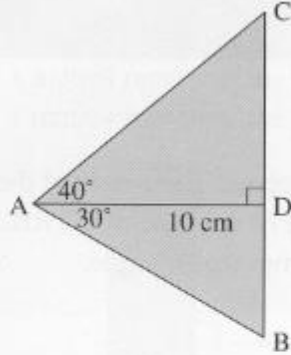
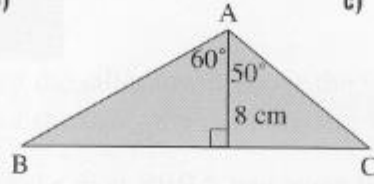


1. Calculate the length of BC.

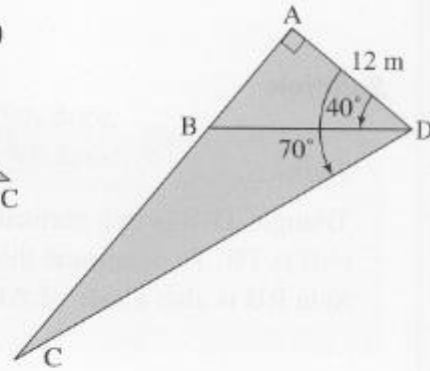
a)



b)

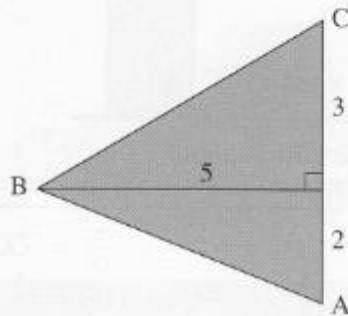


c)

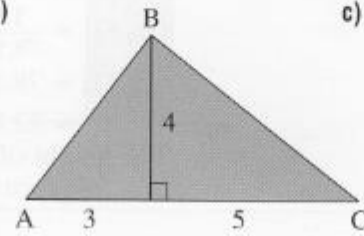


2. Calculate the measure of $\angle ABC$.

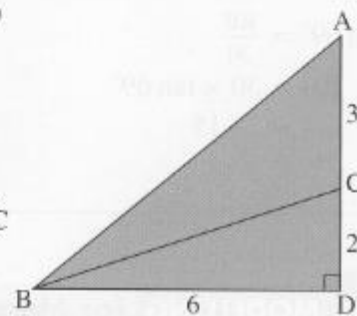
a)



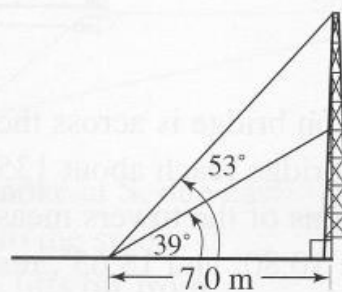
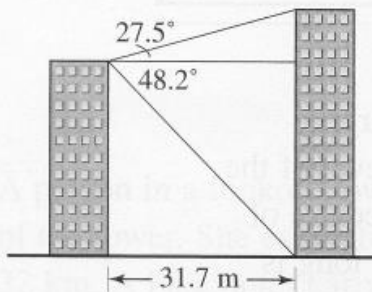
b)



c)



4. Two office towers are 31.7 m apart (below left). From the shorter tower, the angle of elevation to the top of the taller tower is 27.5° . The angle of depression to the base of the taller tower is 48.2° . The diagram is not drawn to scale. Calculate the height of each tower.



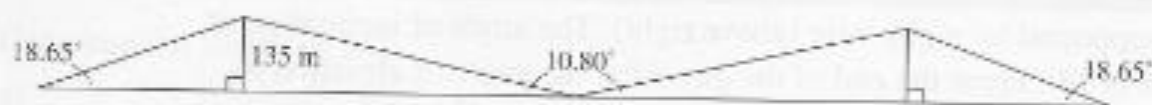
5. A tower is supported by a guy wire (above right). The angle of inclination of the guy wire is 39° . From the end of the guy wire, the angle of elevation to the top of the tower is 53° . The guy wire is fixed to the ground 7.0 m from the base of the tower. The diagram is not drawn to scale.

a) Calculate the length of the guy wire, and the height of the tower.

b) Calculate the distance from the top of the tower to where the guy wire is connected to the tower.

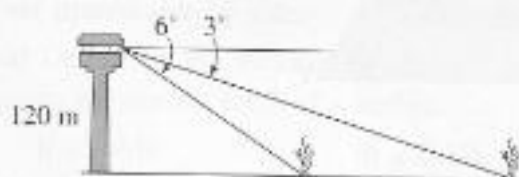
c) Choose part a or b. Explain how you calculated the measure.

10. The world's longest suspension bridge is across the Humber Estuary in England. The towers of this bridge reach about 135 m above the level of the bridge. The angles of elevations of the towers measured from the centre of the bridge and either end are 10.80° and 18.65° , respectively. How long is the bridge?

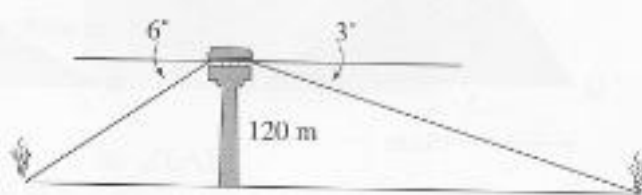


12. From the top of a 120-m fire tower, a fire ranger observes smoke in two locations. One has an angle of depression of 6° , and the other has an angle of depression of 3° . Calculate the distance between the smoke sightings when they are as described below. The diagrams are not to scale.

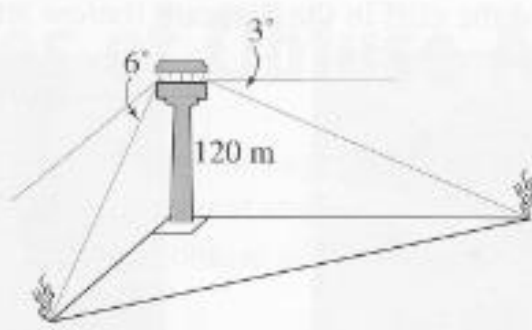
a) on the same side of the tower and in line with the tower



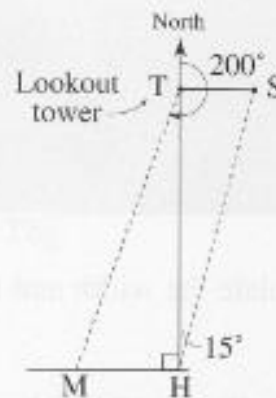
b) on opposite sides of the tower and in line with the tower



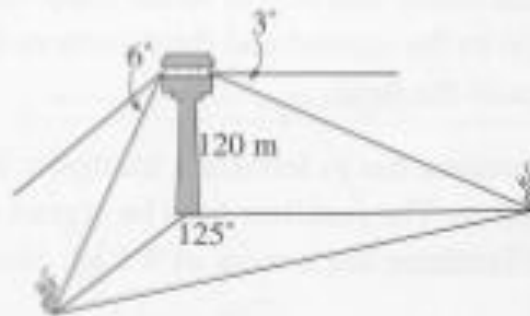
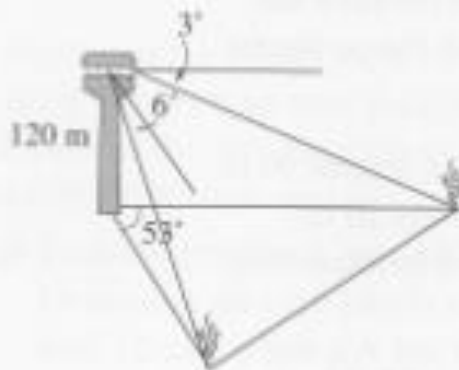
c) in perpendicular directions from the tower



13. A person in a lookout tower T reports smoke at S, due east of the tower. She estimates the distance to the smoke is 22 km. A helicopter carrying firefighters lifts off from its base H, 82 km due south of the tower. From the helicopter base, the smoke is on a bearing of 015° . The person in the tower reports a second smoke sighting at M, on a bearing of 200° . From the helicopter base, the second smoke sighting is due west. The helicopter drops the firefighters at S, flies to T to pick up more firefighters, then flies to M. Calculate the total distance the helicopter travels.



14. Turn to exercise 12c, page 39. Suppose the smoke sightings are observed in directions that are 53° apart (below left). Calculate the distance between the smoke sightings. The diagram is not to scale.



15. Repeat exercise 14, if the smoke sightings are observed in directions that are 125° apart (above right). The diagram is not to scale.

17. Turn to exercise 13 on page 39. Suppose the helicopter flew from the first smoke sighting to the second smoke sighting, not travelling to the lookout tower. Calculate the distance between the two smoke sightings.

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14) 1844 m 15) 3090 m 17) 97 km

13. 194 km	16. 176 m
12. a) 1148 m	b) 3431 m
c) 2259 m	
b) 4 : 3	c) 1 : 1
11. a) $AC = 8$ cm, $CD = 16$ cm, $AD = 8\sqrt{3}$ cm;	$BC = 4\sqrt{3}$ cm, $CE = 12$ cm, $BE = 8\sqrt{3}$ cm
7. 4.7 cm	8. 28.9 cm ²
9. 3.7 m	10. 2215 m
6. a) $x = 1.7$	b) $x = 4.2$
c) $x = 3.5$, $y = 5.4$	
5. a) 9.0 m, 9.3 m	b) 3.6 m
4. 35.5 m, 52.0 m	
e) Yes; explanations may vary.	
fractions.	
b) Answers may vary; their tangents are consecutive unit	
3. a) i) 45°	ii) 26.6°
iii) 18.4°	

2a) 53° b) 88° c) 21°

1a) 14 cm b) 23 cm c) 23 m

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