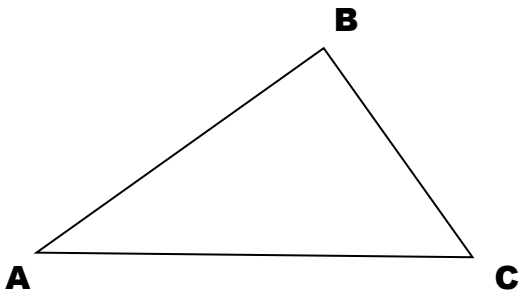
Week 5: Geometry Power Hour

Scale / abstraction

- Geometry figures are not drawn "to scale". You should view them *not too literally*, but as somewhat abstract representations that could have variations.
    - Lengths: Consider as *rubber bands* unless they are expressly fixed in the rules.
    - Angles: Consider as *hinges* unless they are expressly fixed.
    - Positions: Consider as *beads on a wire*.
- Most everything else about the figure (including order) is what it appears
- If a length, position, and / or angle is flexible, try drawing it more than one way.
- A number line with tick marks is considered "algebra" and is to scale. A number line without tick marks is considered "geometry" and is not necessarily to scale!
- Study pp. 143 – 144 for official GRE conventions.

In triangle ABC below, angle A = 30º and AB = 5.



Redraw another realization of the triangle.

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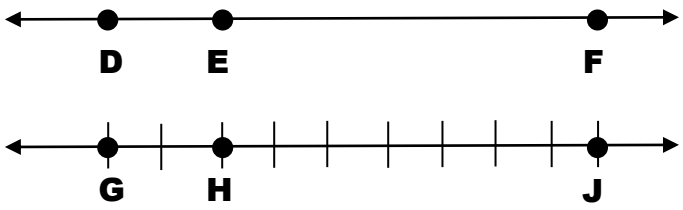
Which figure below would you be able to redraw?



Redraw that figure here:

Quantitative Comparison questions

	A	**B**
1.	DE	EF
2.	H – G	J – H
3.	EF	DF

Length and Area

Differences between perimeter and area

	Perimeter	Area
Location	Outside	Inside
Operation	Add	Multiply
Dimensionality	One (linear)	Two (planar)

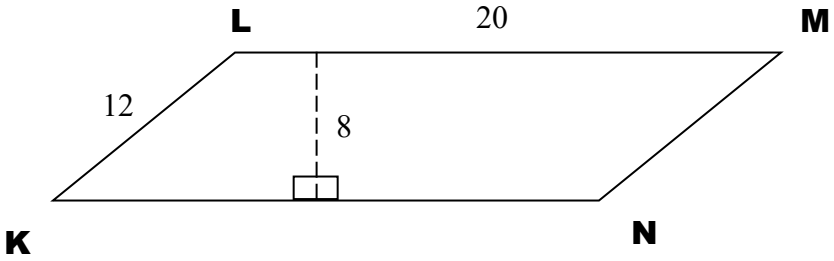
The rectilinear area formulae

Area of rectangle or parallelogram: $A = bh$
Area of triangle: $A = \frac{1}{2} bh$ because every triangle is half of a parallelogram.

The _____ must be a side of the shape.

The height must be _____to the base

Parallelogram KLMN is labelled below.



4. What is the perimeter of KLMN?

5. What are the base and height of the parallelogram?

6. Does the base of a shape have to be the "flat part on the floor"?

7. Does it matter where the height is drawn? Redraw the height so that it touches point M. Is it still the height?

8. What is the area of this parallelogram?

9. What is the area of any triangle formed from three of the points K, L, M, and N?

10. Draw triangle KMN (half of the parallelogram above) and label its base and height.

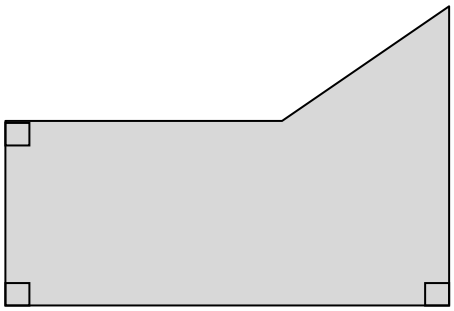
Compound areas

The only area formulas you really need are rectangles / parallelograms, triangles, circles.

Areas add / subtract. Almost all compound shapes can be calculated by adding or subtracting areas of the three basic shapes.

What would be your strategy for calculating these shaded areas?

11.



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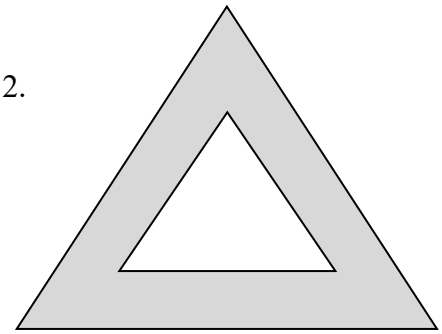

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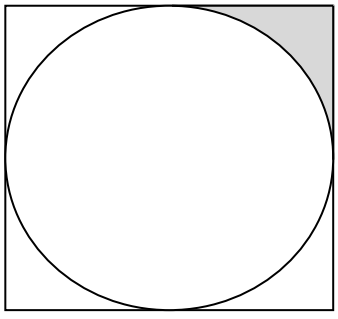
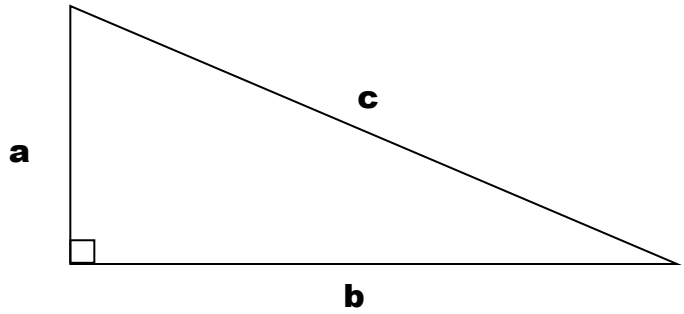
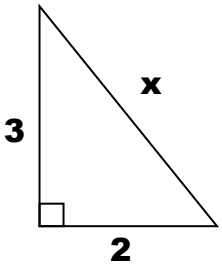


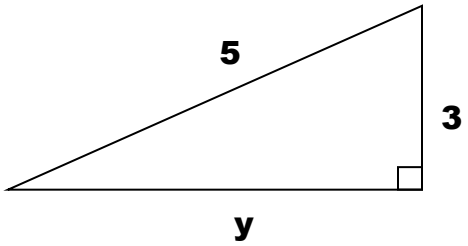
Pythagorean Theorem

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



Applies only to lengths of right triangles





14. What is the exact (irrational) form of *x*?

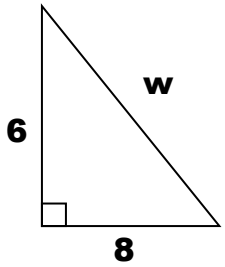
15. Round *x* to the nearest thousandth.

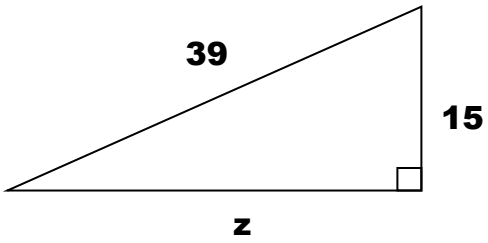
16. Calculate y.

Pythagorean Triplets

3, 4, 5 and 5, 12, 13 are the most important ones.

17. Find *w* and *z* in your head.

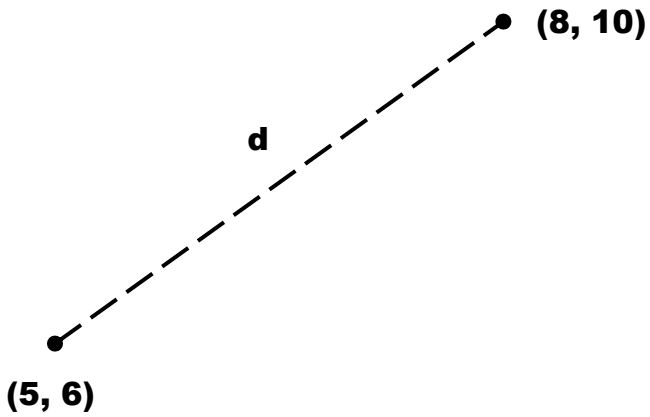




The Distance Formula

Can also use to measure the distance between any two points separated from each other in two dimensions. (Even if there is no right triangle, you can draw one!!!!) Locate the third vertex.

18. Find the distance between these points on the plane.



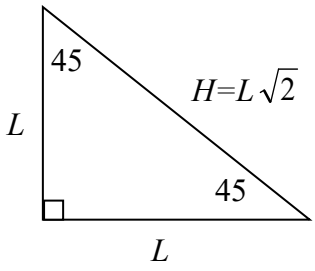
Angles of a triangle

The angles of *any* triangle add up to 180.

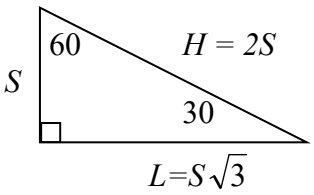
45-45-90 and 30-60-90 triangles

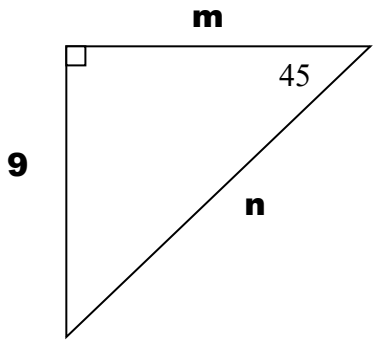
The sides of 45-45-90 and 30-60-90 triangles have fixed ratios.

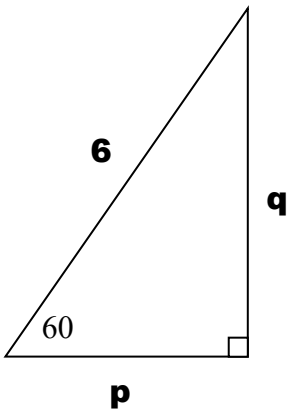
45-45-90:



30-60-90:







19. Find *m, n, p,* and *q* above.

20. Find angle x below.