AS 2.2 Graphs: EXCELLENCE Problems
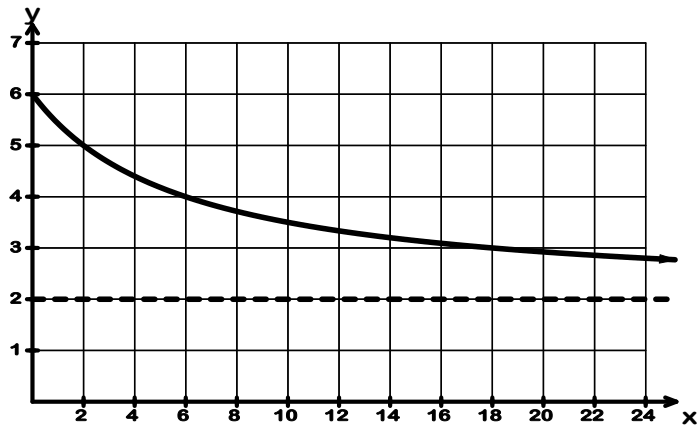
1) Find the equation for a hyperbola.
a) Write the equation for the hyperbola

Find possible equations if parts of the hyperbola were modelled using:
b) an exponential function.
c) a log function.

2) This graph is of part of a hyperbola, with equation in the form:
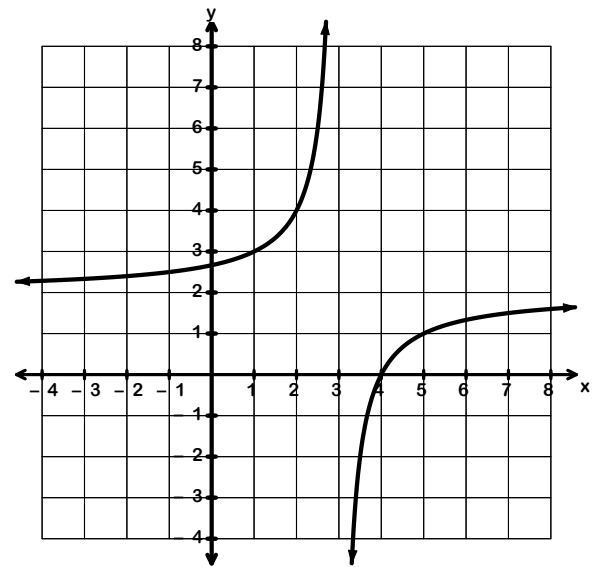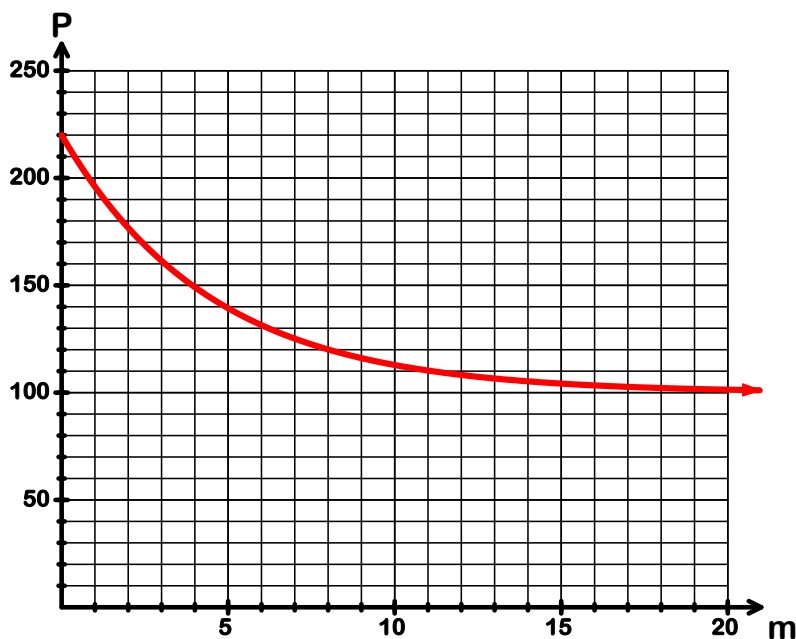$$y = \frac{a}{x+b} + c$$

Find a, b & c

3) The temperature in a heated glasshouse can be modelled using a hyperbola. The form of the equation is given below.

$$t = \frac{A}{h+B} + C$$

t = temp in centigrade
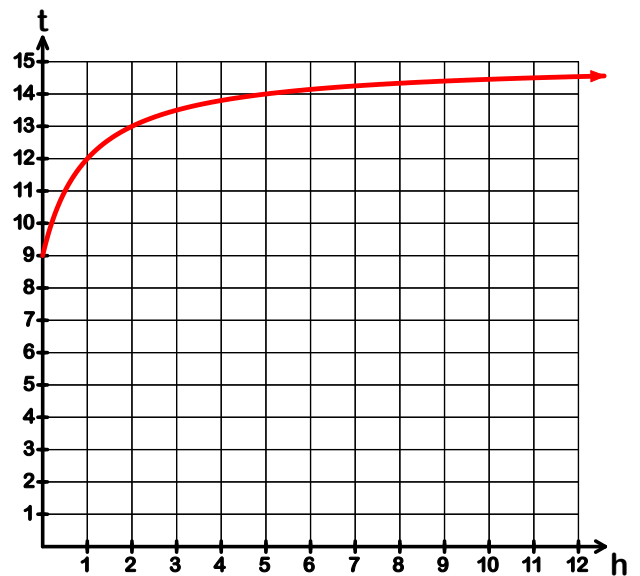h = hours after the heating is turned on

a) Find an equation to model the temperature
b) Use your equation to find the temperature after 8 hr

4) A population of hamsters decreases according to an exponential model.
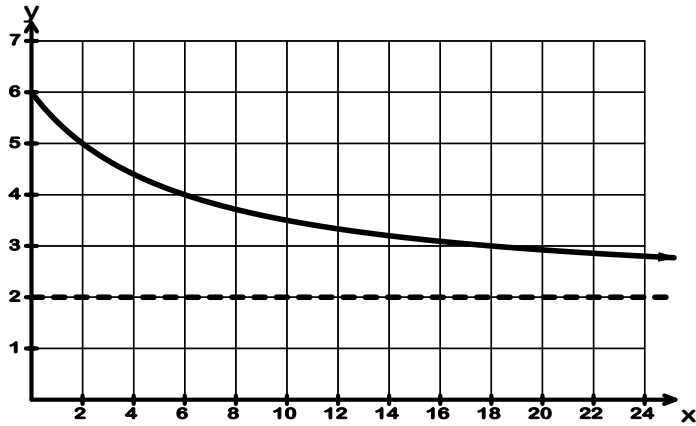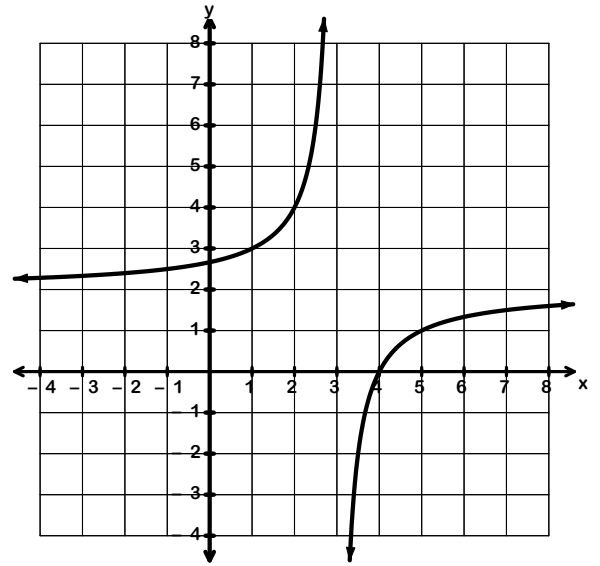P = population   &   m = months

$$P = A \times B^m + C$$

a) Find an equation to model the population
b) Use your equation to find the population after 7 months

AS 2.2 Graphs: EXCELLENCE ANSWERS

1) Find the equation for a hyperbola.
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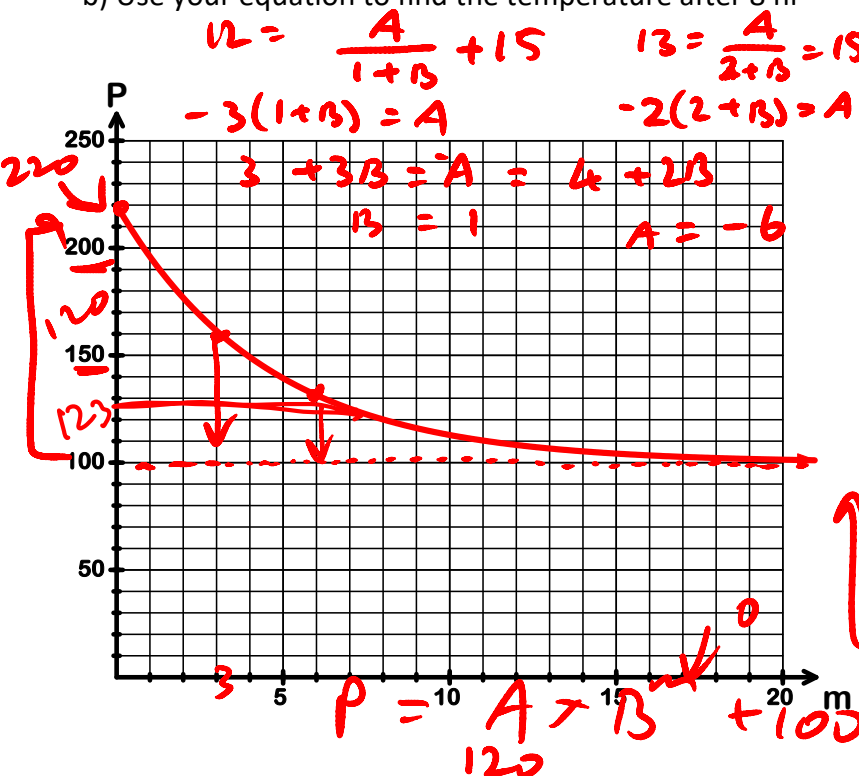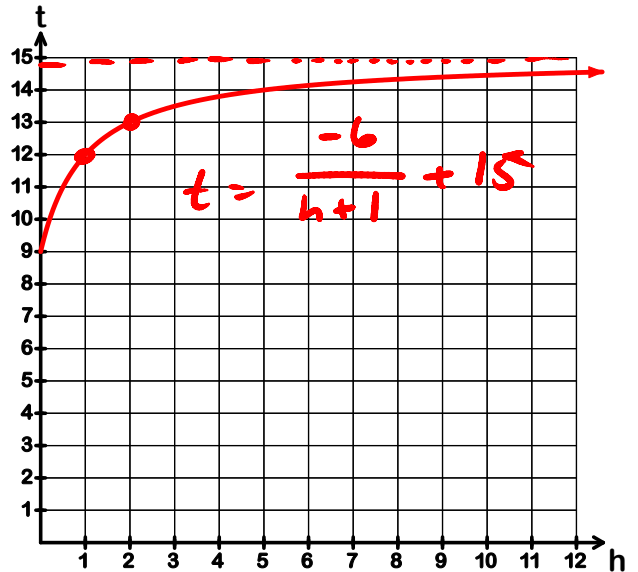
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h = hours after the heating is turned on

a) Find an equation to model the temperature
b) Use your equation to find the temperature after 8 hr

(handwritten, red):
$$t = \frac{-6}{h+1} + 15$$

$$12 = \frac{A}{1+B} + 15 \qquad 13 = \frac{A}{2+B} = 15$$

$$-3(1+B) = A \qquad -2(2+B) = A$$

$$3 + 3B = A = 4 + 2B$$

$$B = 1 \qquad A = -6$$

4) A population of hamsters decreases according to an exponential model.
P = population   &   m = months

$$P = A \times B^m + C$$

c) Find an equation to model the population
d) Use your equation to find the population after 7 months

(handwritten, red):
$$P = A \times B^m + 100$$

$$P = 120 \times B^m + 100$$

$$m = 3$$
$$P = 160$$

$$160 = 120 \times B^3 + 100$$
$$60 = 120 \times B^3$$
$$\frac{60}{120} = B^3$$
$$\frac{1}{2} = B^3$$
$$\sqrt[3]{\frac{1}{2}} = B$$

$\binom{cats}{y}$ ✓

$$P = 120 \times \left(\sqrt[3]{\frac{1}{2}} \right)^m + 100 \quad ✓$$

$$120 \times \sqrt[3]{\frac{1}{2}}^{\,7} + 100$$

$$\left(\frac{1}{2} \right)^{\frac{7}{3}} \qquad \underline{123}$$