LOGS & EXPONENTIALS **SET 1**

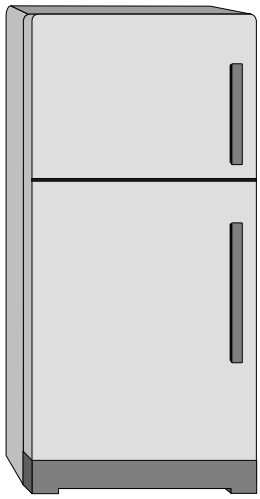
1 Simplify: (a) $\log_b 10 + \log_b 4$ (b) $\log_4 320 - \log_4 5$ (c) $2\log_3 6 - \log_3 4$

2 (a) Write down an expression for the ***exact*** value of z, if $\log_e z = 6$.

(b) Find p, if $p = \dfrac{\log_5 8}{\log_5 2}$.

(c) Solve $4^{x+1} = 3^{2-x}$.

3 A developing country had a campaign to encourage people to purchase a refrigerator. The percentage, y, of households possessing refrigerators t years after the start of the campaign, is modelled by $y = 100 - 95e^{-0.15t}$.



(a) (i) Find the percentage of households that had refrigerators after 5 years.

(ii) Find the percentage of households that already had refrigerators at the start of the campaign.

(a) How many years will need to elapse before 90% of households have a refrigerator?

4 The air resistance acting on a particle was measured while it moved through the atmosphere at various speeds. The results are given in the table below.

Speed	**Air Resistance**
v **(ms^{-1})**	R **(Newtons)**
10	4.5
25	28.1
40	72
70	220.5
80	288

(a) It is believed that a relationship of the form $R = kv^n$ exists between R and v, k and n being constants.
By drawing a suitable straight line graph, verify that the relationship $R = kv^n$ holds.

(b) Determine the values of k and n.

(c) Find the speed when the air resistance is 200.0 Newtons.