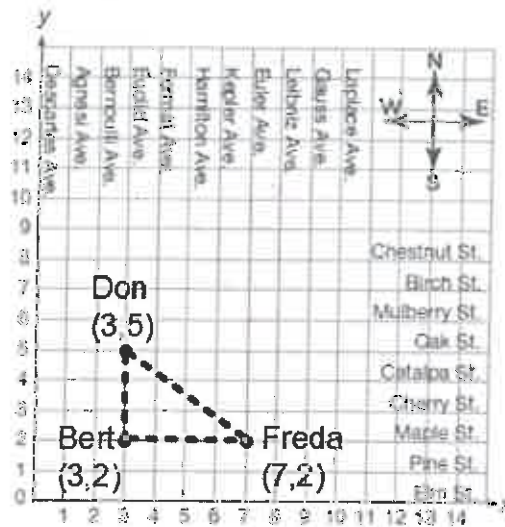


Distance & Translation

Problem 1 – Distance Formula

1. Don lives at the intersection of Euclid Ave. and Oak St. Freda lives at the intersection of Maple St. and Euclid Ave. Bert lives at the intersection of Euclid Ave. and Maple St. The grid below illustrates the locations of Don, Freda and Bert on a rectangular coordinate grid.



2. Complete the table below by calculating the distances between each of the stated locations. Show how you determined each distance and explain your reasoning.

Locations	Distance	Reasoning
Don & Bert	$5 - 2 = 3$	Don is 5 streets up. Bert is 2. The difference is 3 streets.
Bert & Freda	$7 - 3 = 4$	Freda is 7 streets over and Bert is 3. The difference is 4.
Don & Freda	$a^2 + b^2 = c^2$ $3^2 + 4^2 = c^2$ $9 + 16 = c^2$ $25 = c^2$ $c = 5$	the houses form a Right Δ . the length of the hypotenuse can be found using the pythagorean theorem.

Distance Practice:

1. Determine the distance between the given points. Round your answer to the nearest tenth if necessary. Show all work. (Using the grid below is optional)

a. A(1, 2) and B(3, 6)

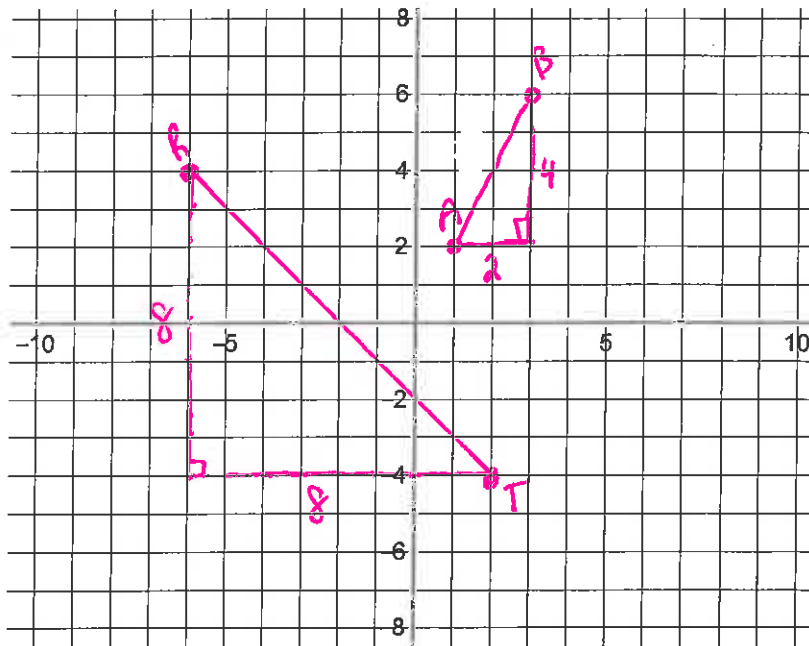
$$\begin{aligned}a^2 + b^2 &= c^2 \\(3-1)^2 + (6-2)^2 &= c^2 \\2^2 + 4^2 &= c^2 \\4 + 16 &= c^2 \\20 &= c^2 \\c &= \sqrt{20} \\&\approx 4.5\end{aligned}$$

$$\overline{AB} = 4.5$$

b. R(-6, 4) and T(2, -4)

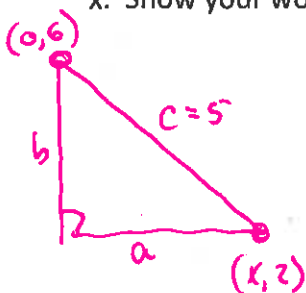
$$\begin{aligned}a^2 + b^2 &= c^2 \\8^2 + 8^2 &= c^2 \\64 + 64 &= c^2 \\128 &= c^2 \\c &= \sqrt{128} \approx 11.3\end{aligned}$$

$$\overline{RT} = 11.3$$



Challenge:

2. The distance between $(x, 2)$ and $(0, 6)$ is 5 units. Use the distance formula to determine the value of x . Show your work.



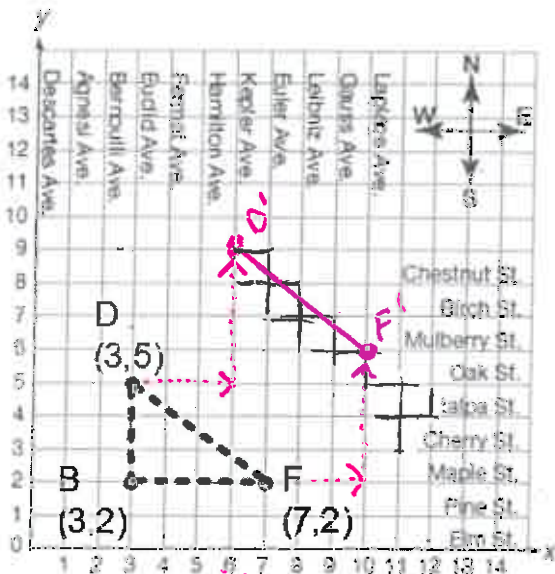
$$\begin{aligned}a^2 + b^2 &= c^2 \\(x-0)^2 + (2-6)^2 &= 5^2 \\x^2 + (-4)^2 &= 25 \\x^2 + 16 &= 25 \\x^2 &= 9 \\x &= 3\end{aligned}$$

Problem 2 – Translation:

1. What is a transformation? *A change in size, shape, or position.*

2. What is a Translation? *A change in position that occurs when an object is slid.*

3. If the line segment connecting Don's house to Freda's house is translated 3 units right and 4 units up, what are the new coordinates of their houses? Explain your reasoning.



Don (6, 9)

Freda (10, 6)

a. Draw and label the **image** of line segment DF under the give translation.

b. What is the length of line segment $D'F'$? Explain how you know.

the length of $\overline{D'F'}$ is exactly the same as the length of \overline{DF} because a translation does not change the size of an object.

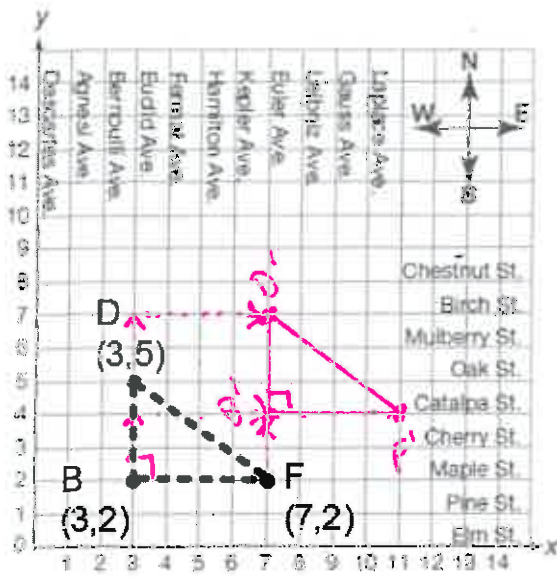
c. Describe the translation that maps point B onto the point $B'(-4, 7)$.

B(3, 2)

B'(-4, 7)

the translation moves point B left 7 units and up 5 units to produce point B'.

4.



a. Draw and label the image of $\angle DBF$ under the translation: 2 units up and 4 units right.

b. What is $m\angle DBF$? How do you know?

$m\angle DBF = 90^\circ$ because the vertical streets and the horizontal streets meet at a right angle.

c. What is the $m\angle D'B'F'$? How do you know?

$m\angle D'B'F'$ is also 90° because translation does not change angle measure.