

Present Today:

9:55 Azjja Kjo., Katie, Megan, Katie, Alyssa, Nicole Nie.
11:00 Jordan Pet., Kyle, Rebecca, Emma, Jamie, Erin San.

Present #1, 5, 7 (from the handout)

Homework:

Sec. 8.2 #57, 59, 61
Sec. 8.3, #9-15 odd, 17, 21, 25-31 odd, 59-65 odd

Present Wednesday: 8.3 #59, 63, 65

9:55 Rachel Roc., Hannah, Chelsea, Molly, Amy, Jared Taf.
11:00 Jamie Sch., Victoria, Abbey, Kelly, Jeffrey, Kayla Tet.



After reviewing the correct solution (below), write your score on the back of your quiz.

- 0 = no progress at all; just rewrote problem
- 0.5 = false start, not based on relevant principles
- 1 = false start, but sustained effort with some relevant principles
- 1.5 = significant mistake(s), or significant misunderstanding(s)
- 2 = mistake near the end or could not finish; also excessive reliance on calculator or 'brute force' methods
- 2.5 = trivial mistake (e.g. arithmetic error), but work is mostly correct
- 3 = correct answer and work

Latoya can get to school in 15 minutes if she rides her bike. It takes her 45 minutes if she walks. Her speed when walking is 10 miles per hour slower than her speed when riding. How far does she travel to school?

Let w = her walking speed in mph.
 Then $(w+10)$ is her biking speed in mph.
 Let d = the distance to school in miles.

Note: $15 \text{ min} = \frac{1}{4} \text{ hr}$
 and $45 \text{ min} = \frac{3}{4} \text{ hr}$.

We have:
 $d = (w+10)(\frac{1}{4} \text{ hr})$ and $d = w(\frac{3}{4} \text{ hr})$.

These are equal to one another.

$\Rightarrow w+10 = 3w$
 $\Rightarrow w = 5 \text{ mph}$
 $\Rightarrow d = 5(\frac{3}{4}) = 3.75 \text{ miles}$

Parallel and Perpendicular Slopes

$y = mx + b$ $Ax + By = C$ $y - y_1 = m(x - x_1)$
($m = -A/B$)

The slope of the line between two points is found as the vertical change divided by the horizontal change.

Perpendicular lines (and thus perpendicular slopes) play a central role in many areas of mathematics.

Basic shapes such as rectangles (e.g. buildings, gardens) require them.

Also, in many applications the perpendicular direction (sometimes called the "normal vector") plays a central role.

Parallel and Perpendicular Lines:

Definition 1: Two lines are parallel iff they have the same slopes (including vertical lines whose slopes are undefined).

Definition 2: Two nonvertical lines with slopes m_1 and m_2 are perpendicular iff their slopes are opposite reciprocals.

That is, $m_1 = -1/m_2$, or equivalently, $(m_1)(m_2) = -1$
(Also, every vertical line is perpendicular to every horizontal line.)

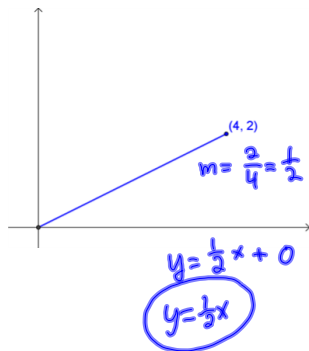
Ex: $y = 2x + 1 \rightarrow m = 2$
 $m_{\perp} = -\frac{1}{2}$

Ex: $y = \frac{1}{3}x - 3 \rightarrow m = \frac{1}{3}$
 $m_{\perp} = -\frac{1}{\frac{1}{3}} = -3$

Below is an aerial view of Wile E. Coyote's path as he raced to set traps for the road runner one sunny morning. We'll use his cave as the origin in our coordinate system (0,0).

First, he runs in a northeasterly direction for a ways, then stops to build a trap before returning home for some cactus stew.

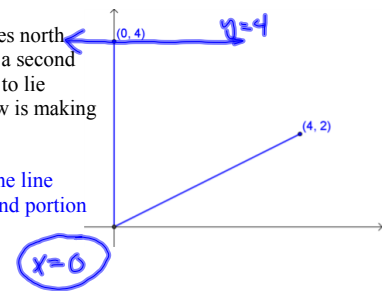
Find the equation of the line that contains this portion of his trip.



Below is an aerial view of Wile E. Coyote's path as he raced to set traps for the road runner one sunny morning. We'll use his cave as the origin in our coordinate system (0,0).

Next, he runs four miles north from his cave to build a second trap. He returns home to lie down... that cactus stew is making his tummy upset.

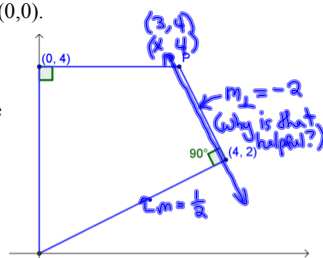
Find the equation of the line that contains this second portion of his trip.



Below is an aerial view of Wile E. Coyote's path as he raced to set traps for the road runner one sunny morning. We'll use his cave as the origin in our coordinate system (0,0).

When Wile E. wakes up from his nap, he sets about planning the location of his final trap. He will place it at point P, as shown in the diagram.

Find the coordinates of the point P.



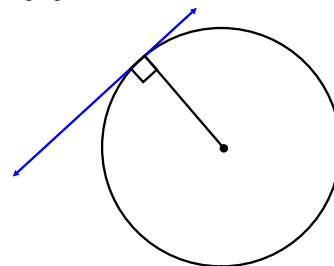
$$-2 = m_{\perp} = \frac{\Delta y}{\Delta x} = \frac{4-2}{x-4} = \frac{2}{-1}$$

$$y = -2x + b$$

$$2 = -2(4) + b \Rightarrow b = 10 \Rightarrow y = -2x + 10$$

$$\text{if } y = 4 \text{ now, } x = 3$$

Circles have a number of interesting properties. One is that the radius intersects the circle at a right angle, so any *tangent* to the circle will be perpendicular to the radius.



Wile E. is chasing the Road Runner around a circular track. He cleverly dumps a pool of vegetable oil at a strategic location, and when the Road Runner passes that point he slips and shoots off at a tangent to the circle.

- a) Find the equation of the line that represents the Road Runner's slippery trajectory.
- b) Wile E. wants to nab the sliding Road Runner at a point due West of the center of the track. What are the coordinates of this point?

