

The Radian Dance

Kim Seashore, inspired by Lew Douglas

Lew Douglas, with his love of math and dancing, showed me how to use our bodies to get a feel for radians. He also taught me that *radian* is a contraction for **radius angle**; that is one radian is the angle formed by two radii where the arc length along a circle is the same as the radius. Here is how to dance these angles.

- Stand up and find a partner who is about the same height as you. Stand back to back and stretch out your arms to compare your wingspans. They should be about the same.
- Now face each other and extend your arms in front of you. You are going to use them to make “angles” with arms where your body (head and torso) at the vertex of the angle.

Warming up: Each partner makes the following angles with their arms. Check each other and take turns leading and following.

90 degrees (a right angle)	60 degrees	45 degrees	30 degrees
180 degrees (a straight angle)	120 degrees	135 degrees	150 degrees

Complements and Supplements:

- Two angles are *complementary* if together they make a **right angle**, so their measures add to 90 degrees. Take turns: one partner makes an acute angle and the other partner trying to make the *complementary* angle. These angles are called *complements* – so be sure to complement your partner!
- Two angles are *supplementary* if together they make a **straight angle**. That is, their measures add to 180 degrees. Take turns: one partner makes an acute angle and the other partner trying to make the *supplementary* angle. These angles are called *supplements* of each other – good partners should also supplement each other!

Turning angles: Have one partner make an angle with their arms, and then have the other partner try to rotate their body *through* that angle. Start with simple angles like 90 degrees or 180 degrees and work your way up. See how many turns you need to make to get back to facing your partner.

- We can also measure angles using fractions of a complete revolution. What fractions go with 90 degrees? 120 degrees? 270 degrees? 540 degrees?

RADIANS, at last! Since your arms are about the same length, one partner is going to use two arms to make the radii (the “angle” partner) while the other uses one arm to form the arc of the circle (the “arc” partner). The fingertips of the “angle” partner’s arms should touch the shoulder (or maybe armpit) and fingertips of the “arc” partner’s arm. Switch roles so you can both *feel a radian*.

- Explain to each other why this angle is **1 radian**.
- Approximate the number of degrees in **1 radian** and the fraction of a complete turn that 1 radian represents. How many radians does it take to make a half-turn?

Bonus: Together, use your bodies (arms, legs, torso) to show the following angle relationships:

- a. When two lines intersect, they form pairs of congruent *vertical* angles.
- b. When two parallel lines are intersected by a transversal the following sets of angles are congruent:
 - i. corresponding angles
 - ii. alternate interior angles
 - iii. alternate exterior angles
- c. What else? Now it is your turn to make up the dance.