Peanut in Trouble

You need: a classmate

Tom's cat, Peanut, has been chased up a Norfolk pine tree by the neighbour's chihuahua. Tom phones Patu at Counter Catastrophe.

How far up the tree is the cat, Tom?

She's at least 10 metres up and still climbing.

Patu arrives in minutes with his rescue truck. He wonders if he can manage with a ladder or whether he needs to get a mobile crane. Before he decides, he works out the height of the tree and the distance from the ground to the lowest branches.

He walks 48 metres from the base of the tree and uses a clinometer to measure the angle from his eye level to the top. Patu knows that his eyes are 1.5 metres above ground level.

Scale 1 cm : 3 m

0   3   6   9   12 m

19°

1.5 m

48 m
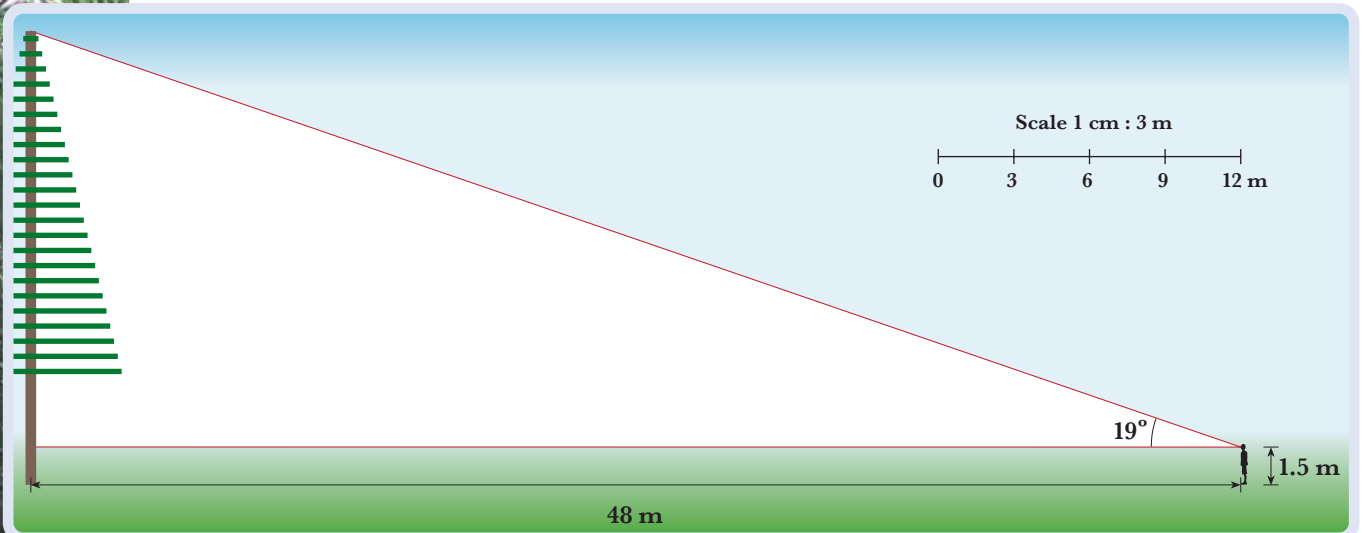
1. The diagram above is drawn to scale. Use the information from the diagram to work out:
   a. the total height of the tree
   b. the height of the bottom branches from the ground.

2. Discuss with a classmate the different ways to work out these heights.

3. In his truck, Patu has a ladder that will extend to 2, 3, 4, 5, and 6 metres long. He needs to adjust it so that he can reach the lower branches. If the ladder is too short, it won't reach. If the ladder is too long, it's hard to set against the tree trunk.

Patu always puts the base of the ladder a certain distance from the tree to make it more stable. Here is a diagram for the ladder extended to 3 metres and 6 metres:
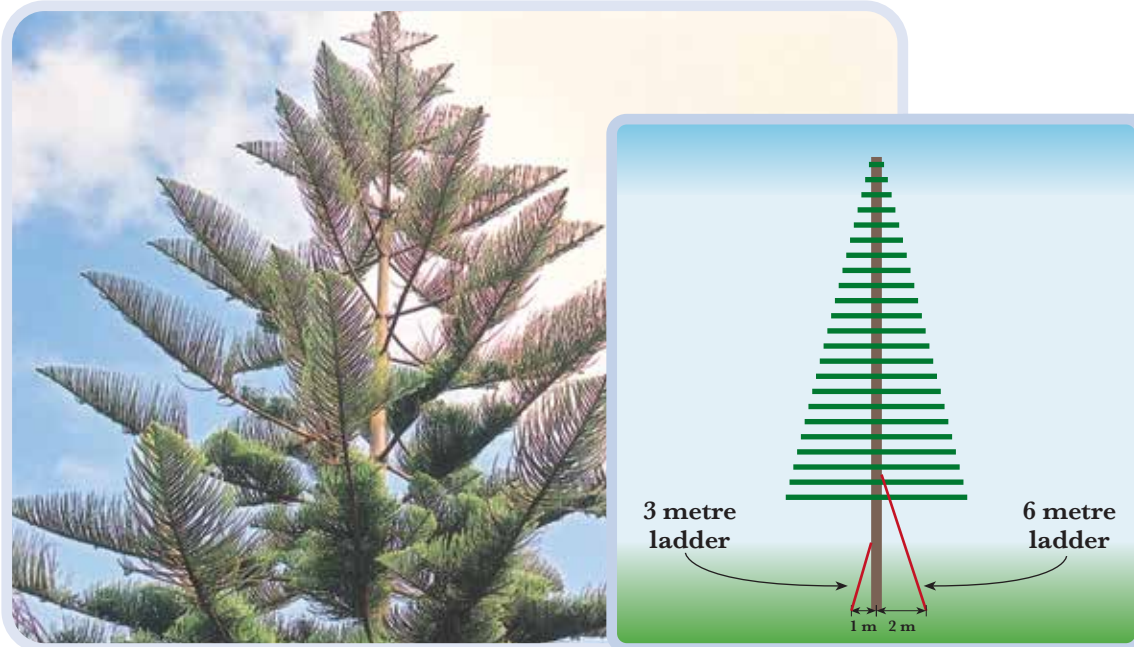
a. What is Patu's rule for how far away he places the base of the ladder?
b. Does the angle of the ladder change? Explain why.
c. How high up the tree trunk do the 3 metre and 6 metre ladders reach?
d. Which ladder length should Patu choose to reach the lowest branch and rescue Peanut?

That chihuahua doesn't look so big from up here!

What are you doing so far up the tree, Peanut?