Office Hours:

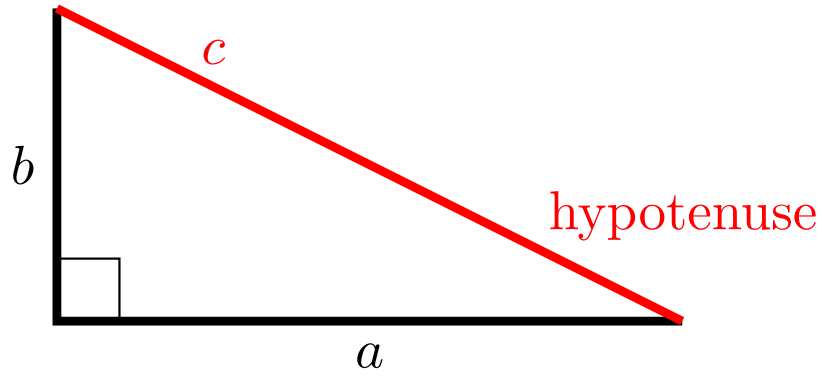
Instructor:

Peter M. Garfield	Mondays 11AM–12PM
garfield@math.ucsb.edu	Tuesdays 1:30–2:30PM * Not 1/14
South Hall 6510	Wednesdays 1–2PM

TAs:

Trevor Klar	Wednesdays 2–3PM
trevorklar@math.ucsb.edu	South Hall 6431 X
Garo Sarajian	Mondays 1–2PM
gsarajian@math.ucsb.edu	South Hall 6431 F
Sam Sehayek	To Be Announced
ssehayek@math.ucsb.edu	South Hall 6432 P

§1.7: Pythagoras' Theorem



$$c^2 = a^2 + b^2$$

1. What is the length of the hypotenuse of a right triangle when the other two sides have length 3 and 4? **E**

(A) 3 (B) 4 (C) 6 (D) 25 (E) none of these

2. Now lengths are 2 and 3. What's the hypotenuse? **B**

(A) $\sqrt{5}$ (B) $\sqrt{13}$ (C) 13 (D) 5

3. Lengths $3x$ and $4x$. What's the hypotenuse? **D**

(A) $5 + x$ (B) $5x^2$ (C) $25x$ (D) $5x$

Pythagorean Theorem Applications

This is very useful to calculate how far apart two things are.

4. You and Marie are in Vegas. You drive north at 40 mph and Marie drives east at 30 mph. How far apart are you after 1 hour?

Click (A) when you have the answer.

5. How many miles apart are you after t hours?

(A) $50t$ (B) $50 + t$ (C) $50t^2$ (D) $2500t^2$

Answer: A

Another Application

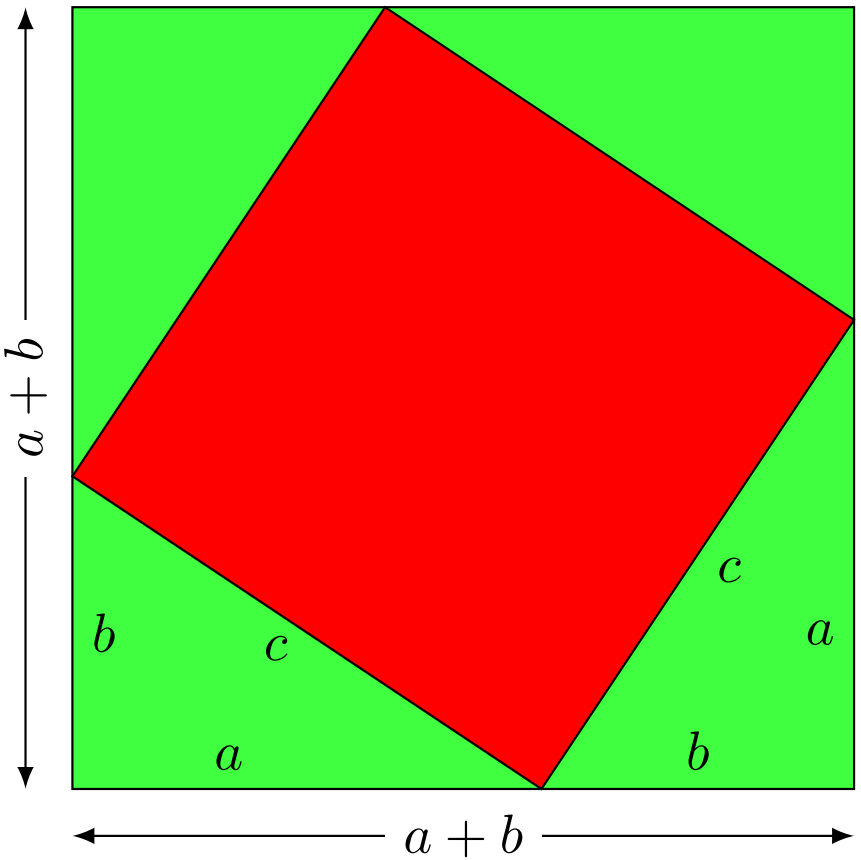
6. The vertical mast of a yacht is 40 feet high. A rope runs in a straight line from the top to a pulley 30 feet horizontally from the base of the mast. How many feet long is the rope?

Hint: Draw a picture!

(A) 30 (B) 40 (C) 50 (D) 60 (E) 70

Answer: C

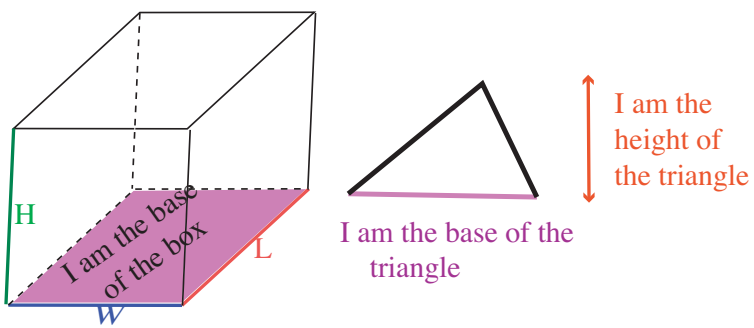
Why Pythagorean Theorem works

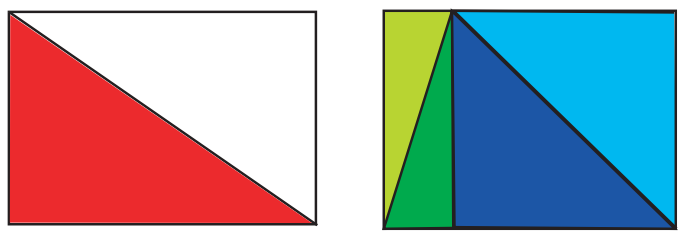


§4.2: Area and Volume

You need to know:

- Area of a rectangle = length × width
- Area of a circle = πR^2 $\quad$ (R = radius)
- Circumference of a circle = $2\pi R$
- Area of a triangle = half base × height = $\frac{1}{2}bh$
- volume of rectangular box = (length × width) × height
  = (area of base) × height





triangle = half a rectangle

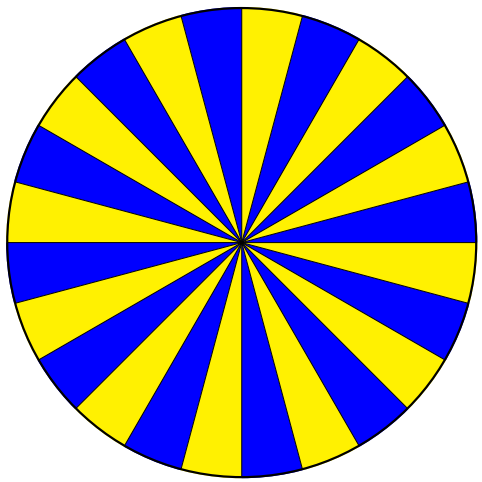
What is the (circumference of a circle) divided by the diameter?

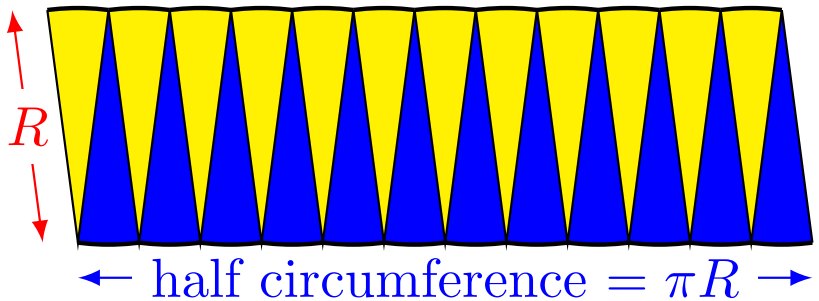
(A) R (B) 2π (C) π (D) the what now? C

The definition of π is

$$\pi = \frac{\text{circumference of circle}}{\text{diameter}} = \frac{C}{2R},$$

so $C = 2\pi R$.





Thus Area= $(R)(\pi R) = \pi R^2$

Applications

7. A rectangular parking lot is to be made in the shape of a rectangle. It will have an area of 2000 square meters. Express the length of the parking lot in terms of the W = width.

(A) $(2000 - 2W)/2$ (B) $2000/W$

(C) $2000 - W$ (D) Other B

8. The parking lot will be surrounded by a fence. Express the total length of the fence in terms of W.

(A) $2000 + 2W$ (B) $L + W$ (C) $4000W^{-1} + 2W$ C

9. The fence cost \$7 per meter. Express the total cost of all the fence in terms of W.

(A) $7 \cdot 2000$ (B) $7 \cdot 4000W^{-1} + 2W$

(C) $28000W^{-1} + 14W$ C

Applications II

10. A rectangular poster is to have a total area of 500 cm^2. There is an empty margin where nothing is printed 6 cm wide at the top and 4 cm wide along the sides and bottom. The rest is the printed area.

Hint: Draw a picture! Name your unknowns!

- Express printed area in terms of width W and height H of the poster.

  (A) HW (B) $(H-8)(W-8)$ (C) Other

  Answer: C

- Express the area of the printed part in terms of the width W of the poster.

  (A) got it! (B) working on it (C) help

  Hint: Express H in terms of W.

Exercise

11. When you substitute $x = y + 3$ into $x^2 - 6x + 8$ you get...

(A) $y^2 - 6y - 1$ (B) $y^2 + 35$

(C) $y^2 - 6y + 35$ (D) $y^2 - 1$

Answer: D

12. Can you check your answer to the previous question?

Hint: Plug in, say, $y = 1$. What is x?

When $y = 1$, $x = 4$ so $x^2 - 6x + 8 = 4^2 - 6(4) + 8 = 0$.

The other expressions are...

(A) $y^2 - 6y - 1 = -6$ (B) $y^2 + 35 = 36$

(C) $y^2 - 6y + 35 = 30$ (D) $y^2 - 1 = 0$