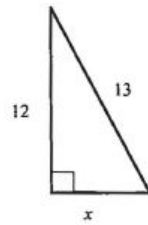
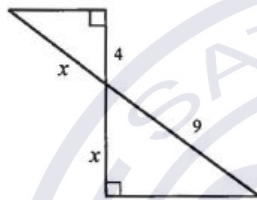


**Easy**

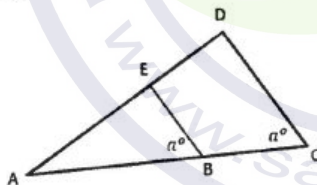
1. In the right triangle above, what is the value of  $x$ ?



2. In the figure above, what is the value of  $x$ ?


- a) 9
- b) 8
- c) 6
- d)  $3\sqrt{5}$

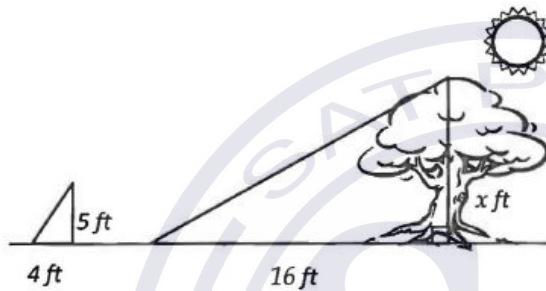
3. In the figure below,  $EB = 3$ ,  $DC = 5$ , and  $BC = 4$ . What is the value of  $AB$ ?



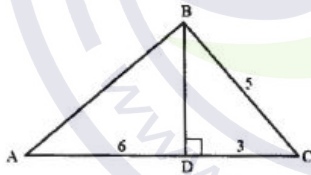
- a) 4
- b) 5
- c) 6
- d) 8

**Medium**

4. The lengths of the sides of a right triangle are consecutive even integers, and the length of the shortest side is  $x$ . Which of the following equations could be used to find  $x$ ? 
- a)  $x^2 + (x + 1)^2 = (x + 2)^2$
  - b)  $x^2 + (x + 2)^2 = (x + 4)^2$
  - c)  $x + x + 2 = x + 4$
  - d)  $x^2 = (x + 2)(x + 4)$

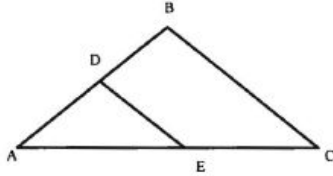


5. At a certain time of day, a tree casts a 16-foot shadow and a 5-foot stick casts a 4-foot shadow. What is the height, in feet, of the tree?

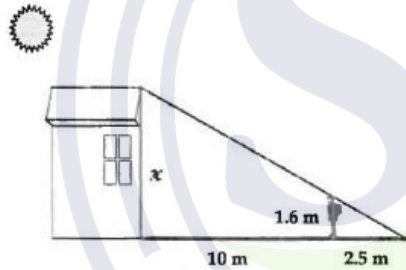


6. In the figure above, what is the length of  $AB$ ?
- a) 4
  - b) 7
  - c)  $\sqrt{52}$
  - d)  $\sqrt{65}$

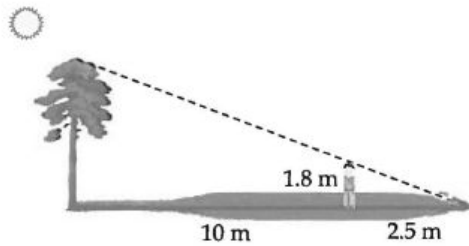
7. In the figure below, points D is the mid-point of  $\overline{AB}$  and point E is the mid-point of  $\overline{AC}$ . If  $AB = 10$ ,  $AC = 12$ , and  $DE = 7$ , what is the perimeter of quadrilateral DBCE?



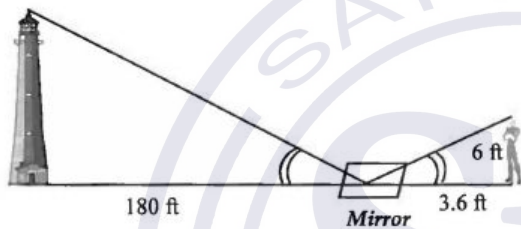
- a) 29  
 b) 30  
 c) 31  
 d) 32
8. Jon walks 10 meters away from a wall outside his school building as shown in the figure below. At the point he stands, he notices that his shadow reaches to the same spot as the shadow of the school. If Jon is 1.6 meters tall and his shadow is 2.5 meters long, how high is the school building, in meters?



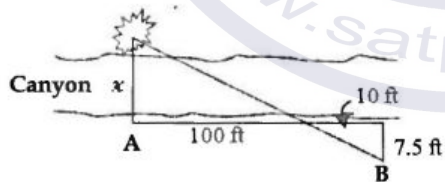
9. A girl who is 160 centimeters tall stands 360 centimeters away from a lamp post at night. If her shadow is 90 centimeters long, how high, in centimeters, is the lamp post?



10. Sam walked 10 meters away from the base of a tree as shown in the figure above. At the point he was standing, he noticed that his shadow reached the same spot on the ground as the shadow of the tree. If Sam is 1.8 meters tall and his shadow is 2.5 meters long, how high is the tree, in meters?

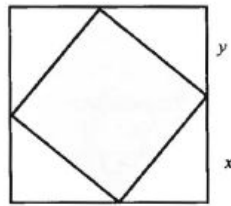


11. John places a mirror on the ground 180 feet from the base of a lighthouse. He walks backward until he can see the top of the lighthouse in the middle of the mirror. At that point, John's eyes are 6 feet above the ground and he is 3.6 feet from the mirror. Find the height, in feet, of the lighthouse.

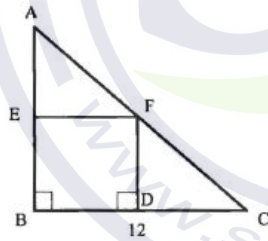


12. A bush fire is sighted on the other side of a canyon at points  $A$  and  $B$  as shown in the figure above. Find the width, in feet, of the canyon.

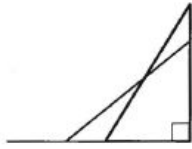
Hard



13. In the two squares in the figure above, if the area of smaller square is one half of the big square, what is the ratio of  $x$  to  $y$ ?
- a) 1
  - b)  $\sqrt{2}$
  - c)  $\sqrt{3}$
  - d)  $\frac{1}{2}$



14. In isosceles right triangle  $\triangle ABC$  above,  $EF \parallel BC$  and length of  $\overline{AF}$  is half of the length of  $\overline{AC}$ . What is the area of the rectangular region?
- a) 16
  - b) 25
  - c) 36
  - d) 64



15. In the figure above, a 20-foot-long ladder is placed against a building which is perpendicular to the ground. After the ladder slides down 4 feet vertically, the bottom of the ladder is now 16 feet away from the base of the building, what is the original distance of the bottom of the ladder from the base of the building, in feet?
- a) 12
  - b) 14
  - c) 16
  - d) 18

16. The graph below is a right triangle. Find the area of this right triangle?

