Y11 Context Graphs Practice #3
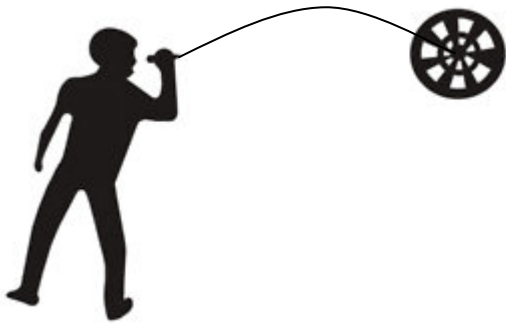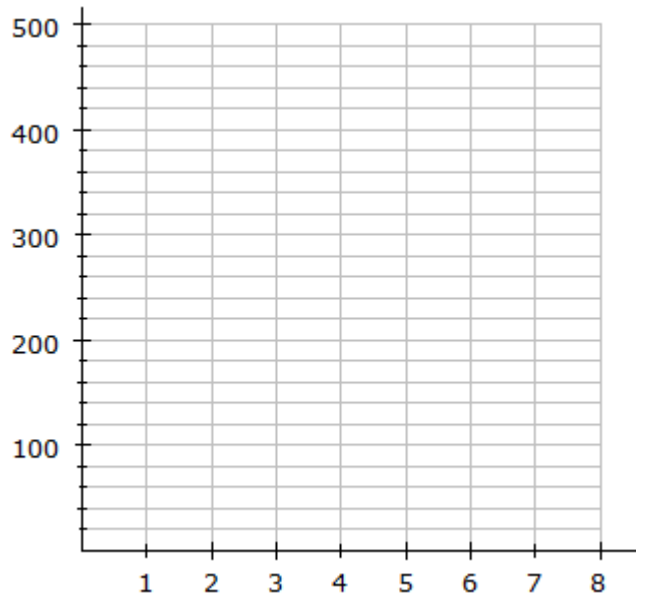
1. Stephen borrows $500 from his father. On the fourth week later he pays back $100, then pays back $100 each week after that.

a   Graph how much he owes opposite

b   Write equations for how much he owes, O, in terms of the week W, for the different parts of the graph.

c   If instead of waiting for two weeks, he didn't pay for T weeks, how would the graph change?

2. A dart is thrown at a board so that its height after it leaves the hand (at $x = 0$) to the board is:

$$h = 0.0016\, x\, (250 - x) + 170$$

where h is dart's height in cm

a   How high is the dart from the ground when thrown?

b   The board is 210 cm from the hand as it leaves, how high from the ground does it hit the board?

c   What is the maximum height the dart reaches?

3. A high school is going to build a parabolic structure for its new gym.

It will be 60 metres wide, and 18 metres high at the peak.

a   Write an equation for the parabola

b   How high will the roof will be at 2 metres from the edge?

c   How much of the structure will be at least 10 metres high?
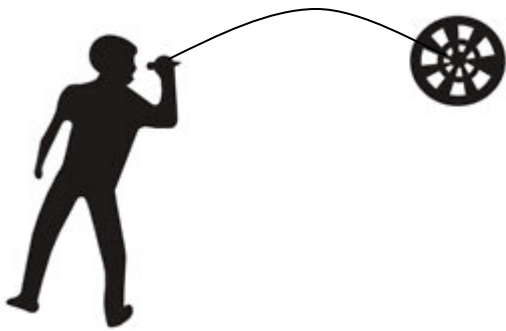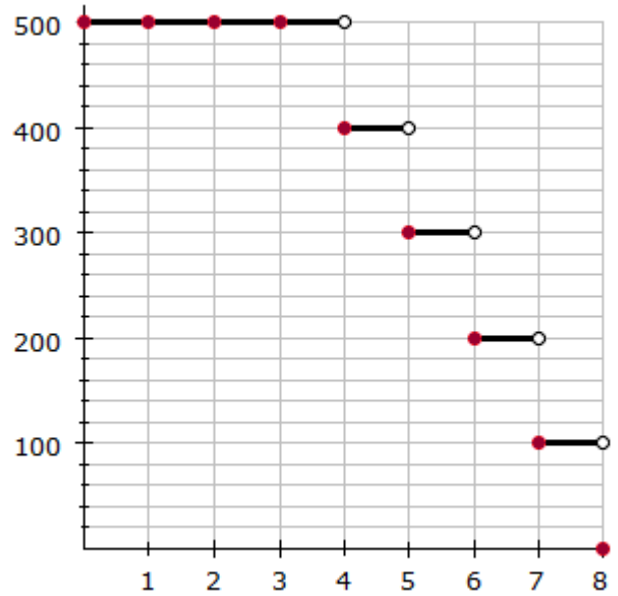
Answers: Y11 Context Graphs Practice #3

1.

a Dots with or without step function as across, but must have **no** line connecting dots.

b **O = 500**   **W ≤ 3**

   O = −100W + 800   **W > 3**

c The rate of payment is the same, but when it starts is different. So the graph will go across T − 1 weeks at O = 500, then have its dots/steps exactly the same gradient as before but **parallel** to the first one.

2.

a $h = 0.0016 \times 0 \times (250 - 0) + 170$

   = **170 cm**

b $h = 0.0016 \times 210 \times (250 - 210) + 170$

   = **183.44 cm**

c Maximum height is 125 cm (halfway between intercepts at $x = 0$ and $x - 250$).

   $h = 0.0016 \times 125 \times (250 - 125) + 170$

   = **195 cm**

3.

a intecept method, with left corner is (0, 0), gives $h = -0.02\, x\, (x - 60)$

   intecept method, with centre is (0, 0), gives $h = -0.02\, (x + 30)(x - 30)$

   turning point method, with left corner is (0, 0), gives $h = 18 - 0.02\, (x - 30)^2$

   turning point method, with centre is (0, 0), gives $h = 18 - 0.02\, x^2$

b Substitute in either $x = 2$ for left corner is origin, or $x = 28$ for centre is origin, and the height given is $0.02 \times 2\, (2 - 60) = $ **2.32 metres high**

c Solving $10 = 0.02 \times x\, (x - 60)$ gives $0 = x^2 - 60x - 500 = (x - 10)(x - 50)$

   So it is 10 metres high at $x = 10$ and $x = 50$, which is **40 metres wide**