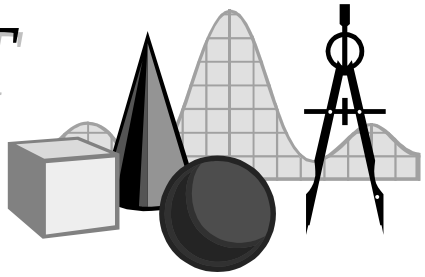
TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION



Math Audit Team
Regional Professional Development Program
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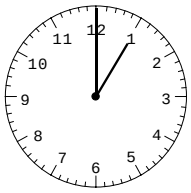
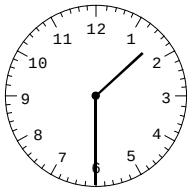
Time. We never seem to have enough of it. We spend a fair amount of it trying to use it more efficiently. This edition of *Take It to the MAT* focuses on time, specifically, time-keeping devices.

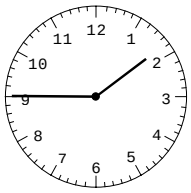
Throughout the history of man, knowing the time has been critical to a smoothly running and developing civilization. Whether it was with Stonehenge or a water clock, measuring time has been an unceasing human endeavor. The invention of increasingly sophisticated mechanical clocks from the 15th to 18th centuries revolutionized time-keeping. The analog clocks we use today do not differ much from clocks of five centuries ago. It uses some manner of drive mechanism—perhaps a falling weight or a wound spring—to turn gears that are connected to the hands.



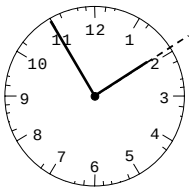
As the drive mechanism turns the gear connected to the second hand, another gear (or series of them) connected to the second hand gear turns one-sixtieth as fast. This second gear is attached to the minute hand. A third gear is linked to the minute hand gear and turns one-twelfth as fast—this is the hour hand gear. Thus, each hand is always in motion regardless of the time.



Ignoring the second hand for now, let's examine an analog timepiece reading one o'clock. If the minute hand moves through half of one revolution, the time is now 1:30. But remember, the hour hand is also moving since gears link it and the minute hand. Therefore, because we are now halfway through the hour, the hour hand has moved precisely one-half of the distance between the "1" and "2" positions. It is not still pointing directly at the "1", as it was one-half hour ago.



As another fifteen minutes pass, now placing the time at 1:45. The hour hand continues to approach the "2" position, but is not quite there yet—it is now three-fourths of the way between "1" and "2" since the minute hand has finished ¾ of its cycle. Even at 1:55, the hour hand is still short of the "2" mark. (A dotted line extending the hour hand of the 4th clock has been added for clarity.)



When teaching students about analog clocks, it is important for them to understand the motion of the hour hand and its relationship to the minute hand. While the connection between the speed of the hands is probably beyond the grasp of most elementary students, the link between the hour and minute hands is not. Even if the hour hand *appears* to lie on an hour position, the position of the minute hand must be examined to determine the hour. The hour is not the closer position as some students believe—if so, they might identify the third clock as *two* forty-five.

Some believe that the advent of the digital clock has made analog clocks obsolete. Nothing could be further from the truth. The calculator has not replaced the pencil, nor the spell-checker a dictionary. To function in society, students must know how to read analog timepieces properly.