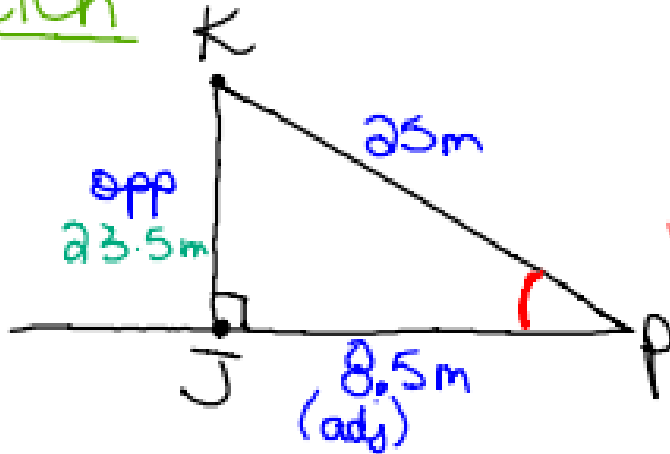# Lesson 2.1

The Tangent Ratio
(day 3 - applications)

Example:

The 25 metre long string of a kite is pegged to the ground. Jay is standing 8.5 metres from the peg, directly below where the kite is in the sky.

Calculate the angle of inclination of the kite string to the nearest degree.

Sketch:

$$leg^2 = hyp^2 - leg^2$$

$$opp^2 = 25^2 - 8.5^2$$

$$\sqrt{opp^2} = \sqrt{552.75}$$

$$opp = 23.5 \text{ to } 1 \text{ d.p.}$$

$$\tan P = \frac{23.5}{8.5}$$
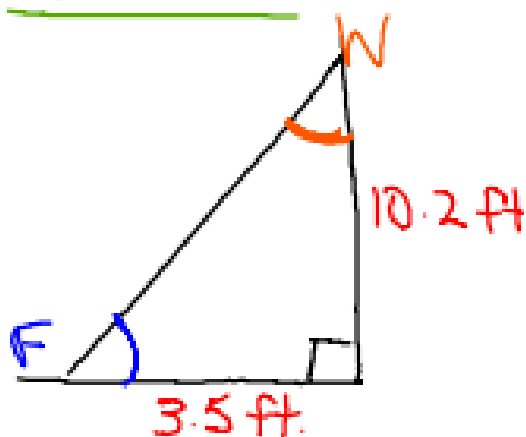
$$\angle P = \tan^{-1}\left(^{23.5}/_{8.5}\right)$$

$$\angle P = 70.11\ldots$$

$$\boxed{70°}$$

Example:

The top of a ladder that is leaning against a wall reaches a height of 10.2 feet. If the base of the ladder is 3.5 feet from the wall, what angle does the ladder make with the floor? What angle does the ladder make with the wall?

Sketch:

$$\tan F = \frac{10.2}{3.5}$$
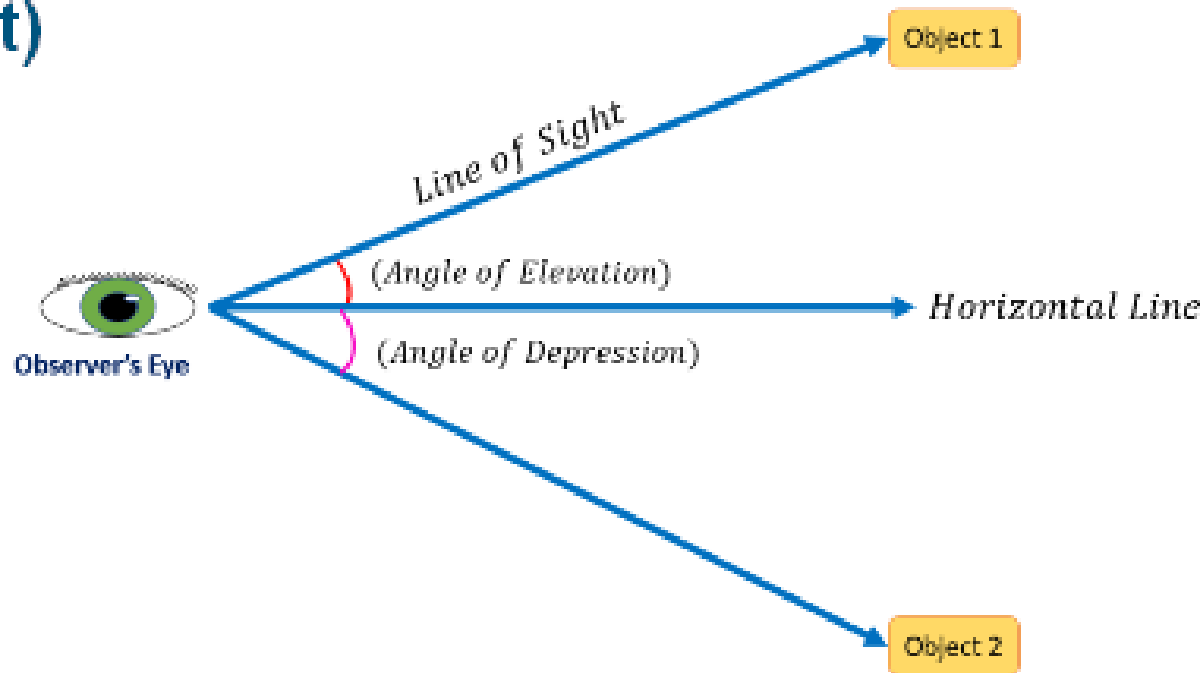
$$\angle F = \tan^{-1}(10.2/3.5)$$

$$\angle F = 71°$$

$$\tan W = \frac{3.5}{10.2}$$

$$\angle W = \tan^{-1}(3.5/10.2)$$

$$\angle W = 19°$$

Angle of Elevation and Angle of Depression:
- the angle formed by the **Line of Sight** and a horizontal line (often imaginary, not a physical object)

Object 1

Line of Sight

(Angle of Elevation)

Horizontal Line

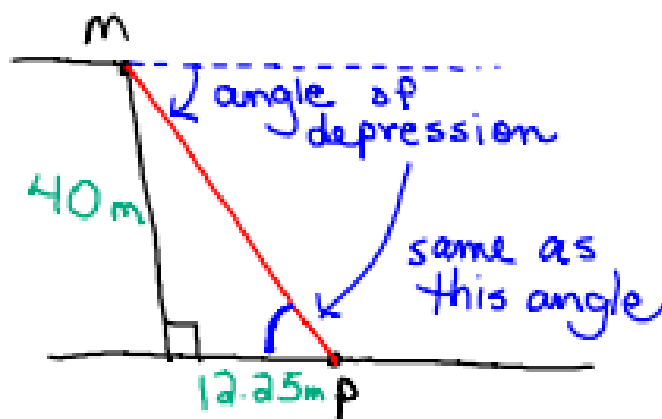(Angle of Depression)

Observer's Eye

Object 2

Example:

A man is on the top of a 40-m tall building, looking down at a point on the ground that is 12.25 metres from the base of the building.

Calculate the angle of depression from the man to the point he is looking at to the nearest degree.

Sketch:

$$\tan P = \frac{40}{12.25}$$

$$\angle P = \tan^{-1}\left(40/12.25\right)$$

$$\angle P = 73°$$

Check your understanding:

Pg. 76 - 77
#14, 15, 16, 17, 18, 19, 20

Challenge yourself - try #21 and #23