Interactive Math Notebook 8 -

8.1 Perimeter, Area and Volume: Rectangles Practice (left) Modified here

Perimeter, Area, Volume:

Squares: P=4s A= b x h or b^2 V=(area of base) x h or b^3

1. 4 cm P= A= V=
2. 6cm P= A= V=
3. 7cm P= A= V=
4. 10cm P= A= V=
5. 3m P= A= V=
6. 8m P= A= V=
7. 4.5 m P= A= V=
8. 2.6m P= A= V=
9. 22.6m P= A= V=
10. 164cm P= A= V=

Rectangles: P 2b+2h = u A= b x h = u^2 V= area of base x h = u^3

1. 5cm x 6 cm P = A= h = 5cm
2. 3cm x 7cm P = A= h = 5cm
3. 2cm x 39 cm P = A= h = 5cm
4. 5m x 23m P = A= h = 5cm
5. 12cm x 0.5 m P = A= h = 5cm

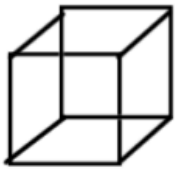
Rectangular prisms:

1. 5cm x 7cm x 2 cm V=
2. 6cm x 24cm 11cm V=
3. 3m x 9m x 14m V=
4. 15cm x 20cm x 13cm V=
5. 2.4m x 170 cm x 89 cm V=

8.1 (Right Side)

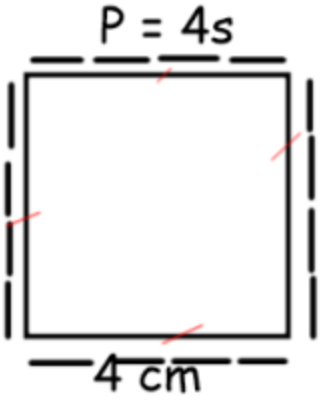
linear measure cm

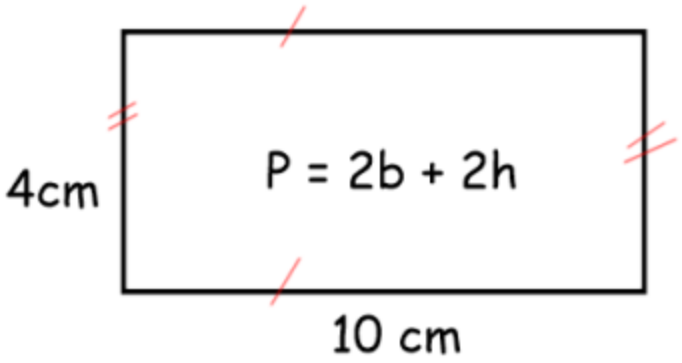
Area measure cm^2



Volume measure cm^3

Surface area cm^2





perimeter= the distance around a 2d closed figure

square: 2d closed figure, all 4 sides are equal and all angles are 90 degrees (right)

rectangle: 2d closed figure, 2 sets of parallel sides, all angles 90 degrees

rectangular prism: 3d figure, shoebox or aquarium

8.2 Practice (left)

Find the surface area for the following Figures:

1. A closed cardboard box, 3m long, 1m high, and 2 m wide
2. A cubic container. 4 inches long on each side.
3. A triangular prism. The triangle base is 5cm wide and 6 cm high. (note: you will need to find the ‘side lengths’ of the triangle base using pythagoras :):):)
4. A rectangular room that is 3m tall, 4m wide and 5m long.

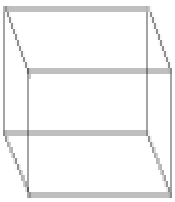
8.2 Surface area vs Volume:

Surface Area: Finding the **Area** of all of the **Surfaces** of a 3D shape and adding them together
For a cube:

find 'face 1' → bh
Then, since a cube has 6 faces which are all equal, 6(bh) = SA $6b^2$

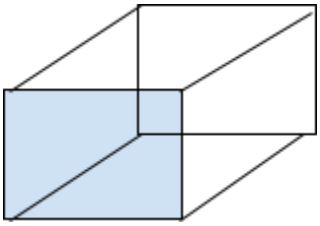
So in a cube with 4cm edges:
face 1 = 4cm x 4cm = $16cm^2$ (so the area of one 'face' is $16cm^2$)
$16cm^2$ x 6 faces = $96cm^2$ so the surface area of the Entire 6 sides of the one cube is $96cm^2$

Compare to Volume: which is 'how many 1u x 1u x 1u cubes COULD fit in the 3D shape:
Volume: area of the base x height (bh)xh (in earlier grade you probably saw l x w x h)



So in a cube with 4cm edges…. b^3
b x h x d: (4 x 4) x 4 = $64cm^3$

Find SAu^2 and Vu^3 for the following:
Rp = 4m x 3m x 11m
V =(4x3) x 11
=12 x 11 = $132m^3$

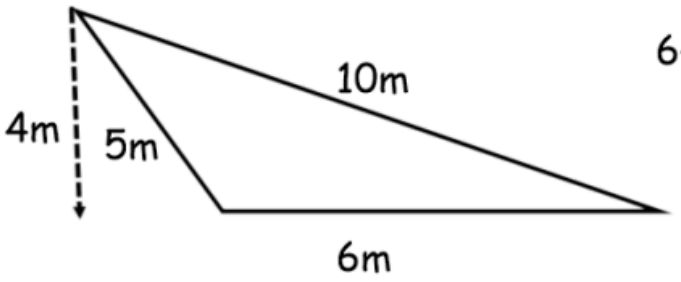


SA = base/top: 4x3 = 12 → 2(12) = $24u^2$
l/r : 3 x 11 = 33 → 2(33) = $66u^2$
f/b: 4 x 11 = 44 → 2(44) = $88u^2$
$168u^2$

1. a cube, with 5 cm sides
2. a cube with 7m sides
3. a rectangular prism, 13cm by 12cm by 24cm
4. a rectangular prism, 4m by 3m by 9m
5. a cube with 3.8m sides
6. a rectangular prism, 45cm by 0.5m by 0.78m *watch the units!!!
7. a cube with 12 inch sides
8. a rectangular prism, 15m by 20m by 1488cm
9. a swimming pool, without a COVER, 10m by 20m by 14m deep
10. an aquarium, with no lid, 50cm tall, 60cm wide, and 35cm deep

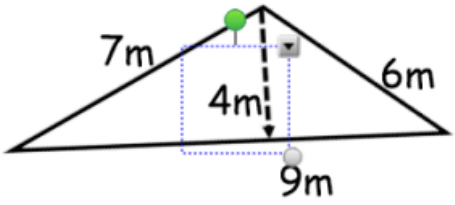
8.3 Triangles (Left practice)

Watch that you always use HEIGHT….. Not ‘slant length’

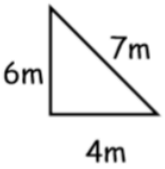


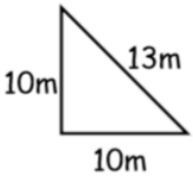
6+5+10 = P

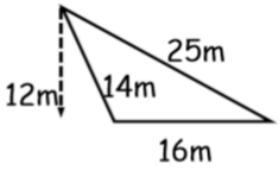
$$\frac{6 \times 4}{2}$$

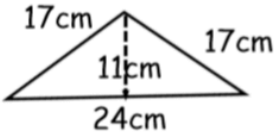


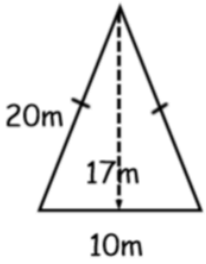
$$\frac{9 \times 4}{2}$$

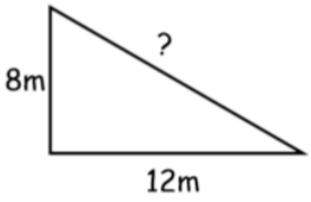


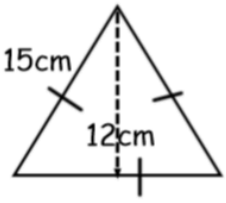


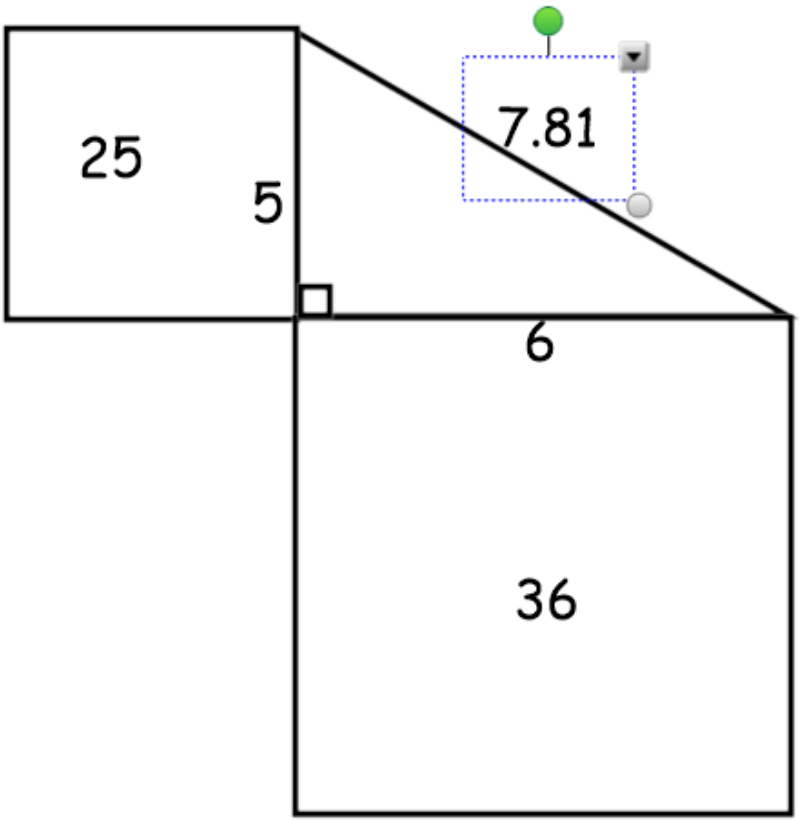










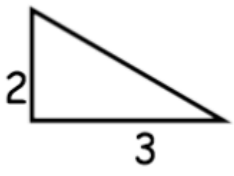


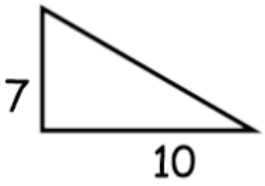
$25 + 36 = 61$

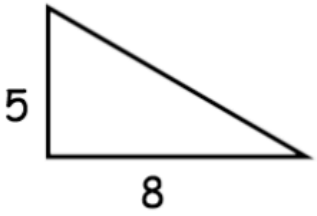
$\sqrt{61} = 7.81$

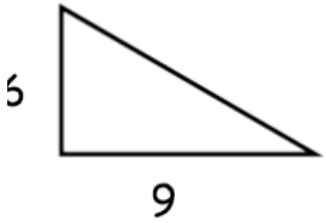
Pythagorean:

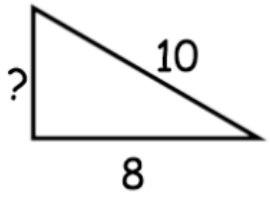
$A^2 + b^2 = c^2$ then $\sqrt{c^2}$ $\quad c = \sqrt{(a^2+b^2)}$

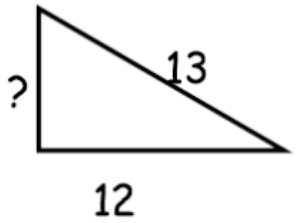






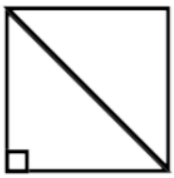






8.3 Right side

Perimeter and area of triangles:



remember: P = distance around
A = surface covered

If this 'rectangle' was 4 x 4, it's area would be?
If we only wanted 'half' of that rectangle.....

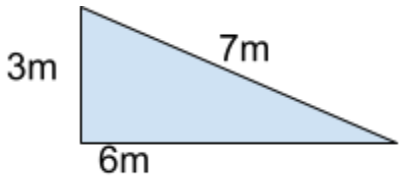
$$\frac{bxh}{2}$$

So: Perimeter of a triangle = add all the sides

Area of a triangle = $\frac{bh}{2} = u^2$

NOTE: Sometimes you need to use Pythagoras to find the 'hypotenuse' of a triangle.

So, this triangle:

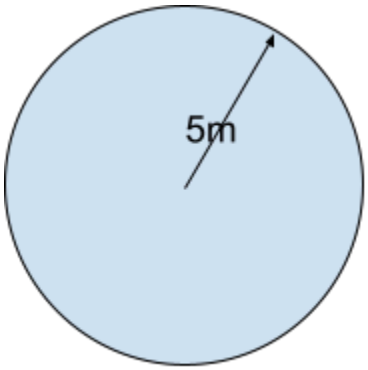


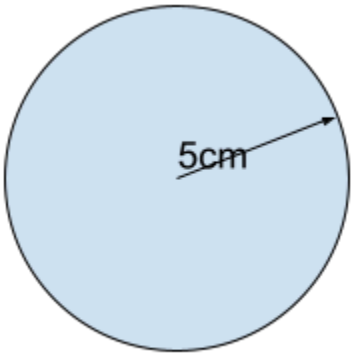
Has a Perimeter of P = 3 + 6 + 7 …. P = 16m

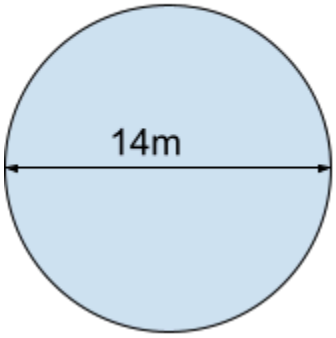
A = $\frac{bh}{2}$ A = $\frac{3 \times 6}{2}$ 18 / 2 = 9 A = $9m^2$

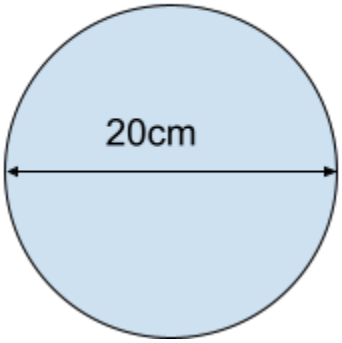
8.4 (Left)

Circle Fun:









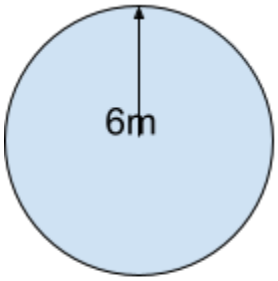
http://www.mraspinall.com/wp-content/uploads/2015/02/surface_area_word_problems_honors.pdf

8.4. Let's talk about Pi:

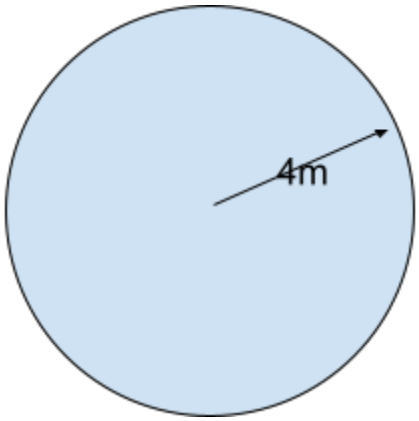
Pi = = 3.14 (in highschool you'll leave it at π , so final answers will be 6π or 23π)
d = diameter -- distance across a circle through it's middle
r = radius -- distance from the centre of a circle to its edge

Circles: Circumference (perimeter): πd
Area: $\pi(r^2)$

Let's apply area and surface area to word problems :) paste the link below into your browser, grab a partner, and go!



C = πd = π x 2(6) π x 12 = 37.68m
A = πr^2 = π x (6^2) = π x 36 = 113.04m^2



C = πd = π x 2(4) π x 8 = 25.12 m
A= πr^2 = π x (4^2) 50.24m^2

8.5 -

When we look at Cylinders, we need to think about un-wrapping a cylinder

The top is a circle:

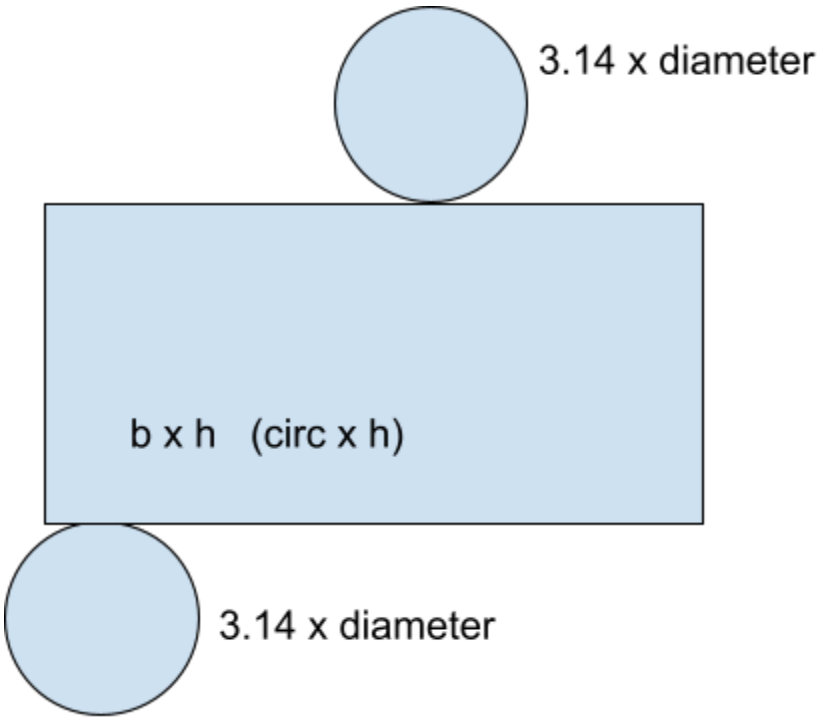
The top is a circle - find its area

The bottom is a circle - find its area

The ‘wrapper’ around the sides is actually a rectangle:

We use A=bh for rectangles…..

Remember: The Circumference of the top/bottom is actually the base of the rectangle :)



So -- if a cylinder had a diameter of 5cm and a height of 10cm…

Top: πr^2

$\pi 2.5^2$

$\pi(6.25)$

$19.625 cm^2$

Bottom: πr^2

$\pi 2.5^2$

$\pi(6.25)$

$19.625 cm^2$

Wrapper: $A = bh$

Remember: the ‘base’ is actually the circumference of the circle:

$C = \pi d$

$3.14 \times 5cm = 15.7cm^2$

Then… add Top + Bottom + Wrapper:

8.6 (left) For my Modified Kiddoes: printable practice here

You have a square, that has 10cm sides.
You remove a centre square which has 4cm sides.

What area of the big square is left?

Area of big square - area of small square = answer cm^2

Step 1: draw it
Step 2: 'math' communicate your process
Step 3: solve and use correct units:

For 7s: printable practice here

You have a circle, that has a 10cm diameter.
You remove a centre circle which has 4cm diameter.

What area of the big circle is left?

Area of big circle - area of small circle= answer cm^2

Step 1: draw it
Step 2: 'math' communicate your process
Step 3: solve and use correct units:

For 8s: subtractive compound area practice here

You have a cylinder, that has a 10cm diameter and a 15cm length.
You remove a centre core which has 4cm diameter.

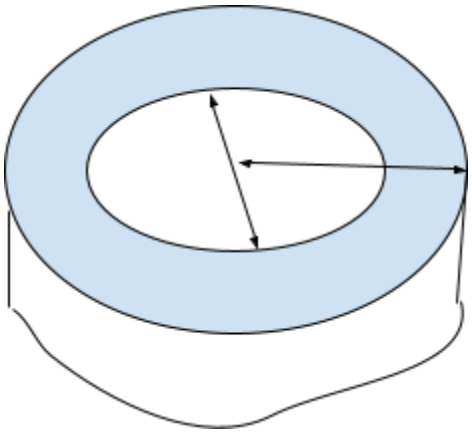
What volume of the big cylinder is left?

Area of big circle - area of small circle= answer cm^2

Step 1: draw it
Step 2: 'math' communicate your process
Step 3: solve and use correct units:

Try These:

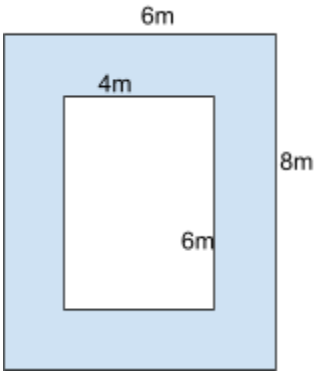
you have donut… it is 5cm tall, and the radius of the outside of the donut is 10cm. The diameter of the donut hole is 4cm. What is the volume of the donut.



8.6 Compound Area Archetypes:

Picture frames: ‘Flat’ problems:

1. Find the area of the SHADED frame:

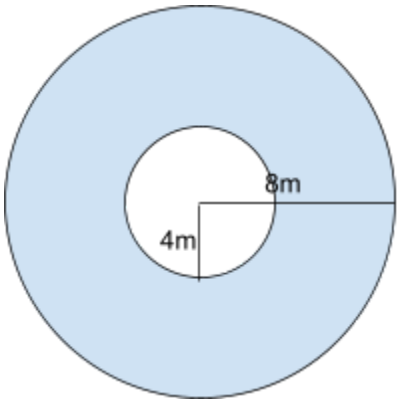


2. Joe cuts a ‘picture frame’ out of black construction paper.
   The outside of the frame is 30cm wide by 50cm tall
   THe ‘hole’ cut-out in the middle is 10cm wide by 30cm tall
   What is the area of the original big black square, BEFORE he cuts out the middle?
   What is the area of the piece he cuts out?
   What is the final area of the entire frame?

3. Fred wants to glue his art to a background piece of paper. His art is 5 cm wide and 8cm tall
If he wants his art to have 5cm of ‘background’ showing on all sides, how large does his background paper need to be?

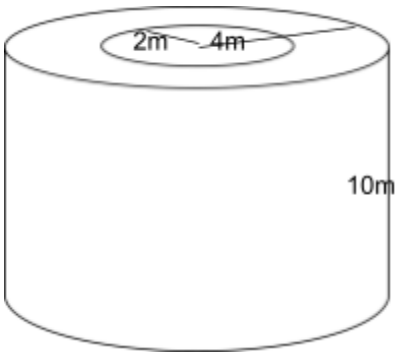
Pools & Patios: ‘Flat problems:

1. What is the area of the shaded circle?



2. If you have a round pond with a diameter of 4m, what is the distance around the pond?
3. If you have a rectangular pond that is 4m by 5m, and you want to build a 'concrete edge' around the whole pond that is 1m wide all around, what is the total area of the finished concrete piece?

Donuts, Pipes & Lifesavers: 'Round' problems



1. Find the surface area of the outside of the above pipe: then find the volume of the pipe itself.

Intersecting Multiple Shapes: "I Ain't Afraid of no Goat…"(Goat-type question)

A goat is tied to the corner of a 6-by-4-meter shed by a 7-meter piece of rope. Rounded to the nearest square meter, what is the area grazed by the goat?

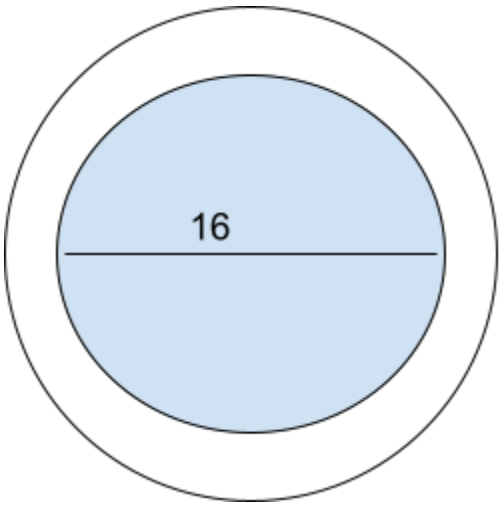
Wire wire pants on fire….(Dependent measure-type question)

12m of wire are folded into the outline of a rectangle. If the length is twice the width, what are the measurements of the rectangle? (Solve algebraically)

We know…	We also know…	And we know….
P = 12m	L = 2w	P = 2(L) + 2w

Splish splash… (Donut-type question)

A circular pool has a diameter of 16 ft . It has a concrete deck around it that is a uniform width. If the area of the deck is 283.385 ft^2, what is the width of the deck?

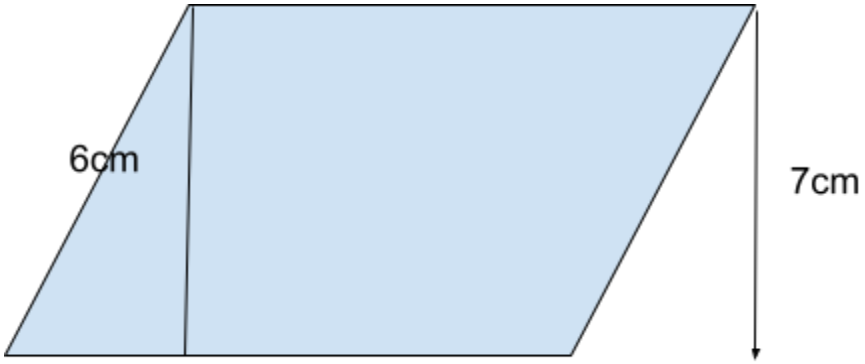


8.7 Trapezoids and Parallelograms

Area of a rectangle formula: A=bh

Area of a triangle formula: $A = \frac{bh}{2}$ because a Triangle is ½ of a rectangle

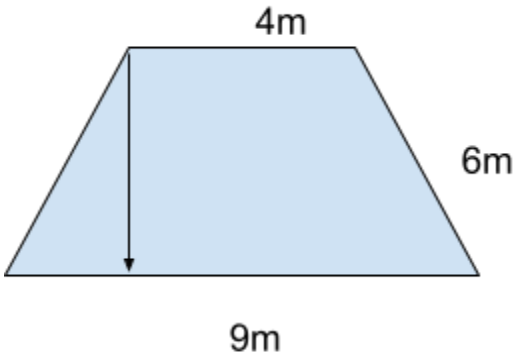
Area of a Parallellogram formula: A = bh why?



A = bh

So….

if A= bh for a rectangle…. and $A=\frac{bh}{2}$ for a triangle… A = bh for a Parallelogram

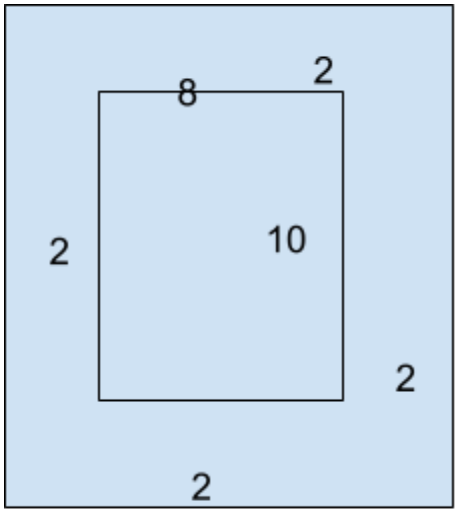


A = ?

8.8 Practice:

Example: An 8x10 picture is placed on a mat so that a 2-inch border goes around the outside:

1. what is the perimeter of the mat?



2. what is the area of the mat that is showing?
3. A piece of paper has a length of 16 inches and an area of 48 square inches. Find the width

4. The area of a triangular-shaped garden is 72 square feet and the height is 24 feet.
   Find the base.

8.8 Parsing real world problems: 7s and 8s…

1. John wants to use wooden cubes to make a model of a rubiks cube. How many wooden cubes does he need to build one? (remember: no inner 'workings' -- just a stack of blocks)

2. Don has a tube full of cookies that is 20cm tall and has a diameter of 6cm. If each cookie is 1cm tall, how many cookies are in the tube?

3. What is the surface area of the wrapper on a tube of cookies 20cm tall and with a diameter of 6cm?

4. Yolanda is asked to unpack a truck which has boxes stacked 3 across, 6 high, and 8 deep. Each box is 1 foot by 1 foot by 1 foot. She must put them in a space on the floor which is 4 boxes by 4 boxes. How many boxes high will the stack be?

5. Suppose she is asked to put them in a square one box high. What is the size (in boxes) of the square shape they will take up?

6. Yolanda is asked to make two separate stacks of boxes. In one room there is a 3 foot by 8 foot space and in another room there is a 4 foot by 6 foot space. She is asked to put the same number of boxes in each room. How high will each stack be?

7. Yolanda found that the warehouse had no more room for boxes so she stacked a truckload of boxes outside. The stack was 6 feet high, 10 feet wide, and 8 feet long. Yolanda needed a rectangular tarp to cover the boxes for protection. What size tarp will she need?

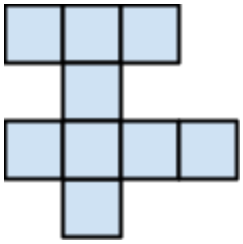
8. Yolanda had a box that was 3 feet high, 4 feet long, and 2 feet wide that she had to wrap for packaging. She discovered that the wrapping paper came in squares that were 1 foot wide and 1 foot long. How many squares of wrapping paper would Yolanda need to get to wrap the package if she did not want the paper to overlap?

9. Yolanda had another box to wrap that was 6 feet high, 5 feet long, and 3 feet wide. How many pieces of the wrapping paper would she need to wrap this box if she again wanted no overlapping?

10. Yolanda had 120 boxes that were 1 foot by 1 foot by 1 foot that again had to be stacked outside and covered with a rectangular tarp. How can Yolanda stack the boxes? What size tarp will she need to cover the boxes? What is the smallest rectangular tarp that Yolanda could get to cover the 120 boxes?

8.9 for anyone who needs a challenge: Open ended problems…

Nine square tiles are laid out on a table so that they make a solid pattern. Each tile must touch at least one other tile along an entire edge, e.g.



a. What are the possible perimeters of the figures that can be formed?
b. Which figure has the least perimeter?

A homeowner has a 9x12 yard rectangular pool. She wants to build a concrete walkway around the pool. Complete the following table to show the area of the walkway.

Width of Walkway	Area of Walkway
0.5 yard	22 sq yrds
1.0 yard	
1.5 yard	
2.0 yard	
N yard