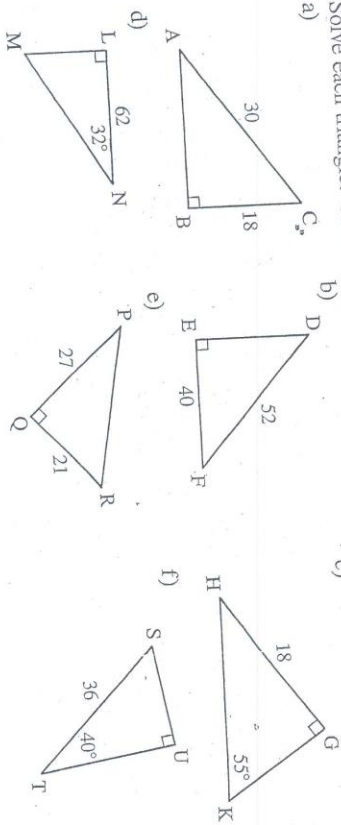


EXERCISES 10-3 Primary Trig Ratios

1. Solve each triangle. Give the answers to 1 decimal place.

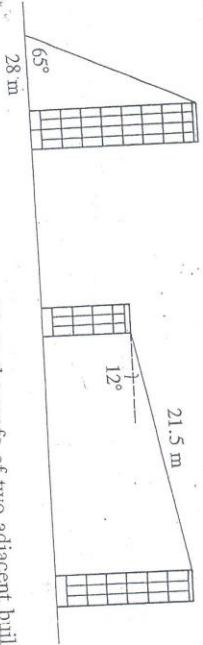


2. Solve ΔXYZ if $\angle Y = 90^\circ$ and:
- a) $XY = 24, XZ = 35$
 - b) $XY = 16, \angle X = 27^\circ$
 - c) $XZ = 51, YZ = 13$
 - d) $XZ = 72, \angle Z = 52^\circ$
 - e) $YZ = 32, \angle X = 64^\circ$
 - f) $XY = 45, YZ = 20$.
- Give the answers to 1 decimal place.

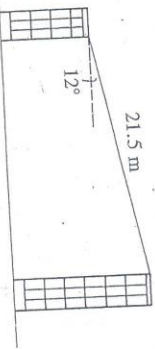
3. Find the other two primary trigonometric ratios for each value of θ .
- a) $\sin \theta = \frac{8}{17}$
 - b) $\cos \theta = \frac{7}{25}$
 - c) $\tan \theta = \frac{20}{21}$
 - d) $\sin \theta = \frac{15}{32}$
 - e) $\cos \theta = \frac{19}{23}$
 - f) $\tan \theta = \frac{43}{112}$

4. Find expressions for the other primary trigonometric ratios for each value of θ .
- a) $\sin \theta = \frac{p}{q}$
 - b) $\cos \theta = \frac{a}{a+2}$
 - c) $\tan \theta = \frac{x-y}{x+y}$

5. At a point 28 m away, the angle of elevation of a building is 65° (below left).
- a) How tall is the building?
 - b) How far is the observer's eye from the top of the building?



6. A tightrope walker attaches a cable to the roofs of two adjacent buildings (above right). The cable is 21.5 m long and the angle of inclination is 12° .
- a) How far apart are the buildings?
 - b) What is the difference in their heights?

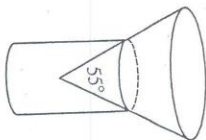


7. A rectangle has length 10 cm and width 6 cm. Find the acute angle to the nearest degree between the diagonals.

8. The length of rectangle ABCD is three times its width. Points M and N are the midpoints of the longer sides AB and DC.

- a) Find $\angle MAN$.
 - b) If P is the midpoint of AD, find $\angle MPN$.
- Give the answers to the nearest degree.

9. A funnel is placed in a glass, as shown. The glass is 14.5 cm tall and 7.6 cm in diameter, how high is the vertex of the funnel above the bottom of the glass?



10. Prior to 1982, visitors to the observation deck of the Peace Tower in Ottawa had to ride two elevators. The Memorial Chamber at the base of the tower made a vertical ascent impossible. A new elevator system carries visitors up the first 24.2 m by travelling a path inclined at 10° to the vertical. It then rises vertically for the balance of the trip.

- a) How long is the elevator shaft that runs on the incline?
- b) By how far is the elevator displaced horizontally by the incline?
- c) What is the slope of the incline to 2 decimal places?

11. Two office towers are 31.7 m apart. From the shorter one, the angle of elevation to the top of the other is 27.5° , while the angle of depression to the base is 78.2° . Find the height of each tower.

Solutions:

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1. a) $AB = 24, \angle A = 36.9^\circ, \angle C = 53.1^\circ$
 b) $DE = 33.2, \angle D = 50.3^\circ, \angle F = 39.7^\circ$
 c) $\angle H = 35^\circ, GK = 12.6, HK = 22.0$
 d) $\angle M = 58^\circ, LM = 38.7, MN = 73.1$
 e) $PR = 34.2, \angle P = 37.9^\circ, \angle R = 52.1^\circ$
 f) $\angle S = 50^\circ, SU = 23.1, UT = 27.6$
2. a) $YZ = 25.5, \angle X = 46.7^\circ, \angle Z = 43.3^\circ$
 b) $\angle Z = 63^\circ, YZ = 8.2, XZ = 18.0$
 c) $XY = 49.3, \angle X = 14.8^\circ, \angle Z = 75.2^\circ$
 d) $\angle X = 38^\circ, XY = 56.7, YZ = 44.3$
 e) $\angle Z = 26^\circ, XY = 15.6, XZ = 35.6$
 f) $XZ = 49.2, \angle Z = 66.0^\circ, \angle X = 24.0^\circ$

3. a) $\cos \theta = \frac{15}{17}, \tan \theta = \frac{8}{15}$
 b) $\sin \theta = \frac{24}{25}, \tan \theta = \frac{24}{7}$
 c) $\sin \theta = \frac{20}{29}, \cos \theta = \frac{21}{29}$
 d) $\cos \theta = \frac{\sqrt{799}}{32}, \tan \theta = \frac{15}{\sqrt{799}}$
 e) $\sin \theta = \frac{\sqrt{168}}{23}, \tan \theta = \frac{\sqrt{168}}{19}$
 f) $\sin \theta = \frac{43}{\sqrt{14\,393}}, \cos \theta = \frac{112}{\sqrt{14\,393}}$

4. a) $\cos \theta = \frac{\sqrt{q^2 - p^2}}{q}, \tan \theta = \frac{p}{\sqrt{q^2 - p^2}}$
 b) $\sin \theta = \frac{2\sqrt{a+1}}{a+2}, \tan \theta = \frac{2\sqrt{a+1}}{a}$
 c) $\sin \theta = \frac{x-y}{\sqrt{2x^2 + 2y^2}}, \cos \theta = \frac{x+y}{\sqrt{2x^2 + 2y^2}}$

5. a) 60 m b) 66 m
 6. a) 21.0 m b) 4.5 m
 7. 62° 8. a) 34° b) 37° 9. 7.2 cm
 10. a) 24.6 m b) 4.3 m c) 5.67
 11. 151.7 68.2 m