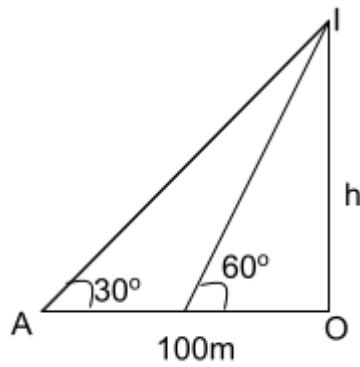


2. The trigonometric ratio 1

1.



$$\tan 30^\circ = \frac{x}{100+y}$$

$$x = (100 + y) \tan 30^\circ$$

$$(100 + y) \tan 30^\circ = y \tan 60^\circ$$

$$\tan 60^\circ = \frac{x}{y} = x = y \tan 60^\circ$$

$$(100 + y) 0.5774 = 1.1732y$$

$$57.74 = 1.155y$$

$$y = \frac{57.74}{1.155}$$

$$y = 49.99 \approx 50m$$

$$\therefore x = 50 \tan 60^\circ$$

$$x = 86.6m$$

2.

$$\sin \theta = 0.70$$

$$\theta = 44.43^\circ, 135.57^\circ$$

3.

$$(a) (i) \text{ Area of triangle } A^1B^1C^1 = \frac{1}{2} \times 4 \times 4$$

$$= 8 \text{ sq. units}$$

$$(b) (ii) \text{ Reflection in the line } y = x$$

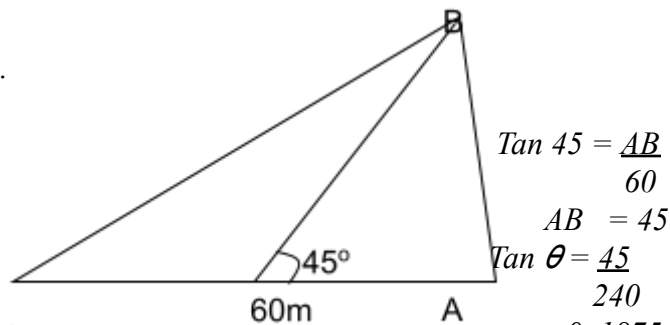
$$(c) \text{ combine transformation} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$$

$$\det \begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix} = 0 - 2 \times 2 = -4$$

$$\text{Inverse transformation} = -\frac{1}{4} \begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix} = \begin{pmatrix} 0 & -1/2 \\ -1/2 & 0 \end{pmatrix}$$

4.



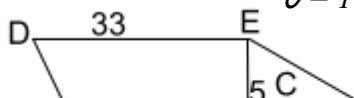
$$\tan 45^\circ = \frac{AB}{60}$$

$$AB = 45$$

$$\tan \theta = \frac{45}{240}$$

$$= 0.1875$$

$$\theta = 10.62^\circ$$



5.

$$\begin{aligned}
 \text{Area A: } & \frac{1}{2} \times 25 (33 + 21) = 675 \\
 \text{Area B: } & \frac{1}{2} \times 40 (21 \times 42) = 1260 \\
 \text{Area C: } & \frac{1}{2} \times 30 \times 42 = 630 \\
 \text{Area D: } & \frac{1}{2} \times 25 \times 40 = 500 \\
 \text{Area E: } & \frac{1}{2} \times 5 (40 + 25) = 162.5 \\
 \text{Area F: } & \frac{1}{2} \times 60 (25 + 36) = 1830 \\
 \text{Area G: } & \frac{1}{2} \times 5 \times 36 = 90 \checkmark \\
 & = 5,147.5m^2
 \end{aligned}$$

6. $\therefore$ Philip takes 10 days.

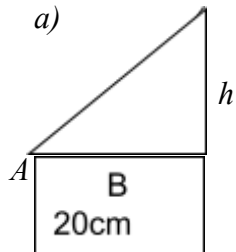
$$2\cos 2x = 0.600$$

$$\cos 2x = 0.3000$$

$$2x = 72.5^\circ, 287.5$$

$$x = 36.25^\circ, 143.75$$

7. a)



$$\tan 32^\circ = \frac{h}{20 + x}$$

$$h = (20 + x) \tan 32^\circ = 12.498 + 0.6249x$$

$$\tan 40^\circ = \frac{h}{x}$$

$$h = x \tan 40^\circ = 0.8391x$$

$$0.8391x = 12.498 + 0.6249x$$

$$0.8391x - 0.6249x = 12.498$$

$$0.2142x = 12.498$$

$$x = \frac{12.498}{0.2142} = 58.35m$$

$$0.2142$$

$$\begin{aligned}
 \therefore \text{The distance of A from the house} \\
 &= (20 + 58.35)m = 78.35
 \end{aligned}$$

$$b) h = x \tan 40^\circ = 58.35 \times 0.8391 = 48.96m$$

$$\therefore \text{The total height of the house} \\ = 1.82m + 48.96m = 50.78m$$

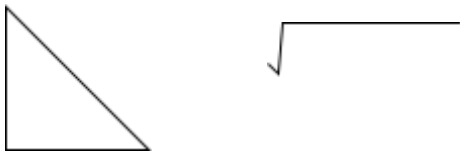
$$11. \quad \tan 32^\circ = \frac{h}{20 + x} \\ h = (20 + x) \tan 32^\circ \\ \tan 40^\circ = \frac{h}{x} \\ h = x \tan 40^\circ$$

$$\therefore x \tan 40^\circ = (20 + x) \tan 32^\circ \\ 0.8391x = (20 + x) 0.6249 \\ 0.8391x = 12.498 + 0.6249x \\ 0.8391x - 0.6249x = 12.498 \\ x = 58.35m \\ 20 + 58.35 = 78.35m$$

$$(b) \text{ The height of the house} \\ \tan 40^\circ = \frac{h}{58.35} = h = 58.35 \tan 40^\circ \\ h = 58.35 \times 0.8391 \\ h = 48.96 + 1.82 \\ h = 50.78$$

$$12. \quad \frac{24}{\sin 48} = 2R \Rightarrow R = 16.15 \text{ cm}$$

$$\text{Area} = 3.14 \times 16.15^2 \\ = \underline{819.26 \text{ cm}^2}$$



13. a)

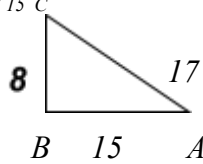
$$\begin{array}{c} \text{Hyp} = 5^2 + 12^2 \\ \text{13} \\ \square^x = 13 \\ \text{12} \end{array}$$

$$\cos x = 12/13$$

(b) $\sin 2990^\circ - x$

$$= (12/13)^2 = 144/169$$

14. $\tan \theta = 8/15$



$$AB^2 = 8^2 + 15^2$$

$$AB = \sqrt{289} = 17$$

$$\sin \theta = 8/17, \cos \theta = 15/17$$

$$\frac{\sin \theta - \cos \theta}{\cos \theta + \sin \theta} = \frac{8/17 - 15/17}{15/17 + 8/17} = -7/17 \times 17/23$$

$$= -7/23$$