

## WS1.4 Solving Triangles &amp; Trig Applications

Show all work on separate paper. Include a diagram. Round angles to the nearest degree and side lengths to the nearest tenth.

Part I - Solve each triangle:

1.  $\triangle PEN$  if  $\angle P = 90^\circ, \angle E = 25^\circ, n = 31 \text{ cm}$
2.  $\triangle GRU$  if  $\angle R = 90^\circ, \angle G = 55^\circ, r = 25 \text{ cm}$
3.  $\triangle ABC$  if  $\angle B = 90^\circ, a = 5 \text{ mm}, c = 8 \text{ mm}$
4.  $\triangle JKL$  if  $\angle L = 90^\circ, j = 17 \text{ m}, l = 27 \text{ m}$
5.  $\triangle ALT$  if  $\angle A = 90^\circ, \angle T = 65^\circ, t = 32 \text{ m}$

Part II - Solve each problem:

6. From a point on the ground 500 m from the base of a building, the angle of elevation of the top of the building is  $12^\circ$ . How tall is the building?
7. From the top of a building 34m high the angle of depression of a bus parked on the street is  $53^\circ$ . How far is the bus from the building?
8. A boat is 350m from the base of a cliff. If the cliff is 180m high, find the angle of elevation of the top of the cliff from the boat.
9. From a point 132m above the ground in a control tower, the angle of depression of an airplane is  $38^\circ$ . How far is the airplane from the base of the tower?
10. A rope tied to the top of a statue is anchored to the ground 18 m from the base of the statue, creating an angle of elevation of  $27^\circ$ . How long is the rope?
11. At a concert, Tony is sitting 40 m away from the stage. He is 10 m above the level of the stage. At what angle of declination is he watching the concert?
12. A steel cable is attached to the top of a television mast. The cable is also attached to the ground at a point 9.8 m from the base of the mast and makes an angle of elevation of  $65^\circ$ .
  - a) How tall is the mast?
  - b) How long is the cable?
13. A tightrope walker plans to walk along a cable attached to the top of two adjacent buildings (from the shorter to the taller). The cable is 21.5 m long and the angle of inclination of the taller building from the smaller is  $12^\circ$ .
  - a) How far apart are the buildings?
  - b) What is the difference in the heights of the buildings?
14. Two office buildings are 31.7 m apart. From the top of the shorter, the angle of elevation to the top of the other is  $27.5^\circ$ , while the angle of depression to the base is  $78.2^\circ$ . Find the height of the taller building.

## KEY

1.  $e = 14.5 \text{ cm}; p = 34.2 \text{ cm}; N = 65^\circ$
2.  $g = 20.5 \text{ cm}; u = 14.3 \text{ cm}; U = 35^\circ$
3.  $b = 9.4 \text{ mm}; A = 32^\circ; C = 58^\circ$
4.  $k = 21.0 \text{ m}; J = 39^\circ; K = 51^\circ$
5.  $l = 14.9 \text{ m}; a = 35.3 \text{ m}; L = 25^\circ$
6. 106.3 m
7. 25.6 m
8.  $27.2^\circ$
9. 169.0 m
10. 20.2m
11. 14.0 m
12. a) 21.0 m b) 23.2 m
13. a) 21.0 m b) 4.5 m
14. 168.2 m