**Problem 1: A line passes through two points A(2, 0), B(0, 3) respectively. Question: What is the standard form of this equation? What is the slope of this line?**

Strategy: The general of line form is ax+by+c=0.

Why 1:

Substitute two points into the general line equation.

How 1:

a\*2 + b\*0 + c = 0, a\*0 + b\*3 + c = 0

Why 2:

Eliminate the term with 0 coefficients.

How 2:

2\*a + c = 0, 3\*b + c = 0

Why 3:

Let c = -6, which is the least common multiplier between coefficients of a and b, calculate a and b.

How 3:

2\*a = 6, a = 3, 3b = 6, b = 2

Why 4:

Substitute the value of a, b, c into the general form of line.

How 4:

L: 3x + 2y – 6 = 0

**Problem 2**: Given an equation 2y + 2x -y + 2x = 4. Question: 1.Graph this equation’s corresponding shape; 2. If this shape is a line, what is the point-slope form of this line?

Strategy: Decide what shape this give equation represents.

Why 1:

The given equation does not contain quadratic terms so that it represents a line.

How 1:

L: 2y + 2x – y + 2X = 4

Why 2:

Move Terms from the Right Of Equation to the Left.

How 2:

2y + 2x – y + 2x – 4 = 0

Why 3:

Find and Group Terms with the different Coefficients and same variable.

How 3:

2x + 2x + 2y – y – 4 = 0

Internal: Commutative Law

Why 4:

Merge Terms with different Coefficients and same variable.

How 4:

4x + y – 4 = 0

Internal : Combining Like Terms

Why 5:

Find X-intercept (X2,Y2) and Y-intercept(X1,Y1) of the line.

How 5:

X1 = 0 -> Y1 = 4; Y2 = 0 -> X2 = 1

Strategy:

A line with point-slope form is like Y-Y0 = K(X-X0), where K is the slope, and (X0,Y0) is a point on the line.

Why 1:

The slope of a line is K = -B/A where the general form of line is Ax + By + C = 0

How 1:

K = -4

Internal : K = -4/1

Why 2:

A point on the line is (0, 4)

How 2:

X0 = 0, Y0 = 4

Why 3:

Substitute the value of X0 and Y0 into point-slope form

How 3:

Y – 4 = -4\*( X – 0)

**Problem 3**: Assume a circle’s central point is C(-1, -1), and its radius is 3. There is a line of which the standard form is x + y - 1 = 0. Question: Find the distance between the center of the circle and this line?

Strategy:

The distance between a point (X0,Y0) and a line ax+by+c = 0 is (|aX0 + bY0 + c| divide by Math.Sqrt(a^2 + b^2) )

Why 1:

The distance between a point (X0,Y0) and a line ax+by+c = 0 is (|aX0 + bY0 + c| divide by Math.Sqrt(a^2 + b^2) )

How 1:

X0 = -1, Y0 = -1, a = 1, b = 1, c = -1

Internal: Extract Coefficients from Expressions.

Why 2:

(X0,Y0) is the coordinate point, a, b, c are coefficients of the line.

How2:

A = |aX0 + bYo + c| = |1 \* (-1) + 1 \* (-1) -1| = 3

Internal: substitute values in divisor and absolute value.

Why 3:

B = Math.Sqrt(a^2 + b^2) = Math.Sqrt(1 + 1) = Math.Sqrt(2)

How3:

Internal: substitute values in dividend and absolute value

Why 4:

D = A/B

How 4:

D = 3 \* math.sqrt(2)/2

Different Problem Strategies:

First, find the equation of the perpendicular line that passes through (-1,-1).

Second, calculate the intersection point between two lines.

Third, calculate the distance between the intersection point and circle’s central point.

Why 1:

The general form of line is Ax+By+C = 0, where K = -B/A.

How 1:

K = -1

Why 2:

The slopes of two lines which are perpendicular to each other will satisfy that K \* K’ = -1.

How 2:

K’ = 1

Why 3:

The slope-intercept form of perpendicular line will be like y = k’x + b

How 3:

L’: y = x + b

Why 4:

The perpendicular line pass the point (-1,-1)

How 4:

-1 = -1 + b -> b = 0

Why 5:

Substitute the value of parameter b

How 5:

L’ : y = x