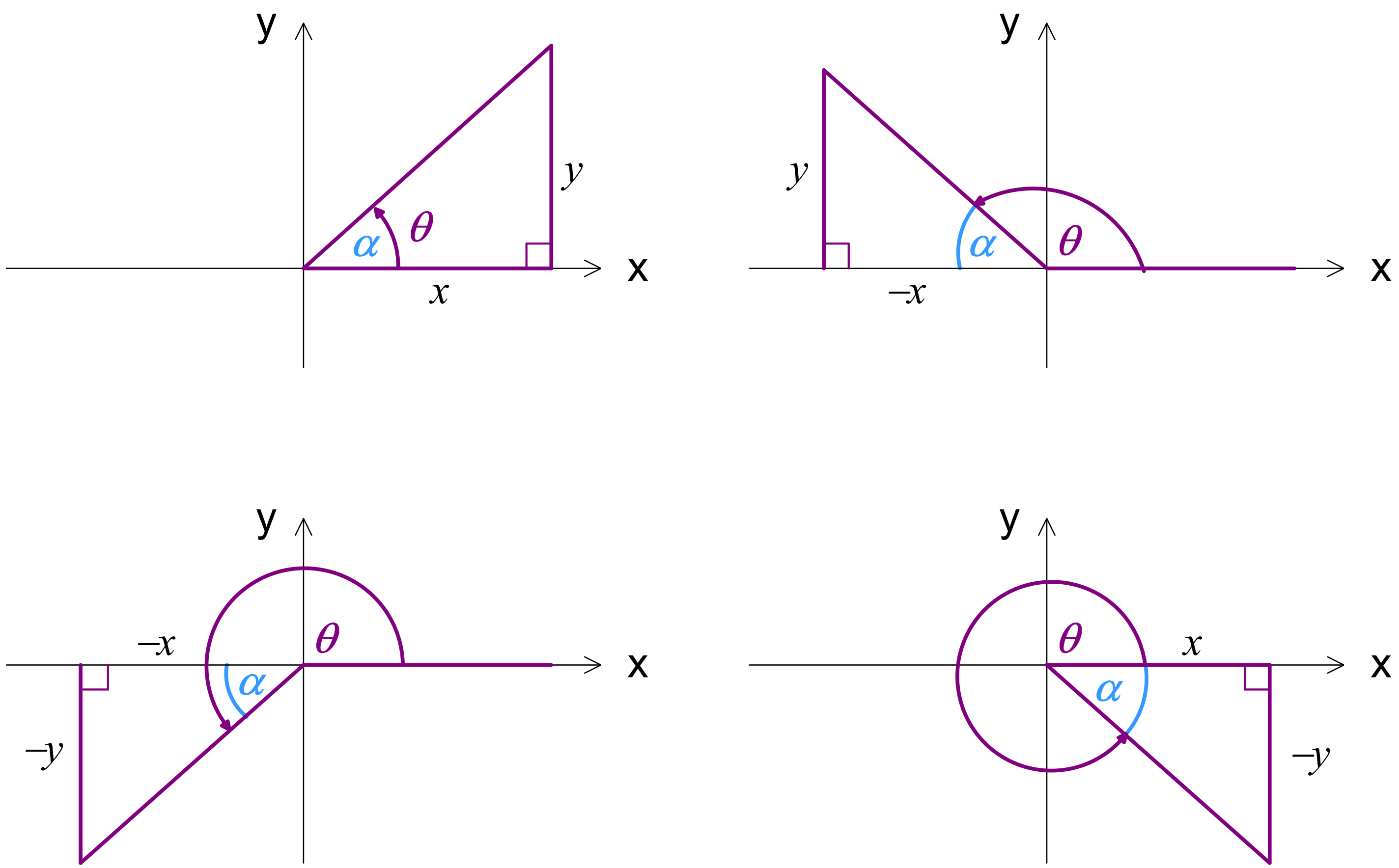
# Communication for maths

**Week 2**: The mathematical communication of trigonometry

# Trigonometry vocabulary

- What are the basic terms of trigonometry?



# Trigonometry vocabulary

- What are the basic terms of trigonometry?

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# Trigonometry phrasing examples

- See handout

# General vocabulary

- Linking terms or phrase:

| | | |
|---|---|---|
| Hence | Therefore | So |
| Implies | Simplifying (we get) | Factorising (we obtain) |
| Dividing by … (we get) | Multiplying both sides by … | Comparing left and right hand sides |
| Substituting … we get … | Given that … | We see that … |

# General vocabulary

- Linking terms or phrase:

| | | |
|---|---|---|
| For all … | There exists … | Such that … |
| The value … | Satisfies … | The exact value of … |
| The approximate value of … to 2 decimal places | Because (of) … | Since … |
| We have … | It follows that … | Let … |

# General vocabulary

- Linking terms or phrase:

| | | |
|---|---|---|
| Hence … | Implying /<br>This implies that … | |
| | | |
| | | |
| | | |

# General vocabulary examples

- See handout

# Exercise

- See handout

# More on trig vocabulary

**Exercise:** Draw a relevant diagram which represents each of the following sentences:

1. The perpendicular bisector of a line.
2. The bisector of an angle.
3. A perpendicular to a given line from a point not on the line
4. A line parallel to a given line through a point not on the given line

# More on trig vocabulary

**Exercise:** Draw a relevant diagram which represents each of the following sentences:

5. A square circumscribed to a circle.
6. An isosceles triangle inscribed to a circle.
7. A tangent line from a point outside a given circle to the circle.

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# Appendix

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# Trigonometry problem

**Problem:**

If $\tan\theta = -3/4$ and $\theta$ is obtuse what is the value of $\sin\theta$?

**Form of presentation:**

$$\sin\theta = +3/5$$

This is not a solution. It is just an answer. So what is the solution?

# Trigonometry problem

**Problem:**

**Form of presentation**

This is a correct presentation of the solution

# Trigonometry problem

## Try also as ex ...

Verify $\tan\theta\cos\theta = \sin\theta$.

**Solution**

We will start on the left side, as it is the more complicated side:

$$\begin{aligned}\tan\theta\cos\theta &= \left(\frac{\sin\theta}{\cos\theta}\right)\cos\theta \\ &= \sin\theta\end{aligned}$$

**Analysis**

This identity was fairly simple to verify, as it only required writing $\tan\theta$ in terms of $\sin\theta$ and $\cos\theta$.

### EXERCISE 7.1.1

Verify the identity $\csc\theta\cos\theta\tan\theta = 1$.

# Trigonometry problem

## Try also as ex …

Verify the following equivalency using the even-odd identities:

$$(1+\sin x)[1+\sin(-x)] = \cos^2 x$$

**Solution**

Working on the left side of the equation, we have

$$(1+\sin x)[1+\sin(-x)] = (1+\sin x)(1-\sin x)$$

Since

$$\begin{aligned} \sin(-x) &= -\sin x \\ [5pt] &= 1-\sin^2 x \qquad \text{Difference of squares} \\ [5pt] &= \cos^2 x \\ \cos^2 x &= 1-\sin^2 x \end{aligned}$$

EXAMPLE 7.1.5D: VERIFYING A TRIGONO

Verify the identity $\dfrac{\sec^2\theta - 1}{\sec^2\theta} = \sin^2\theta$

**Solution**

# The presentation of solutions

**In a solution we do not write in columns.**

- *Example*

  Consider the following presentation to a solution

$$\triangle CBL \qquad\qquad \triangle CLA$$
$$a^2 = (c+x)^2 + h^2 \qquad\qquad b^2 = h^2 + x^2$$

If I read from left to right in the standard fashion, I read

$$\Delta CBL \ \Delta CLA \ a^2 = (c+x)^2 + h^2 \ b^2 = h^2 + x^2.$$

# Trigonometry problem

## Exercise 4

*(*Sine rule, p33, "how to think like a mathematician")*

# The presentation of solutions

## Notation

- <u>*Example 1*</u>

1. *(*Notation is another issue - I fairly often saw an angle described as 1.8(pi). We never write an angle with decimals and pi- either a pure decimal or a 'nice' multiple of (pi).*
2. *If you are asked to find angles between -(pi) and pi, then radian measure is wanted, not degrees. Degrees are not used in calculus. Unless we actually ask for an answer in degrees, you should always assume that radian measure is required. *)*