Mathematics Teachers Enrichment Program
# MTEP 2012
Trigonometry and Bearings: Exercises

1. In $\triangle ABC$, $A\hat{B}C = 90°$, $AB = 8$ and $BC = 15$. Solve $\triangle ABC$. Round side length and angles to one decimal, as necessary.

2. Solve $\triangle XYZ$, given $X\hat{Z}Y = 90°$, $X\hat{Y}Z = 41°$, and $XY = 20$. Round side lengths to one decimal, as necessary.

3. At a point 50 m from the base of a tower the angle of elevation to the top of the tower is 70°. Determine the height of the tower, to the nearest metre.

4. From the top of a 40 m tower, an observer measures the angle of depression to a boat in the water below to be 28°. How far, to the nearest metre, is the boat from the base of the tower?

5. A 12.4 m flagpole is placed on top of a tall building. An observer, standing directly in front of the building and flagpole, measures the angle of elevation to the bottom of the flagpole to be 42.5° and to the top of the flagpole to be 48.2°. Determine the height of the building, to the nearest metre.

6. To calculate the height of a tower, David measured the angle of elevation of the top of the tower from a point A to be 42°. He then moved 30 m closer to the tower and from point B measured the angle of elevation to the top of the tower to be 50°. To the nearest metre, determine the height of the tower.

7. Determine the length of BC in $\triangle ABC$ where $AB = 10$, $AC = 9$ and $B\hat{A}C = 58°$. Round correctly to one decimal place.

8. Determine the size of the largest angle in $\triangle PQR$ where $PQ = 9$, $QR = 15$ and $PR = 11$. Round correctly to one decimal place.

9. In $\triangle XYZ$, $X\hat{Y}Z = 43°$, $X\hat{Z}Y = 73°$ and $YZ = 25$. Solve $\triangle XYZ$, rounding correctly to one decimal place.

10. In $\triangle DEF$, $DE = 9.4$, $EF = 17.5$ and $DF = 12.8$. Solve $\triangle DEF$. rounding each angle to one decimal place.

11. A triangular piece of land is bounded by 32 m of brick wall, 50 m of fencing and 28 m of road along the front. What angle does the fence make with the road?

12. Determine the length of x on the diagram to the right correct to one decimal place.

13. The bearing from A to B is 160°. What is the bearing from B to A?
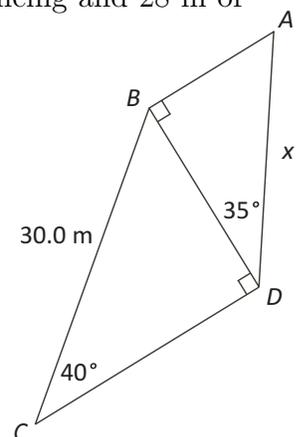
14. From an observation point in a fire tower, the observer spots a fire 5 km away at a bearing 130°. The observer also spots a village 2 km away on a bearing 240°. How far is the fire away from the village?

15. A hiker walks 1.5 km on a bearing 035°. At this point he turns directly south and walks 3.5 km. How far and on what bearing must he walk to return to his original starting point?

16. Two ships, R and Q, left a port, P, at the same time. After two hours, R had travelled 8 km on a bearing 075° from port and Q had travelled 10 km on a bearing 305° from port. How far apart are the two ships after two hours?

17. A tour boat leaves port and travels 15 km on a bearing of 088° and then travels a further 24 km on a bearing of 145°. The boat then returns directly to the starting point. Determine the distance to the port and the bearing along which the tour boat must travel.

18. Two towns, A and B, lie on longitude 37°W. Their latitudes are 50.4°N and 72.6°N, respectively. Calculate the shortest distance between the two towns.

19. Two towns, C and D, lie on the same longitude. Their latitudes are 80°N and 70°S, respectively. Calculate the shortest distance between the two towns.

20. Two citiess, A and B, lie on the Equator, one at longitude 65°E and the other at longitude 23°W. Calculate the distance between the two towns, measured along the Equator.

21. Find the distance, measured along a meridian, from any point on parallel of latitude 30°N to the North Pole.

22. Two towns are located on longitude 50°E. The towns are 5 200 km apart. Calculate the difference in their latitudes.

23. Find the length of the parallel of latitude 41°S.

24. Two places are located on the parallel of latitude 32°N, one at longitude 47°W and the other at longitude 25°E.

    a) How far apart are the two towns, measured along the parallel of latitude 32°N?

    b) If it takes a plane 10 hours to travel from one town to the other, calculate the speed of the plane, correct to the nearest kilometer per hour.

25. Two towns, P and Q, are located at (4°N, 100°E) and (4°N, 140°E), respectively. Calculate the shortest distance from P to Q, along the parallel of latitude 4°N.

26. Havana and Canton are both on latitude 23°N, and their longitudes are 82.25°W and 113.25°E, respectively. Find their distance apart measured along the parallel of latitude.

27. Cherepovets, Russia is located approximately at (60°N, 38°E) and Mt. Logan, Canada is located approximately at (60°N, 142°W).

    a) How far apart are the two locations, measured along the parallel of latitude 60°N?

    b) Calculate the great circle distance between Cherepovets and Mt. Logan.