

3.5.3 Solutions to 3.4 Homework

GCSE Mathematics Non-Right Angled Trigonometry

(i)

$$M = \frac{7.7 + 1.4}{2} = 4.55$$

$$A = \frac{7.7 - 1.4}{2} = 3.15$$

$$T = \frac{4.6 \times 360}{28.8} + 90 = 147.5$$

(ii)

$$H = M + A \sin (28.8t + T)$$

$$H_{CONWY} = 4.55 + 3.15 \sin (28.8t + 147.5)$$

(iii)

$$\begin{aligned} H_{CONWY} &= 4.55 + 3.15 \sin (28.8 \times 4.6 + 147.5) \\ &= 1.447664831... \\ &= 1.45 \end{aligned}$$

This is close to the 1.4 m that was expected (Low tide)

(iv)

<i>t</i>	5am	6am	7am	8am	9am	10am	11am	12am
<i>H</i>	1.61	2.54	3.95	5.52	6.84	7.60	7.60	6.85

(v) It's about half an hour out as the figures suggest the high tide is at 10.30 am
This can be checked by putting 10.5 into H_{conwy}

$$\begin{aligned} H_{CONWY} &= 4.55 + 3.15 \sin (28.8 \times 10.5 + 147.5) \\ &= 7.7 \text{ m} \end{aligned}$$

So our model gives a high tide 10 cm higher and 30 minutes later than the actual high tide.

However, for such a simple model it's yielded a reasonable prediction.