If we think of Dorothy as starting out facing north, then she ends up facing west, and in between she faces all the directions clockwise from north to west. That means Dorothy makes $\frac{3}{4}$ of a full 360° turn during her walk. Since $\frac{3}{4}$ of 360° is 270°, Dorothy turns a total of 270°.

7. As seen in Class Activity 10F, and as indicated in Figure 10.28, if a person were to walk around a triangle, returning to her original position, she would have turned a total of 360°. When the person walks around the triangle, she turns the angles d, e, f, where d, e, and f are the exterior angles, as shown in Figure 10.28. This means that $d + e + f = 360°$. But because

$$a + f = 180°$$
$$b + d = 180°$$
$$c + e = 180°$$

it follows that, on the one hand,

$$\begin{aligned}(a+f) + (b+d) + (c+e) &= 180° + 180° + 180° \\ &= 540°\end{aligned}$$

while, on the other hand,

$$\begin{aligned}(a+f)+(b+d)+(c+e) &= (a+b+c)+(d+e+f) \\ &= (a+b+c) + 360°\end{aligned}$$

Because $(a + f) + (b + d) + (c + e)$ is equal to both 540° and $(a + b + c) + 360°$, these last two expressions must be equal to each other. That is,

$$(a + b + c) + 360° = 540°$$

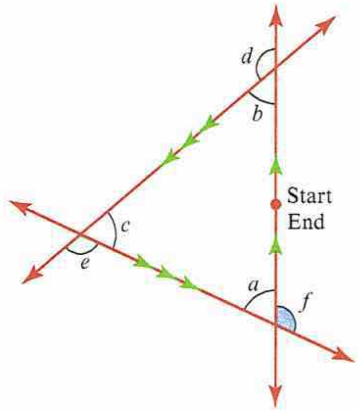


Figure 10.28 Exterior angles of a triangle add to 360°.

Therefore,

$$a + b + c = 540° - 360° = 180°$$

8. Unlike area, the angles in the square and the triangle don't depend on the sizes of either of these shapes. The fact that the square is inside the triangle has nothing to do with the sum of the angles in the square. We could even enlarge the square, so that the triangle fits inside the square, without changing the sum of the angles in the square.

1. Even though the line segments that are forming the angle at A are longer, the angle at A is not larger than the angle at B. This is because the lower line segments of both angles would need to be rotated the same amount (about points A and B respectively) to get to the location of the upper line segments of the angles.

#463

PROBLEMS FOR SECTION 10.1

1. Tiffany says that the angle at A in Figure 10.29 is bigger than the angle at B. Why might she think this? How might you discuss angles with Tiffany?

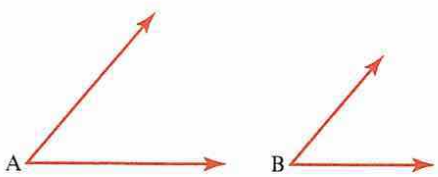


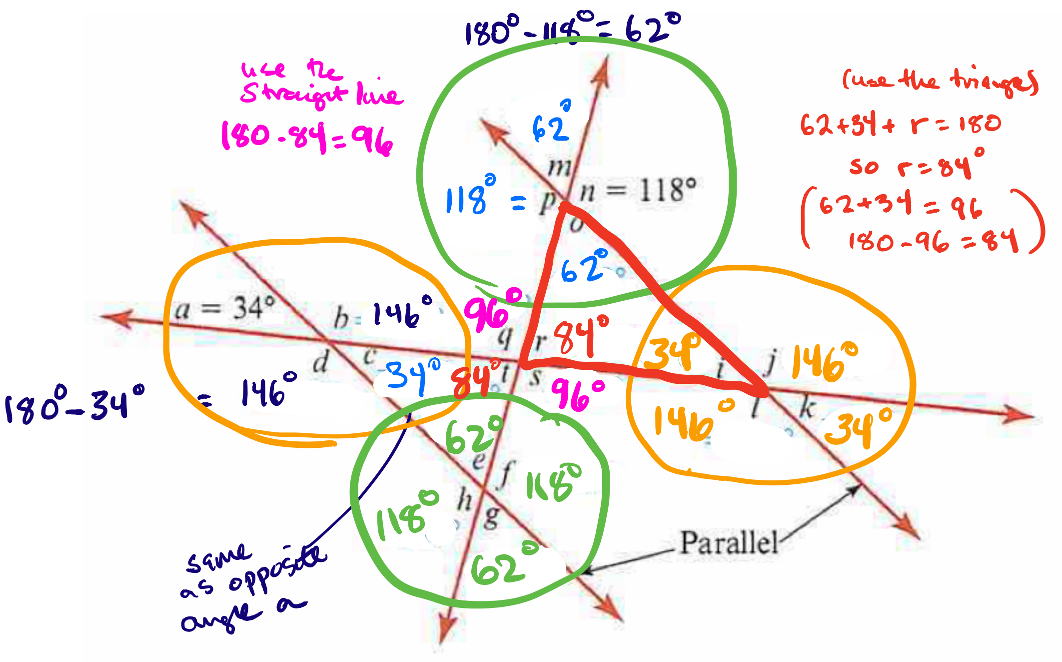
Figure 10.29 Is the angle on the left larger?

2. Given that the indicated lines in Figure 10.30(a) are parallel, determine the unknown angles without actually measuring them. Explain your reasoning briefly. See Practice Exercise 4.

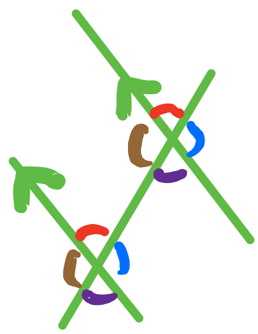
3. Given that the indicated lines in Figure 10.30(b) are parallel, determine the unknown angles without actually measuring them. Explain your reasoning briefly. See Practice Exercise 4.

PROBLEMS FOR SECTION 10.1

2. Given that the indicated lines in Figure 10.30(a) are parallel, determine the unknown angles without actually measuring them. Explain your reasoning briefly. See Practice Exercise 4.



(a)



slide along the 1 line going thru 2 parallel lines

we have 1 line going thru 2 parallel lines

4. Amanda got in her car at point A and drove to point F along the route shown on the map in Figure 10.31.

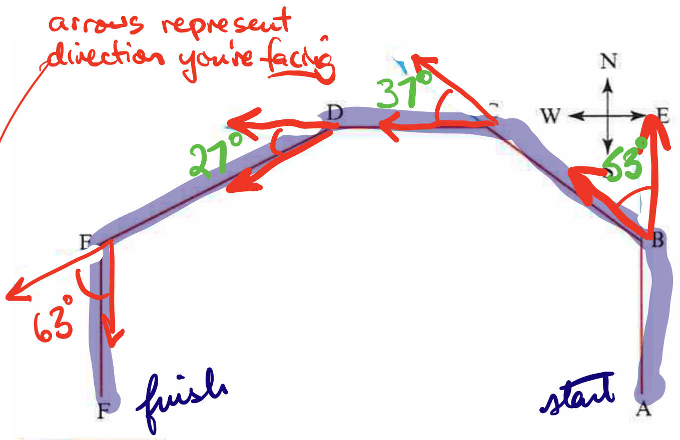


Figure 10.31 Amanda's route.

a. Trace or redraw Amanda's route shown in Figure 10.31; show all of Amanda's angles of turning along her route. Use a protractor to measure these angles. The turn at B is 53°, at C is 37°, at D is 27°, at E is 63°.

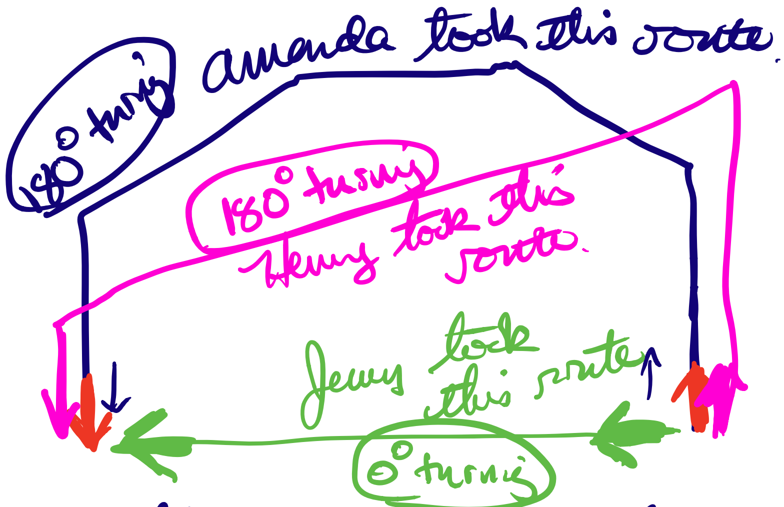
b. Determine Amanda's total amount of turning along her route by adding the angles you measured in part (a). 180°

c. Now describe a way to determine Amanda's total amount of turning along her route *without* measuring the individual angles and adding them up. *Hint*: Consider the directions that Amanda faces as she travels along her route. She was facing N at first and S at last, so 180 degrees total.

✱ ended up in the opposite direction, so in total, half a full turn

think about driving & turning the wheel

$$53+37+27+63=180$$



Amanda went from facing north to facing south.

Jenny turned a total of 0°

The upshot: it's not the route that matters, but the direction you start & end up facing.

5. Ed the robot is standing at point A and will walk to point D along the route shown on the map in Figure 10.32. On the map, each segment between two dots represents 10 of Ed's paces.

a. Trace or redraw the map in Figure 10.32. At the points where Ed will turn, indicate his angle of turning. Use a protractor to measure these angles, and mark them on your map.
The turn at B is 30° and at C is 60°.

b. Ed is a robot, so you must tell Ed exactly how to walk to point D. At points where Ed must turn, tell him how many degrees to turn, and which way. 30 paces turn 30° to the right, then 20 paces, then turn 60° to the right, then 10 paces.

c. Determine Ed's total amount of turning along his route by adding the angles you measured in part (a). 90 degrees. 30° + 60° = 90°

d. Now determine Ed's total amount of turning along his route *without* measuring the individual angles and adding them. *Hint*: Consider the directions that Ed faces as he travels along his route.

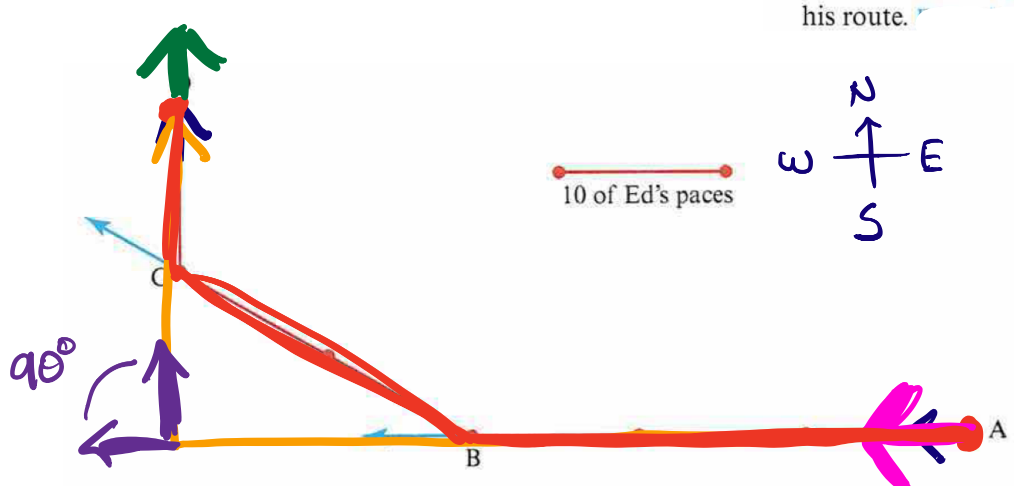
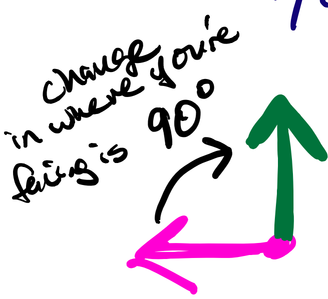


Figure 10.32 Ed's route.

How much turning total?
(How far/
How many degrees)

$\boxed{90°}$

why? Ed starts out facing West
ends up facing North
so that's a ~~half~~ 1/4 turn



started out facing

end up facing

9. Given that the lines in Figure 10.34 marked with arrows are parallel, determine the sum of the angles $a + b + c$ without measuring. 360 degrees.

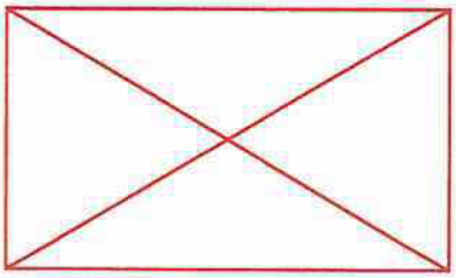
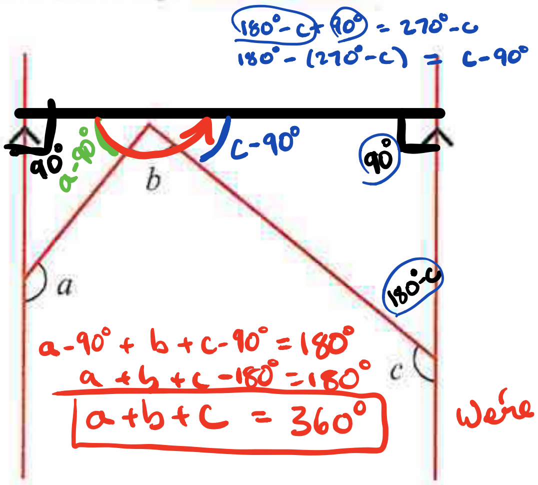


Figure 10.33 A rectangle subdivided into four triangles.

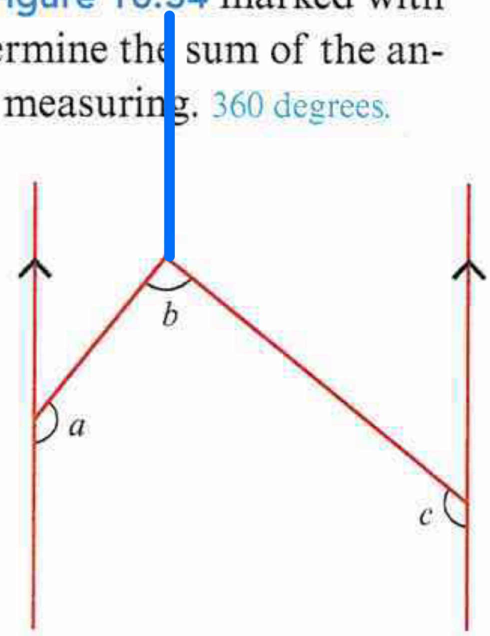


We're done. ∎

Figure 10.34 What is the sum of the marked angles?

Next class we'll do the "official solution"

9. Given that the lines in Figure 10.34 marked with arrows are parallel, determine the sum of the angles $a + b + c$ without measuring. 360 degrees.



add this line

Figure 10.34 What is the sum of the marked angles?