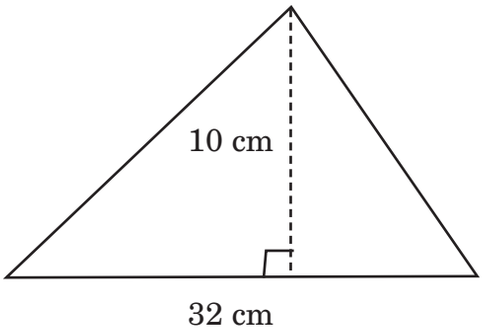
… produces a **parallelogram**!



Therefore area of a triangle is half of the area of a parallelogram.

Area of Triangle = ½ (area of parallogram)
or
= ½ (base × height)

Example: Find the area of:



Area = ½ (base × height)
= ½ (32cm × 10 cm)
= ½ (320 cm2)
= 160 cm2

Example 2: A triangle has a height of 8m and an area of 32 m2. What is the length of the base?

Area = ½ (b × h)
(32) = ½(8)b
32 = 4b
32 ÷ 4 = 4b ÷ 4
8 = b

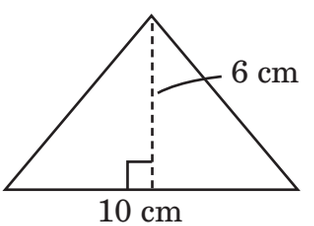
The base is 8 m long.

Practice:

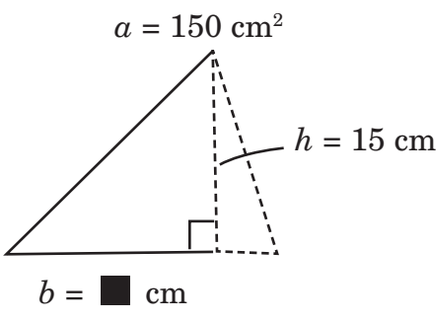
1. Calculate the area of the triangle.

Area = ½ b × h
Area = ½ (10)(6)
Area = ½ 60
Area = 30 cm²

The area is 30 cm²



2. Calculate the base of the triangle.



Area = ½ b × h
150 = ½ (b)(15)
10 = ½ b
20 cm = b

The base is 20 cm

3. A triangle has a base of 4.2 m and a height of 3.0 m. What is the area of the triangle?

Area = ½ b × h
Area = ½ (4.2)(3)
Area = ½ (12.6)
Area = 6.3 m²

The area is 6.3 m²

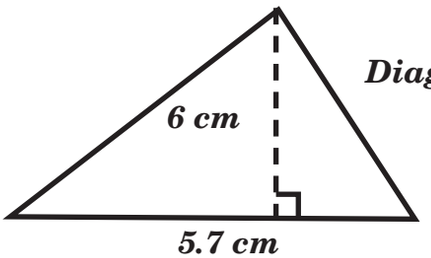
4. A triangle has a base of 4 cm and an area of 12 cm2. What is the height of the triangle?

Area = ½ b × h
12 = ½ (4)(h)
12 = (2)h
6 cm = h

The height is 6 cm

5. A right triangle has a base of 5.7 cm and a height of 6.0 cm.

   a. Sketch the triangle with the height and base measurements clearly labeled.



Diagrams may vary

   b. Calculate the area of the triangle.

Area = ½ b × h
Area = ½ (6)(5.7)
Area = ½ (34.2)
Area = 17.1 cm²

The area is 17.1 cm²

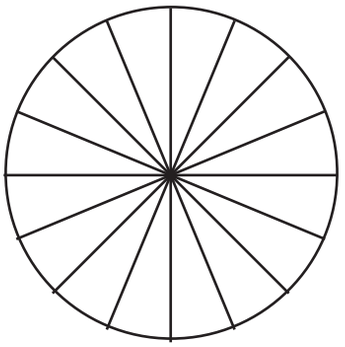
Objective:

- *I can find the area of a circle.*

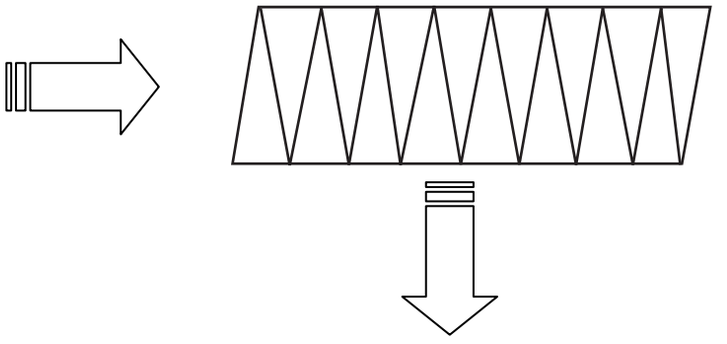
Circles

Formula for the area of a circle

Divide a circle into even pieces…

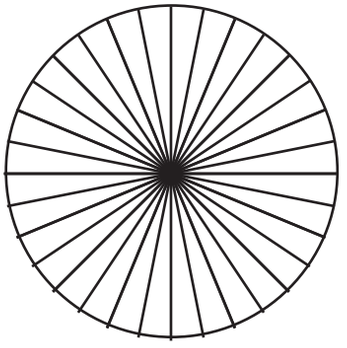


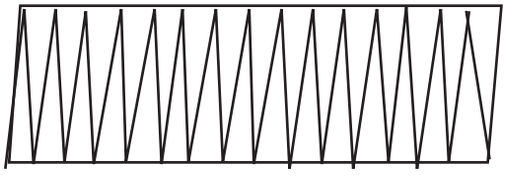
Rearrange the pieces…



… produces a parallelogram

The smaller the pieces the circle is cut into, the closer the rearranged shape gets to a **rectangle**.





Therefore area of a circle is the same as the area of a rectangle.

Area of Circle = base × height
Base = ½ circumference
= ½ π d but (½ d) is radius
Therefore, **Base = π r**

Height = radius

Area of a Circle = π × r × r
or
= π r2

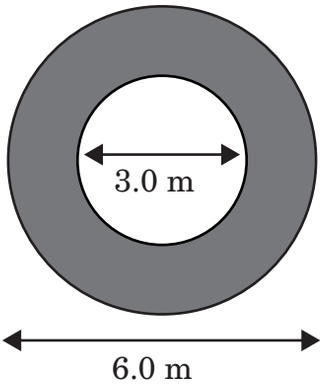
Example: Calculate the area of a circle with a diameter of 22 cm.

Area = π r^2
= (3.14)(11)(11)
= 379.9 cm^2

Radius = ½ d
= ½ (22) = 11cm

Example 2: Calculate the area of the shaded ring.

radius of outer circle = ½(6) = 3m radius of inner circle = ½(3) = 1.5m



Area of Outer circle = π r^2
= (3.14)(3)(3)
= 28.3 m^2

Area of inner circle = π r^2
= (3.14)(1.5)(1.5)
= 7.1 m^2

Area of shaded = outer circle – inner circle
= 28.3 – 7.1
= 21.2 m^2

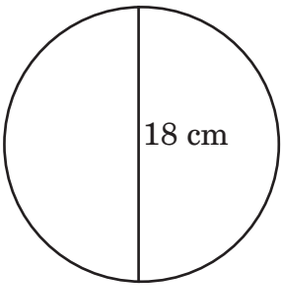
Practice:

1. Calculate the area of a circle with a radius of 7.3 cm.

   Area = π r^2
   Area = (3.14)(7.3)(7.3)
   Area = 167.3 cm^2

   The area is 167.3 cm^2

2. Calculate the area of the circle.



   Area = π r^2
   Area = (3.14)(9)(9)
   Area = 254.3 cm^2

   The area is 254.3 cm^2

3. A hotel is tiling their new circular fountain. The fountain is 3.2 m across. What area will be tiled?

   Area = π r^2
   Area = (3.14)(1.6)(1.6)
   Area = 8 m^2

   The area is 8 m^2

4. A table has an area of 153.9cm^2 what is the diameter of the table?

   Area = π r^2
   153.9 = (3.14) r^2
   Area = 167.3 cm^2
   r2 = 49
   r = 7 d = 2r = 2(7) = 14

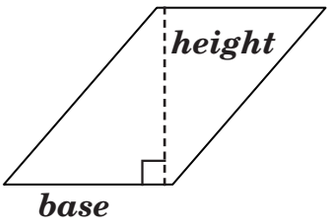
   The diameter is 14 cm

Summary and practice::

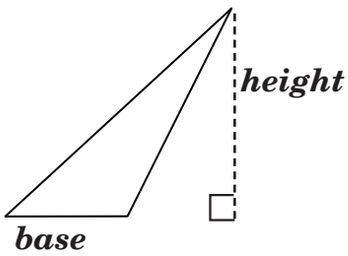
- *Using what you've learned, answer the following questions.*

1. Clearly label the base and height on each of the following figures.

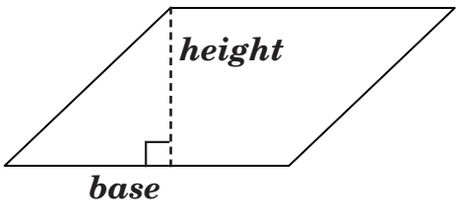
a.



b.



c.



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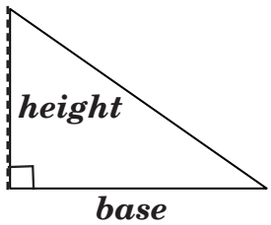
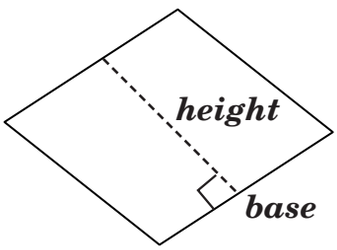
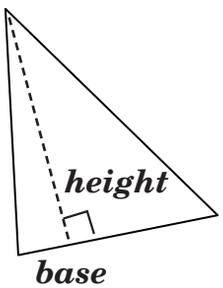


e.



f.



2. Write the formula to calculate area for:

   a. A rectangle: ***Area = base × height***

   b. A triangle: ***Area = ½ base × height***

   c. A parallelogram: ***Area = base × height***

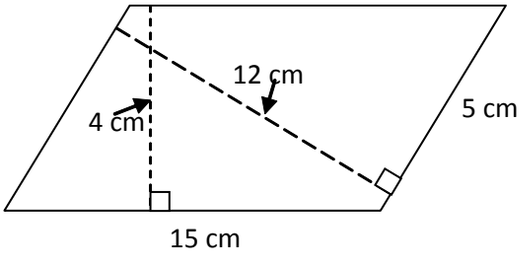
   d. A circle: ***Area = π × radius × radius = π radius^2***

3. Henry wants to make a parallelogram surface with an area of 72 dm^2. What are three possible measurement combinations he could make his table?

Answers will vary
example:

1dm × 72 dm	***4dm × 18 dm***
2dm × 36 dm	***6dm × 12 dm***
3dm × 24 dm	***3dm × 24 dm***
8dm × 9 dm	

4. Calculate the area.



Area = b × h ***or*** ***Area = b × h***
Area = (5)(12) ***Area = (4)(15)***
Area = 60 cm^2 ***Area = 60 cm^2***

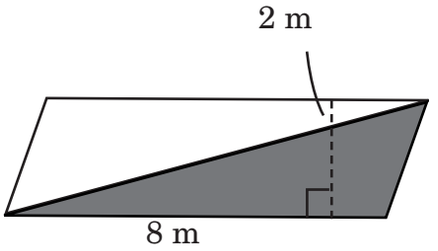
The area is 60 cm^2

5. Parallelogram A has a base of 6.8 cm and an area of 49 cm2. Parallelogram B has a base that is 4 cm longer and it is 5 cm higher. What is the area of parallelogram B?

A: Area = b × h
49 = (6.8)(h)
h = 7.2 cm

B: Area = b × h
Area = (6.8 + 4)(7.2 + 5)
Area = (10.8)(12.2)
Area = 131.8 cm^2

6. The flag below is made of two fabrics; the price of shaded fabric is $8.50 per square meter. Calculate the cost of the shaded fabric.



Area = ½ b × h ***Cost = 8.5(8)***
Area = ½ (8)(2) ***= $68***
Area = ½ (16)
Area = 8 m^2

The shaded fabric will be $68.

7. Sally drew a triangle with a base of 10 cm and a height of 7 cm. Frank drew one with a base of 9 cm and a height of 8 cm. How much greater is the area of the larger triangle?

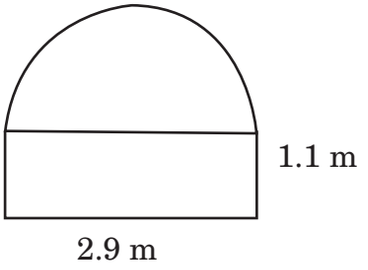
Sally: ***Area = ½ b × h***
Area = ½ (10)(7)
Area = ½ (70)
Area = 35 cm²

Frank: ***Area = ½ b × h***
Area = ½ (9)(8)
Area = ½ (72)
Area = 36 cm²

36 – 35 = 1 cm²

Franks triangle is 1 cm² larger

8. A stained-glass window is a rectangle and a half circle as shown. What is the area of glass needed?



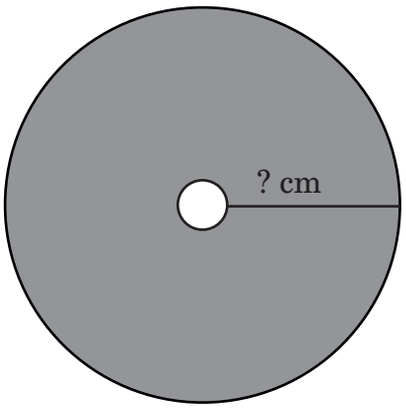
Area rectangle = b × h
= (2.9)(1.1)
= 3.19 m²

Area half circle: ½ π r2
= ½ (3.14)(1.45)(1.45)
= 3.3 m²

3.19 + 3.3 = 6.49 m²

6.49 square meters of glass is needed.

9. The area of the shaded circle is 254.3 cm². The diameter of the hole in the centre is 2.8 cm. What is the radius of the entire circle from the centre of the smaller circle to the outer edge of the large circle?



Small circle
diameter = 2.8
radius = 2.8/2
= 1.4 cm

Area= πr^2
Area = (3.14)(1.4)²
Area = 6.15 cm²
Area= 6.2cm²

Total area
(254.3 + 6.2) cm²
= 260.5 cm²

A = πr^2
260.5 cm² = (3.14)(r²)
82.96 = r²
9.11 m = r

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