

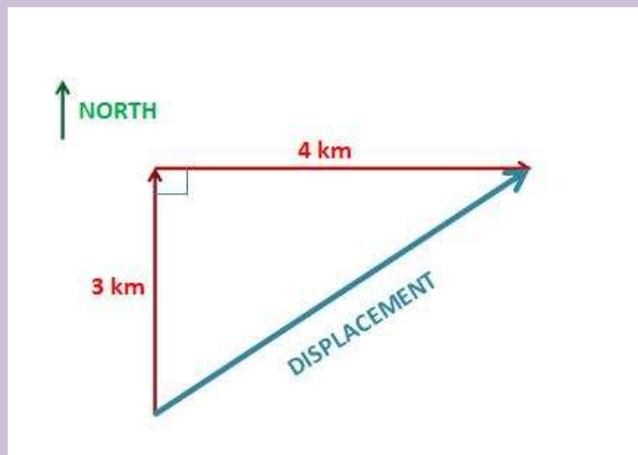
# Distance and Displacement Practice—Solutions

Calculate the **DISTANCE** and **DISPLACEMENT** of the following situations:

1. David walks 3 km north, then turns and walks 4 km east. *Express your answer in kilometers.*

$$\text{Distance} = 3 \text{ km} + 4 \text{ km} = 7 \text{ km}$$

For the displacement, we will use the Pythagorean Theorem because David's path makes a right angle. See the image below.



The Pythagorean Theorem says  $A^2 + B^2 = C^2$ , where  $C$  is the side opposite the right angle.

$$A^2 + B^2 = C^2$$

$$(3 \text{ km})^2 + (4 \text{ km})^2 = C^2$$

$$9 \text{ km}^2 + 16 \text{ km}^2 = C^2$$

$$25 \text{ km}^2 = C^2$$

Take the square root of both sides of the equation.

$$5 \text{ km} = C$$

$$\text{Displacement} = 5 \text{ km Northeast}$$

2. Amy runs 2 miles south, then turns around and runs 3 miles north. *Express your answer in miles.*

$$\text{Distance} = 2 \text{ miles} + 3 \text{ miles} = 5 \text{ miles}$$

Displacement: Because the two legs of the journey point in opposite directions, we subtract. The result points in the same direction as the larger leg.

$$\text{Displacement} = 3 \text{ miles} - 2 \text{ miles} = 1 \text{ mile North}$$

3. Jermaine runs exactly 2 laps around a 400 meter track. *Express your answer in meters.*

$$\text{Distance} = 2 ( 400 \text{ meters} ) = 800 \text{ meters}$$

Displacement = 0 because Jermaine started and stopped in the same place.

4. Derrick crawls 4 feet then turns 90 degrees and crawls 6 feet.

*Express your answer in feet.*

$$\text{Distance} = 4 \text{ feet} + 6 \text{ feet} = 10 \text{ feet}$$

Because Derrick turns at a right angle, we can find his displacement with the Pythagorean Theorem.

$$A^2 + B^2 = C^2$$

$$(4 \text{ feet})^2 + (6 \text{ feet})^2 = C^2$$

$$16 \text{ feet}^2 + 36 \text{ feet}^2 = C^2$$

$$52 \text{ feet}^2 = C^2$$

Take the square root of both sides of the equation.

$$7.21 \text{ feet} = C$$

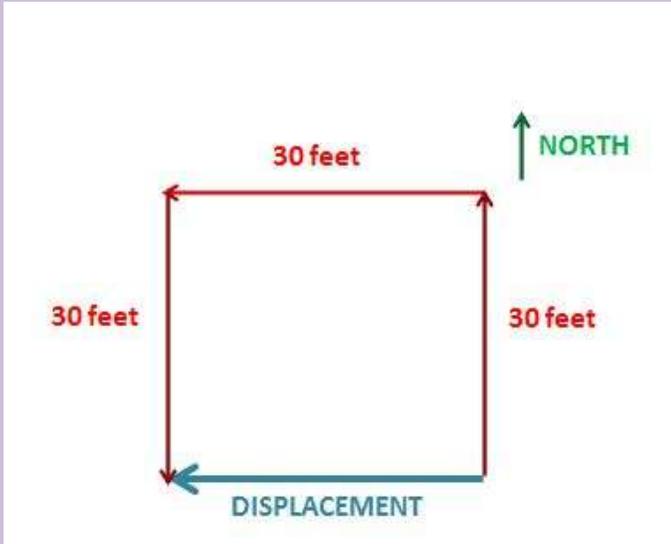
Displacement is 7.21 feet *up and to the right*. Your direction may be different because the problem doesn't really specify which directions Derrick crawled.

5. Ray runs 30 feet north, 30 feet west, and then 30 feet south.

*Express your answer in feet.*

Distance = 30 feet + 30 feet + 30 feet = 90 feet

His displacement is 30 feet West. See the image below.



6. Jamison turns around (in circles) 5 times. *Express your answer in feet.*

Distance = 0 feet because he did not move along some path.

Displacement = 0 feet because he started and stopped in the same place.

7. Jim walks 1 mile then turns 90 degrees and walks 2 miles. *Express your answer in miles.*

Distance = 1 mile + 2 miles = 3 miles

Because Jim turns at a right angle, we can find his displacement with the Pythagorean Theorem.

$$A^2 + B^2 = C^2$$

$$(1 \text{ mile})^2 + (2 \text{ miles})^2 = C^2$$

$$1 \text{ mile}^2 + 4 \text{ miles}^2 = C^2$$

$$5 \text{ miles}^2 = C^2$$

Take the square root of both sides of the equation.

$$2.24 \text{ miles} = C$$

Displacement is 2.24 miles up and to the right. Your direction might be different. The problem didn't give directions.

8. Taja walks two miles from her door to the park, then returns home to her door. *Express your answer in miles.*

$$\text{Distance} = 2 \text{ miles} + 2 \text{ miles} = 4 \text{ miles}$$

Displacement = 0 miles because she started and stopped in the same place.

9. Sandy ran 3 blocks north, and then 2 blocks west. *Express your answer in blocks.*

$$\text{Distance} = 3 \text{ blocks} + 2 \text{ blocks} = 5 \text{ blocks}$$

Because Sandy turns at a right angle, we can find her displacement with the Pythagorean Theorem.

$$A^2 + B^2 = C^2$$

$$(3 \text{ blocks})^2 + (2 \text{ blocks})^2 = C^2$$

$$9 \text{ blocks}^2 + 4 \text{ blocks}^2 = C^2$$

$$13 \text{ blocks}^2 = C^2$$

Take the square root of both sides of the equation.

$$3.61 \text{ blocks} = C$$

Displacement is 3.61 blocks Northwest.

10. Neva swam 3 complete laps in a 50 meter pool. ( 1 lap is to the other side and back). *Express your answer in meters.*

$$\text{Distance} = 3 ( 100 \text{ meters} ) = 300 \text{ meters}$$

Note: I am reading the problem to mean that 1 lap is 50 meters to one side and back = 100 meters.

Displacement = 0 because Neva starts and stops in the same place.