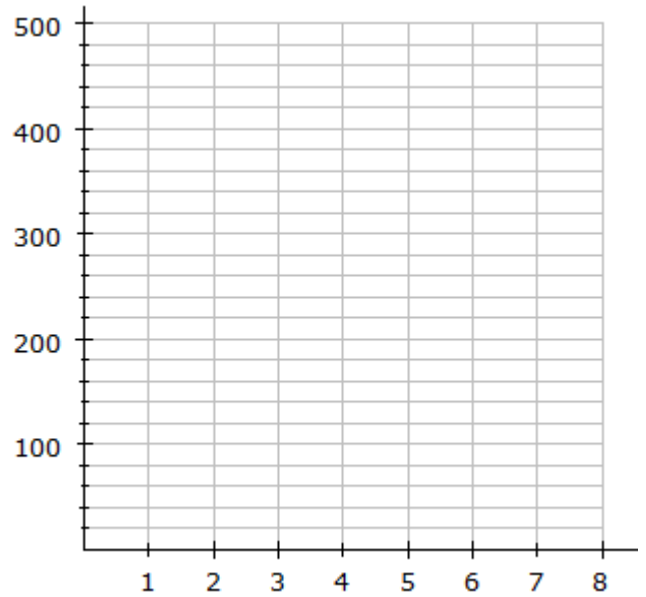


## Y11 Context Graphs Practice #1

1. Bill the plumber charges \$160 for two hours' work, and \$340 for five hours' work. This is made up of a set fee for all work plus a constant hourly rate.
  - a Write an equation for  $C$ , what he charges, in terms of  $H$ , the number of hours worked.
  - b Bill charges a full hour rate for any part hour worked. Show on the graph opposite the relationship between  $C$  and  $H$ .



2. A canal is built with an equation for the base:
 
$$d = \frac{(x - 8)(x + 8)}{28}$$
 where  $d$  is canal's depth in metres

- a. How wide is the canal at its widest?
- b. How deep is the canal 1 metre from the edge?
- c. If the water level is 1 metre below the top of the canal, show that the water is 12 m wide.

3. An engineer wants to make a parabolic support structure for a bridge.

The width base to base of the parabola is 250 metres.

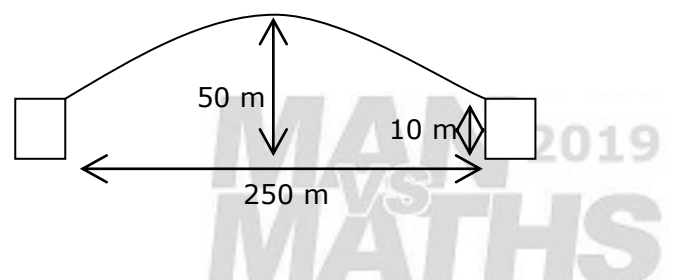
The base starts 10 metres above river level.

The maximum height above the river is 50 metres.

Write an equation for the parabola, and use that to find how high the bridge is 15 metres out from the base.



From: commons.wikimedia.org/wiki/File:Rainbow\_Bridge(2).jpg



## Answers: Y11 Context Graphs Practice #1

1.

a Hourly rate is  $\frac{340 - 160}{5 - 2} = 60$

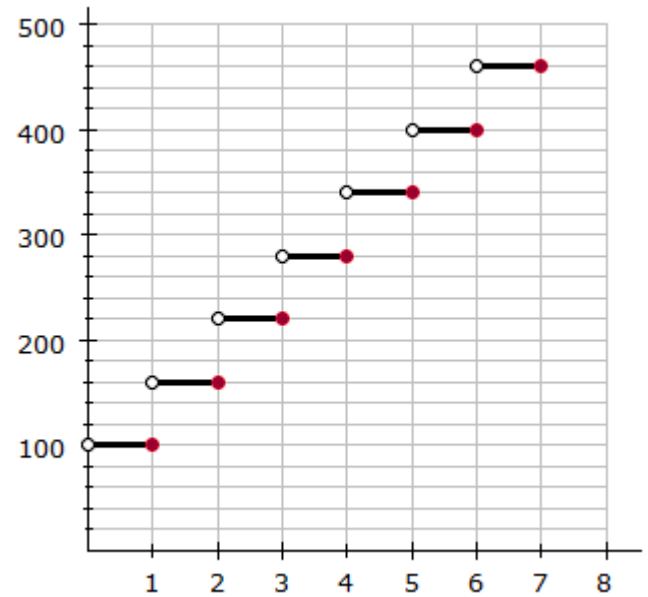
Two hours is \$120, therefore \$40 left over must be the constant (i.e. the set fee):

$$C = 60H + 40$$

b Shown as a **step function** for E.

Shown as only the red dots is M.

**Must** be no value at  $H = 0$  zero (no-one pays money for no work).



2.  $d = \frac{(x - 8)(x + 8)}{28}$

a. Intercepts are  $x = +8$  and  $x = -8$ .

From  $-8$  to  $8$  is **16 metres wide**

b. 1 from the edge is 7 from the centre, so

$$\frac{(7 - 8)(7 + 8)}{28} = \mathbf{0.536 \text{ metres deep}}$$

c. Solving  $1 = \frac{(x - 8)(x + 8)}{28}$

gives  $0 = (x - 6)(x + 6)$ , which has solutions of  $x = +6$  and  $x = -6$ , which are 12 metres apart.

3. There are several possible equations:

intercept method, with left corner is  $(0, 0)$ , gives  $h = -0.00256 x (x - 250) + 10$

intercept method, with centre is  $(0, 0)$ , gives  $h = -0.00256 (x + 125)(x - 125) + 10$

turning point method, with left corner is  $(0, 0)$ , gives  $h = -0.00256 (x - 125)^2 + 50$

turning point method, with centre is  $(0, 0)$ , gives  $h = -0.00256 x^2 + 50$

Substitute in either  $x = 15$  for left corner is origin, or  $x = 110$  for centre is origin, and the height given is

$$0.00256 \times 15 (15 - 250) + 10 = \mathbf{19.024 \text{ metres high}}$$

