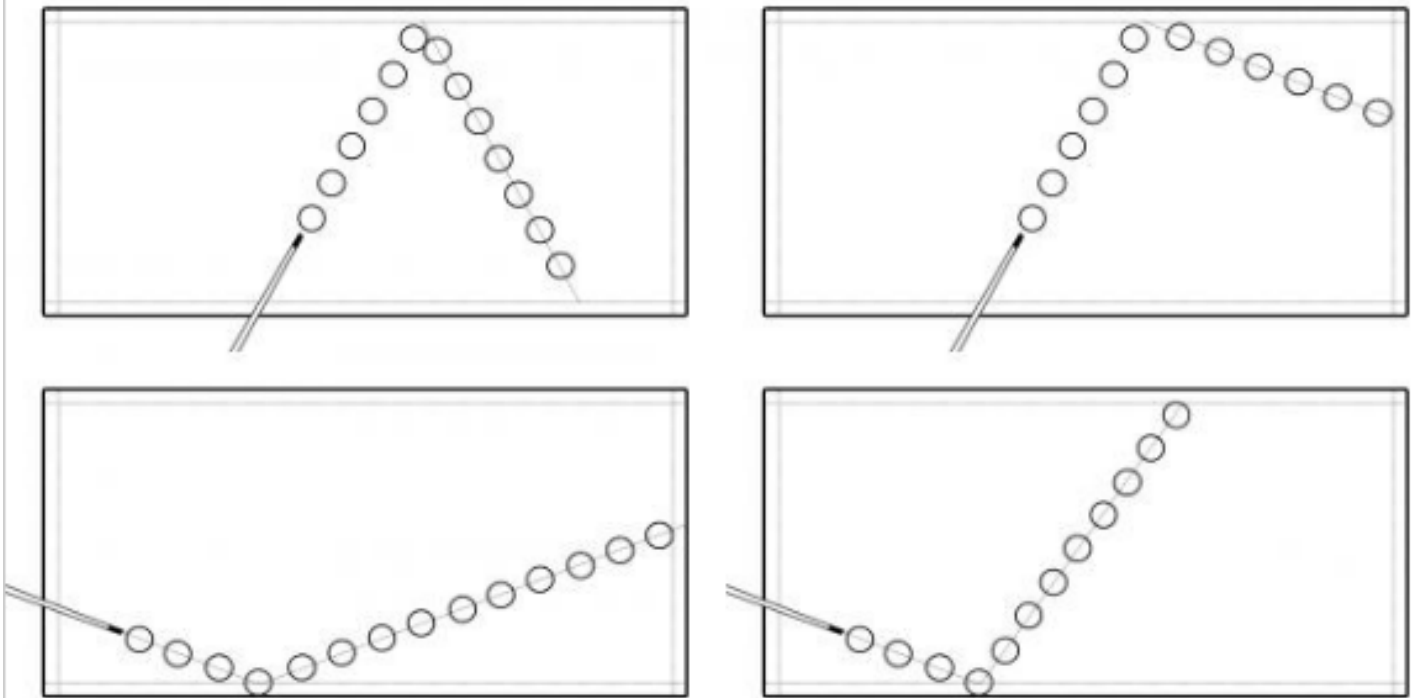


# Activity 1 - Pool Bounce

- 1. Watch eight pool shots. Then make your best estimate in the table to the left. Which part of the cushion will the ball hit? A, B, or C? Your teacher might play the video again for you if you ask really nicely.

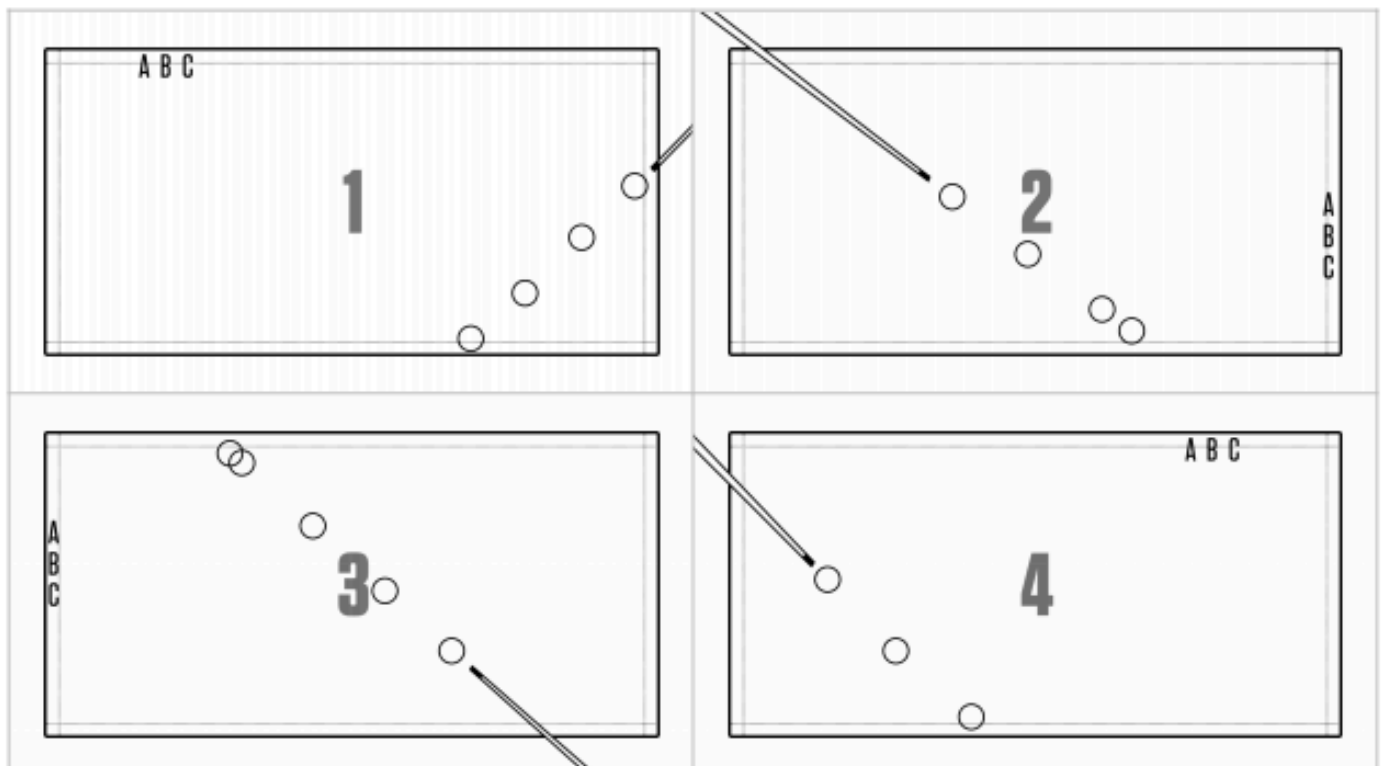
Shot #	Estimate	Calculate	Verify
1			
2			
3			
4			
5			
6			
7			
8			
# correct			

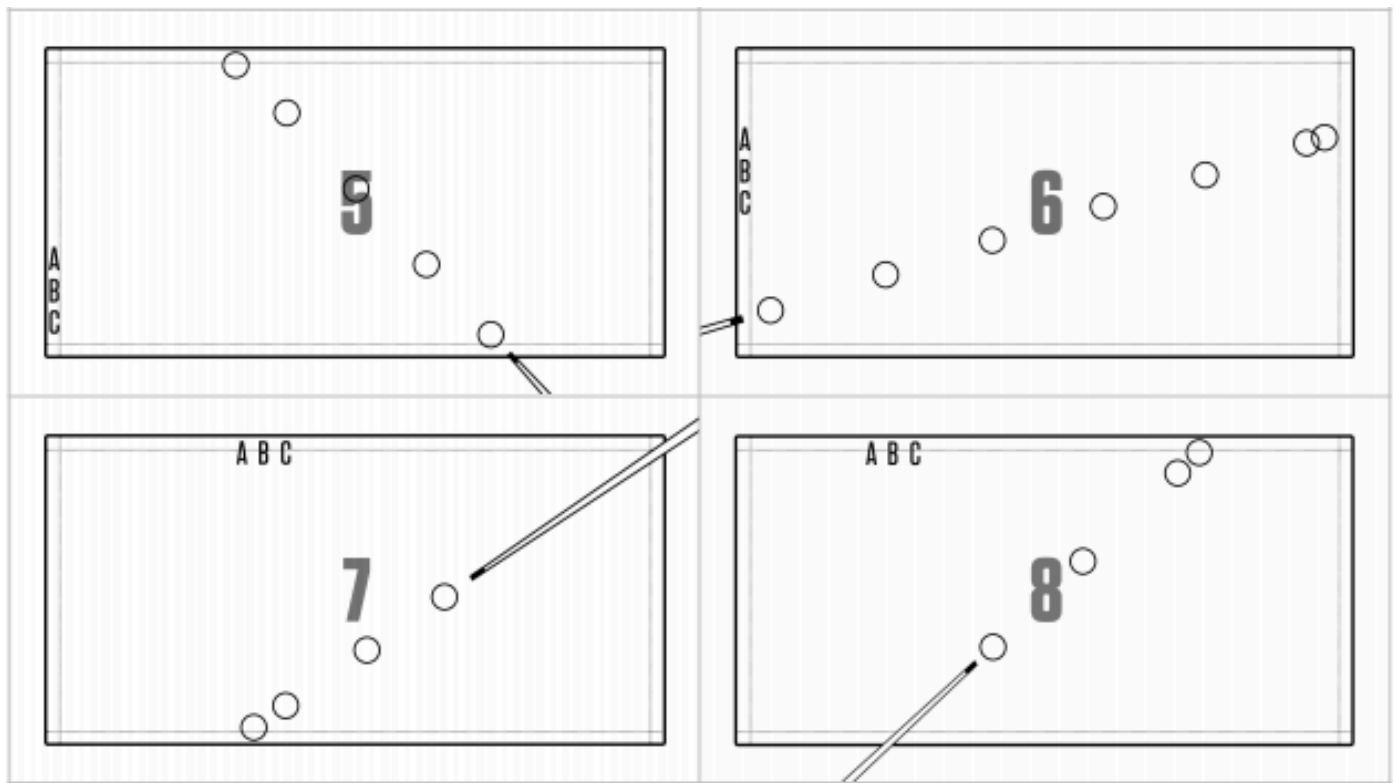
2. Of the 4 shots below, identify which 2 are real and which 2 are fake.



If you didn't already know which pool shots were real and fake, how could you tell the difference?

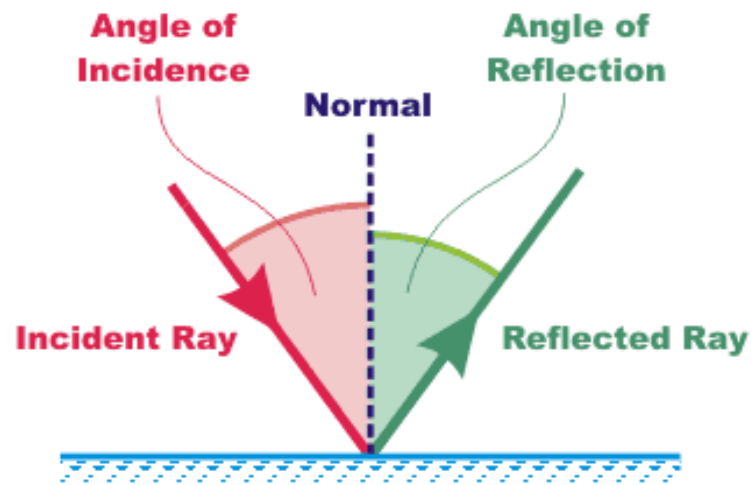
3. Use what you now know about pool shots to calculate the part of the cushion the ball will hit. Write those answers in the "Calculate" column.



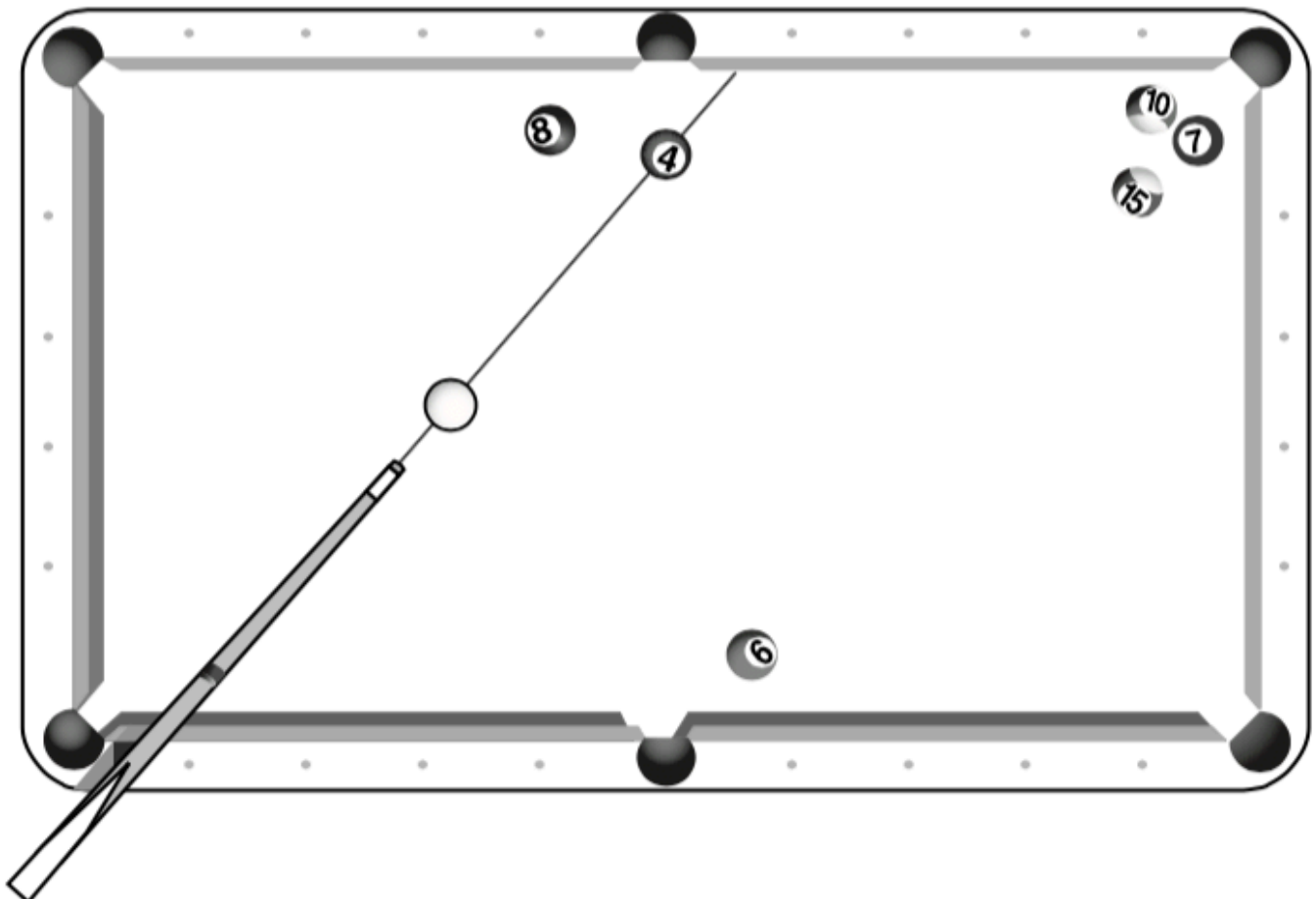


4. Check your answers with Mrs. Urquhart. Fill answers into the “Verify” column of the table. Then describe how close your original guesses were. What percent accuracy did you have?

\*\*\*This property of how the ball bounces off the side of the pool is call the angle of incidence \*\*\*  
It also works with mirrors!



3. Where will the ball end in the example below? **Will it go in?**

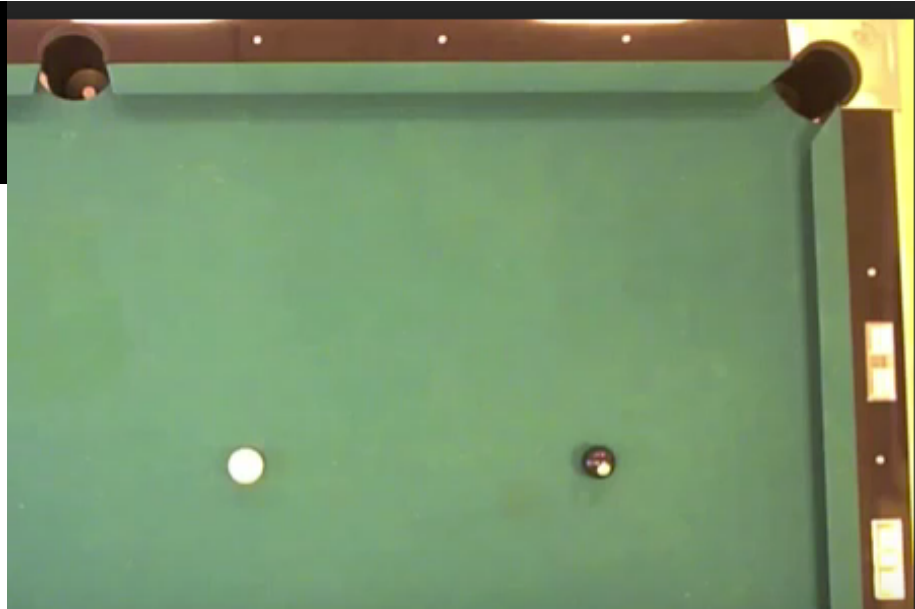


## Activity 2 – Geometry & Billiards

*Draw the similar (or congruent) triangles for each case and explain why they are similar (or congruent)?*

### Case 1:

Equal Bank Shot



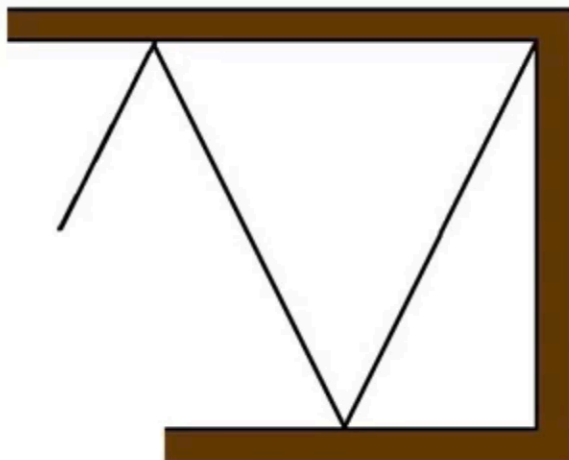
### Case 2:

Unequal Bank Shot



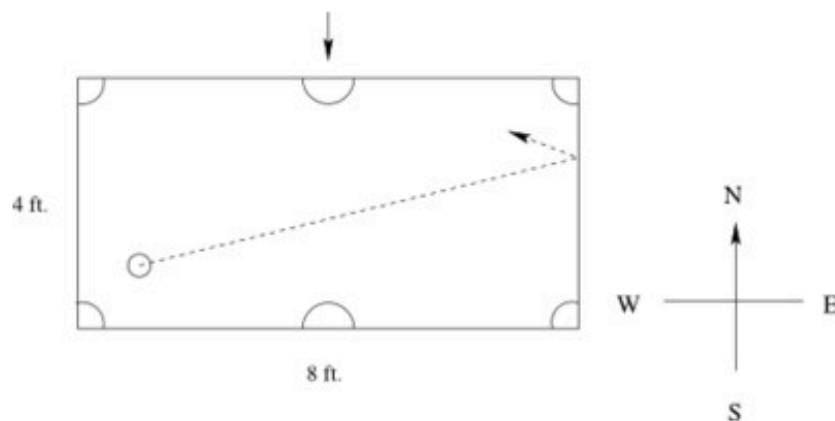
### Case 3:

Double Bank Shot



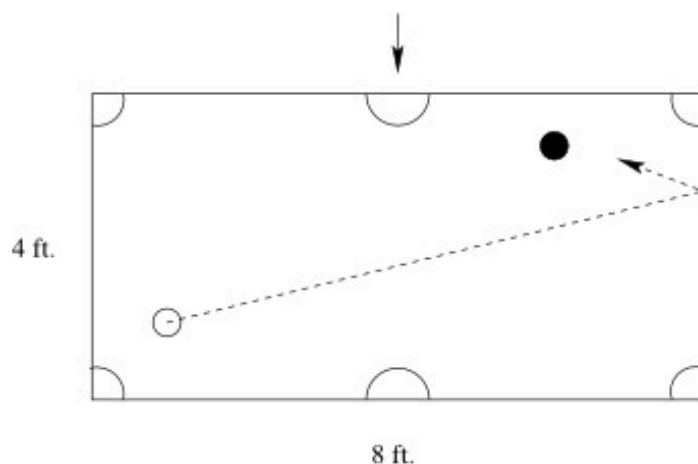
Pablo is practicing bank shots on a standard 4 ft.-by-8 ft. pool table that has a wall on each side, a pocket in each corner, and a pocket at the midpoint of each eight-foot side.

Pablo places the cue ball one foot away from the south wall of the table and one foot away from the west wall, as shown in the diagram below. He wants to bank the cue ball off of the east wall and into the pocket at the midpoint of the north wall.



a. At what point should the cue ball hit the east wall?

b. After Pablo practices banking the cue ball off of the east wall, he tries placing the eight-ball two feet from the east wall, as shown in the diagram below, so that if he shoots the cue ball exactly as he did before, the cue ball will strike the eight-ball directly and sink the eight-ball into the north pocket. How far from the north wall should Pablo place the eight-ball?



Feel free watch the additional video. Then, summarize any tricks your learned to improve your pool game.

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## Activity 3 – Mirror Trick

- A. Watch the intro video provided by Ms. Urquhart. Draw two similar triangles depicting the scenario in the space below. Then, explain why we know that the two triangles are similar.
- B. What quick calculation did the teacher put in her calculator to approximate the Brad's height within an inch? (i.e. set up the proportion)
- C. What is the Brad's height in the video?
- D. Get a mirror from Mrs. Urquhart and repeat this method to find the missing height something. Make sure to include: (1) what exactly it is you are finding the height of, (2) a sketch of the similar triangles, (3) any work you needed to perform to solve the problem, and (4) correct units of measure.

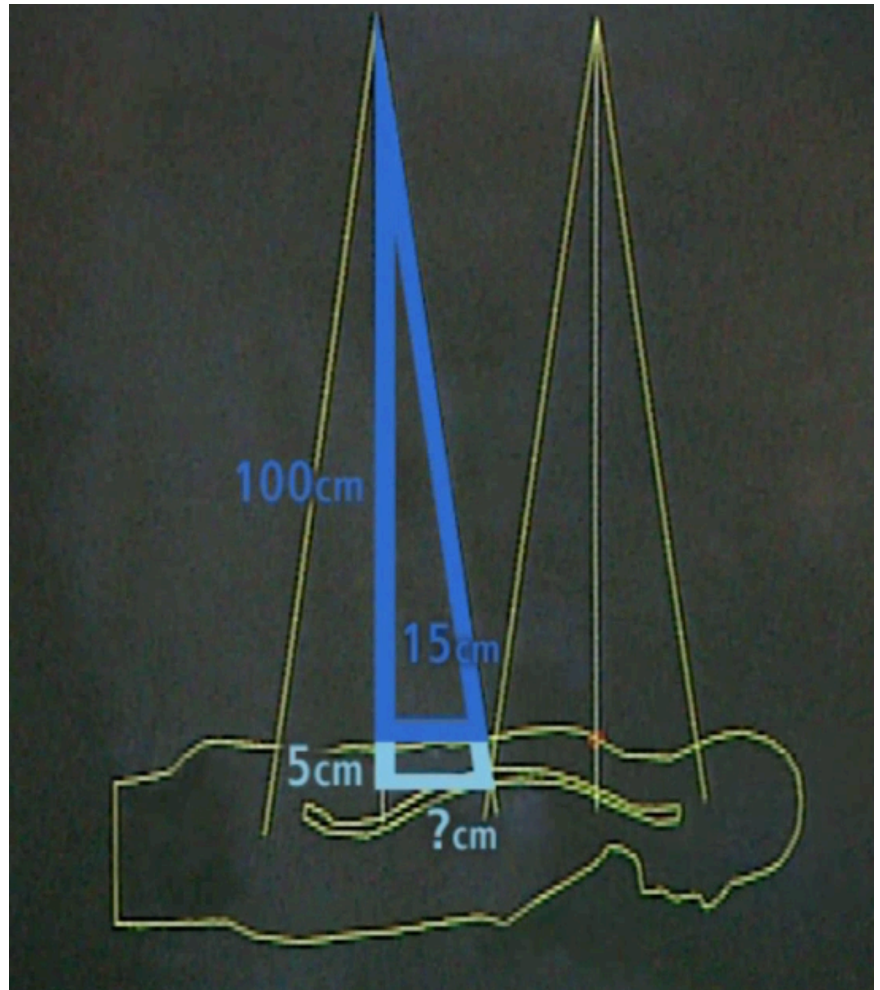




## Activity 4 – Radiation Therapy

1. Radiation therapy example:  
(Note this is a vintage machine – There are updated medical machines available now)

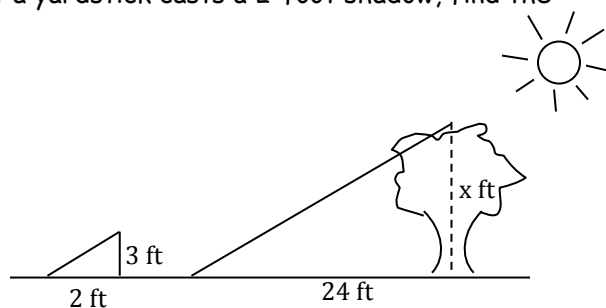
- A. Watch the 1<sup>st</sup> video provided by Ms. Urquhart. Draw the two overlapping triangles separate from one another. Then, explain why we know that the two triangles are similar.



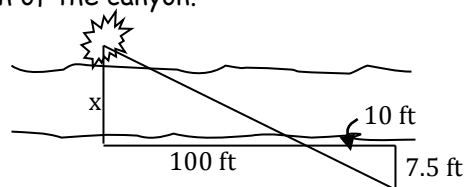
- B. Setup a proportion to find the exact length of the spinal cord getting hit with radiation in the video?
- C. Verify your answer by watching the 2<sup>nd</sup> video in this activity.

## Application Problems using Similar Triangles

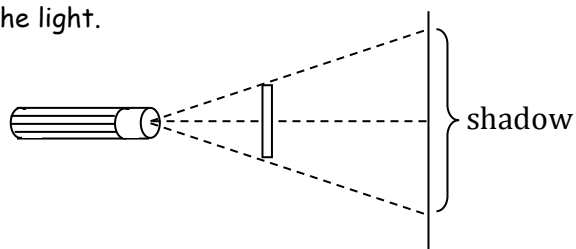
1. If a tree casts a 24-foot shadow at the same time that a yardstick casts a 2-foot shadow, find the height of the tree.



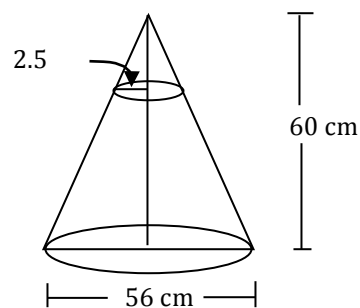
2. A bush is sighted on the other side of a canyon. Find the width of the canyon.



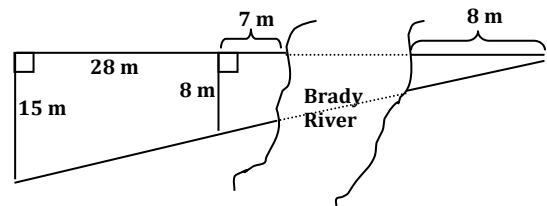
3. A 12-centimeter rod is held between a flashlight and a wall as shown. Find the length of the shadow on the wall if the rod is 45 cm from the wall and 15 cm from the light.



4. The cheerleaders at City High make their own megaphones by cutting off the small end of a cone made from heavy paper. If the small end of the megaphone is to have a radius of 2.5 cm, what should be the height of the cone that is cut off?

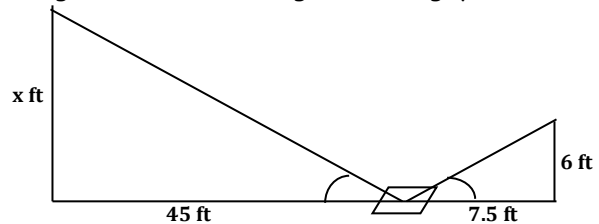


5. Find the width of the Brady River.

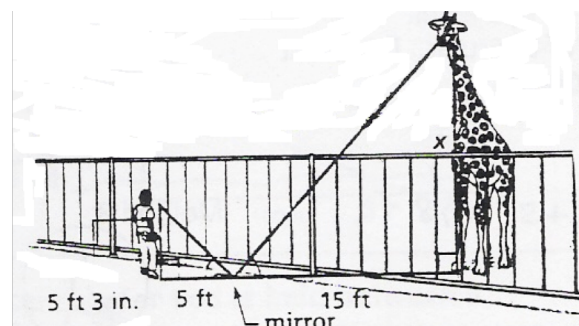


6. The foot of a ladder is 1.2 m from a fence that is 1.8 m high. The ladder touches the fence and rests against a building that is 1.8 m behind the fence. Draw a diagram, and determine the height on the building reached by the top of the ladder.

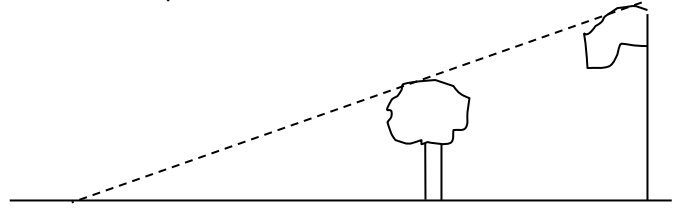
7. Ramon places a mirror on the ground 45 ft from the base of a geyser. He walks backward until he can see the top of the geyser in the middle of the mirror. At that point, Ramon's eyes are 6 ft above the ground and he is 7.5 ft from the mirror. Use similar triangles to find the height of the geyser.



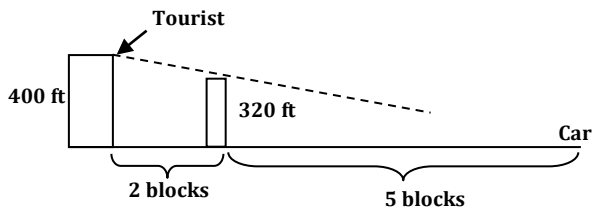
8. Find the height of the giraffe in the diagram below.



9. On level ground, the base of a tree is 20 ft from the bottom of a 48-ft flagpole. The tree is shorter than the pole. At a certain time, their shadows end at the same point 60 ft from the base of the flagpole. How tall is the tree?



10. A tourist on the observation deck of a building looks east, facing another building 320 ft high and two blocks from the first building. Her view is 400 ft above street level. Her car is parked five blocks east of the second building. If no other buildings intervene, can she see her car?



11. Suppose you want to use the shadow method to estimate the height of a building. You make the following measurements:

- length of the stick: 3 m
- length of the stick's shadow: 1.5 m
- length of the building's shadow: 8 m

### Using Shadows to Find Heights

