Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. Determine tan Q and tan R.

   ![Diagram of triangle PQR with sides 16 and 12]

   - a. \( \tan Q = \frac{0.428571}{0.75} \); \( \tan R = 0.75 \)
   - b. \( \tan Q = 1.3 \); \( \tan R = 0.75 \)
   - c. \( \tan Q = 1.3 \); \( \tan R = 0.571428 \)
   - d. \( \tan Q = 0.75 \); \( \tan R = 1.3 \)

2. Determine the measure of \( \angle N \) to the nearest tenth of a degree.

   ![Diagram of triangle KNM with sides 7 and 13]

   - a. 57.4°
   - b. 61.7°
   - c. 32.6°
   - d. 28.3°

3. Calculate the angle of inclination, to the nearest tenth of a degree, of a road with a grade of 22%.

   - a. 77.3°
   - b. 77.6°
   - c. 12.4°
   - d. 12.7°

4. Rhonda walked diagonally across a rectangular playground with dimensions 60 m by 45 m. She started at point C. Determine the angle, to the nearest degree, between her path and the longest side of the playground.

   ![Diagram of rectangle with diagonal AC]

   - a. 37°
   - b. 41°
   - c. 53°
   - d. 49°

5. A ladder leans against the side of a building. The top of the ladder is 5 m from the ground. The base of the ladder is 1.0 m from the wall. What angle, to the nearest degree, does the ladder make with the ground?

   - a. 79°
   - b. 11°
   - c. 9°
   - d. 83°

6. Determine the tangent ratio for \( \angle K \).

   ![Diagram of triangle LKM with sides 12 and 37]

   - a. \( \frac{37}{12} \)
   - b. \( \frac{12}{37} \)
   - c. \( \frac{37}{12} \)
   - d. \( \frac{35}{37} \)
7. Determine the length of side \( l \) to the nearest tenth of a metre.

![Diagram of \( \triangle LNM \)]

\[ \angle LNM = 66^\circ, \quad LM = 12.2 \text{ m} \]

a. 5.4 m  
   b. 27.4 m  
   c. 11.1 m  
   d. 5.0 m

8. A helicopter is ascending vertically. On the ground, a searchlight is 125 m from the point where the helicopter lifted off the ground. It shines on the helicopter and the angle the beam makes with the ground is 48°. How high is the helicopter at this point, to the nearest metre?

a. 187 m  
   b. 93 m  
   c. 113 m  
   d. 139 m

9. A guy wire is attached to a tower at a point that is 5.5 m above the ground. The angle between the wire and the level ground is 56°. How far from the base of the tower is the wire anchored to the ground, to the nearest tenth of a metre?

a. 3.1 m  
   b. 6.6 m  
   c. 3.7 m  
   d. 8.2 m

10. A road has an angle of inclination of 16°. Determine the increase in altitude of the road, to the nearest metre, for every 150 m of horizontal distance.

a. 523 m  
   b. 144 m  
   c. 43 m  
   d. 41 m

11. Determine \( \sin G \) and \( \cos G \) to the nearest hundredth.

![Diagram of \( \triangle FGE \)]

\[ FG = 13, \quad GE = 84, \quad EF = 85 \]

a. \( \sin G = 0.99; \cos G = 6.54 \)  
   b. \( \sin G = 0.15; \cos G = 0.99 \)  
   c. \( \sin G = 1.01; \cos G = 0.15 \)  
   d. \( \sin G = 0.99; \cos G = 0.15 \)

12. Determine the measure of \( \angle Q \) to the nearest tenth of a degree.

![Diagram of \( \triangle PQR \)]

\[ PR = 19, \quad QR = 7 \]

a. 68.4°  
   b. 69.8°  
   c. 21.6°  
   d. 20.2°

13. A helicopter is hovering 200 m above a road. A car stopped on the side of the road is 300 m from the helicopter. What is the angle of elevation of the helicopter measured from the car, to the nearest degree?

a. 56°  
   b. 48°  
   c. 42°  
   d. 34°

14. A ladder is 13.0 m long. It leans against a wall. The base of the ladder is 3.7 m from the wall. What is the angle of inclination of the ladder to the nearest tenth of a degree?

a. 73.5°  
   b. 16.5°  
   c. 74.1°  
   d. 15.9°
15. A rope that supports a canopy is 8.5 m long. The rope is attached to the canopy at a point that is 7.5 m above the ground. What is the angle of inclination of the rope to the nearest tenth of a degree?
   a. 48.6°  b. 61.9°  c. 28.1°  d. 41.4°

16. Determine the length of XY to the nearest tenth of a centimetre.

17. From the start of a runway, the angle of elevation of an approaching airplane is 17.5°. At this time, the plane is flying at an altitude of 7.7 km. How far is the plane from the start of the runway to the nearest tenth of a kilometre?
   a. 8.1 km  b. 2.3 km  c. 25.6 km  d. 24.4 km

18. A surveyor made the measurements shown in the diagram. Determine the distance from R to S, to the nearest hundredth of a metre.

19. A balloon is flying at the end of a 170-m length of string, which is anchored to the ground. The angle of inclination of the string is 50°. Calculate the height of the balloon to the nearest metre.
   a. 130 m  b. 143 m  c. 109 m  d. 222 m

20. Two trees are 55 yd. apart. From a point halfway between the trees, the angles of elevation of the tops of the trees are measured. What is the height of each tree to the nearest yard?
   a. 33 yd.; 31 yd.  c. 41 yd.; 50 yd.
   b. 19 yd.; 15 yd.  d. 40 yd.; 49 yd.

Short Answer

21. A tree is supported by a guy wire. The guy wire is anchored to the ground 7.0 m from the base of the tree. The angle between the wire and the level ground is 60°. How far up the tree does the wire reach, to the nearest tenth of a metre?

22. Solve this right triangle. Give the measures to the nearest tenth.
23. Determine the length of WX to the nearest tenth of a centimetre.

\[ \text{WX} = \sqrt{9.5^2 + 29^2} \]

24. Calculate the measure of \( \angle ABC \) to the nearest degree.

\[ \angle ABC = \arctan \left( \frac{10}{9} \right) \]

25. From the top of an 80-ft. building, the angle of elevation of the top of a taller building is 49° and the angle of depression of the base of this building is 62°. Determine the height of the taller building to the nearest foot.

\[ \text{Height of taller building} = 80 \tan(49°) \]

26. A surveyor held a clinometer 1.5 m above the ground from a point 60.0 m from the base of a tower. The angle between the horizontal and the line of sight to the top of the tower was 21°. Determine the height of the tower to the nearest tenth of a metre.

\[ \text{Height of tower} = 60 \tan(21°) + 1.5 \]

Problem

27. In the diagram below, a Coast Guard patrol boat is at C, which is 11.7 km south of Point Atkinson lighthouse. A sailboat in distress is at A, which is 7.3 km west of the lighthouse.

a) How far is the patrol boat from the sailboat, to the nearest tenth of a kilometre?

b) At what angle to BC should the patrol boat travel to reach the sailboat? Give the answer to the nearest tenth of a degree.
28. Determine the measures of $\angle A$ and $\angle C$ to the nearest tenth of a degree.

![Diagram](image1.png)

29. Determine the area of $\triangle ABC$ to the nearest tenth of a square unit. Determine its perimeter to the nearest tenth of a unit.

![Diagram](image2.png)

30. A boat was docked 30.0 m from the base of a cliff. A sailor used a clinometer to sight the top of the cliff. The angle between the horizontal and the line of sight was 74°. The sailor held the clinometer 1.5 m above the surface of the water. Determine the height of the cliff to the nearest tenth of a metre.

31. Determine the perimeter of this triangle to the nearest tenth of a centimetre.

![Diagram](image3.png)

32. Solve $\triangle XYZ$. Give the measures to the nearest tenth. Explain your strategy.

![Diagram](image4.png)